



A123 SYSTEMS JSP17-21

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Public Hearing at the request of Etkin, LLC for approval of Preliminary Site Plan, Woodland Permit, and Stormwater Management Plan. The subject parcel is located in Section 15, West of Cabaret Drive and South of Twelve Mile Road and is zoned OST, Office Service Technology. The applicant is proposing to develop the 31.25 acre parcel to two buildings: one office/lab space of 128,936 square feet and the other as assembly building of 53,469 square feet including associated site improvements.

Required Action

Approve/Deny the Preliminary Site Plan, Woodland Permit, and Stormwater Management Plan.

REVIEW	RESULT	DATE	COMMENTS
Planning	Approval recommended	05-19-17	<ul style="list-style-type: none"> • Waiver for not providing covered bicycle parking spaces – supported by staff • Items to be addressed by the applicant prior to Final Site Plan approval
Engineering	Approval recommended	05-15-17	<ul style="list-style-type: none"> • Applicant is requesting a variance from providing sidewalk along Twelve Mile Road – not supported by staff • Items to be addressed by the applicant prior to Final Site Plan approval
Landscaping	Approval recommended	05-05-17	<ul style="list-style-type: none"> • Items to be addressed by the applicant prior to Final Site Plan approval
Wetlands	Approval recommended	05-18-17	<ul style="list-style-type: none"> • Items to be addressed by the applicant prior to Final Site Plan approval
Woodlands	Approval recommended	05-18-17	<ul style="list-style-type: none"> • Woodland permit required • Items to be addressed by the applicant prior to Final Site Plan approval
Traffic	Approval recommended	05-18-17	<ul style="list-style-type: none"> • Items to be addressed by the applicant prior to Final Site Plan approval
Traffic Study	Approval not recommended	05-18-17	<ul style="list-style-type: none"> • Applicant has provided response letter and additional information regarding the traffic study
Façade	Approval recommended	05-17-17	<ul style="list-style-type: none"> • Items to be addressed by the applicant prior to Final Site Plan approval
Fire	Approval recommended with conditions	05-11-17	<ul style="list-style-type: none"> • Hydrants to be provided every 300 feet, applicant has indicated in the response letter this will be met • Items to be addressed by the applicant prior to Final Site Plan approval

MOTION SHEET

Approval – Preliminary Site Plan

In the matter of A123 Systems JSP17-21, motion to **approve** the Preliminary Site Plan based on and subject to the following:

- a. Planning waiver from Section 5.16 for not providing covered bicycle parking spaces for 25% of the required bicycle parking spaces, which is hereby granted;
- b. Applicant to provide a sidewalk on Twelve Mile Road;
- c. The findings of compliance with Ordinance standards in the staff and consultant review letters and the conditions and the items listed in those letters being addressed on the Final Site Plan; and
- d. *(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 -

Approval – Woodland Permit

In the matter of A123 Systems JSP17-21, motion to **approve** the Woodland Permit 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 37 of the Code of Ordinances and all other applicable provisions of the Ordinance.)

- AND -

Approval – Stormwater Management Plan

In the matter of A123 Systems JSP17-21, motion to **approve** the Stormwater Management Plan based on and subject to the following:

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

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

- OR -

Denial – Preliminary Site Plan

In the matter of A123 Systems JSP17-21, motion to **deny** the Preliminary Site Plan... (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 – Woodland Permit

In the matter of A123 Systems JSP17-21, motion to **deny** the Woodland Permit...(because the plan is not in compliance with Chapter 37 of the Code of Ordinances and all other applicable provisions of the Ordinance.)

- AND -

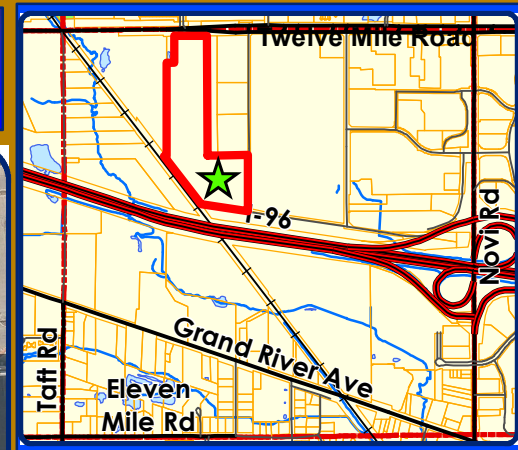
Denial – Stormwater Management Plan

In the matter of A123 Systems JSP17-21, motion to **deny** the Stormwater Management Plan... (because the plan is not in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.)

Maps
Location
Zoning
Future Land Use
Natural Features

JSP17-21: A123 Systems

Location Map




LEGEND

- Sections



City of Novi
Community Development Department
Civic Center
45175 W Ten Mile Road
Novi, MI 48375
www.cityofnovi.org

Map Author: Kirsten Mellem
Date: 05/30/2017
Project: JSP17-21 A123 Systems
Version #: 1



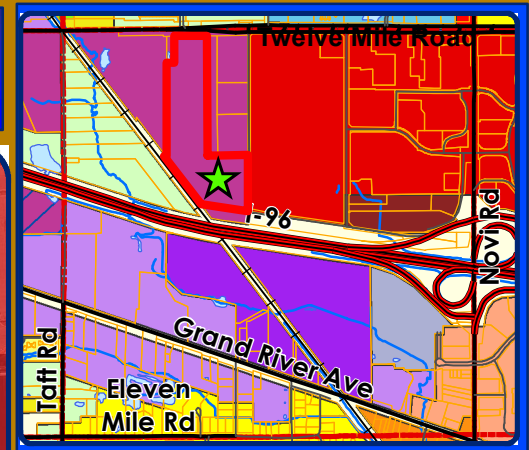
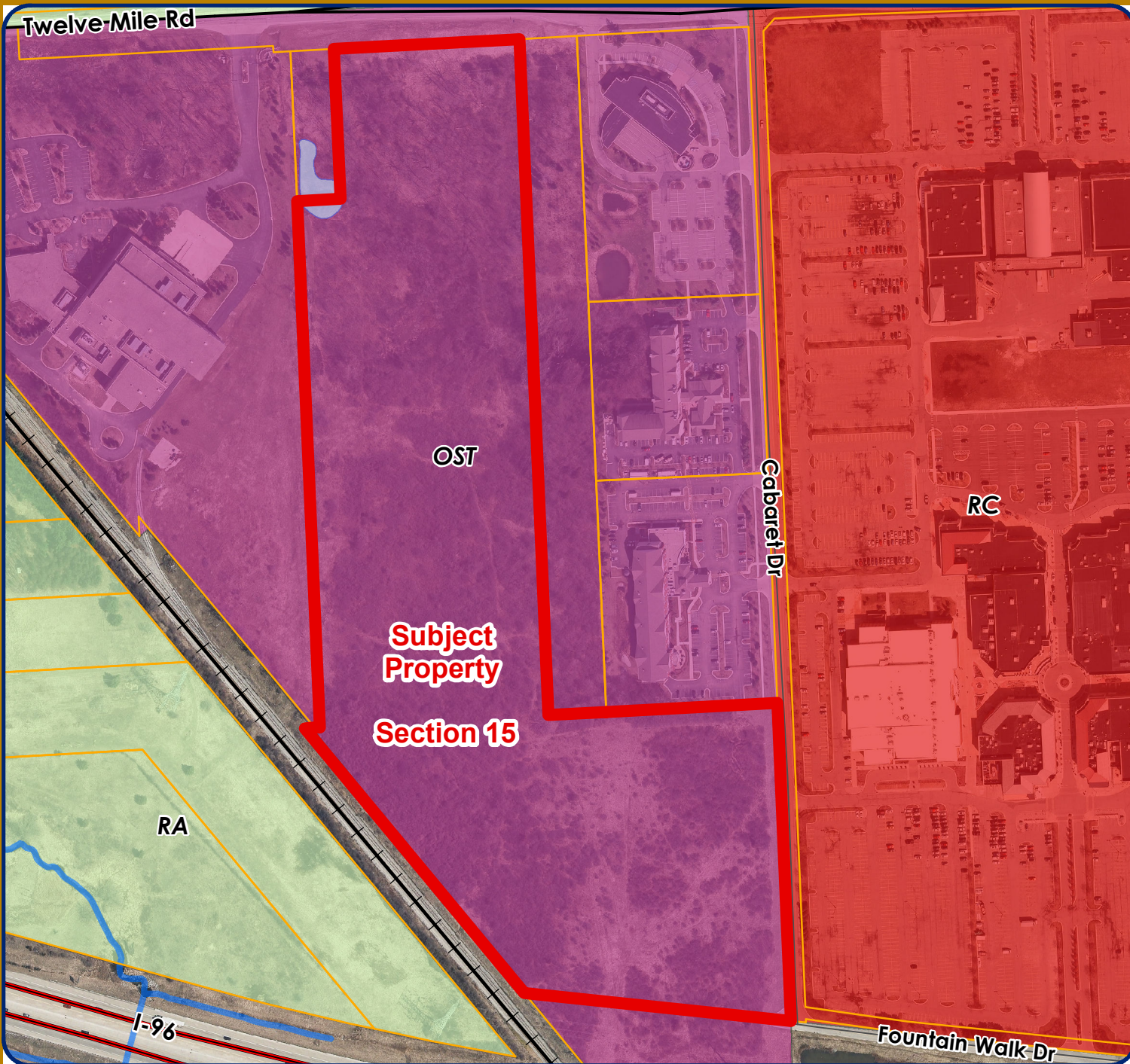
0 80 160 320 480 Feet
1 inch = 333 feet

MAP INTERPRETATION NOTICE

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

JSP17-21: A123 Systems

Zoning Map



LEGEND

	Sections
	R-A: Residential Acreage
	R-1: One-Family Residential District
	R-2: One-Family Residential
	R-4: One-Family Residential District
	B-3: General Business District
	C: Conference District
	EXO: OST District with EXO Overlay
	EXPO: EXPO District
	I-1: Light Industrial District
	I-2: General Industrial District
	OS-1: Office Service District
	OST: Office Service Technology
	RC: Regional Center District
	TC: Town Center District
	TC-1: Town Center -1 District

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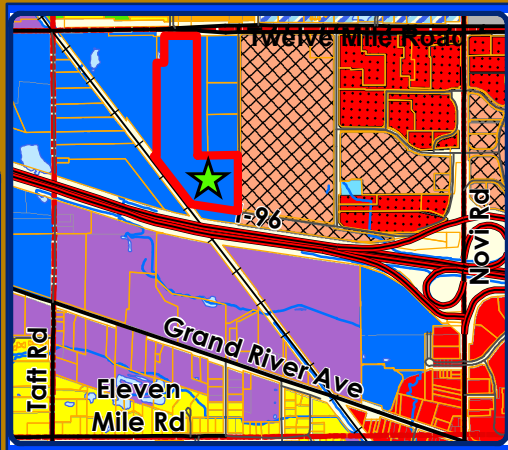
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JSP17-21: A123 Systems

Future Land Use Map



LEGEND

- Sections
- FUTURE LAND USE
 - Single Family
 - Multiple Family
 - Community Office
 - Office RD Tech
 - Industrial RD Tech
 - Regional Commercial
 - TC Commercial
 - PD2
 - Educational Facility
 - Public
 - Public Park
 - Private Park
 - Cemetery

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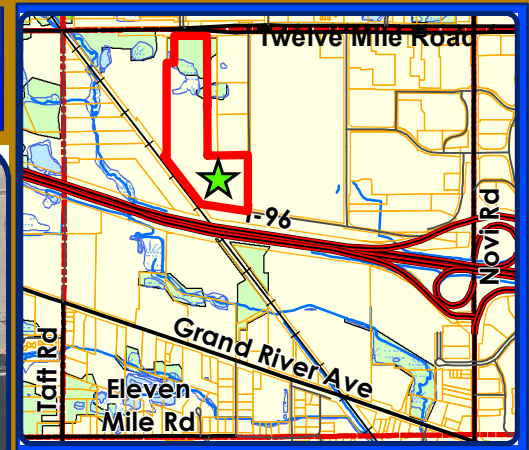
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JSP17-21: A123 Systems

Natural Features Map



Subject Property
Section 15



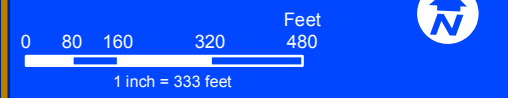
- LEGEND**
-  Sections
 -  WETLANDS
 -  WOODLANDS

CITY OF NOVI

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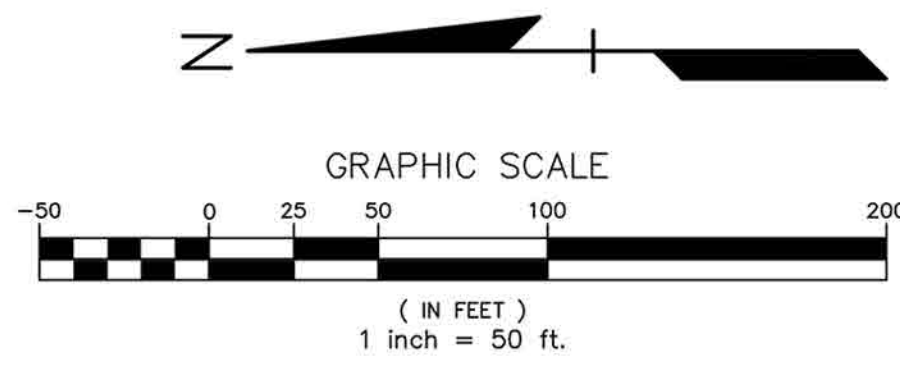


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SITE PLAN

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



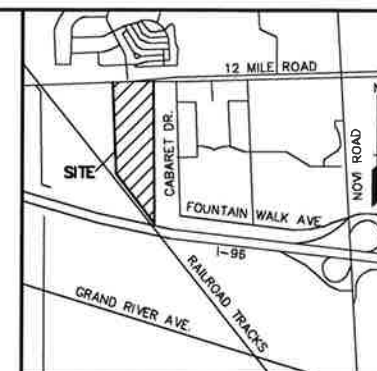
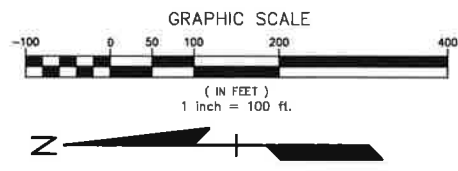
Fountain Office Park

Novi, Michigan

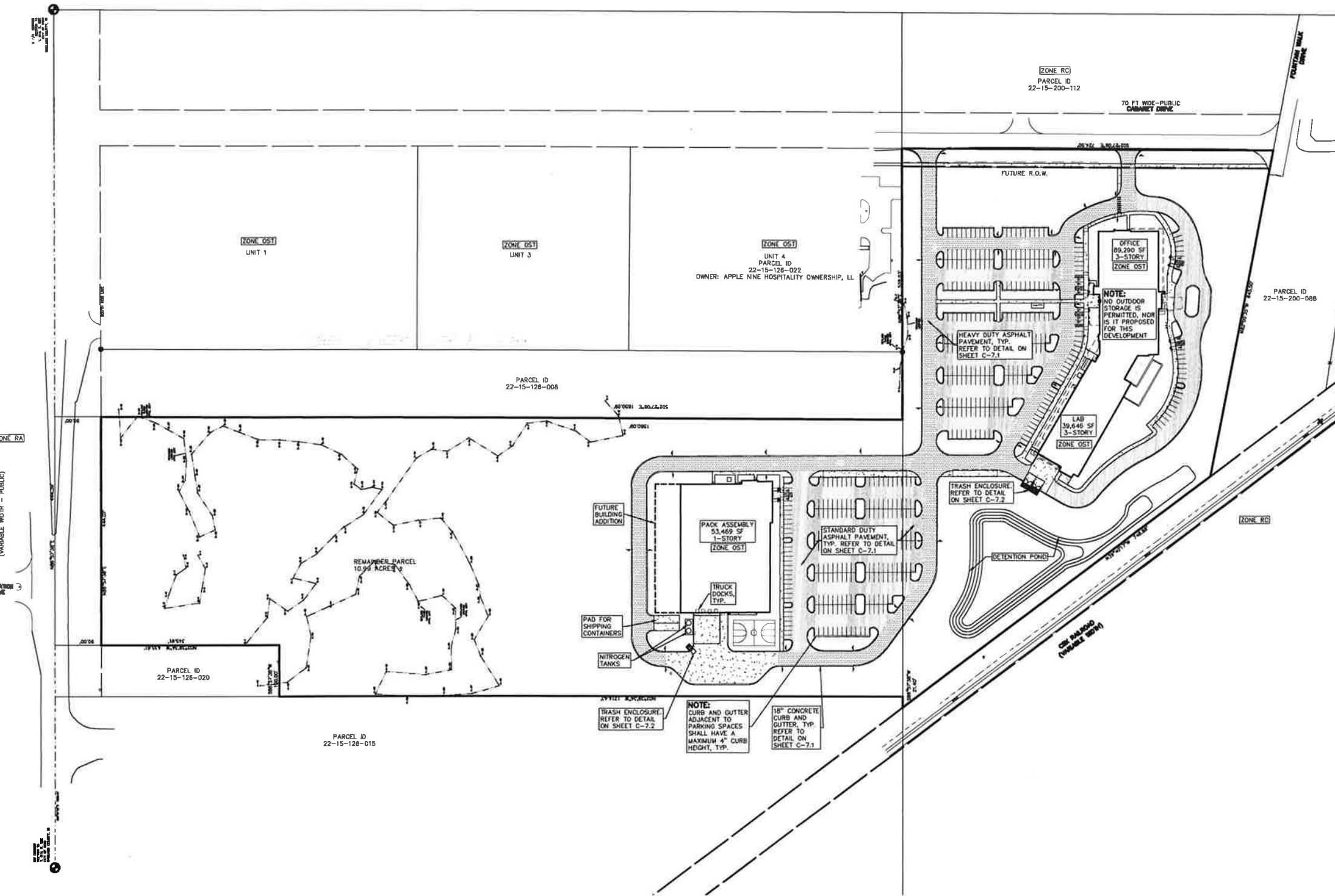
June , 2017

PEA, Inc.
7927 Nemco Way, Ste 115
Brighton, MI 48116
t: 517.546-8583
f: 517.546.8973
www.peainc.com





NO.	DATE	DESCRIPTION



LEGEND

● IRON FOUND	⊙ BRASS PLUG SET	⊙ SEC. CORNER FOUND
⊙ IRON SET	⊙ MONUMENT FOUND	⊙ RECORDED
⊙ MAIL FOUND	⊙ MONUMENT SET	⊙ MEASURED
⊙ MAIL & CAP SET	⊙ MONUMENT	⊙ CALCULATED

PROPOSED

—○— ELEC. POLE OF CABLE TV OR LINE, POLE & DUTY MFR.	—○— ELEC. POLE OF CABLE TV, CATV PRESTAB.	—○— ELEC. POLE OF CABLE TV, CATV PRESTAB.
—○— UG-CATV	—○— TELEPHONE U.S. CABLE, POSTAL & MANHOLE	—○— TELEPHONE U.S. CABLE, POSTAL & MANHOLE
—○— UG-PHONE	—○— ELECTRIC U.S. CABLE, MANHOLE, METER & MANHOLE	—○— ELECTRIC U.S. CABLE, MANHOLE, METER & MANHOLE
—○— UG-ELEC.	—○— GAS MAIN, VALVE & GAS LINE MARKER	—○— GAS MAIN, VALVE & GAS LINE MARKER
—○— IN-TRUNK, WTC, ONE WALK TYPING SERVICE & VALVE	—○— SANITARY SEWER, CLEANOUT & MANHOLE	—○— SANITARY SEWER, CLEANOUT & MANHOLE
—○— STORM SEWER, CLEANOUT & MANHOLE	—○— COMBINED SEWER & MANHOLE	—○— COMBINED SEWER & MANHOLE
—○— POT HOLE FOR WALK	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE
—○— POT HOLE FOR WALK	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE
—○— POT HOLE FOR WALK	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE	—○— WATER MAIN, VALVE, TAPING SERVICE & VALVE

SPOT ELEVATION

CONCRETE

ASPH.

GRAVEL

GRAVEL SHOULDER

RETAIN

CAUTION!
THE LOCATION AND ELEVATIONS OF EXISTING UTILITIES AND STRUCTURES SHOWN ON THIS DRAWING ARE THE PROPERTY OF THE CITY OF NOVI, MICHIGAN. ANY CHANGES TO THESE UTILITIES OR STRUCTURES MUST BE APPROVED BY THE CITY OF NOVI, MICHIGAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND ELEVATIONS OF EXISTING UTILITIES AND STRUCTURES PRIOR TO THE START OF CONSTRUCTION.

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ETKIN, LLC
29100 NORTHWESTERN HIGHWAY, SUITE 200
SOUTHFIELD, MICHIGAN 48034

PRELIMINARY OVERALL SITE PLAN
FOUNTAIN OFFICE PARK
PART OF THE MAP 116 OF SECTION 16, TOWNSHIP 42N, RANGE 16E, 2ND MERIDIAN, OAKLAND COUNTY, MICHIGAN
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

ORIGINAL ISSUE DATE:
APRIL 28, 2017

PEA JOB NO. 2016-312

SCALE: 1" = 100'

DRAWING NUMBER
C-2.0

BENCHMARKS
(ENTER DATUM HERE)

BM #301
EASTERLY NORTH BOLT OF POWER POLE 11337,
SOUTHEASTERN PORTION OF SITE
ELEV. = 928.28

BM #302
ARROW ON HYDRANT AT THE SOUTH SIDE OF
THE SOUTHWESTERN ENTRANCE TO EMAGNE
THEATER
ELEV. = 940.10

BM #303
ARROW ON HYDRANT AT THE SOUTH END OF THE
EASTERN ISLAND AT THE GARDEN INN
ELEV. = 932.84

BM #304
ARROW ON HYDRANT, NORTH OF 12 MILE ROAD,
±150' EAST OF DECLARATION DRIVE
ELEV. = 946.55

BM #305
ARROW ON HYDRANT, NORTH OF 12 MILE ROAD,
±150' WEST OF DECLARATION DRIVE,
ELEV. = 942.23

LEGAL DESCRIPTION
Per Fidelity National Title Insurance Company Commitment File No. 16-110544 6042871,
effective date September 27, 2016

Situated in the City of Novi, County of Oakland, State of Michigan

Parcel 1: That part of the Northwest quarter of Section 15, Town 1 North, Range 8 East, Novi Township, Oakland County, Michigan, described as: The West 398 feet of the North 825 feet of the East half of the Northwest quarter of said Section 15, EXCEPTING THEREFROM the West 100 feet of the North 435.60 feet thereof.

Parcel 2: Part of the Northwest 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point on the North line of Section 15, also being the centerline of 12 Mile Road, distant South 87 degrees 32' 25" West 793.00 feet from the North 1/4 corner of Section 15, Town 1 North, Range 8 East; and proceeding, Thence South 01 degree 52' 16" East 1,650.00 feet; Thence South 87 degrees 32' 25" West 544.56 feet; Thence North 01 degree 52' 16" West 825.00 feet; Thence North 87 degrees 32' 25" East 303.00 feet; Thence North 01 degree 52' 16" West 825.00 feet; Thence along the North line of Section 15, also being the centerline of 12 Mile Road, North 87 degrees 32' 25" East 41.56 feet to the point of beginning.

Parcel 3: Part of the Northwest 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point on the North line of Section 15, also being the centerline of 12 Mile Road, distant South 87 degrees 32' 25" West 833.58 feet from the North 1/4 corner of Section 15, Town 1 North, Range 8 East; and proceeding, Thence South 01 degree 52' 16" East 825.00 feet; Thence South 87 degrees 32' 25" West 107.00 feet; Thence North 01 degree 52' 16" West 825.00 feet; Thence along the North line of Section 15, also being the centerline of 12 Mile Road, North 87 degrees 32' 25" East 107.00 feet to the point of beginning.

Parcel 4: Part of the Northwest 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point on the North and South 1/4 line of Section 15, distant South 01 degree 52' 16" East 1,650.00 feet from the North 1/4 corner of Section 15, Town 1 North, Range 8 East; and proceeding, Thence South 01 degree 52' 16" East 90.00 feet; Thence South 87 degrees 32' 25" West 444.56 feet; Thence North 01 degree 52' 16" West 80.00 feet to the North line of Section 15 and the centerline of Twelve Mile Road; Thence North 01 degree 52' 16" East, on said common line, 444.56 feet to the point of beginning.

Parcel 5: Part of the Northwest 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as beginning at a point on the North and South 1/4 line of Section 15, distant South 01 degree 52' 16" East 1,650.00 feet from the North 1/4 corner of Section 15, Town 1 North, Range 8 East; and proceeding, Thence South 01 degree 52' 16" East 775.25 feet; Thence North 01 degree 52' 16" West 775.25 feet; Thence along the Northeastly line of the railroad right-of-way North 39 degrees 02' 16" West 749.63 feet; Thence North 87 degrees 32' 25" East 1,343.31 feet to the point of beginning.

EXCEPTING FROM said Parcel 4, the following described land: That part of the Northwest 1/4 of Section 15, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 15; Thence South 01 degree 52' 22" East, 1650.00 feet along the North-South 1/4 line of said Section 15 to the point of beginning; Thence South 01 degree 52' 22" East, 775.85 feet along said North-South line to a point on the North line of Detroit Edison Wilson-Sunset Corridor; Thence North 81 degrees 25' 51" West, 268.45 feet along said line; Thence North 01 degree 52' 22" West, 724.51 feet; Thence North 87 degrees 32' 34" East, 284.01 feet to the point of beginning.

SIGN LEGEND:

NO PARKING FIRE LANE SIGN (LR7-22) 33 EA.

24"x24" STOP SIGN (R1-1) 2 EA.

BARRIER FREE PARKING SIGN (R7-8) 7 EA.

VAN ACCESSIBLE SIGN (R7-8P) 6 EA.

CROSSWALK SIGN (W11-2 & W18-7P) 2 EA.

REFER TO SHEET C-7.1 FOR SIGN DETAILS.
SIGN TOTALS ARE TOTAL QUANTITIES NEEDED FOR ENTIRE SITE. ALL SIGNS WILL COMPLY WITH THE LATEST EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD)

GENERAL NOTES:

1. THESE NOTES APPLY TO ALL CONSTRUCTION ACTIVITIES ON THIS PROJECT.

2. ALL DIMENSIONS SHOWN ARE TO BACK OF CURB, FACE OF SIDEWALK, OUTSIDE FACE OF BUILDING, PROPERTY LINE, CENTER OF MANHOLE/CATCH BASIN OR CENTERLINE OF PIPE UNLESS OTHERWISE NOTED.

3. REFER TO SHEET C-7.1 AND C-7.2 FOR ON-SITE PAVING DETAILS.

4. REFER TO LATEST M.D.O.T. DETAIL R-28 FOR SIDEWALK RAMP DETAILS.

5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF NOVI CURRENT STANDARDS AND REGULATIONS.

6. THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEER AND/OR THE AUTHORITY HAVING JURISDICTION 3 BUSINESS DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

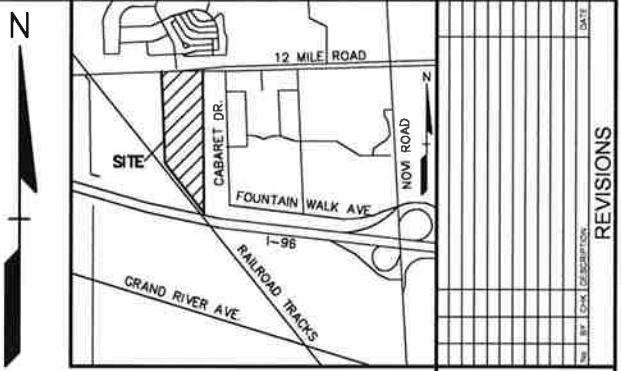
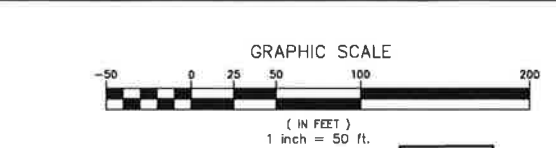
7. ANY WORK WITHIN THE STREET OR HIGHWAY RIGHT-OF-WAYS SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AGENCIES HAVING JURISDICTION AND SHALL NOT BEGUN UNTIL ALL NECESSARY PERMITS HAVE BEEN ISSUED FOR THE WORK.

8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ADJUST THE TOP OF ALL EXISTING AND PROPOSED STRUCTURES (MANHOLES, CATCH BASINS, INLETS, GATE WELLS ETC.) WITHIN GRADED AND/OR PAVED AREAS TO FINAL GRADE SHOWN ON THE PLANS. ALL SUCH ADJUSTMENTS SHALL BE INCIDENTAL TO THE JOB AND WILL NOT BE PAID FOR SEPARATELY.

9. ALL PARKING SPACE PAVEMENT MARKINGS SHALL BE 4" WHITE WITH THE EXCEPTION OF THE BARRIER FREE PARKING SPACES.

10. PROVIDE 4" BLUE STRIPING FOR BARRIER FREE PARKING SPACES AND WHITE FOR BARRIER FREE PARKING SYMBOL. NOTE THAT WHERE A BARRIER FREE PARKING SPACE ADJUTS A NON-BARRIER FREE SPACE, THE TWO SPACES SHALL BE SEPARATED BY ADJUTING BLUE AND WHITE STRIPES.

11. SIGNS NOTED TO BE MOUNTED ON BUILDING FACADE SHALL HAVE A MINIMUM MOUNTING HEIGHT OF 6 FEET AND A MAXIMUM MOUNTING HEIGHT OF 7 FEET.



SIDEWALK RAMP LEGEND:

SIDEWALK RAMP TYPE R ①

SIDEWALK RAMP TYPE P ②

SIDEWALK RAMP TYPE D ③

REFER TO LATEST M.D.O.T. R-28 STANDARD RAMP AND DETECTABLE WARNING DETAILS

FLOODPLAIN NOTE:
BY GRAPHICAL PLOTTING, SITE IS WITHIN ZONE 'X', AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN PER FLOOD INSURANCE RATE MAP NUMBER 28125C-0628 DATED SEPTEMBER 29, 2008.

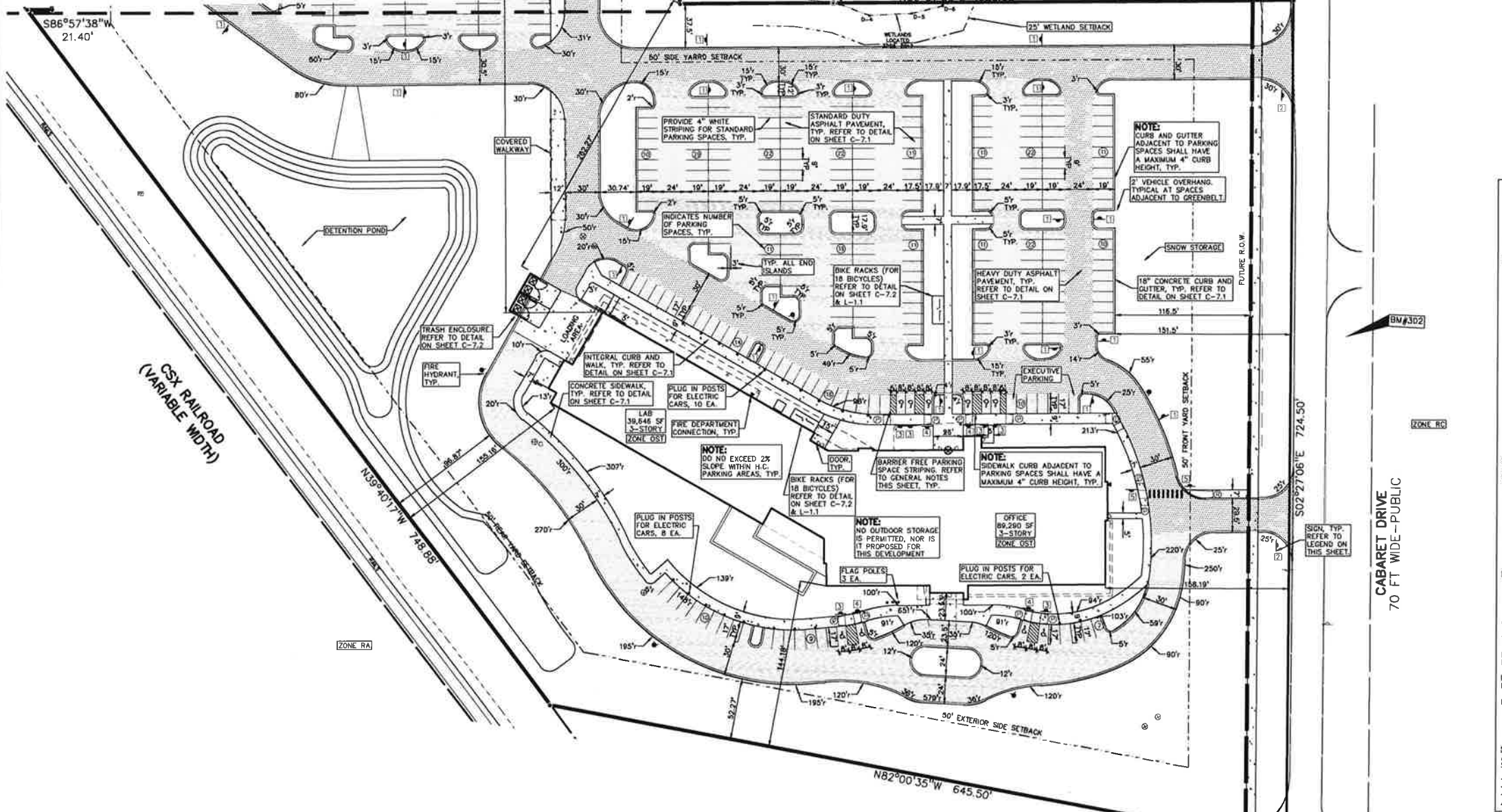
LEGEND

EXISTING	PROPOSED
IRON PILING	BRASS PILING SET
IRON NET	MONUMENT FOUND
WALL FOUND	MONUMENT SET
MAIL & CAP SET	RECORDED
	MEASURED
	CALCULATED

REC. CORNER FOUND

LEGAL DESCRIPTION NOTE:
THE LEGAL DESCRIPTION SHOWN IS PER THE LATEST TITLE COMMITMENT FOR THE PROPERTY AND DOES NOT MATCH INFORMATION CURRENTLY ON RECORD AT THE CITY. THIS WILL BE RESOLVED DURING THE FINAL SITE PLAN PROCESS.

MATCHLINE - SEE SHEET C-3.2



SITE DATA TABLE:

TOTAL SITE AREA: 30.8± ACRES
DEVELOPED SITE AREA: 19.6± ACRES
ZONING: O-S-T, OFFICE SERVICE TECHNOLOGY
PROPOSED USE: OFFICE SPACE, RESEARCH, AND STORAGE

BUILDING INFORMATION:
MAXIMUM ALLOWABLE BUILDING HEIGHT: 46 FEET OR 3 STORIES, WHICHEVER IS LESS (NOTE: BUILDING HEIGHT CAN BE UP TO 115' PROVIDED THAT 2' OF ADDITIONAL SETBACK IS PROVIDED FOR EVERY 1' OF BUILDING HEIGHT OVER 46')
PROPOSED BUILDING HEIGHT:
OFFICE: 46'-8" (3 STORIES)
LAB: 30'-8" (3 STORIES)
ASSEMBLY: 31'-4" (2 STORY W/AZZANINE)

BUILDING FOOTPRINT AREA:
OFFICE: 30,809 S.F.
LAB: 19,124 S.F.
ASSEMBLY: 44,438 S.F.

TOTAL BUILDING AREA:
OFFICE: 86,290 S.F.
LAB: 38,645 S.F.
ASSEMBLY: 53,469 S.F.

MAX. BUILDING COVERAGE:
OFFICE: 39,929/853,035 = 4.68%
LAB: 19,124/853,035 = 2.24%
ASSEMBLY: 44,438/853,035 = 5.21%

SETBACK REQUIREMENTS:
FRONT SETBACK (CABARET DR.): 50 FEET REQUIRED 158.10' PROVIDED
EXTERIOR SIDE SETBACK (SOUTH): 50 FEET REQUIRED 144.18' PROVIDED
REAR SETBACK (WEST): 50 FEET REQUIRED 155.16' PROVIDED
SIDE SETBACK (NORTH): 50 FEET REQUIRED 282.27' PROVIDED
PARKING SETBACK: 20 FEET REQUIRED 20.00' PROVIDED
NO PARKING PERMITTED WITHIN THE REQUIRED FRONT SETBACK

PARKING CALCULATIONS:
OFFICE = 1 SPACE PER 222 S.F.
LAB = 1 SPACE PER 703 S.F.
ASSEMBLY = 1 SPACE PER 1,700 S.F.
= [(89,290 SF/222) + (38,645 SF/700) + (53,411/1700)]*0.8
= 429 REQUIRED PARKING SPACES (w/ 9 HC SPACES)
TOTAL PROPOSED PARKING SPACES = 488 SPACES INC. 12 H/C SPACES
BICYCLE PARKING REQUIRED: 5% OF TOTAL CAR SPACES = 25 SPACES
BICYCLE PARKING PROPOSED: 36

LOADING REQUIREMENTS:
LOADING REQUIRED = 5 S.F. PER L.F. OF BUILDING FRONTAGE OR 360 S.F. PER BUILDING (360*2 = 720 S.F.)
LOADING PROVIDED = 3,860 S.F. AT LOADING ENTRANCE NEAR TRUCK DOCK AT ASSEMBLY BUILDING
3,087 S.F. AT LOADING ENTRANCE NEAR TRUCK DOCK AT OFFICE/LAB BUILDING

SITE SOILS INFORMATION:
ACCORDING TO THE USDA NATURAL RESOURCES CONSERVATION SERVICE WEB SOIL SURVEY FOR OAKLAND COUNTY, THE SITE CONSISTS OF THE FOLLOWING SOIL TYPES:
10B - MARLETTE SANDY LOAM, 1 TO 6 PERCENT SLOPES
11B - CAPAC SANDY LOAM, 0 TO 4 PERCENT SLOPES
12 - BROOKSTON AND COXWOOD LOAMS
44C - RIDDLERS SANDY LOAM, 6 TO 12 PERCENT SLOPES

CAUTION!
THE EXISTING UTILITIES OF EXISTING BUILDINGS AND UTILITIES AS SHOWN ON THIS DRAWING ARE APPROXIMATE. AN UNLICENSED CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION.

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ETKIN, LLC
29100 NORTHWESTERN HIGHWAY, SUITE 200
SOUTHFIELD, MICHIGAN 48034

PRELIMINARY SITE PLAN (SOUTH) FOUNTAIN OFFICE PARK
PART OF THE NW 1/4 OF SECTION 15, T. 1N., R. 8E., CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

DES: JMM, DN, JC, SUR, MR, P, M, SAS
CHECKED: JMM, DN, JC, SUR, MR, P, M, SAS
DATE: 04/28/2017

BENCHMARKS
(ENTER DATUM HERE)

BM #301
EASTERLY NORTH BOLT OF POWER POLE 11337,
SOUTHEASTERN PORTION OF SITE
ELEV. - 928.28

BM #302
ARROW ON HYDRANT AT THE SOUTH SIDE OF
THE SOUTHWESTERN ENTRANCE TO EMAGNE
THEATER
ELEV. - 940.10

BM #303
ARROW ON HYDRANT AT THE SOUTH END OF THE
EASTERN ISLAND AT THE GARDEN INN
ELEV. - 952.94

BM #304
ARROW ON HYDRANT, NORTH OF 12 MILE ROAD,
±150' EAST OF DECLARATION DRIVE
ELEV. - 946.55

BM #305
ARROW ON HYDRANT, NORTH OF 12 MILE ROAD,
±150' WEST OF DECLARATION DRIVE
ELEV. - 942.23

SIGN LEGEND:

'NO PARKING FIRE LANE' SIGN (R7-22)	11	33 EA.
24"x24" 'STOP' SIGN (R1-1)	2	2 EA.
'BARRIER FREE PARKING' SIGN (R7-8)	3	7 EA.
'VAN ACCESSIBLE' SIGN (R7-8P)	4	5 EA.
'CROSSWALK' SIGN (W11-2 & W18-7P)	15	2 EA.

REFER TO SHEET C-7.1 FOR SIGN DETAILS.
SIGN TOTALS ARE TOTAL QUANTITIES NEEDED FOR ENTIRE SITE. ALL
SIGNS WILL COMPLY WITH THE LATEST EDITION OF THE MICHIGAN
MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

GENERAL NOTES:

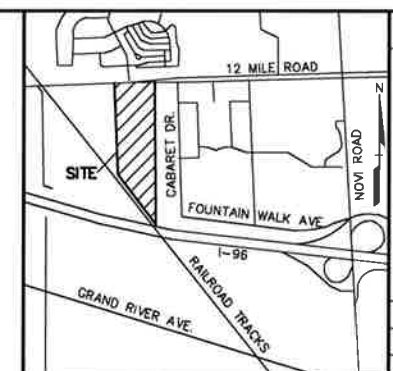
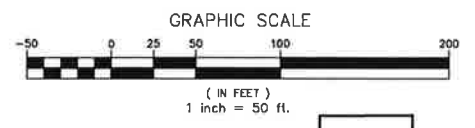
THESE NOTES APPLY TO ALL CONSTRUCTION ACTIVITIES ON THIS PROJECT.

- ALL DIMENSIONS SHOWN ARE TO BACK OF CURB, FACE OF SIDEWALK, OUTSIDE FACE OF BUILDING, PROPERTY LINE, CENTER OF MANHOLE/CATCH BASIN OR CENTERLINE OF PIPE UNLESS OTHERWISE NOTED.
- REFER TO SHEET C-7.1 AND C-7.2 FOR ON-SITE PAVING DETAILS.
- REFER TO LATEST M.D.O.T. DETAIL R-28 FOR SIDEWALK RAMP DETAILS.
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF INDIAN CURRENT STANDARDS AND REGULATIONS.
- THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEER AND/OR THE AUTHORITY HAVING JURISDICTION 3 BUSINESS DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.
- ANY WORK WITHIN THE STREET OR HIGHWAY RIGHT-OF-WAYS SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AGENCIES HAVING JURISDICTION AND SHALL NOT BEGIN UNTIL ALL NECESSARY PERMITS HAVE BEEN ISSUED FOR THE WORK.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ADJUST THE TOP OF ALL EXISTING AND PROPOSED STRUCTURES (MANHOLES, CATCH BASINS, INLETS, GATE WELLS ETC.) WITHIN GRADED AND /OR PAVED AREAS TO FINAL GRADE SHOWN ON THE PLANS. ALL SUCH ADJUSTMENTS SHALL BE INCIDENTAL TO THE JOB AND WILL NOT BE PAID FOR SEPARATELY.
- ALL PARKING SPACE PAVEMENT MARKINGS SHALL BE 4" WHITE WITH THE EXCEPTION OF THE BARRIER FREE PARKING SPACES.
- PROVIDE 4" BLUE STRIPING FOR BARRIER FREE PARKING SPACES AND WHITE FOR BARRIER FREE PARKING SYMBOL. NOTE THAT WHERE A BARRIER FREE PARKING SPACE ADJUTS A NON-BARRIER FREE SPACE, THE TWO SPACES SHALL BE SEPARATED BY ADJUTING BLUE AND WHITE STRIPES.
- SIGNS NOTED TO BE MOUNTED ON BUILDING FACADE SHALL HAVE A MINIMUM MOUNTING HEIGHT OF 5 FEET AND A MAXIMUM MOUNTING HEIGHT OF 7 FEET.

SIDEWALK RAMP LEGEND:

SIDEWALK RAMP 'TYPE R'	⊙
SIDEWALK RAMP 'TYPE P'	⊙
SIDEWALK RAMP 'TYPE D'	⊙

REFER TO LATEST M.D.O.T. R-28 STANDARD RAMP AND DETECTABLE WARNING DETAILS



CAUTION!

THE LOCATION AND ELEVATION OF EXISTING AND PROPOSED STRUCTURES, UTILITIES AND SURVEY MARKS SHOWN ON THIS DRAWING ARE BASED ON THE FIELD SURVEY AND DATA PROVIDED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF THE LOCATION AND ELEVATION DATA PROVIDED TO THE ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION.

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CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND NOTICES OF CONSTRUCTION FROM THE CITY OF INDIAN AND THE AUTHORITY HAVING JURISDICTION PRIOR TO THE BEGINNING OF CONSTRUCTION.

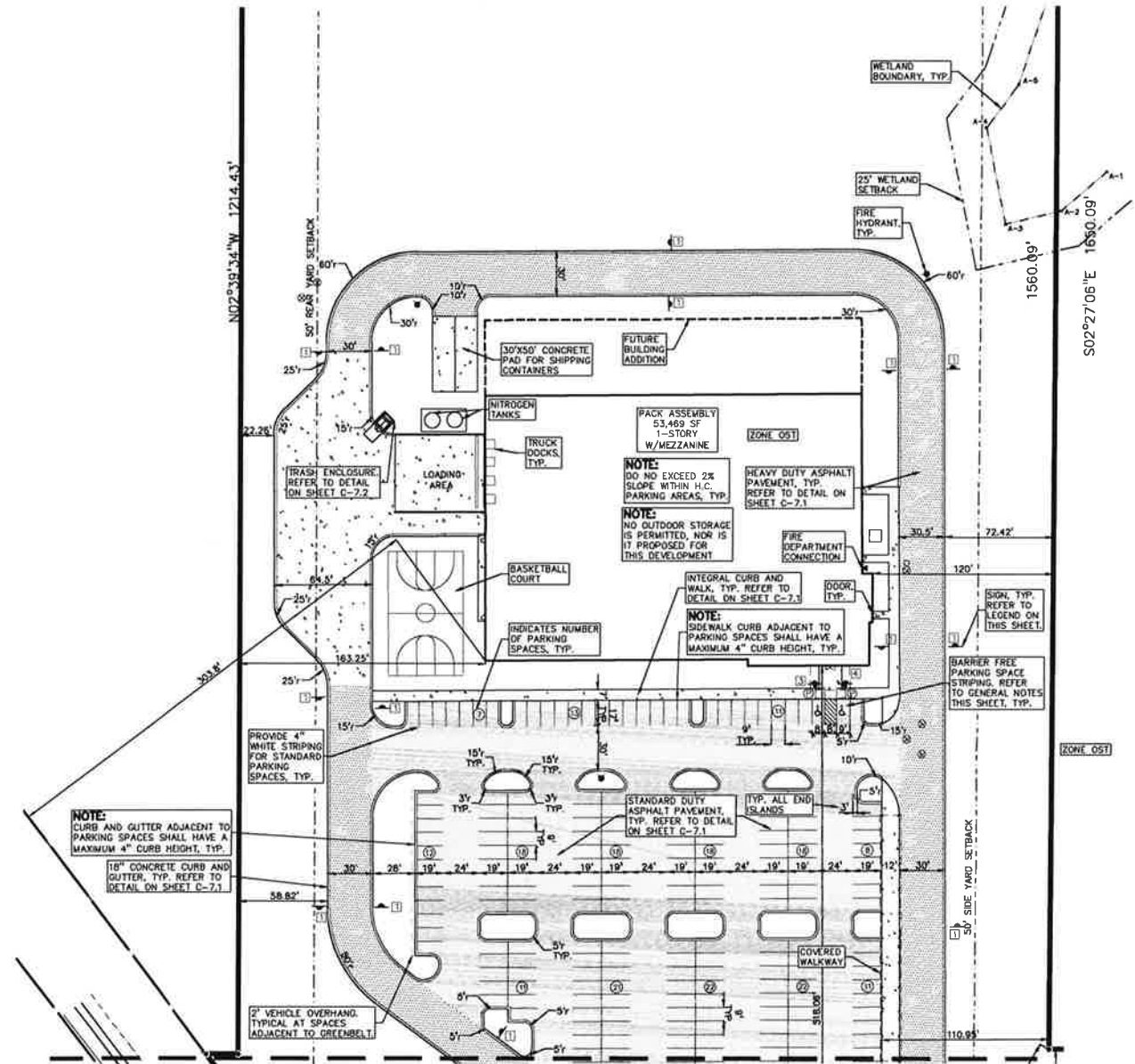
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MATCHLINE - SEE SHEET C-3.1

NOT FOR CONSTRUCTION

ETKIN, LLC
29100 NORTHWESTERN HIGHWAY, SUITE 200
SOUTHFIELD, MICHIGAN 48034

PRELIMINARY SITE PLAN (NORTH)
FOUNTAIN OFFICE PARK
PART OF NEWLY DEVELOPED SECTION 15, T1N, 1R BE.
CITY OF INDIAN, DEQUARBOROUGH COUNTY, MICHIGAN

DES: JMM, ON: JC, SUR: MR, P: PJ, W: SAS

ORIGINAL ISSUE DATE:
APRIL 28, 2017

PEA JOB NO 2016-312

SCALE 1" = 50'

DRAWING NUMBER:
C-3.2

SECTION A-A: 1" = 30'

TREE PLANT LIST: L-1.0

QUANTITY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
15	AL8	Allegheny Serviceberry	<i>Amelanchier laevis</i>	6-10" H	DB8	Native
25	AR3	Red Maple	<i>Acer rubrum</i>	3" Cal.	DB8	Native
10	AS3	Legacy Sugar Maple	<i>Acer saccharum 'Legacy'</i>	3" Cal.	DB8	Native
8	BNS	River Birch	<i>Betula nigra</i>	6-10" H	DB8	Native
17	CA3	American Hornbeam	<i>Carpinus caroliniana</i>	3" Cal.	DB8	Native
12	CC8	Eastern Redbud	<i>Cercis canadensis</i>	6-10" H	DB8	Native
8	GM3	Magyar Ginkgo	<i>Ginkgo biloba 'Magyar'</i>	3" Cal.	DB8	Non-Native
33	GT3	Skyline Honeylocust	<i>Gleditsia inaequalis 'Skyline'</i>	3" Cal.	DB8	Native
5	LT3	Tulip Tree	<i>Liriodendron tulipifera</i>	3" Cal.	DB8	Native
8	MP3	Pravara Crab	<i>Malus 'Pravara'</i>	3" Cal.	DB8	Non-Native
10	MR2.5	Royal Haindrup Crabapple	<i>Malus 'JPS-KWS'</i>	2.5" Cal.	DB8	Non-Native
4	MS2.5	Sugar Time Crab	<i>Malus 'Sugar Time'</i>	2.5" Cal.	DB8	Non-Native
5	OV3	American Hophornbeam	<i>Ostrya virginiana</i>	3" Cal.	DB8	Native
7	PA3	Emory London Planetree	<i>Platanus x emoryi 'Emory'</i>	3" Cal.	DB8	Native
10	OP3	Regal Pincus Oak	<i>Quercus robur x bicolor 'Lamp' (columnar)</i>	3" Cal.	DB8	Non-Native
5	OM3	Burr Oak	<i>Quercus macrocarpa</i>	3" Cal.	DB8	Native
8	OR3	Red Oak	<i>Quercus rubra</i>	3" Cal.	DB8	Native
9	OB3	Skymaster English Oak	<i>Quercus robur 'Skymaster'</i>	3" Cal.	DB8	Native
10	OW3	Swains White Oak	<i>Quercus bicolor</i>	3" Cal.	DB8	Native
14	TB3	Boulevard Linden	<i>Tilia americana 'Boulevard'</i>	3" Cal.	DB8	Non-Native
16	TC3	Littlesat Linden	<i>Tilia cordata 'Littlesat'</i>	3" Cal.	DB8	Non-Native
13	TE3	Crimson Linden	<i>Tilia x euhymis 'Crimson'</i>	3" Cal.	DB8	Non-Native
8	UA3	Valley Forge Elm	<i>Ulmus americana 'Valley Forge'</i>	3" Cal.	DB8	Native
25	UP3	Froebel Elm	<i>Ulmus parviflorus 'Froebel'</i>	3" Cal.	DB8	Non-Native

EVERGREEN PLANT LIST:

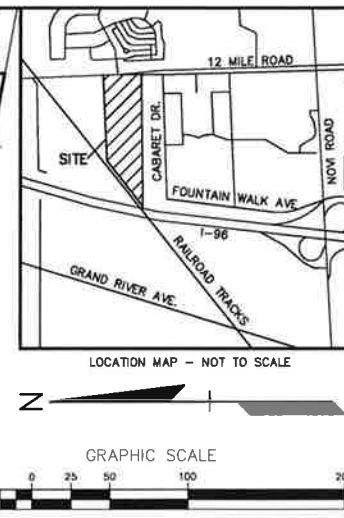
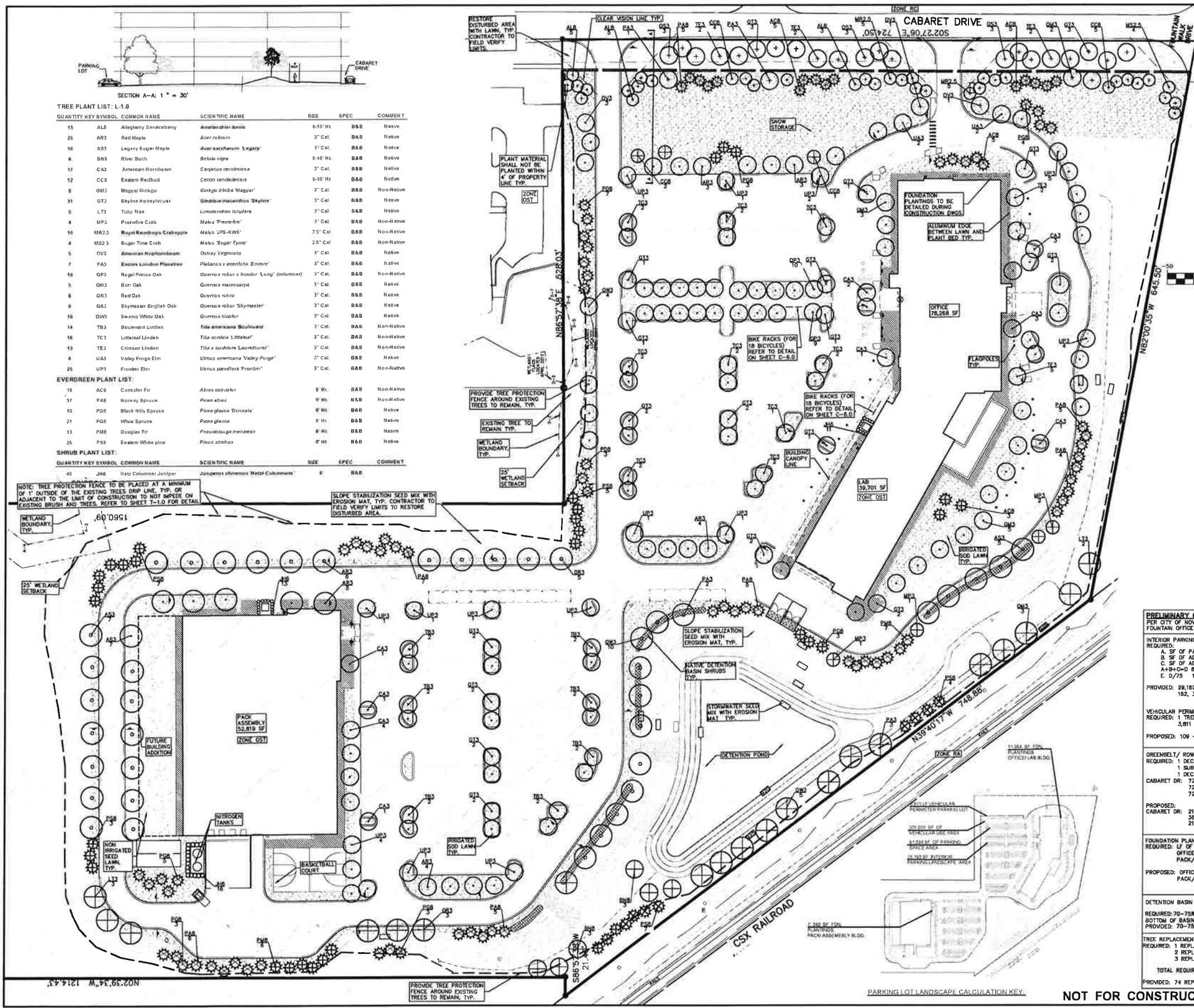
QUANTITY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
10	AC8	Concolor Fir	<i>Abies concolor</i>	8" H	DB8	Non-Native
37	PA8	Norway Spruce	<i>Picea abies</i>	8" H	DB8	Non-Native
10	PDB	Black Hills Spruce	<i>Picea glauca 'Dorset'</i>	8" H	DB8	Native
21	PGB	White Spruce	<i>Picea glauca</i>	8" H	DB8	Native
13	PAB	Douglas Fir	<i>Pseudotsuga menziesii</i>	8" H	DB8	Native
25	PSE	Eastern White Pine	<i>Pinus strobus</i>	8" H	DB8	Native

SHRUB PLANT LIST:

QUANTITY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
40	JM6	Nett Columnar Juniper	<i>Juniperus chinensis 'Nett Columnar'</i>	6"	DB8	

NOTE: TREE PROTECTION FENCE TO BE PLACED AT A MINIMUM OF 1' OUTSIDE OF THE EXISTING TREES DROP LINE, TYP. OR ADJACENT TO THE LIMIT OF CONSTRUCTION TO NOT IMPEDE ON EXISTING BRUSH AND TREES. REFER TO SHEET T-1.0 FOR DETAIL.

NOTE: SLOPE STABILIZATION SEED MIX WITH EROSION MAT, TYP. CONTRACTOR TO FIELD VERIFY LIMITS TO RESTORE DISTURBED AREA.



- KEY:
- GREENBELT ROW TREES
 - INTERIOR PARKING LOT TREES
 - PERIMETER PARKING LOT TREES
 - TREE REPLACEMENT
 - EXISTING TREE TO REMAIN WITH TREE PROTECTION FENCE
 - EXISTING TREE TO BE REMOVED
 - FOUNDATION PLANTINGS - TO BE DETAILED DURING CONSTRUCTION DWGS. TO BE IRRIGATED.
 - NATIVE DETENTION BASIN SHRUBS - TO BE DETAILED DURING CONSTRUCTION DWGS.
 - IRRIGATED SOO LAWN
 - NON-IRRIGATED BEED LAWN
 - STORM WATER SEED MIX & STAKED EROSION MAT BY CARDNO NATIVE PLANT NURSERY PHONE: 574.586.2412
 - SLOPE STABILIZATION SEED MIX & STAKED EROSION MAT BY CARDNO NATIVE PLANT NURSERY PHONE: 574.586.2412
- PLANT MATERIAL SHALL NOT BE PLANTED WITHIN 4' OF PROPERTY LINE

PRELIMINARY CONCEPTUAL LANDSCAPE CALCULATION:
PER CITY OF NOV ZONING ORDINANCE - ZONED OST DISTRICT
FOUNTAIN OFFICE PARK, NOV: 2016-312

INTERIOR PARKING LOT LANDSCAPE REQUIRED:
A. SF OF PARKING SPACES = 81,034 x 10% = 8,104 SF
B. SF OF ADDITIONAL PAVED AREA UNDER 50,000 SF = 50,000 X 5% = 2,500
C. SF OF ADDITIONAL PAVED AREA OVER 50,000 SF = 151,030 X 1% = 1,511
A+B+C = 12,115 SF OF ISLANDS REQUIRED
E. D/75 12,115 / 75 = 162 CANOPY TREES REQUIRED

PROVIDED: 28,180 SF OF INTERIOR LANDSCAPE ISLAND AREA
182, 3" CAL. DEC. TREES

VEHICULAR PERIMETER PARKING LOT REQUIRED:
1 TREE PER 35 LF OF PAVED VEHICULAR PERIMETER
3,811 LF OF PARKING LOT / 35 LF = 108 TREES REQUIRED

PROPOSED: 108 - 3" CAL DEC OR 8' EVG. TREES

GREENBELT / ROW REQUIRED:
1 DEC. CANOPY DR LG. EVG. / 35 LF OF FRONTAGE
1 SUB CANOPY DEC. / 20 LF OF FRONTAGE
1 DEC. CANOPY TREE / 35 LF BETWEEN SIDEWALK & CURB

CABARET DR: 724.5 LF / 35 = 21 CANOPY DEC OR LG. EVG. REQUIRED
724.5 LF / 20 = 36 SUB CANOPY REQUIRED
724.5 LF / 35 = 21 DEC. CANOPY DEC. REQUIRED

PROPOSED: CABARET DR: 21 CANOPY DEC OR LG. EVG. TREES
36 SUB CANOPY TREES
21 CANOPY DEC. TREES

FOUNDATION PLANTINGS REQUIRED: LF OF BUILDING PERIMETER x 8 = REQ. SF BLDG. FDN. PLANTINGS
OFFICE / LAB BLDG. = 1311 LF X 8 = 10,488 SF
PACK / ASSEMBLY BLDG. = 875 LF X 8 = 7,000 SF

PROPOSED: OFFICE / LAB BLDG. = 11,064 SF FDN. PLANTINGS
PACK / ASSEMBLY BLDG. = 7,340 SF FDN. PLANTINGS

DETENTION BASIN LANDSCAPE REQUIRED: 70-75% AREA NATIVE SHRUBS PLANTED ABOVE THE HIGH WATER ELEVATION.
BOTTOM OF BASIN PLANTED IN NATIVE GRASSES / GROUNDCOVER.
PROVIDED: 70-75% AREA NATIVE SHRUBS AND NATIVE SEED MIXES

TREE REPLACEMENT REQUIRED:
1 REPLACEMENT : 8" < 11" = 55 TREES (55 REPLACEMENT REQUIRED)
2 REPLACEMENT : >11" < 20" = 8 TREES (16 REPLACEMENT REQUIRED)
3 REPLACEMENT : >20" < 29" = 1 TREES (3 REPLACEMENT REQUIRED)

TOTAL REQUIRED REPLACEMENT TREES = 74

PROVIDED: 74 REPLACEMENT TREES

REVISIONS

CAUTION!

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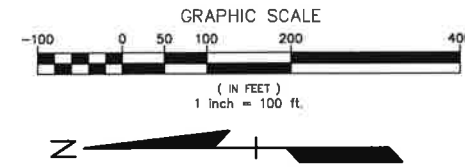
LANDSCAPE PLAN
FOUNTAIN OFFICE PARK
CITY OF NOV, OAKLAND COUNTY, MICHIGAN

DES: ALE JON JLE LAW SUR MZ P.M. SAS
DATE: APRIL 28, 2017

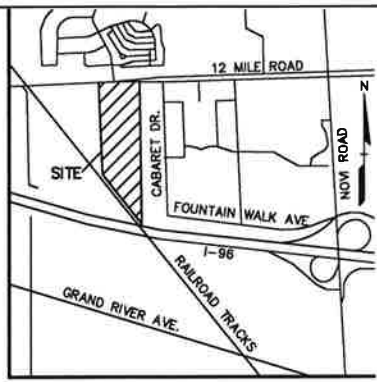
ORIGINAL ISSUE DATE: APRIL 28, 2017
PEA JOB NO. 2016-312
SCALE: 1" = 50'
DRAWING NUMBER: L-1.0

PARKING LOT LANDSCAPE CALCULATION KEY

NOT FOR CONSTRUCTION

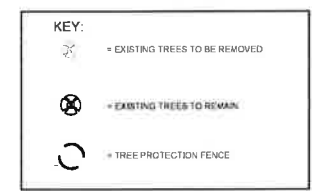


TREE REPLACEMENT CALCULATIONS:
 REQUIRED: 1 REPLACEMENT : 8" < 11" = 55 TREES (55 REPLACEMENT REQUIRED)
 2 REPLACEMENT : >11" < 20" = 8 TREES (8 REPLACEMENT REQUIRED)
 3 REPLACEMENT : >20" < 29" = 1 TREES (3 REPLACEMENT REQUIRED)
TOTAL REQUIRED REPLACEMENT TREES = 74
 (EXISTING TREES THAT ARE DEAD, VERY POOR OR POOR CONDITION, ARE EXEMPT FROM REPLACEMENT)
 PROVIDED: IF THERE IS NOT ADEQUATE SPACE FOR REPLACEMENT TREES ON SITE, TREE REPLACEMENT WILL BE DONE VIA CONTRIBUTION TO THE CITY OF NOV TREE REPLACEMENT FUND.



NO.	BY	DATE	DESCRIPTION

REVISIONS



USDA SOILS SURVEY :
 SITE: PREDOMINATELY CONSISTS OF SOILS 44C - RIDGEL SANDY LOAM, 6-12% SLOPES APPROX. 50% OF AREA
 10B - MARLETTE SANDY LOAM, 1-6% SLOPES APPROX. 40% OF AREA



CAUTION!
 THE LOCATION AND ELEVATION OF EXISTING TREES AND UTILITIES ARE SHOWN ON THIS DRAWING AS NEARLY AS POSSIBLE. NO GUARANTEE IS MADE FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND ELEVATION OF EXISTING TREES AND UTILITIES PRIOR TO THE START OF CONSTRUCTION.

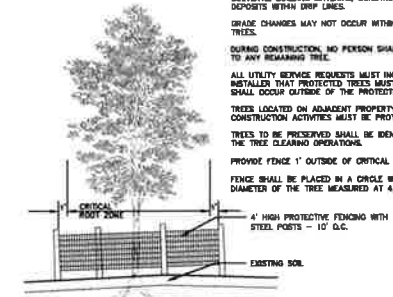
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND UTILITIES.

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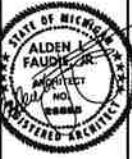
ETKIN, LLC
 29100 NORTHWESTERN HIGHWAY, SUITE 200
 SOUTHFIELD, MICHIGAN 48034
TREE PRESERVATION PLAN
FOUNTAIN OFFICE PARK
 PART OF THE NW 1/4 OF SECTION 15, T4N, R1E, E6
 CITY OF NOV, OAKLAND COUNTY, MICHIGAN
 DES: JLE | DN: JLE LW | SUR: MR | DATE: 4/28/2017

ORIGINAL ISSUE DATE:
 APRIL 28, 2017
 PEA JOB NO, 2016-312
 SCALE: 1" = 100'
 DRAWING NUMBER:
T-1.0



TREE PROTECTION DETAIL
 NOT TO SCALE

NOT FOR CONSTRUCTION



ACM COLOR SCHEDULE

- ACM COLOR 1
MFG: TBD
COLOR NAME: TBD
COLOR: TBD
- ACM COLOR 2
MFG: TBD
COLOR NAME: TBD
COLOR: TBD
- ACM COLOR 3
MFG: TBD
COLOR NAME: TBD
COLOR: TBD

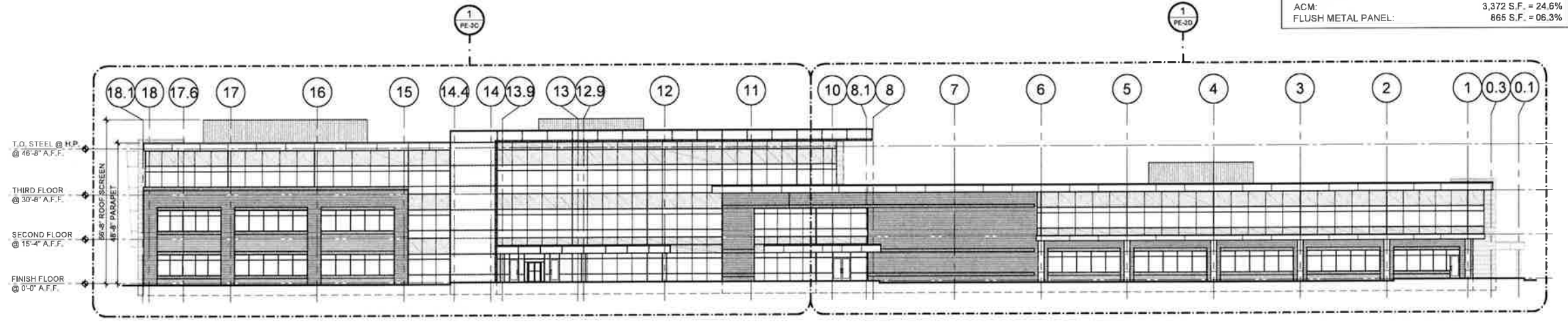
EXTERIOR MATERIAL SCHEDULE @ OFFICE & LAB

- 1 PREFINISHED METAL COPING
- 2 4" UTILITY BRICK - FIELD COLOR
COLOR: TBD
- 3 BRICK ACCENT - SOLIDER COURSE
COLOR: TBD
- 4 BRICK ACCENT - STACK BOND
COLOR: TBD
- 5 1" GRAY TINTED LOW 'E' INSUL. VISION GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
- 6 1" TINTED INSULATED SPANDREL GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
- 7 ALUMINUM COMPOSITE METAL PANEL SYSTEM (ACM)
COLOR: TBD
- 8 FLUSH METAL SIDING
- 9 3"x8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
- 10 6"x6" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
- 11 8"x8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
- 12 3"x8" FIBERGLASS DOOR AND FRAME
- 13 CONC. TRENCH FOOTING BELOW
- 14 10"x12" SECTIONAL INSULATED OVERHEAD GRADE DOOR W/ MOTOR OPERATED OPENER & INSULATED CLEAR ACRYLIC WINDOWS
- 15 6" DIA. CONC. FILLED STEEL GUARD POSTS

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	21,351 S.F.
VISION GLASS & OPENINGS:	7,642 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	13,709 S.F.

BRICK:	5,722 S.F. = 41.7%
SPANDREL:	3,750 S.F. = 27.4%
ACM:	3,372 S.F. = 24.5%
FLUSH METAL PANEL:	865 S.F. = 6.3%



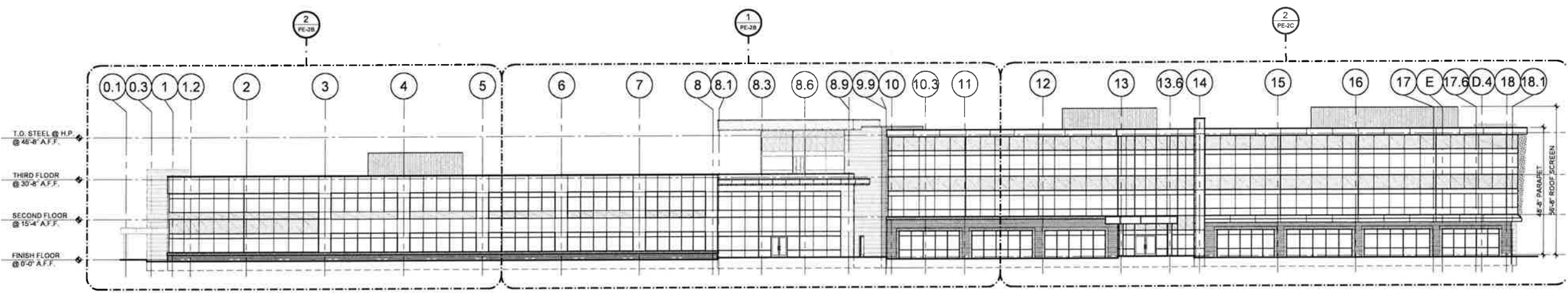
OVERALL NORTH ELEVATION
SCALE: 1" = 20'-0"

2

BUILDING FACADE MATERIAL BREAKDOWN

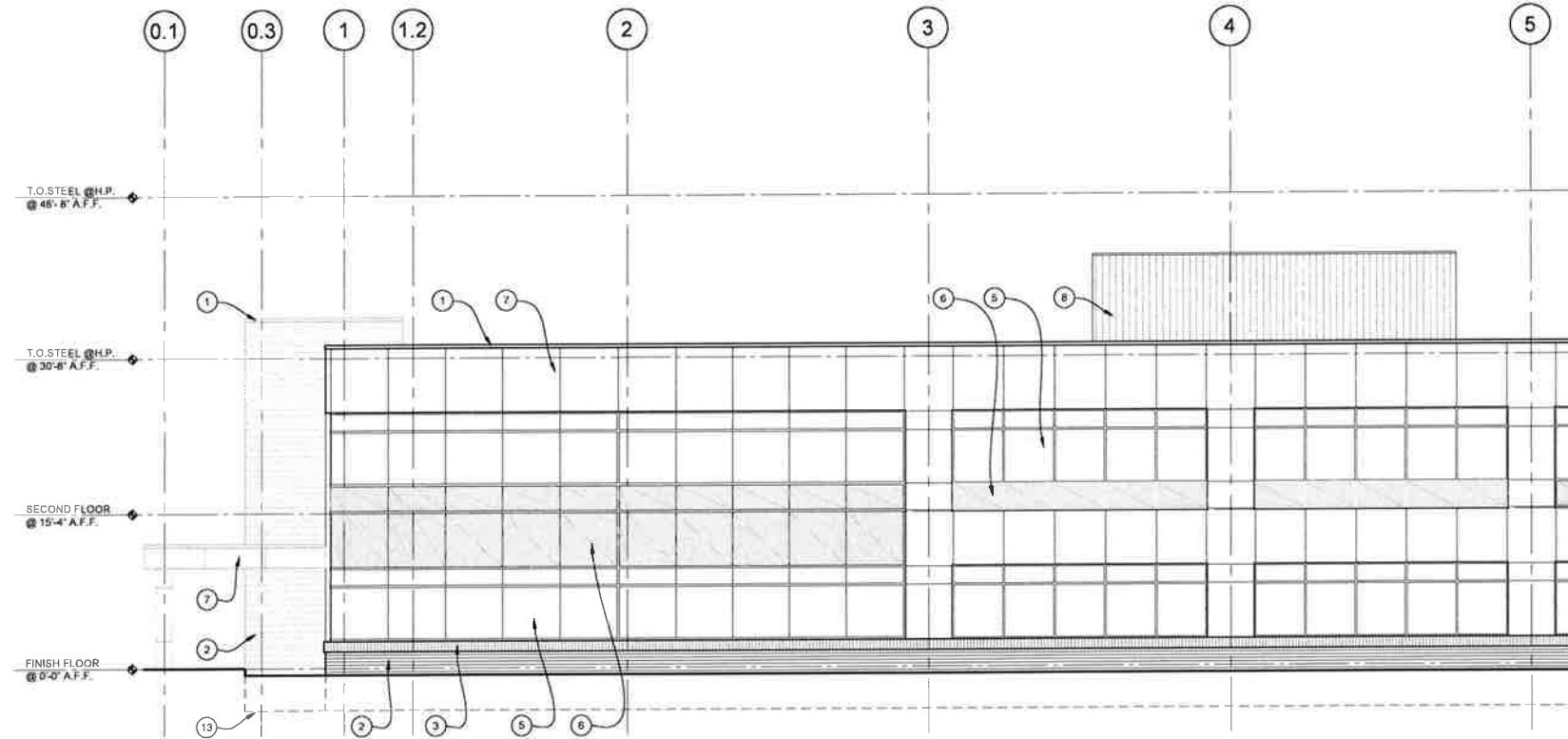
TOTAL MATERIAL SQUARE FOOTAGE:	21,844 S.F.
VISION GLASS & OPENINGS:	10,514 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	11,330 S.F.

BRICK:	2,213 S.F. = 19.5%
SPANDREL:	3,436 S.F. = 30.3%
ACM:	4,623 S.F. = 40.9%
FLUSH METAL PANEL:	1,058 S.F. = 9.3%



OVERALL SOUTH ELEVATION
SCALE: 1" = 20'-0"

1



PARTIAL SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

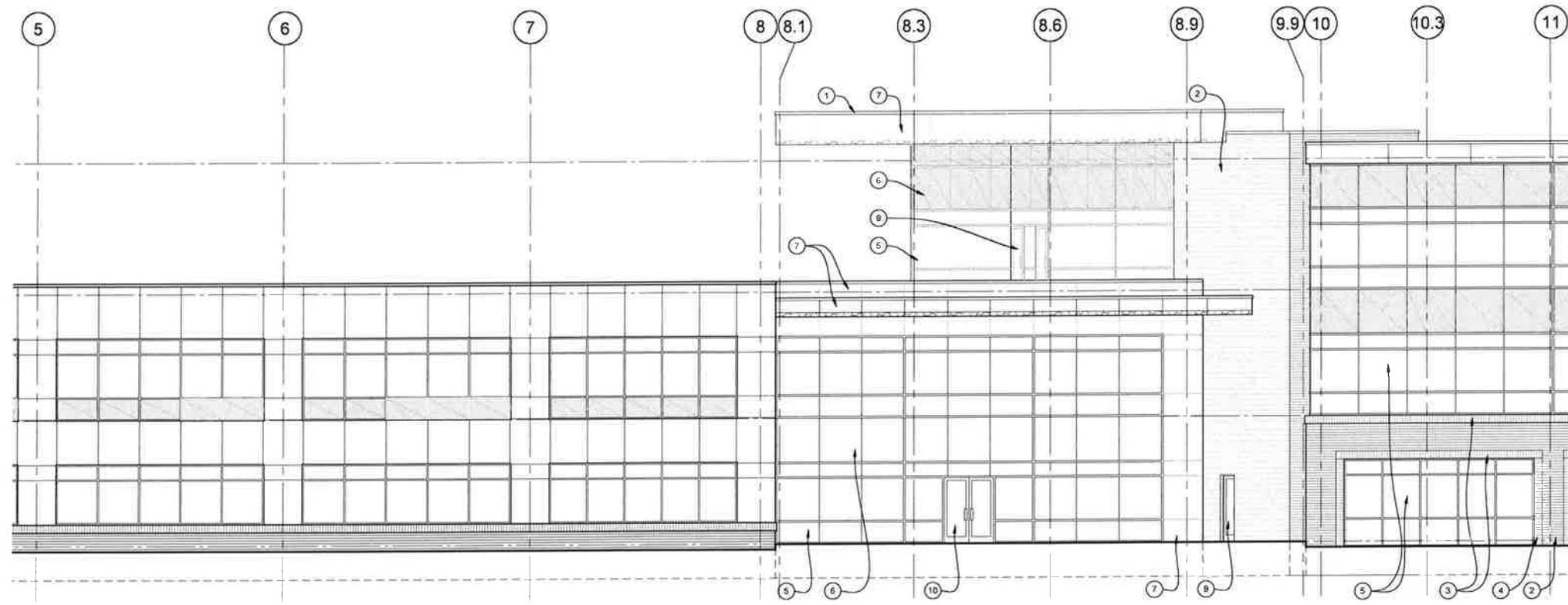
2

ACM COLOR SCHEDULE

- ACM COLOR 1
 MFG. TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 2
 MFG. TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 3
 MFG. TBD
 COLOR NAME: TBD
 COLOR: TBD

EXTERIOR MATERIAL SCHEDULE @ OFFICE & LAB

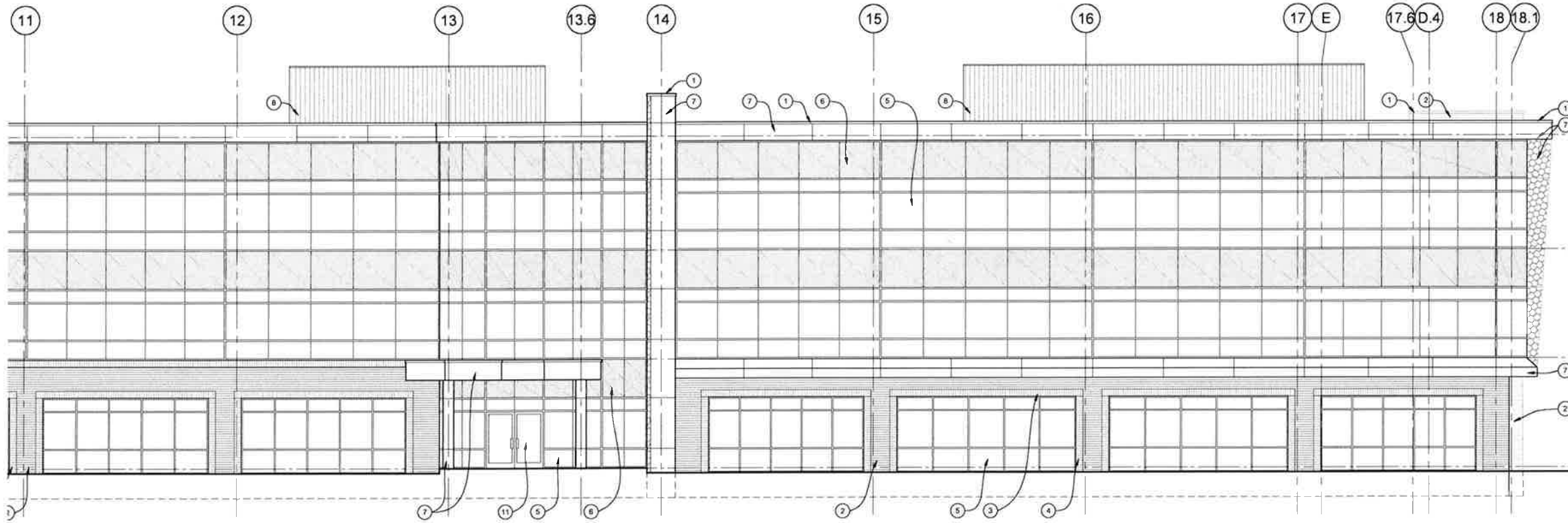
- | | |
|----|--|
| 1 | PREFINISHED METAL COPING |
| 2 | 4" UTILITY BRICK - FIELD COLOR
COLOR: TBD |
| 3 | BRICK ACCENT - SOLIDER COURSE
COLOR: TBD |
| 4 | BRICK ACCENT - STACK BOND
COLOR: TBD |
| 5 | 1" GRAY TINTED LOW 'E' INSUL. VISION GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES |
| 6 | 1" TINTED INSULATED SPANDREL GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES |
| 7 | ALUMINUM COMPOSITE METAL PANEL SYSTEM (ACM)
COLOR: TBD |
| 8 | FLUSH METAL SIDING |
| 9 | 3'x8' CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 10 | 6'x8' CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 11 | 8'x8' CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 12 | 3'x8' FIBERGLASS DOOR AND FRAME |
| 13 | CONC. TRENCH FOOTING BELOW |
| 14 | 10'x12' SECTIONAL INSULATED OVERHEAD GRADE DOOR W/ MOTOR OPERATED OPENER & INSULATED CLEAR ACRYLIC WINDOWS |
| 15 | 6" DIA. CONC. FILLED STEEL GUARD POSTS |



PARTIAL SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

1





PARTIAL SOUTH ELEVATION

SCALE: 1/8" = 1'-0"

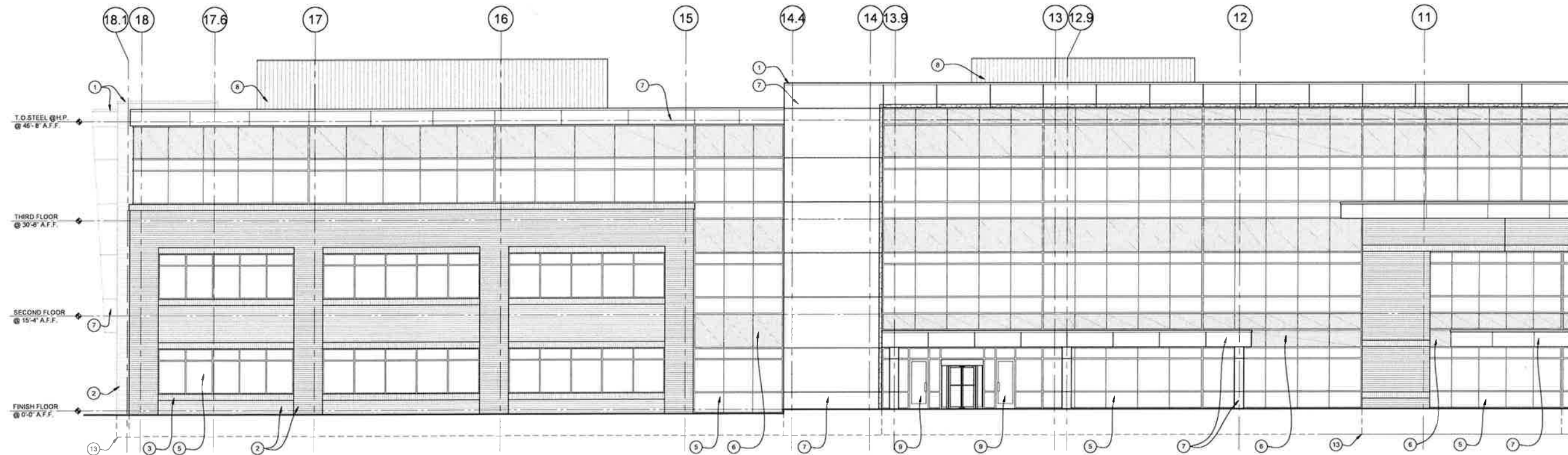
2

ACM COLOR SCHEDULE

- ACM COLOR 1
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 2
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 3
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD

**EXTERIOR MATERIAL SCHEDULE
@ OFFICE & LAB**

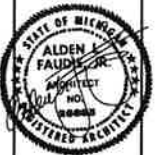
- | | |
|----|--|
| 1 | PREFINISHED METAL COPING |
| 2 | 4" UTILITY BRICK - FIELD COLOR
COLOR: TBD |
| 3 | BRICK ACCENT - SOLIDER COURSE
COLOR: TBD |
| 4 | BRICK ACCENT - STACK BOND
COLOR: TBD |
| 5 | 1" GRAY TINTED LOW E' INSUL. VISION GLAZING IN
CLEAR ANOD. ALUM. THERMAL BREAK FRAMES |
| 6 | 1" TINTED INSULATED SPANDREL GLAZING IN CLEAR
ANOD. ALUM. THERMAL BREAK FRAMES |
| 7 | ALUMINUM COMPOSITE METAL PANEL SYSTEM (ACM)
COLOR: TBD |
| 8 | FLUSH METAL SIDING |
| 9 | 3/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY
TINTED TEMPERED GLASS |
| 10 | 6/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED
TEMPERED GLASS |
| 11 | 6/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED
TEMPERED GLASS |
| 12 | 3/8" FIBERGLASS DOOR AND FRAME |
| 13 | CONC. TRENCH FOOTING BELOW |
| 14 | 10'x12' SECTIONAL INSULATED OVERHEAD GRADE DOOR
W/ MOTOR OPERATED OPENER & INSULATED CLEAR
ACRYLIC WINDOWS |
| 15 | 6" DIA. CONC. FILLED STEEL GUARD POSTS |

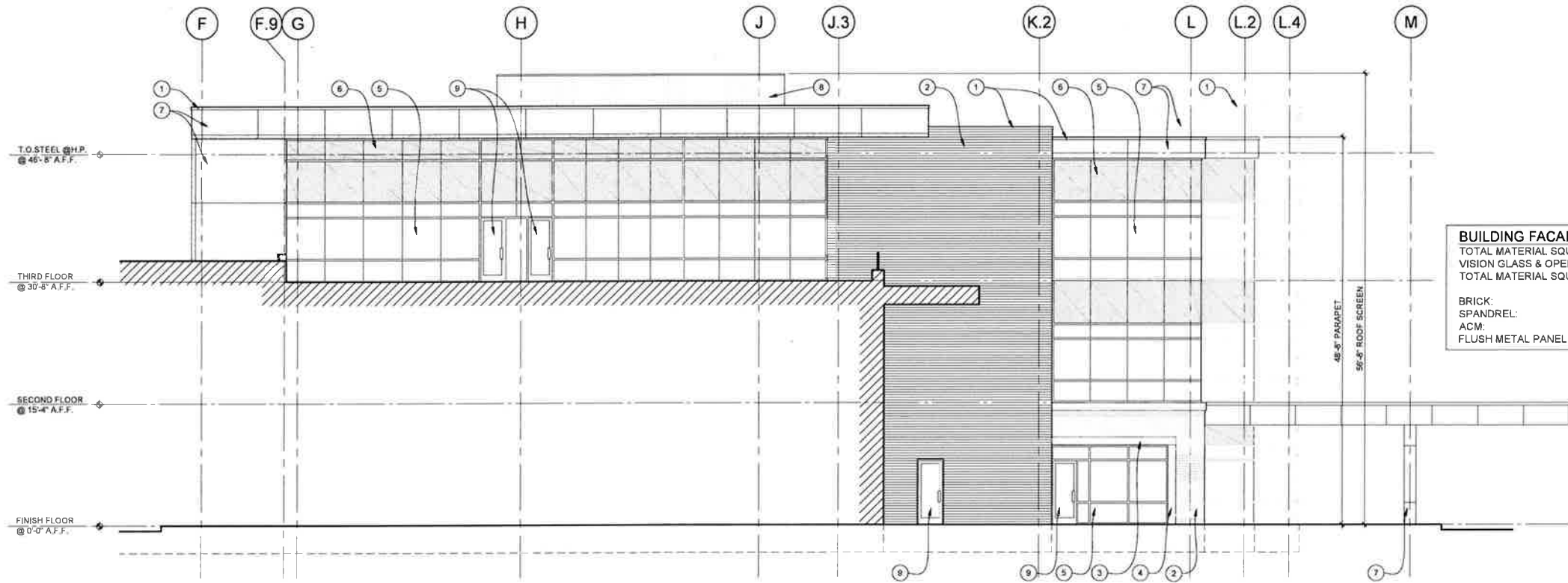


PARTIAL NORTH ELEVATION

SCALE: 1/8" = 1'-0"

1





BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	4,842 S.F.
VISION GLASS & OPENINGS:	1,432 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	3,410 S.F.
BRICK:	1,307 S.F. = 38.3%
SPANDREL:	837 S.F. = 24.5%
ACM:	1,121 S.F. = 32.9%
FLUSH METAL PANEL:	145 S.F. = 04.3%

ACM COLOR SCHEDULE

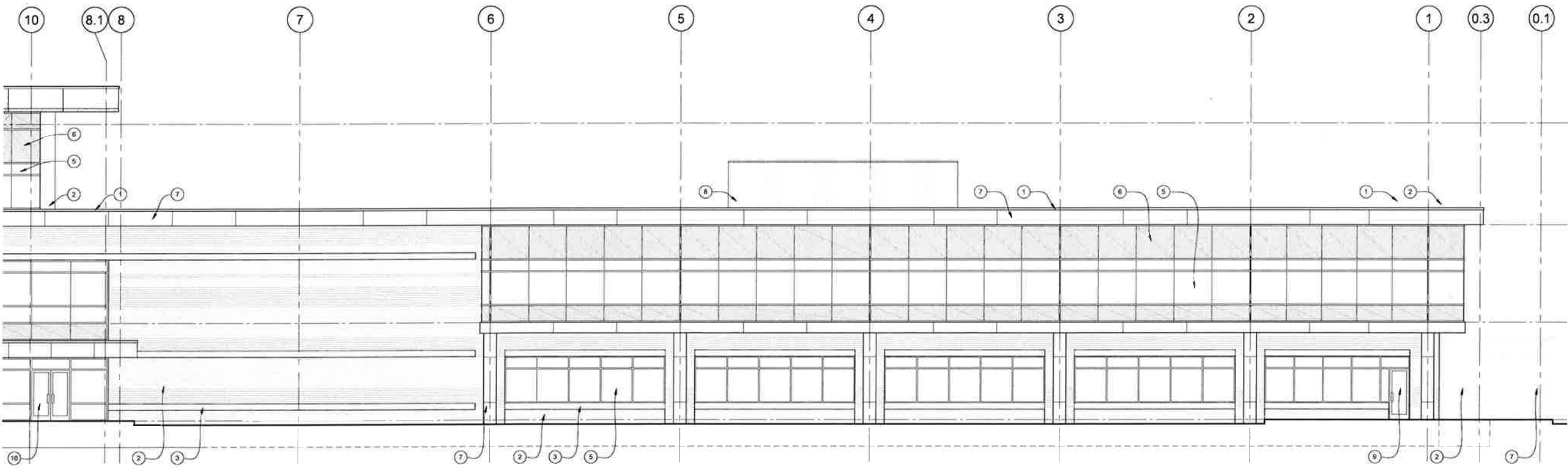
- ACM COLOR 1
MFG: TBD
COLOR NAME: TBD
COLOR: TBD
- ACM COLOR 2
MFG: TBD
COLOR NAME: TBD
COLOR: TBD
- ACM COLOR 3
MFG: TBD
COLOR NAME: TBD
COLOR: TBD

EXTERIOR MATERIAL SCHEDULE @ OFFICE & LAB

- | | |
|----|--|
| 1 | PREFINISHED METAL COPING |
| 2 | 4" UTILITY BRICK - FIELD COLOR
COLOR: TBD |
| 3 | BRICK ACCENT - SOLIDER COURSE
COLOR: TBD |
| 4 | BRICK ACCENT - STACK BOND
COLOR: TBD |
| 5 | 1" GRAY TINTED LOW'E' INSUL. VISION GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES |
| 6 | 1" TINTED INSULATED SPANDREL GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES |
| 7 | ALUMINUM COMPOSITE METAL PANEL SYSTEM (ACM)
COLOR: TBD |
| 8 | FLUSH METAL SIDING |
| 9 | 3"x8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 10 | 6"x8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 11 | 8"x8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS |
| 12 | 3"x8" FIBERGLASS DOOR AND FRAME |
| 13 | CONC. TRENCH FOOTING BELOW |
| 14 | 10'x12' SECTIONAL INSULATED OVERHEAD GRADE DOOR W/ MOTOR OPERATED OPENER & INSULATED CLEAR ACRYLIC WINDOWS |
| 15 | 6" DIA. CONC. FILLED STEEL GUARD POSTS |

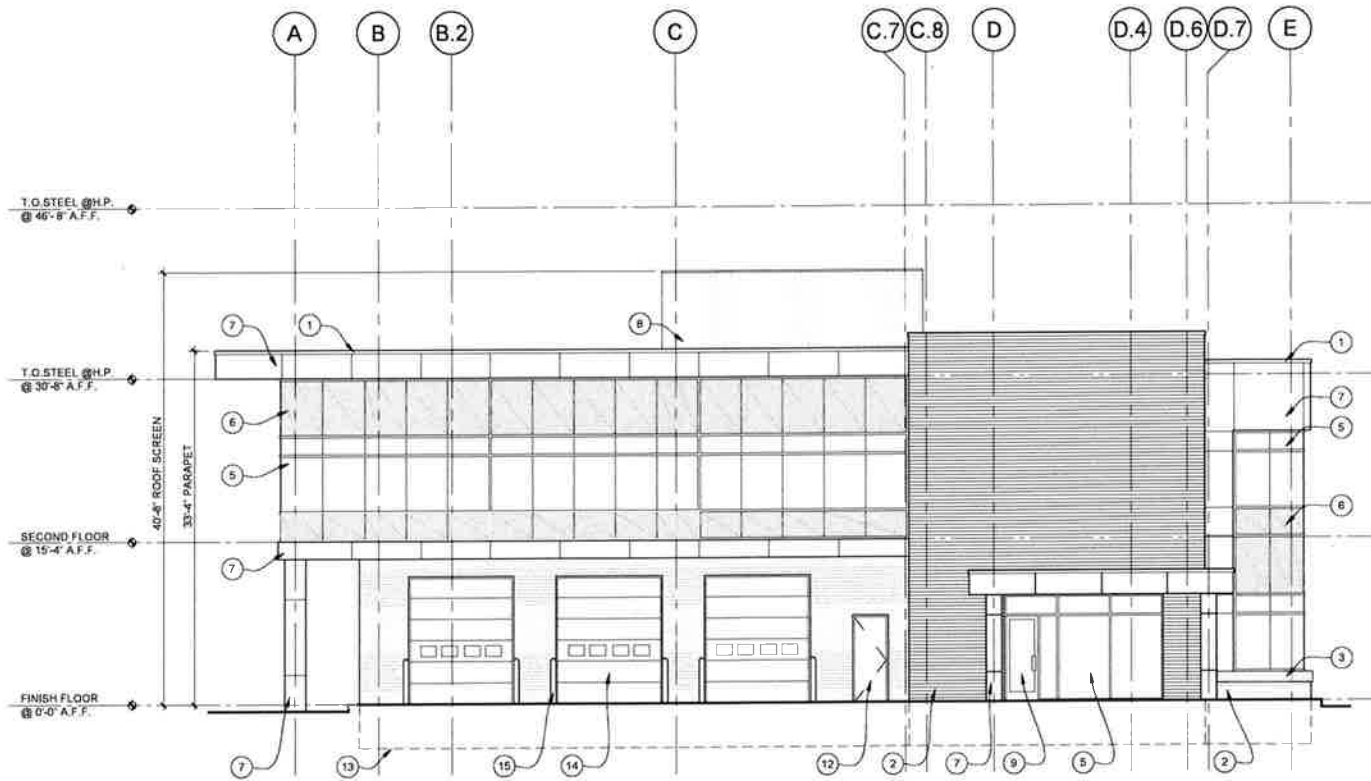
AUXILIARY WEST ELEVATION @ OFFICE
SCALE: 1/8" = 1'-0"

2



PARTIAL NORTH ELEVATION
SCALE: 1/8" = 1'-0"

1



WEST ELEVATION
SCALE: 1/8" = 1'-0"

2

BUILDING FACADE MATERIAL BREAKDOWN

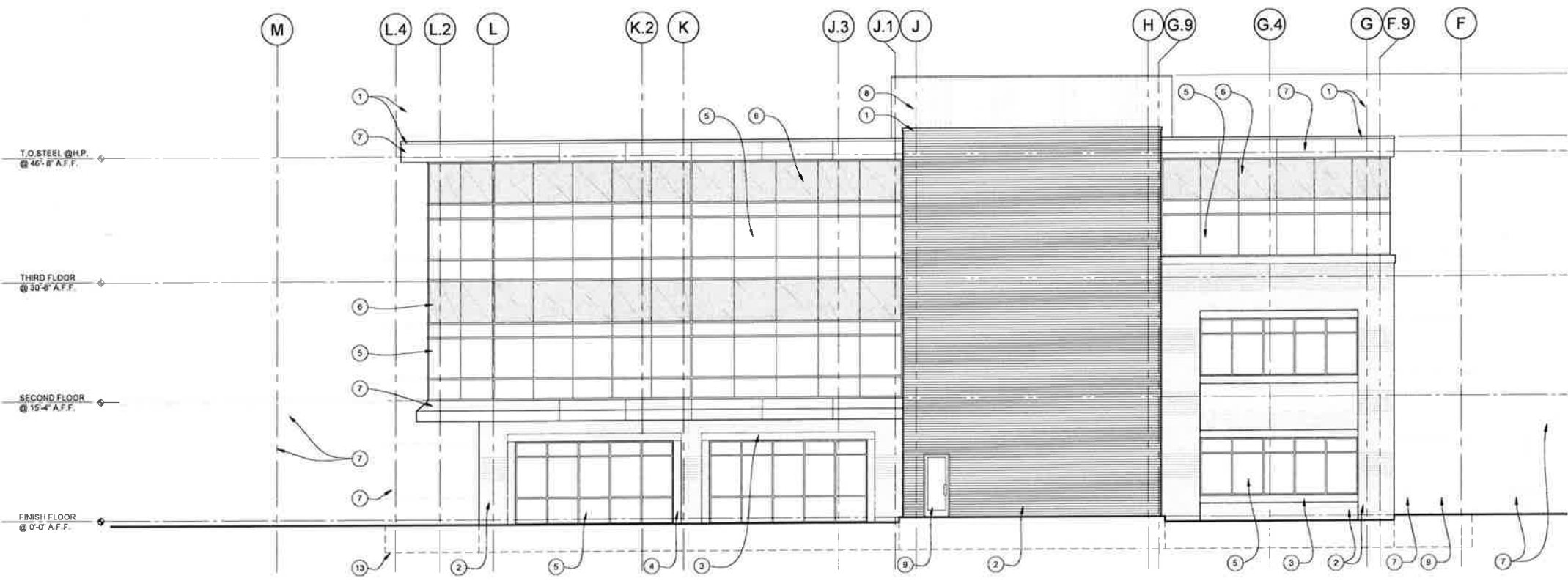
TOTAL MATERIAL SQUARE FOOTAGE:	3,383 S.F.
VISION GLASS & OPENINGS:	1,060 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	2,323 S.F.
BRICK:	1,097 S.F. = 47.2%
SPANDREL:	544 S.F. = 23.4%
ACM:	503 S.F. = 21.7%
FLUSH METAL PANEL:	179 S.F. = 07.7%

ACM COLOR SCHEDULE

- ACM COLOR 1
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 2
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD
- ACM COLOR 3
 MFG: TBD
 COLOR NAME: TBD
 COLOR: TBD

EXTERIOR MATERIAL SCHEDULE @ OFFICE & LAB

1	PREFINISHED METAL COPING
2	4" UTILITY BRICK - FIELD COLOR
3	BRICK ACCENT - SOLIDER COURSE
4	BRICK ACCENT - STACK BOND
5	1" GRAY TINTED LOW'E' INSUL. VISION GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
6	1" TINTED INSULATED SPANDREL GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
7	ALUMINUM COMPOSITE METAL PANEL SYSTEM (ACM) COLOR: TBD
8	FLUSH METAL SIDING
9	3/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
10	6/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
11	8/8" CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
12	3/8" FIBERGLASS DOOR AND FRAME
13	CONC. TRENCH FOOTING BELOW
14	10'x12' SECTIONAL INSULATED OVERHEAD GRADE DOOR W/ MOTOR OPERATED OPENER & INSULATED CLEAR ACRYLIC WINDOWS
15	6" DIA. CONC. FILLED STEEL GUARD POSTS



EAST ELEVATION
SCALE: 1/8" = 1'-0"

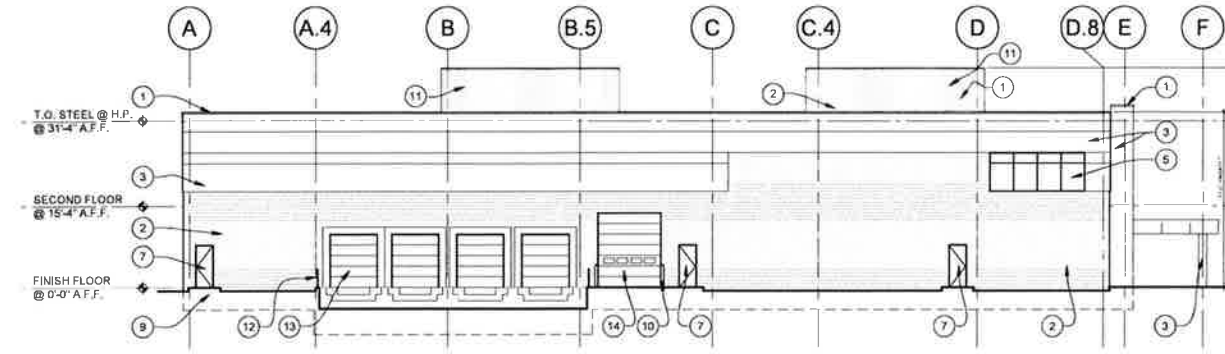
1

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	7,464 S.F.
VISION GLASS & OPENINGS:	2,173 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	5,291 S.F.
BRICK:	2,627 S.F. = 49.6%
SPANDREL:	839 S.F. = 15.9%
ACM:	1,580 S.F. = 29.9%
FLUSH METAL PANEL:	245 S.F. = 04.6%

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	6,551 S.F.
VISION GLASS & OPENINGS:	740 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	5,811 S.F.
SPLIT FACE CMU:	2,904 S.F. = 50.0%
SPANDREL:	0 S.F. = 00.0%
FLUSH METAL PANEL:	2,907 S.F. = 50.0%



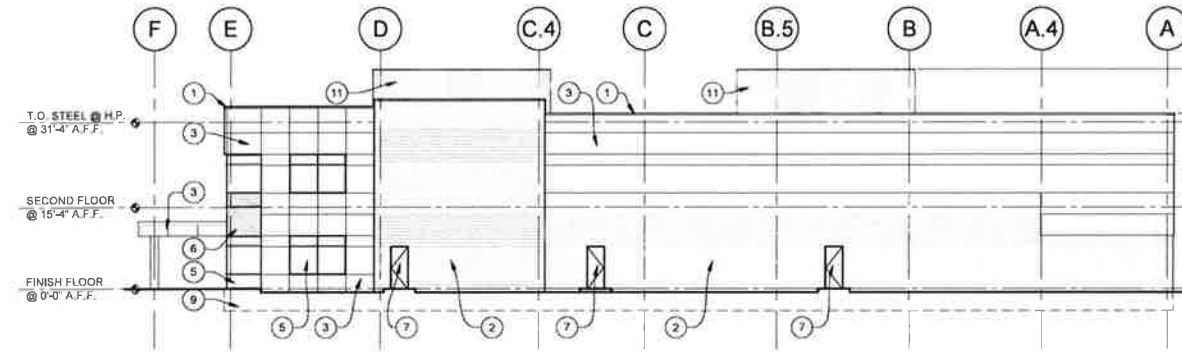
WEST ELEVATION - PACK ASSEMBLY

SCALE: 1/16" = 1'-0"

4

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	6,574 S.F.
VISION GLASS & OPENINGS:	350 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	6,224 S.F.
SPLIT FACE CMU:	3,011 S.F. = 48.6%
SPANDREL:	55 S.F. = 00.8%
FLUSH METAL PANEL:	3,011 S.F. = 48.6%



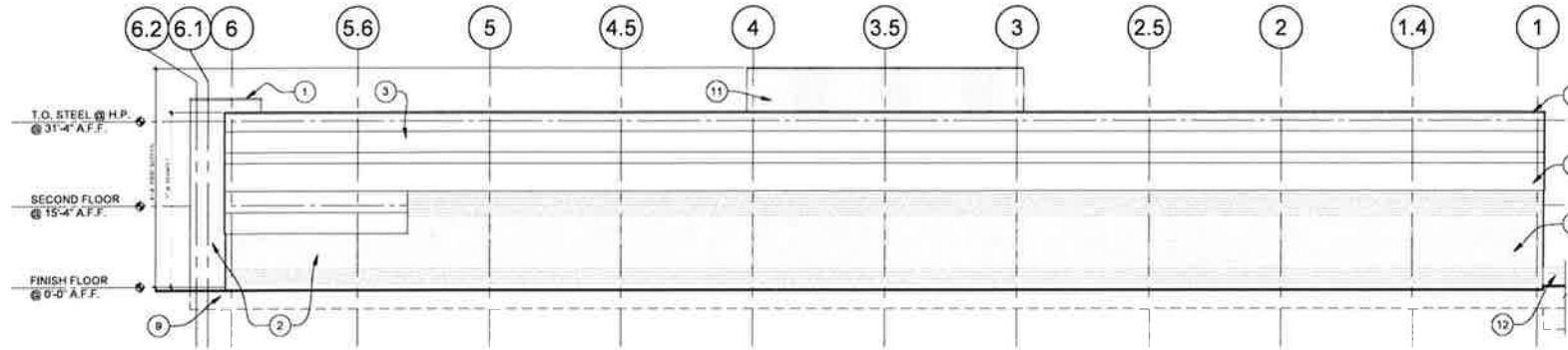
EAST ELEVATION - PACK ASSEMBLY

SCALE: 1/16" = 1'-0"

3

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	8,946 S.F.
VISION GLASS & OPENINGS:	0 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	8,946 S.F.
SPLIT FACE CMU:	4,476 S.F. = 50.0%
SPANDREL:	0 S.F. = 00.0%
FLUSH METAL PANEL:	4,469 S.F. = 50.0%



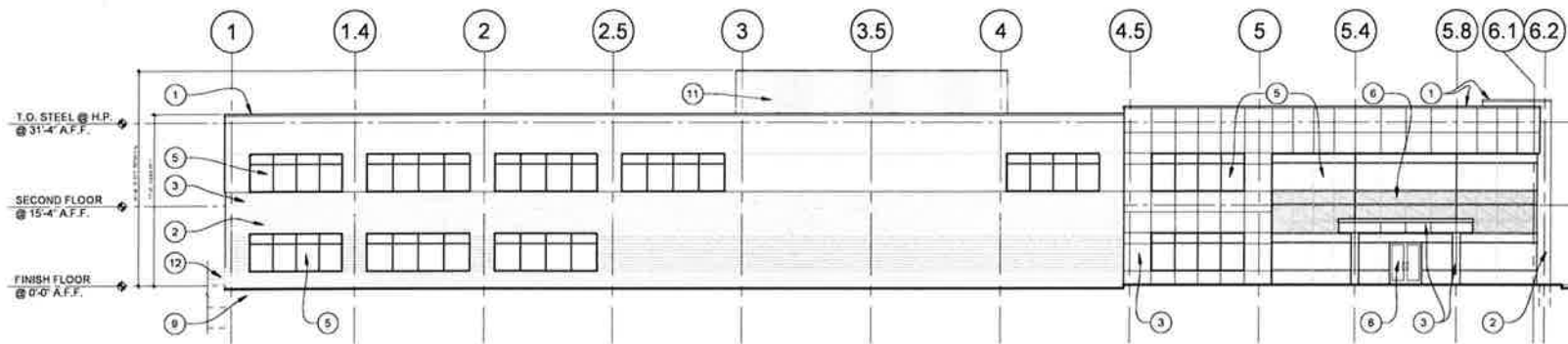
NORTH ELEVATION - PACK ASSEMBLY

SCALE: 1/16" = 1'-0"

2

BUILDING FACADE MATERIAL BREAKDOWN

TOTAL MATERIAL SQUARE FOOTAGE:	9,039 S.F.
VISION GLASS & OPENINGS:	2,256 S.F.
TOTAL MATERIAL SQUARE FOOTAGE:	6,783 S.F.
SPLIT FACE CMU:	2,808 S.F. = 41.4%
SPANDREL:	343 S.F. = 05.1%
FLUSH METAL PANEL:	3,632 S.F. = 34.6%



SOUTH ELEVATION - PACK ASSEMBLY

SCALE: 1/16" = 1'-0"

1

EXTERIOR MATERIAL SCHEDULE @ PACK ASSEMBLY

REV. #	IDENTIFIER	DESCRIPTION
	1	PREFINISHED METAL COPING
	2	PAINTED SMOOTH FACE CMU
	3	2-1/2" INSULATED METAL PANEL
	4	DASHED LINE INDICATES TOP OF MASONRY
	5	1" GRAY TINTED LOW E' INSUL. VISION GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
	6	1" TINTED INSULATED SPANDREL GLAZING IN CLEAR ANOD. ALUM. THERMAL BREAK FRAMES
	7	3'x8' H.M. DOOR AND FRAME PAINTED TO MATCH ADJACENT WALL COLOR.
	8	6'x8' CLEAR ANOD. ALUM. ENTRY DOOR W/ GRAY TINTED TEMPERED GLASS
	9	CONC. TRENCH FOOTING BELOW
	10	6" DIA. CONC. FILLED STEEL GUARD POSTS
	11	FLUSH METAL SIDING
	12	1 1/2" DIA. PAINTED STEEL PIPE GUARDRAIL
	13	8'x10' SECTIONAL INSULATED OVERHEAD TRUCK DOCK DOOR w/ DOCK LEVELER, & SHELTER/SEAL
	14	12'x14' SECTIONAL INSULATED OVERHEAD GRADE DOOR w/ MOTOR OPERATED OPENER & INSULATED CLEAR ACRYLIC WINDOWS

PLANNING REVIEW



PLAN REVIEW CENTER REPORT

May 19, 2017

Planning Review

A123 Systems

JSP 17-21

Petitioner

Etkin on behalf of A123 Systems

Review Type

Preliminary Site Plan

Property Characteristics

Section	15	
Site Location	West of Cabaret Drive, South of Twelve Mile Road, North of I-96	
Site School District	Novi Community School District	
Site Zoning	OST: Office Service Technology	
Adjoining Zoning	North	RA: One-Family Residential
	East	OST: Office Service Technology & RC: Regional Commercial
	West	OST: Office Service Technology & CSX Railroad
	South	Interstate I-96
Current Site Use	Vacant	
Adjoining Uses	North	Residential
	East	Hotels, Commercial
	West	Research and Development Office & CSX Railroad
	South	Interstate I-96
Site Size	31.25 Acres	
Plan Date	April 28, 2017	

Project Summary

The applicant is proposing to construct headquarters for A123 Systems near Cabaret Drive and Twelve Mile Road. The site plan consists of two buildings one office/lab space of 128,936 square feet and another assembly building of 53,469 square feet including associated site improvements of parking and landscaping. The site amenities include a basketball court, rooftop patio, water feature at entrance facing I-96, and plug-in electric vehicle stations. The applicant has indicated on the site plan a building addition to the assembly building that will be reviewed at a future time. The purpose of this note is to show why there is a lack of landscaping proposed in this area.

Recommendation

Approval of the ***Preliminary Site Plan is recommended.*** The plan mostly conforms to the requirements of the Zoning Ordinance, with a few deviations listed in this and other review letters. **Planning Commission's approval for Preliminary Site Plan, Woodland Permit, and Storm Water Management Plan is required.**

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. **Deviations from the Zoning Ordinance are listed below.**

Ordinance Deviations

1. Planning Commission Waivers:

- I. Waiver to reduce maneuvering lane width for bike rack from 4 ft. to 3 ft.
- II. Waiver to not provide covered bicycle parking spaces
2. DCS Variance:
 - I. Twelve Mile Sidewalk

Please see the attached chart for information pertaining to ordinance requirements. Items in **bold** below must be addressed and incorporated as part of the Final Site Plan submittal:

1. Outdoor Storage (Sec. 3.20.2.D): The applicant is proposing to store shipping containers outside of the assembly building. **Please clarify the intent of this storage area.**
2. Above Ground Storage Tanks (Sec. 3.20.2.E): Above ground storage tanks are to be an accessory use on the site, located in a non-required yard, and screened/enclosed from public view. **Please provide enclosure for the nitrogen storage tanks, see chart for ordinance details.**
3. Interior Landscaped Islands (Sec. 5.5.3.C.ii.i): Landscaped islands are required every 15 parking spaces. **Adjust the location of the landscaped peninsula near the northwest side of the lab building by one space so that there are 15 parking spaces on each side to eliminate the waiver.**
4. Bicycle Parking (Sec. 5.16.1): Bicycle parking requires that when 20 more spaces are required 25% are covered. And a maneuvering lane width of 4 ft. **Please provide covered bicycle parking and a maneuvering width of 4 ft. or formally request a Planning Commission waiver.**
5. Plug-in Electric Vehicle (Sec. 5.3.15): There are several standards listed under the Ordinance for PEV charging stations. **Please provide details on the PEV charging station type, location, distance from building, height, signage, and pavement markings on the site plan, see chart.**
6. Non-motorized facilities: The proposed site plan fronts on both Twelve Mile Road and Cabaret Drive. The applicant is required to provide sidewalks along both roads, but is only proposing sidewalks along Cabaret Drive. **Please provide a sidewalk along Twelve Mile Road or apply for a DCS variance from Engineering.**
7. Basketball Court: **Please clarify the intent of the basketball court and its users.**
8. Economic Impact: **Please provide in the response letter for Planning Commission the economic impact details including the proposed cost of the building, site improvements, and number of anticipated jobs created during and after construction.**
9. Lighting and Photometric Plan (Sec. 5.7): Additional notes and details are required to be included on the lighting plan. **Please add the required notes and clarify security lighting.**

Other Reviews

- a. Engineering Review: **Engineering recommends approval.** Additional comments to be addressed with Final Site Plan.
- b. Landscape Review: **Landscape recommends approval.** Additional comments to be addressed with Final Site Plan.
- c. Wetlands Review: **Wetlands recommends approval.** A City of Novi Wetland Buffer Authorization and Conservation Easement are required for the proposed impacts to regulated wetland setbacks. Additional comments to be addressed with Final Site Plan.
- d. Woodlands Review: **Woodlands recommend approval.** A City of Novi Woodland permit is required for the proposed impacts to regulated woodlands. Additional comments to be addressed with Final Site Plan.
- e. Traffic Review: **Traffic recommends approval.** Traffic identified couple of deviations that would require variances/waivers. Additional information requested to perform complete review.
- f. Traffic Study Review: **Traffic does not recommend approval of the TIS.** Traffic is requesting additional information to determine roadway improvements that may be required. **Updated TIS addressing items requested by Traffic in the review letter should be submitted prior to Planning Commission meeting for staff and consultant review.**
- g. Facade Review: **Façade recommends approval.** Full compliance.
- h. Fire Review: **Fire recommends approval.** Additional comments to be addressed with Final Site Plan.

NEXT STEP: Planning Commission Meeting

This Site Plan is scheduled to go before Planning Commission for public hearing on **June 14, 2017**. Please provide the following **no later than 12:00pm, June 7, 2017** if you wish to keep the schedule.

1. Original 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 including **request for waivers as you see fit.**
3. A color rendering of the Site Plan, if any.

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 **10 size 24" x 36" copies with original signature and original seals**, to the Community Development Department for final Stamping Set approval. Plans addressing the comments in all of the staff and consultant review letters should be submitted electronically for informal review and approval prior to printing Stamping Sets.

Site Addressing

A new address is required for this project. The applicant should contact the Building Division for an address 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.

Signage

Exterior Signage is not regulated by the Planning Division or Planning Commission. Sign permit applications that relate to construction of a new building or an addition to an existing building may be submitted, reviewed, and approved as part of a site plan application. Proposed signs shall be shown on the preliminary site plan. Alternatively, an applicant may choose to submit a sign application to the Building Official for administrative review. Following preliminary site plan approval, any application to amend a sign permit or for a new or additional sign shall be submitted to the Building Official. Please contact the Ordinance Division 248.735.5678 for information regarding sign permits.

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. If you have questions regarding the checklist or the Pre-Con itself, please contact Sarah Marchioni [248.347.0430 or smarchioni@cityofnovi.org] in the Community Development Department.

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 kmellem@cityofnovi.org.



Kirsten Mellem, Planner



PLANNING REVIEW CHART: Office Service Technology (OST)

Review Date: May 8, 2017
Review Type: Preliminary Site Plan
Project Name: **A123 Systems**
Plan Date: April 28, 2017
Prepared by: Kirsten Mellem, Planner
E-mail: kmellem@cityofnovi.org; **Phone:** 248-347-0484

Bold To be addressed with the next submittal
Underline To be addressed with final site plan submittal
Bold and Underline Requires Planning Commission and / or City Council Approval
Italics To be noted

Item	Required Code	Proposed	Meets Code	Comments
Zoning and Use Requirements				
Master Plan <i>(adopted August 25, 2010)</i>	Office research development and technology	Office	Yes	<i>The Preliminary Site Plan will require Planning Commission approval</i>
Area Study	The site does not fall under any special category	NA	Yes	
Zoning <i>(Eff. Dec. 25, 2013)</i>	OST: Office Service and Technology	OST: Office Service and Technology	Yes	
Uses Permitted <i>(Sec 3.1.23.B & C)</i>	Sec. 3.1.23.B. - Principal Uses Permitted. Sec. 3.1.23.C. - Special Land Uses Permitted.	Research, testing, design and development	Yes	
Phasing	Phasing Plan	No phasing proposed	Yes	<i>Phasing requires Planning Commission approval.</i>
Use Standards - Research, Testing, Design and Development (Sec. 4.68)				
Permitted Uses <i>(Sec. 4.68)</i>	<ul style="list-style-type: none"> - Manufacturing and assembly line operations when accessory research and development activities occurring on the same site. - Warehousing, storage, distribution activities shall not be permitted as principal uses. - Shall be permitted as part of a mixed use development, no less than 10% of combined 	Assembly line proposed as secondary use >10% lab/office use	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	floor area of buildings within are utilized for office/lab.			
Height, bulk, density and area limitations (Sec 3.1.23.D)				
Frontage on a Public Street. (Sec. 5.12)	Frontage on a Public Street is required	The site has frontage on Cabaret Drive	Yes	Applicant has said this will be one project, no parcel split.
Access To Major Thoroughfare (Sec. 5.13)	Access to Major Thoroughfare only; Access to other roads only if other side of street has multi-family or non-residential uses, or City determines meets requirements	The site has access to Twelve Mile road via Cabaret Drive and the current uses on Cabaret Drive are not residential.	Yes	
Minimum Zoning Lot Size for each Unit in Ac (Sec 3.6.2.D)	Except where otherwise provided in this Ordinance, the minimum lot area and width, and the maximum percent of lot coverage shall be determined on the basis of off-street parking, loading, greenbelt screening, yard setback or usable open space		NA	
Minimum Zoning Lot Size for each Unit: Width in Feet (Sec 3.6.2.D)			NA	
Maximum % of Lot Area Covered (By All Buildings)	(Sec 3.6.2.D)	11%	Yes	
Building Height (Sec. 3.1.23.D & Sec. 3.20.1)	46 feet or 3 stories, whichever is less Additional height if conditions met in Section 3.20: Max Height is 115'	Office: 56'8" (w/rooftop) Lab: 30'8" Assembly: 31'4"	Yes	<i>Building setback to be increased by 2 ft. for every 1 ft. in excess of 46' Equals an additional 21'4" in building setback.</i>
Building Setbacks (Sec 3.1.23.D) Office and Lab				
Front (Cabaret Dr.)	50 ft. + 21'4" = 61'4"	158.19 ft.	Yes	
Exterior Side (South)	50 ft. + 21'4" = 61'4"	144.18 ft.	Yes	
Rear (West)	50 ft. + 21'4" = 61'4"	155.16 ft.	Yes	
Side (North)	50 ft. + 21'4" = 61'4"	300+ ft.	Yes	
Building Setbacks (Sec 3.1.23.D) Assembly				
Front (North)	50 ft.	50+ ft.	Yes	
Side (East)	50 ft.	120 ft.	Yes	
Side (West)	50 ft.	163.25 ft.	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Rear (South)	50 ft.	50+ ft.	Yes	
Parking Setback (Sec 3.1.23.D) Refer to applicable notes in Sec 3.6.2				
Front (Cabaret Dr.)	20 ft.	110 ft.	Yes	
Exterior Side (South)	20 ft.	100 ft.	Yes	
Rear (West)	20 ft.	115 ft.	Yes	
Side (North)	20 ft.	20 ft.	Yes	
Note To District Standards (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.	All setbacks are 50 ft.	Yes	
Off-Street Parking in Front Yard (Sec 3.6.2.E)	Off-street parking is allowed in front yard	Parking is proposed in front yard and meets the parking setback requirements	Yes	
Distance between buildings (Sec 3.6.2.H)	It is governed by Sec. 3.8.2 or by the minimum setback requirements, whichever is greater	Two buildings proposed 518.06' between buildings	Yes	
Wetland/Watercourse Setback (Sec 3.6.2.M)	A setback of 25 ft. from wetlands and from high watermark course shall be maintained	Provided	Yes	
Parking setback screening (Sec 3.6.2.P)	Required parking setback area landscaped per § 5.5.3.	A landscape plan is provided	Yes	<i>Please refer to landscape review for additional information</i>
Modification of parking setback requirements (Sec 3.6.2.Q)	The Planning Commission may modify setback requirements.	Setbacks reduction is not proposed	NA	
OST District Required Conditions (Sec 3.20)				
Additional Height (Sec 3.20.1.iii.c)	Properties located west of Cabaret Drive, north of I-96 and south of 12 Mile Road, may construct up to 115 ft.	56'8"	Yes	
Loading and Unloading Screening (Sec 3.20.2.A)	Truck service areas and overhead truck loading/unloading doors shall be totally screened from view from any public right-of-way, including freeway right-	The loading dock is proposed in the interior side yard away from public right-of-way	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	of-way, and adjacent properties, except for required driveway access.			
Required Parking Calculation (Sec 3.20.2.B)	A floor plan indicating different uses, leasable floor space used for calculating parking should be shown on the plans.	Floor plans provided including square footage by use and floor	Yes	
Additional conditions for permitted uses in 3.1.23.B.ii – v (Sec 3.20.2.C)	Uses permitted under subsections 3.1.23.B.ii - v shall not be located on property sharing a common boundary with property zoned for RA, R-1, R-2, R-3, R-4 or MH district use unless conditions in section 3.20.2.C are met.	Unable to determine the type of uses. The properties zoned RA are separated by a railroad ROW and the use in the Master Plan is recommended for office uses, so the conditions of this section would not apply.	NA	
Outdoor storage (Sec 3.20.2.D)	The outdoor storage of goods or materials shall be prohibited.	Outdoor storage of shipping containers proposed	??	Clarify the intent of the shipping container storage area.
Above Ground Storage Tanks (Sec. 3.20.2.E)	<ul style="list-style-type: none"> - Shall be accessory - Shall be located in non-required rear or interior side yard that does not abut residential - In compliance with state and federal fire prevention code - Enclosed and screened from public view: 1 foot higher wall of similar material to primary building façade and contain tank with room for maintenance 	<p>Yes Yes</p> <p>Submit hazardous materials checklist</p> <p>Not proposed</p>	No	Provide details on the nitrogen tank storage enclosure.
Parking, Loading, and Dumpster Requirements				
Number of Parking Spaces (Sec.5.2.12) Office Research Assembly	<p>1 space per 222 gla 71,432/222= 322</p> <p>1 space per 700 ufa or 5 + 1 per 1.5 employees on largest shift 31,717/700= 45</p> <p>1 space per 1700 sf 42,329/700= 60</p> <p>427 spaces required</p>	498 spaces proposed	Yes	

Item	Required Code	Proposed	Meets Code	Comments
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 landscaping		Yes	
Parking stall adjacent to parking entrance (public/private) (Sec. 5.3.13)	Shall not be located closer than 25 ft. from the street ROW line, street easement or sidewalk, whichever is closer	116.5 ft. from ROW line	Yes	
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 10 ft. wide, have an outside radius of 15 ft., and be constructed 3 ft. shorter than the adjacent parking stall as illustrated in the Zoning Ordinance	End Islands are proposed wherever applicable	No	One bay of parking proposes 16 spaces near the northwest side of the lab building. Move the peninsula over one space so there are 15 parking spaces on each side.
Interior Islands (Sec. 5.5.3.C.ii.i)	- Landscape islands every 15 spaces	One bay of 16 proposed		
Barrier Free Spaces <i>Barrier Free Code</i>	For total 401 to 500 = 9 spaces including 2 van accessible	12 barrier free provided 10 van accessible 2 regular accessible	Yes	
Barrier Free Space Dimensions <i>Barrier Free Code</i>	- 8' wide with an 8' wide access aisle for van accessible spaces - 5' wide with a 5' wide access aisle for regular accessible spaces	Provided	Yes	
Barrier Free Signs <i>Barrier Free Code</i>	One sign for each accessible space.	Provided	Yes	
Bicycle Parking (Section 5.16)				

Item	Required Code	Proposed	Meets Code	Comments
Minimum number of Bicycle Parking (Sec. 5.16.1)	<u>General Offices:</u> Five (5) percent of required automobile spaces, minimum two (2) spaces For 429 – 21 bike spaces	Provided	Yes	
Bicycle Parking General requirements (Sec. 5.16)	<ul style="list-style-type: none"> - 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 - When 20 or more bicycle parking spaces are required, 25% shall be covered spaces. 	<p>Provided</p> <p>Provided</p> <p>Alternate Loop Design proposed</p> <p>Provided</p> <p>Not proposed</p>	No	Applicant should provide covered bicycle parking outdoors or indoors or request a Planning Commission waiver.
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	Provided	Yes	Applicant should provide 4 ft. maneuvering width or seek a waiver from Planning Commission to reduce the maneuvering lane width from 4 ft. to 3 ft.
Plug-in Electric Vehicle (PEV) (Sec. 5.3.15)				
PEV Charging Stations (Sec. 5.3.15)	PEV permitted anywhere off-street parking is permitted	Proposed	Yes	Provide details on PEV charging stations
	Meet all NEC and MBC codes			<i>Reviewed as part of electrical permit</i>
	Level-1 and Level-2 capable by NEC		No	Provide details on stations
	If proposed perpendicular to a 4 in curb, all ancillary structures shall be installed minimum 2 ft. from curb	Unknown	No	Provide details on location of stations
	Sidewalks shall be maintained at 5 ft.	Sidewalks are 9 ft.	Yes	2 ft. for overhang; 2 ft. for stations

Item	Required Code	Proposed	Meets Code	Comments
	MMUTCD sign and pavement standard required	Unknown	No	Provide signage and pavement markings for PEV stations
	Cords shall not extend over a walkway	Stations not near walkways	Yes	
	Spaces shall meet parking setbacks	Proposed	Yes	
	Units shall meet building setbacks	Unknown	Yes?	Provide detailed location; must be 10 ft. from building
	Units shall meet maximum height requirements	Unknown	Yes?	
Loading Spaces Sec. 5.4.1	<ul style="list-style-type: none"> - Within the OS districts, loading space shall be provided in the rear yard or - in the case of a double frontage lot, in the interior side yard, - in the ratio of 5 sq. ft. per front foot of building up to a total area of 360 sq. ft. per building. 	<p>Loading area are located in rear/interior side yards</p> <p>Office/Lab 360 sq. ft.</p> <p>Assembly 360 sq. ft.</p>	Yes	
Dumpster Sec 4.19.2.F	<ul style="list-style-type: none"> - Located in rear yard - Attached to the building or - No closer than 10 ft. from building if not attached - Not located in parking setback - If no setback, then it cannot be any closer than 10 ft, from property line. - Away from Barrier free Spaces 	<p>Proposed No</p> <p>Proposed</p> <p>Correct</p> <p>Correct</p>	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Dumpster Enclosure Sec. 21-145. (c) Chapter 21 of City Code of Ordinances	<ul style="list-style-type: none"> - 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 	<p>Correct</p> <p>Correct</p> <p>6 ft.</p> <p>Correct</p> <p>Concrete</p> <p>Wood and masonry</p>	Yes	
Exterior lighting Sec. 5.7	Photometric plan and exterior lighting details needed at time of Final Site Plan submittal	Provided	Yes	
Roof top equipment and wall mounted utility equipment Sec. 4.19.2.E.ii	All roof top equipment must be screened and all wall mounted utility equipment must be enclosed and integrated into the design and color of the building	Roof top screening indicated	Yes	
Roof top appurtenances screening	Roof top appurtenances shall be screened in accordance with applicable facade regulations, and shall not be visible from any street, road, or adjacent property.	Roof top screening indicated	Yes	
Non-Motorized Facilities				
Article XI. Off-Road Non-Motorized Facilities	8 foot pathway is required along Twelve Mile Rd and Cabaret Dr.	8 ft. path along Cabaret Dr. proposed	No	Applicant required to provide 8 ft. path along Twelve Mile Road or apply for a DCS variance.
Pedestrian Connectivity	Assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	Applicant has provided 7 ft. sidewalks to connect the office/lab to assembly and connection to Cabaret Dr.	Yes	
Building Code and Other Requirements				
Outdoor Recreation	Private outdoor recreation facilities for employee benefit only	Basketball court is proposed	Yes?	Provide information on the intent and users of the basketball court

Item	Required Code	Proposed	Meets Code	Comments
	may be considered an accessory use			
Master Plan	Roadway Master Plan shows the continuation of Fountain Walk Drive along the south property line to the west.		NA	<u>Applicant should be aware of future roadway development along the south property line.</u>
Building Code	Building exits must be connected to sidewalk system or parking lot.	Some exits have sidewalk connection	Yes	
Flagpoles (Sec. 4.19.2.B)	Flagpoles may be located within any required front or exterior side yard. Such poles shall be located no closer to a public right-of-way than one-half (½) the distance between the right-of-way and the principal building.	3 flagpoles are proposed at the main entrance on the south side of the property	Yes	<u>A building permit is required for any new flagpoles.</u>
Design and Construction Standards Manual	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).	Legal description for all parcels provided	Yes	
Site Plan and Development Manual (Chapter 5)	- Traffic Impact Study (see table) - Community Impact Statement (over: 30 acres, 10 acres SLU, 150 units)	Provided Not required	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	Refer to all review letters for additional information requested
Economic Impact	- Total cost of the proposed building &	Not provided	No	Provide in the response letter the total costs and

Item	Required Code	Proposed	Meets Code	Comments
	<p>site improvements</p> <ul style="list-style-type: none"> - Number of anticipated jobs created (during construction & after building is occupied, if known) 			anticipated jobs for this project for Planning Commission review.
<p>Development/ Business Sign & Street addressing</p> <p><u>Contact Jeannie Niland 248-347-0438.</u></p>	<ul style="list-style-type: none"> - Signage if proposed requires a permit. - The applicant should contact the Building Division for an address prior to applying for a building permit. 	<p>Proposed</p> <p>Site address will not be issued without an approved Site Plan</p>	Yes	<i>Apply for lot addressing prior to stamping set approval.</i>
Project and Street Naming	Some projects may need approval from the Street and Project Naming Committee.		NA	
Property Split	All property splits and combination must be submitted to the Assessing Department for approval.	Not sure	NA	Please clarify if a parcel split is proposed.
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	Provided	Yes	
Lighting Plan (Sec. 5.7.A.i)	Site plan showing location of all existing & proposed buildings, landscaping, streets, drives, parking areas & exterior lighting fixtures	Provided	Yes	
Building Lighting (Sec. 5.7.2.A.iii)	Relevant building elevation drawings showing all fixtures, the portions of the walls to be illuminated, illuminance levels of walls and the aiming points of any remote fixtures.	Provided	Yes	

Item	Required Code	Proposed	Meets Code	Comments
Lighting Plan (Sec.5.7.2.A.ii)	Specifications for all proposed & existing lighting fixtures	Provided	Yes	Add note for hours of operation for lighting
	Photometric data	Provided	Yes	
	Fixture height	25 ft.	Yes	
	Mounting & design	Provided	Yes	
	Glare control devices	Provided	Yes	
	Type & color rendition of lamps	LED	Yes	
	Hours of operation	Not provided	No	
	Photometric plan illustrating all light sources that impact the subject site, including spill-over information from neighboring properties	Provided	Yes	
Maximum Height (Sec. 5.7.3.A)	Height not to exceed maximum height of zoning district (or 25 ft. where adjacent to residential districts or uses	46 ft.; maximum proposed is 25 ft.	Yes	
Standard Notes (Sec. 5.7.3.B)	<ul style="list-style-type: none"> - 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 	Not provided	No	Provide notes on site plan
Security Lighting (Sec. 5.7.3.H) Lighting for security purposes shall be directed only onto the area to be secured.	<ul style="list-style-type: none"> - 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 provided	No	Show on site plan which lights are security lighting
Average Light Levels (Sec.5.7.3.E)	Average light level of the surface being lit to	4:1	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	the lowest light of the surface being lit - not exceed 4:1			
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 proposed	Yes	
Min. Illumination (Sec. 5.7.3.k)	Parking areas: 0.2 min	Provided	Yes	
	Loading & unloading areas: 0.4 min	Provided	Yes	
	Walkways: 0.2 min	Provided	Yes	
	Building entrances, frequent use: 1.0 min	Provided	Yes	
	Building entrances, infrequent use: 0.2 min	Provided	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	Not provided	No	Provide photometric data to the parcel lot line
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		NA	

NOTES:

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

ENGINEERING REVIEW



PLAN REVIEW CENTER REPORT

May 15, 2017

Engineering Review

A123 Systems
JSP17-0021

Applicant

Etkin

Review Type

Preliminary Site Plan

Property Characteristics

- Site Location: South of 12 Mile Road, West of Novi Road
- Site Size: 30.8 +/- acres
- Plan Date: 04/28/17
- Design Engineer: PEA, Inc.

Project Summary

- Construction of 78,069 square-foot office building, 32,350 square-foot laboratory building, 36,454 square-foot assembly building, and associated parking. Site access would be provided off of Cabaret Drive, a public street.
- Water service would be provided by an 8-inch extension from the existing 8-inch water main stub at the north property line of proposed site adjacent to hotel site at Cabaret Drive and by an 8-inch extension from the existing 12-inch water main stub on the southeast corner of proposed site that crossed Cabaret Drive.
- Sanitary sewer service would be provided from the existing 12-inch sanitary sewer adjacent to the west property line of the proposed site.
- Ultimate storm sewer system is not existing to service the proposed site at this time. Detention of the storm water is required. An 18-inch storm sewer (that does not appear to have adequate capacity) exists on the west side of Cabaret Drive connected to the existing detention basin on south side of Fountain Walk Drive.

Recommendation

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

Comments:

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

Additional Comments (to be addressed upon Final Site Plan submittal):

General

1. Provide a note on the plans that all work shall conform to the current City of Novi standards and specifications.
2. The City standard detail sheets are not required for the Final Site Plan submittal. They will be required with the Stamping Set submittal. They can be found on the City website (www.cityofnovi.org/DesignManual).
3. Unless there is only one legal description for the whole site, include a combined legal description on the plan for the scope of the proposed development.
4. The ultimate half right-of-way width for 12 Mile Road (to 90.0 feet from section line) may be dedicated at this time in keeping with the City's Master Road Plan.
5. Additional right-of-way across the entire frontage of proposed site for Cabaret Drive must be dedicated to the City of Novi prior to final engineering approval.
6. Soil borings shall be provided for a preliminary review of the constructability of the proposed development (pavement, basin, etc.). Borings identifying soil types, and groundwater elevation should be provided at the time of Final Site plan.

Water Main

7. The off-site hydrant that is indicated to be removed near the northwest corner of the subject parcel must be replaced. This must be noted and shown on the plans.
8. The size of the existing water main that will be tied into near the northwest corner of the site has not been noted on the plans. The size of this existing water main must be noted on the plans. If the existing hydrant lead is smaller than 8" diameter, it must be replaced with 8" diameter pipe.
9. The proposed water main should be relocated to 6 feet off of the west property line to avoid the water main being installed beneath pavement.
10. Note and show the existing off-site water main easement near the northwest corner of the site. Note liber and page numbers.
11. Note and show the existing easement of the water main on the southeast corner of the adjacent hotel site that the proposed site is connecting to. Note the liber and page numbers on plan.

12. Provide three (3) signed and sealed sets of revised utility plans along with the MDEQ permit application (1/07 rev.) for water main construction. The Streamlined Water Main Permit Checklist should be submitted to the Engineering Division for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets.

Sanitary Sewer

13. Note and show the existing easement of the sanitary sewer adjacent to the west property line of the proposed site that it is connecting to. Note the liber and page numbers on plan.
14. Provide seven (7) signed sealed sets of revised utility plans along with the MDEQ permit application (04/14 rev.) for sanitary sewer construction and the Streamlined Sanitary Sewer Permit Certification Checklist should be submitted to the Engineering Division for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets. Also, the MDEQ can be contacted for an expedited review by their office.

Storm Sewer

15. Is there any storm water pretreatment (for sediment control) provided? If so, note and show on plan.
16. An adequate maintenance access route to the basin outlet structure and any other pretreatment structures shall be provided (15 feet wide, maximum slope of 1V:5H, and able to withstand the passage of heavy equipment). Verify the access route does not conflict with proposed landscaping. It appears as if the route is shown on the plans, but it must be called out on the plans.
17. The required 25-foot vegetated buffer provided around the perimeter of storm water basin must be dimensioned on the plans.
18. Storm water agreement/detention basin agreement is required.

Storm Water Management Plan

19. The Storm Water Management Plan for this development shall be designed in accordance with the Storm Water Ordinance and Chapter 5 of the new Engineering Design Manual (refer to the runoff coefficients, 1V:4H allowable basin slopes, etc.).
20. The SWMP must detail the storm water system design, calculations, details, and maintenance as stated in the ordinance. The SWMP must address the discharge of storm water off-site, and evidence of its adequacy must be provided. This should be done by comparing pre- and post-development discharge rates and volumes. The area being used for this off-site discharge should be delineated.

Paving & Grading

21. There is a paved access driveway on the existing hotel site to the north extended at the property line of the proposed site. It appears that the intent of this driveway is to be connected to the proposed site for shared use of drive entries. If so, show proposed paved connection to this existing driveway on the plans and cross-access easement would be required.

Soil Erosion and Sediment Control

22. A SESC permit is required. A full review has not been done at this time. The review checklist detailing all SESC requirements is attached to this letter. An informal review will be complete with the Final Site Plan if SESC plans are included in the submittal.

Off-Site Easements

23. Any off-site utility easements, including the cross-access easement, anticipated must be executed **prior to final approval of the plans**. If you have not done so already, 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.

The following must be provided at the time of Final Site Plan resubmittal:

24. A letter from either the applicant or the applicant's engineer must be submitted with the Final Site Plan highlighting the changes made to the plans addressing each of the comments listed above and indicating the revised sheets involved.

The following must be submitted at the time of Final Site Plan submittal:

25. An itemized construction cost estimate must be submitted to the Community Development Department at the time of Final Site Plan submittal 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. **The cost estimate must be itemized** for each utility (water, sanitary, storm sewer), on-site paving, right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pretreatment structure and restoration).
26. Draft copies of any off-site utility easements, a recent title search, and legal escrow funds must be submitted to the Community Development Department for review and approved by the Engineering Division and the City Attorney prior to getting executed.
27. A draft copy of the private ingress/egress easement for shared use of the drive entry with the existing hotel site to the north together with the corresponding legal escrow payment must be submitted to the Community Development Department.

The following must be submitted at the time of Stamping Set submittal:

28. A draft copy of the maintenance agreement for the storm water facilities, as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department with the Final Site Plan. Once the form of the agreement is approved, this agreement must be approved by City Council and shall be recorded in the office of the Oakland County Register of Deeds.
29. An executed copy of the private ingress/egress easement for shared use of the drive entry with the existing hotel site to the north must be submitted to the Community Development Department.
30. A draft copy of the drainage easement must be submitted to the Community Development Department.
31. A draft copy of the 20-foot wide easement for the water main to be constructed on the site must be submitted to the Community Development Department.
32. A draft copy of the 20-foot wide easement for the sanitary sewer to be constructed on the site must be submitted to the Community Development Department.
33. A 20-foot wide easement where storm sewer or surface drainage crosses lot boundaries must be shown on the Exhibit B drawings of the Master Deed.
34. Executed copies of any required off-site utility easements must be submitted to the Community Development Department.

The following must be addressed prior to construction:

35. A pre-construction meeting shall be required prior to the commencement of any site work. Please contact Sarah Marchioni in the Community Development Department to setup a meeting (248-347-0430).
36. 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. Once determined, a grading permit fee must be paid to the City Treasurer's Office.
37. An NPDES permit must be obtained from the MDEQ since the site is over 5 acres in size. The MDEQ requires an approved plan to be submitted with the Notice of Coverage.
38. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department (248-347-0430) for forms and information.
39. A permit for work within the right-of-way of Cabaret Drive must be obtained from the City of Novi. The application is available from the City Engineering Division and should be filed at the time of Final Site Plan submittal. Please contact the Engineering Division at 248-347-0454 for further information.

40. A permit for water main construction must be obtained from the MDEQ. This permit application must be submitted through the Water and Sewer Senior Manager after the water main plans have been approved.
41. A permit for sanitary sewer construction must be obtained from the MDEQ. This permit application must be submitted through the Water and Sewer Senior Manager after the sanitary sewer plans have been approved.
42. Construction Inspection Fees, to be determined once the construction cost estimate is submitted, must be paid prior to the pre-construction meeting.
43. A storm water performance guarantee, equal to 1.2 times the amount required to complete storm water management and facilities as specified in the Storm Water Management Ordinance, must be posted at the Treasurer's Office.
44. A street sign financial guarantee in an amount to be determined (\$400 per traffic control sign proposed) must be posted at the Treasurer's Office.
45. Permits for the construction of each retaining wall must be obtained from the Community Development Department (248-347-0415).

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 David E. Richmond or Noel Y. Santos at (248) 844-5400 with any questions.

Very truly yours,



Noel Y. Santos, P.E.

cc: Darcy Rechten, Engineering
Theresa Bridges, Engineering
Kirsten Mellem, Community Development

LANDSCAPE REVIEW



PLAN REVIEW CENTER REPORT

May 5, 2017

Preliminary Site Plan - Landscaping

A123 Systems

Review Type

Preliminary Site Plan Landscape Review

Project Number

JSP17-0021

Property Characteristics

- Site Location: West side of Cabaret, south of Twelve Mile Road
- Parcel ID(s): 50-22-15-126-016
- Site Zoning: OST
- Adjacent Zoning: N: OST & RA; E: OST & RC; S: CSX/RA & I-96; W: CSX/RA & OST
- Plan Date: April 28, 2017

Recommendation:

This project is **recommended for approval** with the understanding that the items listed below and on the accompanying Landscape Chart will be addressed satisfactorily in the Final Site Plans.

Ordinance Considerations

This project was reviewed for conformance with Chapter 37: Woodland Protection, Zoning Article 5.5 Landscape Standards, the Landscape Design Manual and any other applicable provisions of the Zoning Ordinance. Items in **bold** below must be addressed and incorporated as part of the Preliminary Site Plan submittal. Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review is a summary and not intended to substitute for any Ordinance.

EXISTING ELEMENTS

Existing Soils (Preliminary Site Plan checklist #10, #17)

Provided.

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

1. Provided.
2. **Please clearly show all proposed hydrants and utility structures on the landscape plan.**

Existing Trees and Tree Protection (Sec 37 Woodland Protection, Preliminary Site Plan checklist #17 and LDM 2.3 (2))

1. All existing trees, tree removals and trees to be saved are shown on T-1 and T-2.
2. Tree protection fencing and fencing details have been provided.
3. **Please make tree numbers larger and more legible.**

LANDSCAPING REQUIREMENTS

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

TWELVE MILE ROAD

No development work is proposed along Twelve Mile Road so no landscaping is required.

CABARET ROAD

1. **Based on the frontage of 724.5 LF, and since the parking is at least 76 feet away from the right-of-way, the applicant may use the "Not adjacent to parking" requirements instead of the "Adjacent to parking" requirements used in the proposed landscaping. The**

required numbers of trees per the "adjacent to" requirements are provided, but the landscaping may be reduced to the lower numbers if desired. The required number of trees is 18 deciduous canopy or large evergreen trees and 29 subcanopy trees in the greenbelt, and 16 deciduous canopy trees along the street, in the right-of-way.

2. Please provide a berm south of the southern driveway per the requirements to screen the parking from view of Cabaret.
3. Please locate the location of the building address(s) on the landscape plan and provide clear views to it/them through the landscaping.

Street Tree Requirements (Zoning Sec. 5.5.3.E.i.c and LDM 1.d.)

As noted above, the "not adjacent to parking" requirement may be used for the deciduous canopy trees along the street, in the right-of-way (16) instead of the 21 provided.

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

1. Based on the paved vehicular use areas in the parking lots, 162 canopy trees are required (1 per 75 sf of paved area) within the boundaries of the parking lot. 162 are provided.
2. **Please label the individual parking areas with their sf to ensure that the islands meet the spatial requirements. Please enlarge islands where necessary.**

Parking Lot Perimeter Canopy Trees (Zoning Sec. 5.5.3.C.(3) Chart footnote)

1. Based on the perimeter noted, 109 deciduous canopy trees are required. 69 evergreen trees and 40 deciduous canopy trees, plus replacement trees, are provided around the perimeter.
2. **Aside from the evergreen trees planted along the property line west of the assembly building loading area, all perimeter evergreen trees should be changed to canopy trees with a mature canopy of at least 20 feet.**

Building Foundation Landscape (Zoning Sec 5.5.3.D.)

1. Based on the building perimeters of 1311 lf for the office building and 875 lf for the assembly building, 10,488 sf and 7,000 sf of foundation landscaping is required at the base of the respective buildings. Currently, sufficient area appears to be reserved for the required landscaping.
2. **Please add SF labels for all foundation landscaping areas to verify the foundation landscaping noted on the plans.**
3. Please provide detailed landscape plans for the foundations' landscaping in the Final Site Plans.

Storm Basin Landscape (Zoning Sec 5.5.3.E.iv and LDM 1.d.(3))

1. Bands of landscaping area indicated along the northern edge of the detention pond.
2. **Please show the high water line (HWL) of the pond on the landscape plan.**
3. **Please show the required masses of large native shrubs around 70-75% of the entire rim of the detention pond. Include the plant counts and species.**
4. **Add the seed mixes for the detention basin and disturbed areas to the plan.**

Transformer/Utility Box and Fire Hydrant Plantings (LDM 1.3 from 1-5, Zoning Sec 5.5.3.C.ii.d)

1. The required utility box screening and screening detail has been provided.
2. **Please add the location of the utility boxes to the landscape plan as soon as possible and provide the required screening.**
3. If the utility box locations are not available by the time of Final Stamping sets, please add a note stating that all transformers and utility boxes shall be screened per the standard detail.

OTHER REQUIREMENTS

Plant List, Notations and Details (LDM 2.h. and t.)

All have been provided satisfactorily. Please adjust it per the notes in the landscape chart.

Cost estimates for Proposed Landscaping (LDM 2.t.)

Cost estimates were provided. Please adjust it per the notes in the landscape chart.

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

An irrigation plan for all landscaped areas is required as part of the Final Site Plans.

Proposed topography. 2' contour minimum (LDM 2.e.(1))

Spot elevations and berm contours are provided.

Snow Deposit (LDM.2.q.)

Snow deposit areas have been noted on the plans. Please be sure that landscaping is placed such that it won't be harmed in putting the plowed snow in those locations.

Corner Clearance (Zoning Sec 5.9)

Required corner clearances are provided.

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



Rick Meader – Landscape Architect

LANDSCAPE REVIEW SUMMARY CHART

Review Date: May 5, 2017
Project Name: JSP17 – 0021: A123 SYSTEMS
Plan Date: April 28, 2017
Prepared by: Rick Meader, Landscape Architect E-mail: rmeader@cityofnovi.org;
 Phone: (248) 735-5621

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

Item	Required	Proposed	Meets Code	Comments
Landscape Plan Requirements (LDM (2))				
Landscape Plan (Zoning Sec 5.5.2, LDM 2.e.)	<ul style="list-style-type: none"> ▪ New commercial or residential developments ▪ Addition to existing building greater than 25% increase in overall footage or 400 SF whichever is less. ▪ 1"=20' minimum with proper North. Variations from this scale can be approved by LA ▪ Consistent with plans throughout set 	Yes	Yes	1. 1"=50' is okay for overall. 2. <u>Please use 1"=20' for foundation landscaping details</u>
Project Information (LDM 2.d.)	Name and Address	Yes	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	Yes	Yes	
Sealed by LA. (LDM 2.g.)	Requires original signature	Yes	Yes	<u>Need for Final Site Plan</u>
Miss Dig Note (800) 482-7171 (LDM.3.a.(8))	Show on all plan sheets	Yes	Yes	
Zoning (LDM 2.f.)	Include all adjacent zoning	Partially shown on C2.0	No	1. Site: OST 2. Adjacent: N: OST & RA; E: OST & RC; S: CSX/RA & I-96; W: CSX/RA & OST 3. Please completely show adjacent zoning.

Item	Required	Proposed	Meets Code	Comments
Survey information (LDM 2.c.)	<ul style="list-style-type: none"> ▪ Legal description or boundary line survey ▪ Existing topography 	Yes	Yes	Sheets C1.1, 1.2
Existing plant material Existing woodlands or wetlands (LDM 2.e.(2))	<ul style="list-style-type: none"> ▪ Show location type and size. Label to be saved or removed. ▪ Plan shall state if none exists. 	Yes	Yes	<ol style="list-style-type: none"> 1. Tree locations and IDs provided on Sheets T-1 and T-2 2. Removal boundaries clearly indicated. 3. Please add regulated woodland boundaries to T-1 and T-2 4. Please make tree numbers bigger so they are legible.
Soil types (LDM.2.r.)	<ul style="list-style-type: none"> ▪ As determined by Soils survey of Oakland county ▪ Show types, boundaries 	Yes	Yes	Sheet C 3.1
Existing and proposed improvements (LDM 2.e.(4))	Existing and proposed buildings, easements, parking spaces, vehicular use areas, and R.O.W	Yes	Yes	
Existing and proposed utilities (LDM 2.e.(4))	Overhead and underground utilities, including hydrants	No	No	Please clearly show and label all overhead wires on and adjacent to site on the landscape plans to minimize risk of conflicts.
Proposed grading. 2' contour minimum (LDM 2.e.(1))	Provide proposed contours at 2' interval	Yes	Yes	Sheets C4.1, C4.2
Snow deposit (LDM.2.q.)	Show snow deposit areas on plan	Yes	Yes	Coordinate snow storage areas with plantings on L1.0 so trees aren't negatively impacted.
LANDSCAPING REQUIREMENTS				
Parking Area Landscape Requirements LDM 1.c. & Calculations (LDM 2.o.)				
General requirements (LDM 1.c)	<ul style="list-style-type: none"> ▪ 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	Yes	Yes	Please make hatches used for seed and sod more different so they can be distinguished from each other.
General (Zoning Sec 5.5.3.C.ii)				

Item	Required	Proposed	Meets Code	Comments
Parking lot Islands (a, b, i)	<ul style="list-style-type: none"> ▪ A minimum of 300 SF to qualify ▪ 6" curbs ▪ Islands minimum width 10' BOC to BOC 	Yes	TBD	
Curbs and Parking stall reduction (c)	Parking stall can be reduced to 17' and the curb to 4" adjacent to a sidewalk of minimum 7 ft.	Yes	Yes	
Contiguous space limit (i)	Maximum of 15 contiguous spaces	Yes	Yes	Please shift the landscape island in the bay on the north side of the office building one space to the east to make each bay 15 spaces.
Plantings around Fire Hydrant (d)	No plantings with matured height greater than 12' within 10 ft. of fire hydrants	Unclear	TBD	Please show all hydrants and all utility structures clearly to ensure trees are at least 10 feet away from hydrants and structures. It appears that there are trees closer than 10 feet from some catch basins and manholes.
Landscaped area (g)	Areas not dedicated to parking use or driveways exceeding 100 sq. ft. shall be landscaped	Yes	Yes	
Clear Zones (LDM 2.3.(5))	25 ft corner clearance required. Refer to Zoning Section 5.5.9	Yes	Yes	
Category 1: For OS-1, OS-2, OSC, OST, B-1, B-2, B-3, NCC, EXPO, FS, TC, TC-1, RC, Special Land Use or non-residential use in any R district (Zoning Sec 5.5.3.C.iii)				
A = Total square footage of parking spaces not including access aisles x 10%	<ul style="list-style-type: none"> ▪ $A = x 10\% = sf$ ▪ $81034 * 10\% = 8103 sf$ 	Yes		
B = Total square footage of additional paved vehicular use areas (not including A) under 50,000 SF) x 5%	<ul style="list-style-type: none"> ▪ $B = x 5\% = sf$ ▪ Paved Vehicular access area includes loading areas ▪ $50000 * 5\% = 2500 sf$ 	Yes		
C = Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF)	<ul style="list-style-type: none"> ▪ $C = 151050 x 1\% = 1511 sf$ 	Yes		

Item	Required	Proposed	Meets Code	Comments
x 1 %				
Category 2: For: I-1 and I-2 (Zoning Sec 5.5.3.C.iii)				
A. = Total square footage of parking spaces not including access aisles x 7%	<ul style="list-style-type: none"> A = 7% x xx sf = xx sf 	NA		
B = Total square footage of additional Paved vehicular use areas (not including A) under 50,000 SF) x 2%	<ul style="list-style-type: none"> B = 2% x xx sf = xx sf 	NA		
C= Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF) x 0.5%	<ul style="list-style-type: none"> C = 0.5% x 0 sf = 0 SF 	NA		
All Categories				
D = A+B or A+C Total square footage of landscaped islands	8103+2500+1511 = 12114 SF	29161 SF	Yes	Please label individual parking lot island areas in SF to ensure that they fulfill the size requirement.
E = D/75 Number of canopy trees required	<ul style="list-style-type: none"> 12114/75 = 162 Trees 	162 trees	Yes	
Perimeter Green space	<ul style="list-style-type: none"> 1 Canopy tree per 35 lf 3811/35 = 109 trees 	69 evergreen trees + 40 canopy trees	No	<ol style="list-style-type: none"> 1. Parking lot perimeter trees are to be deciduous canopy trees with a mature canopy width of at least 20 feet. 2. Please change perimeter trees to species that fulfill the requirement. 3. Evergreen trees can remain as perimeter trees to screen the assembly building loading zone.
Parking land banked	<ul style="list-style-type: none"> NA 	No		
Berms, Walls and ROW Planting Requirements				
Berms				
<ul style="list-style-type: none"> Undulating form with gradual slopes are encouraged. Show 1ft. contours Berm should be located on lot line except in 				

Item	Required	Proposed	Meets Code	Comments
conflict with utilities.				
Residential Adjacent to Non-residential (Sec 5.5.3.A) & (LDM 1.a)				
Berm requirements (Zoning Sec 5.5.A)	Refer to Residential Adjacent to Non-residential berm requirements chart	NA		Property is not adjacent to residentially zoned land.
Planting requirements (LDM 1.a.)	LDM Novi Street Tree List	NA		
Cross-Section of Berms (LDM 2.j)				
Slope, height and width	<ul style="list-style-type: none"> ▪ Label contour lines ▪ Maximum 33% slope ▪ Construction of loam with 6" top layer of topsoil. 	Yes	No	Please provide construction callouts on detail (loam, topsoil, max slope)
Type of Ground Cover		No	No	Please indicate berm ground cover.
Setbacks from Utilities	Overhead utility lines and 15 ft. setback from edge of utility or 20 ft. setback from closest pole	No	No	
Walls (LDM 2.k & Zoning 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	None		
Walls greater than 3 ½ ft. should be designed and sealed by an Engineer		NA		
ROW Landscape Screening Requirements (Sec 5.5.3.B. ii)				
Greenbelt width (2)(3) (5)	Parking: 20 ft.	Minimum 72.6 feet to parking/drive.	Yes	
Min. berm crest width	Parking: 2 ft.	<ul style="list-style-type: none"> • Berm is provided along northern office parking area • No berm screens southern parking area 	No	Please provide required berm between Cabaret and the southern parking areas.
Minimum berm height (9)	Parking: 3 ft.	See above	No	Please provide required berm between Cabaret and the southern parking areas.
3' wall	(4)(7)	NA		
Canopy deciduous or large evergreen trees	<ul style="list-style-type: none"> ▪ Not adjacent to parking: 1 tree per 40 lf 	21 trees – combination of	Yes	1. Calculations are provided.

Item	Required	Proposed	Meets Code	Comments
Notes (1) (10)	<ul style="list-style-type: none"> 724.5/40 = 18 trees 	deciduous canopy and large evergreen trees		<ol style="list-style-type: none"> As parking is so far from the road, the requirements the greenbelt not adjacent to parking can be used if desired. If so, please revise calculations and trees provided accordingly. Please create good visibility between building address and road. Show location of building address on building, or sign location if number will be on sign and arrange plantings accordingly.
Sub-canopy deciduous trees Notes (2)(10)	<ul style="list-style-type: none"> Not adjacent to Parking: 1 tree per 25 lf 724.5/25 = 29 trees 	36 trees	Yes	<ol style="list-style-type: none"> Calculations are provided. See above
Canopy deciduous trees in area between sidewalk and curb (Novi Street Tree List)	<ul style="list-style-type: none"> Not adjacent to Parking: 1 tree per 45 lf 724.5/45 = 16 trees 	21 deciduous canopy trees	Yes	<ol style="list-style-type: none"> Calculations are provided. See above
Non-Residential Zoning Sec 5.5.3.E.iii & LDM 1.d (2)				
Refer to Planting in ROW, building foundation landscape, parking lot landscaping and LDM				
Interior Street to Industrial subdivision (LDM 1.d.(2))	<ul style="list-style-type: none"> 1 canopy deciduous or 1 large evergreen per 35 l.f. along ROW No evergreen trees closer than 20 ft. 3 sub canopy trees per 40 l.f. of total linear frontage Plant massing for 25% of ROW 	NA		
Screening of outdoor storage, loading/unloading (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)		<ul style="list-style-type: none"> Loading zone is on west side of assembly building, away from road and hotels. There is no loading zone for the office building. 	Yes	Building screens loading area from east, dense evergreens screen loading zone from the west
Transformers/Utility	<ul style="list-style-type: none"> A minimum of 2ft. 	No transformers or	No	1. Please show

Item	Required	Proposed	Meets Code	Comments
boxes (LDM 1.e from 1 through 5)	separation between box and the plants <ul style="list-style-type: none"> ▪ Ground cover below 4" is allowed up to pad. ▪ No plant materials within 8 ft. from the doors 	utility boxes are shown.		transformers and other utility boxes on landscape plan, and screen per the city screening detail. 2. The screening detail is included on L1.1
Building Foundation Landscape Requirements (Sec 5.5.3.D)				
Interior site landscaping SF	<ul style="list-style-type: none"> ▪ Equals to entire perimeter of the building x 8 with a minimum width of 4 ft. ▪ Office bldg: 1311 x 8 = 10,488 sf ▪ Assembly bldg: 875 lf x 8ft = 7000 SF 	<ul style="list-style-type: none"> ▪ Office bldg: 11,064 sf ▪ Assembly bldg: 7,340 sf 	Yes	1. Please label in SF each of the areas counted toward foundation landscaping. 2. Please provide detailed foundation landscaping plans in the Final Site Plan set
<i>Zoning Sec 5.5.3.D.ii. All items from (b) to (e)</i>	If visible from public street a minimum of 60% of the exterior building perimeter should be covered in green space	Only the office building will be visible from I-96 and Cabaret. 95% of the frontage on those roads is shown as being landscaped.	Yes	
Detention/Retention Basin Requirements (Sec. 5.5.3.E.iv)				
Planting requirements (Sec. 5.5.3.E.iv)	<ul style="list-style-type: none"> ▪ Clusters of large native shrubs shall cover 70-75% of the basin rim perimeter ▪ 10" to 14" tall grass along sides of basin ▪ Refer to wetland for basin mix 	Clusters of shrubs along the north side of the basin	No	1. Please show the HWL of the basin. 2. Please add required large shrubs native to Michigan around the pond to fulfill the requirement. 3. Please add seed mix to be used in and around detention basin.
LANDSCAPING NOTES, DETAILS AND GENERAL REQUIREMENTS				
Landscape Notes – Utilize City of Novi Standard Notes				
Installation date (LDM 2.i. & Zoning Sec 5.5.5.B)	Provide intended date	Between Mar 15 and Nov 15	Yes	
Maintenance & Statement of intent (LDM 2.m & Zoning Sec 5.5.6)	<ul style="list-style-type: none"> ▪ Include statement of intent to install and guarantee all materials for 2 years. ▪ Include a minimum one cultivation in 	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
	June, July and August for the 2-year warranty period.			
Plant source (LDM 2.n & LDM 3.a.(2))	Shall be northern nursery grown, No.1 grade.	Yes	Yes	
Irrigation plan (LDM 2.s.)	A fully automatic irrigation system and a method of draining is required with Final Site Plan	No		<u>Need for final site plan</u>
Other information (LDM 2.u)	Required by Planning Commission	NA		
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	
Plant List (LDM 2.h.) – Include all cost estimates				
Botanical and common names	Refer to LDM suggested plant list	Yes	Yes	
Root type		Yes	Yes	
Quantities and sizes		Yes	Yes	
Type and amount of lawn		Lawn is sod, basin is seed.	Yes	Please use hatches for sod and seed that are more easily distinguished between each other.
Species Breakdowns		See LDM 1.d.(1)(d)	No	No
Cost estimate (LDM 2.t)	For all new plantings, mulch and sod as listed on the plan	Yes	Yes	1. <u>Required for Final Site Plans.</u> 2. <u>Please use \$6/sy for sod, \$3/sy for seed. Other costs are accurate</u>
Planting Details/Info (LDM 2.i) – Utilize City of Novi Standard Details				
Canopy Deciduous Tree	Refer to LDM for detail drawings	Yes	Yes	Please add callout stating that dirt from rootball is to be removed to expose root flare.
Multi-stem tree		Yes	Yes	Please add callout stating that dirt from rootball is to be removed to expose root

Item	Required	Proposed	Meets Code	Comments
				flare.
Evergreen Tree		Yes	Yes	Please add callout stating that dirt from rootball is to be removed to expose root flare.
Shrub		Yes	Yes	
Perennial/ Ground Cover		Yes	Yes	
Tree stakes and guys. (Wood stakes, fabric guys)		Yes	Yes	
Tree protection fencing	Located at Critical Root Zone (1' outside of dripline)	Yes	Yes	
Other Plant Material Requirements (LDM 3)				
General Conditions (LDM 3.a)	Plant materials shall not be planted within 4 ft. of property line	No	Yes	Please add note near property lines stating this.
Plant Materials & Existing Plant Material (LDM 3.b)	Clearly show trees to be removed and trees to be saved.	Clearly shown on Sheets T-1 and T-2.	Yes	Please make tree numbers more legible
Landscape tree credit (LDM3.b.(d))	Substitutions to landscape standards for preserved canopy trees outside woodlands/ wetlands should be approved by LA. Refer to Landscape tree Credit Chart in LDM	No		
Plant Sizes for ROW, Woodland replacement and others (LDM 3.c)	Canopy Deciduous shall be 3" and sub-canopy deciduous shall be 2.5" caliper. Refer to section for more details	Yes	Yes	
Plant size credit (LDM3.c.(2))	NA	No		
Prohibited Plants (LDM 3.d)	No plants on City Invasive Species List	No	TBD	
Recommended trees for planting under overhead utilities (LDM 3.e)	Label the distance from the overhead utilities	No	No	Please clearly show all overhead utilities on landscape plans.
Collected or Transplanted trees (LDM 3.f)		No		
Nonliving Durable Material: Mulch (LDM 4)	<ul style="list-style-type: none"> ▪ Trees shall be mulched to 3" depth and shrubs, groundcovers to 2" depth 	Yes	Yes	Please include this information in the planting details.

Item	Required	Proposed	Meets Code	Comments
	<ul style="list-style-type: none"> ▪ Specify natural color, finely shredded hardwood bark mulch. Include in cost estimate. ▪ Refer to section for additional information 			

NOTES:

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

WETLANDS REVIEW



May 18, 2017
ECT No. 170326-0100

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

Re: A123 Systems (JSP17-0021)
Wetland Review of the Preliminary Site Plan (PSP17-0067)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the Preliminary Site Plan (Plan) for the proposed A123 Systems project prepared by PEA, Inc. dated April 28, 2017 (Plan). The Plan was reviewed for conformance with the City of Novi Wetland and Watercourse Protection Ordinance and the natural features setback provisions in the Zoning Ordinance. ECT also visited the site on May 16, 2017 in order to verify wetland boundaries.

ECT currently recommends approval of the Preliminary Site Plan for Wetlands. ECT recommends that the Applicant address the items noted in the *Wetland/Watercourse Comments* section of this letter prior to approval of the Final Site Plan.

The following wetland related items are required for this project:

Item	Required/Not Required/Not Applicable
Wetland Permit (specify Non-Minor or Minor)	Not Required
Wetland Mitigation	Not Required
Wetland Buffer Authorization	Required
MDEQ Permit	Not Required
Wetland Conservation Easement	Required

The proposed development is located south of Twelve Mile Road, between Taft Road and Cabaret Drive (Section 15). The overall project site area is 31.25 acres. The project includes the construction of a 128,936 square foot, 3-story proposed office building, 53,469 square foot, 1-story building, associated parking and utilities. Site stormwater will be managed within an on-site stormwater detention basin with a pump station and storm sewer force main. The applicant has stated that per discussions with the City of Novi Engineering Staff, the site is within an area that has been accounted for by the City's regional detention plan. ECT suggests that the City of Novi Engineering Department review this plan in order to verify that the site's stormwater will be adequately managed and meet the City's stormwater storage requirements.

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48105

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769-3164

The southern and central portions of the subject parcel consists of upland and forested areas and is bounded by the CSX Railroad on the southwest. The northern portion of the site contains both forested and wetland areas.

Based on our review of the Plan, Novi aerial photos, Novi GIS, the City of Novi Official Wetlands and Woodlands Maps (see Figure 1, attached) it appears as if this proposed project site contains City-regulated wetland areas. These wetland areas are concentrated in the northern portion of the subject site.

Onsite Wetland Evaluation

ECT has reviewed the City of Novi Official Wetland and Woodlands Map and completed an onsite wetland verification on May 16, 2017. There are several existing areas of wetlands on-site. The Plan does not appear to include any information related to when the most recent wetland delineation and wetland boundary survey was completed. Several wetland areas located on the subject site appear to be included on the City of *Novi Regulated Wetlands and Watercourse Map* (see Figure 1, attached). It should be noted that in addition to wetlands, the City of Novi also regulates the 25-foot wetland setback (i.e., buffer). The surveyed wetland boundaries are indicated on the Plan, however, the 25-foot wetland buffers are not (specifically, the plan includes a wetland boundary line A, B, and C.

As noted above, the site does contain area mapped as City regulated wetland (Figure 1). The focus of the inspection was to review site conditions in order to determine whether on-site wetlands are considered regulated under the City of Novi's Wetland and Watercourse Protection Ordinance. Wetland boundary flagging was in place at the time of this site inspection, however it is not clear how recently the wetland delineation had been completed on the site. ECT concurs with the wetland areas as indicated on the Plan. These wetlands appear to be accurately flagged in the field. The two (2) existing wetland areas also appear to be accurately indicated on the Plan.

Wetlands "A" and "B" area primarily forested and scrub-shrub wetlands located in the northern section of the subject property. These wetland areas contained standing water at the time of our site visit. These wetland areas contained the following species of vegetation: silver maple (*Acer saccharinum*), white willow (*Salix alba*), green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*) and American elm (*Ulmus americana*), as well as reed canary grass (*Phalaris arundinacea*). The following wildlife was observed within the wetlands at the time of our evaluation: white-tailed deer (*Odocoileus virginianus*), mallard ducks (*Anas platyrhynchos*), and painted turtle (*Chrysemys picta*).

While the majority of these wetland areas are of good quality, it should be noted that areas of the wetlands are littered with various pieces of debris/trash including glass and metal (cans), old appliances (washing machine) and the body of an old automobile. Ideally, this debris should be removed from these wetland areas.

What follows is a summary of the wetland impacts associated with the proposed site design.

Wetland Impact Review

The Plan currently does not propose impacts to wetlands. All development will remain outside of the wetland boundaries.

Although the 25-foot wetland setbacks are not indicated on the Plan, impact to the 25-foot setback near Wetland Flag A3 appears to be proposed. It appears as if grading in the northeast corner of the development site will encroach into the wetland buffer. This apparent impact has not been indicated or quantified on the Plan.

The applicant should graphically indicate and quantify all permanent and temporary impacts to all wetland and 25-foot wetland setback on the Plan. The applicant shall show the following information on subsequent site plans:

- Areas of all existing wetlands (square feet or acres);
- Areas of all existing wetland buffers (square feet or acres);
- Area (square feet) and volume (cubic yards) of all wetland impacts (both permanent and temporary), if applicable;
- Area (square feet) of all existing 25-foot wetland buffers;
- Area (square feet) and volume (cubic yards) of all wetland buffer impacts (both permanent and temporary).

As no wetland impacts appear to be currently proposed, wetland mitigation will not be required. The City's threshold for wetland mitigation is 0.25-acre of wetland impact and the MDEQ's threshold is 0.30-acre.

Permits & Regulatory Status

The purpose of the City of Novi Wetland and Watercourse Protection Ordinance is described in the City of Novi Code of Ordinances, Part II, Chapter 12, Article V.; Division 1. This section states that:

- (a) The wetlands and watercourses of the city are indispensable and fragile natural resources subject to floodwater capacity limitations, erosion, soil bearing capacity limitations and other hazards. In their natural state, wetlands and watercourses provide many public benefits, such as the maintenance of water quality through nutrient cycling and sediment trapping, and flood and stormwater runoff control through temporary water storage, slow release and groundwater recharge. In addition, wetlands provide open space, passive recreation, fish and wildlife habitat, including migratory waterfowl and rare, threatened or endangered animal and plant species. The continued destruction and loss of wetlands and watercourses constitutes a distinct and immediate danger to the public health, safety and general welfare.
- (b) Throughout the state, considerable acreage of these important natural resources has been lost or impaired by draining, dredging, filling, excavating, building, pollution and other acts inconsistent with the natural uses of such areas. Remaining wetlands and watercourses are in jeopardy of being despoiled or impaired. Consequently, it is the policy of the city to prevent a further net loss of those wetlands that are: (1) contiguous to a lake, pond, river or stream, as defined in Administrative Rule 281.921; (2) two (2) acres in size or greater; or (3) less than two (2) acres in size, but deemed essential to the preservation of the natural resources of the city under the criteria set forth in subsection 12-174(b).
- (c) Pursuant to Mich. Const. 1963, Art. IV, § 52, the conservation and development of natural resources of the state is a matter of paramount public concern in the interest of the health, safety and general welfare of the people. Pursuant to the Michigan Environmental Protection Act, MCL 324.1701, et seq., it is the responsibility of public and private entities to prevent the pollution, impairment or destruction of the air, water or other natural resources by their conduct. It is, therefore, the policy of the city to protect wetlands and watercourses while taking into account varying ecological, hydrologic, economic, recreational and aesthetic values. Activities which may damage wetlands and watercourses shall be located on upland sites outside of upland woodland areas, unless there are no less harmful, feasible and prudent alternatives to the proposed activity. When an activity will result in the impairment or destruction of a wetland, mitigation shall be required in accordance with section 12-173(e)1.b.
- (d) It is the purpose of this article to protect the public health, safety and welfare through the protection of wetlands and watercourses. To meet these purposes, this article establishes standards and procedures for the review of proposed activities in wetlands and watercourses, provides for the issuance of use permits

for approved activities, requires coordination with other applicable ordinances, statutes and regulations and establishes penalties for the violation of this article.

Any proposed use of the on-site wetlands would require a City of Novi *Wetland Use Permit* as well as an *Authorization to Encroach the 25-Foot Natural Features Setback* for any proposed impacts to the 25-foot wetland buffers. The on-site wetlands are considered essential by the City as they appear to meet one or more of the essentiality criteria set forth in the City's Wetland and Watercourse Protection Ordinance (i.e., storm water storage/flood control, wildlife habitat, etc.).

The Michigan Department of Environmental Quality (MDEQ) generally regulates wetlands that are within 500 feet of a waterbody, regulated stream or are part of wetland system greater than 5 acres in size. It is the applicant's responsibility to contact MDEQ in order to confirm the regulatory authority with respect to the on-site wetland areas should any impacts to wetlands be proposed. The MDEQ does not regulate the 25-foot wetland buffer as does the City of Novi.

Wetland Comments

Please consider the following comments when preparing subsequent site plan submittals:

1. The current Plan does not graphically indicate the 25-foot wetland setback areas on the Plan. Please review and revise as necessary.
2. Although the 25-foot wetland setbacks are not indicated on the Plan, impact to the 25-foot setback near Wetland Flag A3 appears to be proposed. It appears as if grading in the northeast corner of the development site will encroach into the wetland buffer. This apparent impact has not been indicated or quantified on the Plan. ECT recommends that the existing wetland buffers be preserved. The applicant could modify the site grading in this area and/or provide a retaining wall.
3. In general, the following information shall be provided on future site plan submittals:
 - Acreages of all on-site wetlands (square feet or acres);
 - Indicate and label all 25-foot wetland buffers as necessary on the Plan;
 - Indicate, label and quantify any proposed impacts to the wetland and 25-foot wetland buffers on the Plan. The area (square feet or acres) of all impacts to the wetland and 25-foot buffers shall be indicated on the Plan. All impacts (both permanent and temporary shall be indicated on the Plan);
 - The volume (cubic feet or cubic yards) of all permanent wetland impacts shall be indicated on the Plan, if applicable.
4. While the majority of these wetland areas are of good quality, it should be noted that areas of the wetlands are littered with various pieces of debris/trash including glass and metal (cans), old appliances (washing machine) and the body of an old automobile. Ideally, this debris should be removed from these wetland areas.
5. The Applicant shall provide wetland conservation easements as directed by the City of Novi Community Development Department for any areas of remaining wetland as well as for any proposed wetland mitigation areas (if necessary). A Conservation Easement shall be executed covering all remaining wetland areas on site. This language shall be submitted to the City Attorney for review. The executed

A123 Systems (JSP17-0021)
Wetland Review of the Preliminary Site Plan (PSP17-0067)
May 18, 2017
Page 5 of 8

easement must be returned to the City Attorney within 60 days of the issuance of the City of Novi Wetland and Watercourse permit.

Recommendation

ECT currently recommends approval of the Preliminary Site Plan for Wetlands. ECT recommends that the Applicant address the items noted in the *Wetland/Watercourse Comments* section of this letter prior to approval of the Final Site Plan.

If you have any questions regarding the contents of this letter, please contact us.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.



Peter Hill, P.E.
Senior Associate Engineer

cc: Sri Komaragiri, City of Novi Planner
Richelle Leskun, City of Novi Planning Assistant
Rick Meader, City of Novi Landscape Architect
Kirsten Mellem, City of Novi Planner

Attachments: Figure 1. City of Novi Regulated Wetland & Woodland Map
Site Photos



Figure 1. City of Novi Regulated Wetland & Woodland GIS Coverage Map (approximate project boundary shown in red). Regulated Woodland areas are shown in green and regulated Wetland areas are shown in blue.

Site Photos



Photo 1. Looking southeast at existing forested wetland near the eastern edge of the project site (ECT, May 16, 2017).



Photo 2. Looking southeast at existing forested wetland near the eastern edge of the project site (ECT, May 16, 2017). Litter should be removed from the wetlands.



Photo 3. Looking northwest towards existing wetland boundary "C" in northwest section of the project site (ECT, May 16, 2017). Litter should be removed from the wetlands.



Photo 4. Looking southeast towards existing wetland boundary "B" (area of wetland flags B-30 and B-31), ECT, May 16, 2017.

WOODLANDS REVIEW



May 18, 2017
ECT No. 170326-0200

Ms. Barbara McBeth
City Planner
Community Development Department
City of Novi
45175 West Ten Mile Road
Novi, MI 48375

Re: A123 Systems (JSP17-0021)
Woodland Review of the Preliminary Site Plan (PSP17-0067)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the Preliminary Site Plan for the proposed A123 Systems project prepared by PEA, Inc. dated April 28, 2017 (Plan). The Plan was reviewed for conformance with the City of Novi Woodland Protection Ordinance Chapter 37. ECT conducted a woodland evaluation for the property on May 16, 2017.

ECT recommends approval of the Preliminary Site Plan for Woodlands; however, the Applicant should address the items noted below in the *Woodland Comments* Section of this letter prior to receiving Woodland approval of the Final Site Plan.

The following woodland related items are required for this project:

Item	Required/Not Required/Not Applicable
Woodland Permit	Required
Woodland Fence	Required
Woodland Conservation Easement	Required

The proposed development is located south of Twelve Mile Road, between Taft Road and Cabaret Drive (Section 15). The overall project site area is 31.25 acres. The project includes the construction of a 128,936 square foot, 3-story proposed office building, 53,469 square foot, 1-story building, associated parking and utilities. A tree survey has previously been completed for the site.

The purpose of the Woodlands Protection Ordinance is to:

- 1) *Provide for the protection, preservation, replacement, proper maintenance and use of trees and woodlands located in the city in order to minimize disturbance to them and to prevent damage from erosion and siltation, a loss of wildlife and vegetation, and/or from the destruction of the natural habitat. In this regard, it is the intent of this chapter to protect the integrity of woodland areas as a whole, in recognition that woodlands serve as part of an ecosystem, and to place priority on the preservation of woodlands, trees, similar woody vegetation, and related natural resources over development when there are no location alternatives;*

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48105

(734)
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769-3164

- 2) *Protect the woodlands, including trees and other forms of vegetation, of the city for their economic support of local property values when allowed to remain uncleared and/or unharvested and for their natural beauty, wilderness character of geological, ecological, or historical significance; and*
- 3) *Provide for the paramount public concern for these natural resources in the interest of health, safety and general welfare of the residents of the city.*

What follows is a summary of our findings regarding on-site woodlands associated with the proposed project.

On-Site Woodland Evaluation

ECT has reviewed the City of Novi Official Woodlands Map and completed an onsite Woodland Evaluation on May 16, 2017. ECT's in-office review of available materials included the City of Novi Regulated Woodland map and other available mapping. The subject property includes area that is indicated as City-regulated woodland on the official City of Novi Regulated Wetland and Watercourse Map (see Figure 1). Much of the area included within the project's limits of disturbance contains shrubby, somewhat-disturbed, open field character as well as some trees and understory (shrubs).

An existing tree survey has been completed for the site and is included as Sheet T-1.0 (*Tree Preservation Plan*). The Plan also includes an *Existing Tree List* (Sheet T-1.1) that identifies tree tag numbers, diameter-at-breast-height (DBH), common/botanical name, and condition of all surveyed trees. The *Tree Preservation Plan* includes a Tree Replacement Calculation table that lists the total woodland replacements credits that are required for the proposed tree removals. It should be noted that the Tree Tag Numbers are difficult to read on the *Tree Preservation Plan*. Please revise the Plan as necessary (perhaps 2 sheets will need to be provided at a smaller/closer scale).

The surveyed trees have been marked with aluminum tree tags allowing ECT to compare the tree diameters reported on the *Existing Tree List* to the existing tree diameters in the field. ECT found that the Plan appears to accurately depict the location, species composition and the size of the existing trees. ECT took a sample of diameter-at-breast-height (DBH) measurements and found that the data provided on the Plan was consistent with the field measurements.

The highest quality woodlands on site are found in and around the forested wetland area on the northeast side of the project site (near northeastern limits of disturbance area). In general, the on-site trees consist of silver maple (*Acer saccharinum*), box elder (*Acer negundo*), black locust (*Robinia pseudoacacia*), American elm (*Ulmus americana*), black cherry (*Prunus serotina*), cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), white oak (*Quercus alba*) and Norway spruce (*Picea abies*).

In terms of habitat quality and diversity of tree species, the overall subject site consists of fair to good quality trees. In terms of a scenic asset, wildlife habitat, windblock, noise buffer or other environmental asset, the forested area located on the subject site is considered to be of fair to good quality. As noted above, the northern section of the site is mapped as Regulated Woodland on the City of Novi's Regulated Woodland Map. There are a number of trees to be removed for the proposed development. While the trees indicated for removal fall outside of the City of Novi's mapped Woodland Boundaries, the City's Woodland Ordinance contains the following:

Where uncertainty exists with respect to the boundaries of designated woodland areas shown on the regulated woodland map, the following rules shall apply:

- *Distances not specifically indicated on the map shall be determined by the scale on the map;*
- *Where physical or natural features existing on the ground are at variance with those shown on the regulated woodland map, or in other circumstances where uncertainty exists, the community development director or his or her designee shall interpret the woodland area boundaries;*
- *On any parcel containing any degree of regulated woodland, the applicant shall provide site plan documentation showing the locations, species, size and condition of all trees of eight-inch caliper or larger. Existing site understory trees, shrubs and ground cover conditions must be documented on the site plan or woodland use permit application plan in the form of a brief narrative. The woodland conditions narrative should include information regarding plant species, general quantities and condition of the woodland vegetation*

It is ECT's opinion that the areas containing surveyed trees on the Plan, including within the project's proposed limits of disturbance, should be considered as Regulated Woodland area. As such, there are physical and natural features existing on the site that are at variance with those shown on the regulated woodland map. The Woodland Ordinance also defines Woodland Areas as:

All lands (including all trees, shrubs and ground cover thereon regardless of size) which are subject to this chapter under section 37-4 as designated on the regulated woodland map and/or on an approved site plan. Woodlands areas are identified by such factors as: soil quality, habitat quality, tree species and diversity, health and vigor of tree stand, understory species and quality, presence of wildlife, and other factors such as the value of the woodland area as a scenic asset, windblock, noise buffer, healthy environment, and the value of historic or specimen trees.

Proposed Woodland Impacts and Replacements

The Applicant has noted the following woodland impacts associated with the Plan:

- Total Trees: 380
- Total Trees Removed: 118 (31% of total surveyed)
 - Regulated Trees Removed: 64
 - 'Exempt' Trees Removed: 54
- Regulated Trees Preserved: 262 (69%)

- Stems to be Removed 8" to 11": 55 x 1 replacement (Requiring 55 Replacements)
- Stems to be Removed 11" to 20": 8 x 2 replacements (Requiring 16 Replacements)
- Stems to be Removed 20" to 30": 1 x 3 replacements (Requiring 3 Replacements)
- Stems to be Removed 30"+: 0 x 4 replacements (Requiring 0 Replacements)

- Total Woodland Replacements Required: 74

Sheet L-1.0 (*Landscape Plan*) notes that all 74 required Woodland Replacement trees will be provided for on-site.

City of Novi Woodland Review Standards, Woodland Permit Requirements & Proposed Impacts

Based on Section 37-29 (*Application Review Standards*) of the City of Novi Woodland Ordinance, the following standards shall govern the grant or denial of an application for a use permit required by this article:

No application shall be denied solely on the basis that some trees are growing on the property under consideration. However, the protection and conservation of irreplaceable natural resources from pollution, impairment, or destruction is of paramount concern. Therefore, the preservation of woodlands, trees, similar woody vegetation, and related natural resources shall have priority over development when there are location alternatives.

In addition,

"The removal or relocation of trees shall be limited to those instances when necessary for the location of a structure or site improvements and when no feasible and prudent alternative location for the structure or improvements can be had without causing undue hardship".

The City of Novi regulates all trees 8-inches diameter-at-breast-height (DBH) and greater that are located within the areas delineated as regulated woodlands on the City-Regulated Woodlands Map. The City also regulates any individual tree greater than or equal to 36-inches DBH, irrespective of whether such tree is within a regulated woodland. Proposed woodland impacts will require a Woodland Permit and the regulated trees shall be relocated or replaced by the permit grantee.

It should be noted that the Plan proposes a total of 118 tree removals. Of these, the applicant notes that 54 of these trees (46%) should be treated as exempt because the trees indicated as exempt (EX-1) are considered less than 50% healthy per the International Society of Arboriculture ratings. ECT will need to further assess the condition of these 54 trees during an additional site evaluation because some of the trees were still in the process of 'leaf-out' during our site inspection.

The Landscape Plan (Sheet L-1.0) states that the 74 required Woodland Replacement Trees will be provided on-site for the 64 regulated trees to be removed. It is not clear however which trees are proposed as Woodland Replacements. It appears as if some Tulip trees, red oak, river birch, swamp white oak, London Planetree, eastern white pine, Douglas fir, and white spruce are proposed as Woodland Replacements. Please review the City of Novi Woodland Tree Replacement Chart (attached) as some of the species of tree proposed as Woodland Replacement are not acceptable to the City (i.e., Douglas fir and London Planetree). The applicant shall review and revise the Landscape Plan and the associated Plant Schedule to list the quantities and species of Woodland Replacement Trees in table-form (i.e., indicate which trees are being proposed as Woodland Replacement trees in the *Tree Plant List*).

Woodland Comments

Please consider the following comments when submitting future site development plan submittals:

1. It should be noted that the Tree Tag Numbers are difficult to read on the *Tree Preservation Plan*. Please revise the Plan as necessary (perhaps 2 sheets will need to be provided at a smaller/closer scale so that the tag numbers are legible).
2. It should be noted that the Plan proposes a total of 118 tree removals. Of these, the applicant notes that 54 of these trees (46%) should be treated as exempt because the trees indicated as exempt (EX-1) are

considered less than 50% healthy per the International Society of Arboriculture ratings. ECT will need to further assess the condition of these 54 trees during an additional site evaluation because some of the trees were still in the process of 'leaf-out' during our site inspection. ECT will provide recommendations related to final number of replacement trees required during the Final Site Plan review.

3. Please add a column to the *Existing Tree List* (Sheet T-.11) that indicates how many Woodland Replacement Credits are required for each tree to be removed.
4. The Landscape Plan (Sheet L-1.0) states that the 74 required Woodland Replacement Trees will be provided on-site. It is not clear however which trees are proposed as Woodland Replacements. The applicant shall review and revise the Landscape Plan and the associated Plant Schedule to list the quantities and species of Woodland Replacement Trees in table-form (i.e., indicate which trees are being proposed as Woodland Replacement trees in the *Tree Plant List*).
5. Woodland Replacement trees shall be relocated or replaced by the permit grantee either through approved on-site replacement trees or through a payment to the City of Novi Tree Fund. All deciduous replacement trees shall be two and one-half (2 ½) inches caliper or greater and will be counted at a 1:1 replacement ratio. All proposed coniferous replacement trees shall be 6-feet in height (minimum) and will be counted at a 1.5:1 replacement ratio. See the attached City of Novi Woodland Replacement Chart for acceptable woodland replacement species.
6. It should be noted that Encore London Planetree, Douglas fir, river birch and Frontier elm do not qualify as eligible for Woodland Replacement tree credit. Please review the City of Novi Woodland Replacement Chart (attached) and revise the landscaping plans as necessary.
7. A Woodland Replacement Performance financial guarantee for the planting of replacement trees will be required. This financial guarantee will be based on the number of on-site woodland replacement trees (credits) being provided at a per tree value of \$400.
8. The Applicant will be required to pay the City of Novi Tree Fund at a value of \$400/credit for any Woodland Replacement tree credits that cannot be placed on site.
9. Based on a successful inspection of the installed on-site Woodland Replacement trees, the Woodland Replacement Performance Guarantee shall be returned to the Applicant. A Woodland Maintenance and Guarantee bond equal to twenty-five percent (25%) of the value of the original Woodland Replacement material will then be kept for a period of 2-years after the successful inspection of the tree replacement installation.
10. The Applicant shall provide preservation/conservation easements as directed by the City of Novi Community Development Department for any areas of remaining woodland and woodland replacement trees. The applicant shall demonstrate that the all proposed woodland replacement trees and existing regulated woodland trees to remain will be guaranteed to be preserved as planted with a conservation easement or landscape easement to be granted to the city. This language shall be submitted to the City Attorney for review. The executed easement must be returned to the City Attorney within 60 days of the issuance of the City of Novi Woodland permit.

A123 Systems (JSP17-0021)
Woodland Review of the Preliminary Site Plan (PSP17-0067)
May 18, 2017
Page 6 of 10

11. Replacement material should not be located 1) within 10' of built structures or the edges of utility easements and 2) over underground structures/utilities or within their associated easements. In addition, replacement tree spacing should follow the *Plant Material Spacing Relationship Chart for Landscape Purposes* found in the City of Novi *Landscape Design Manual*.

Recommendation

ECT recommends approval of the Preliminary Site Plan for Woodlands; however, the Applicant should address the items noted in the *Woodland Comments* Section of this letter prior to receiving Woodland approval of the Final Site Plan.

If you have any questions regarding the contents of this letter, please contact us.

Respectfully submitted,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.



Pete Hill, P.E.
Senior Associate Engineer

cc: Sri Komaragiri, City of Novi Planner
Richelle Leskun, City of Novi Planning Assistant
Rick Meader, City of Novi Landscape Architect
Kirsten Mellem, City of Novi Planner

Attachments: Figure 1 – City of Novi Regulated Wetland & Woodland Map
Woodland Tree Replacement Chart

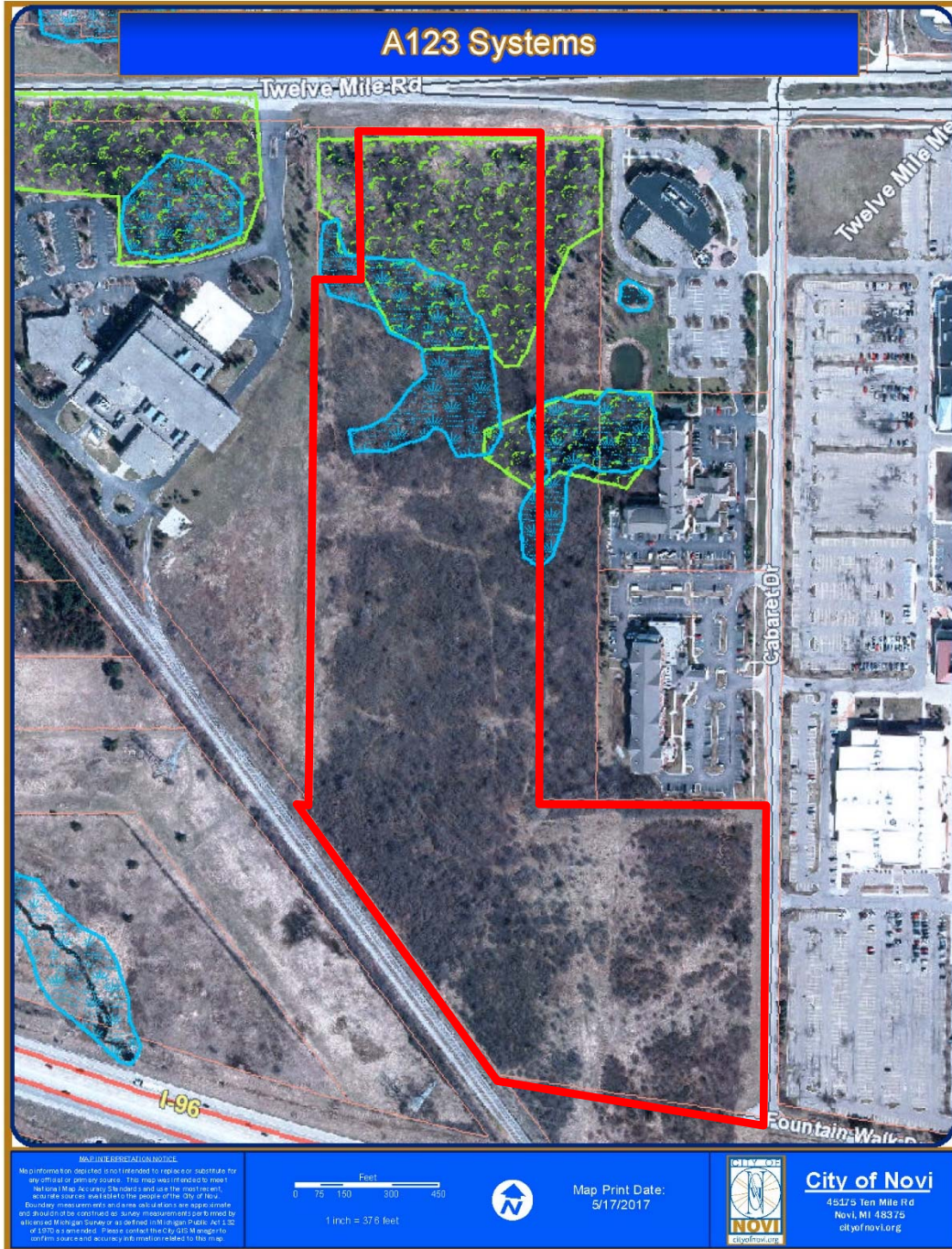


Figure 1. City of Novi Regulated Wetland & Woodland Map (approximate project boundary shown in red). Regulated Woodland areas are shown in green and regulated Wetland areas are shown in blue.

Site Photos



Photo 1. Looking west at area of southern portion of project site. Shrubby, somewhat-disturbed, open-field character (ECT 5/16/2017).



Photo 2. The surveyed trees were marked with aluminum tree tags allowing ECT to compare the tree diameters reported on the *Existing Tree List* to the existing tree diameters in the field. Tree #1075 (11" black walnut on north end of site to be preserved). ECT 5/16/2017.



Photo 3. The highest quality woodlands on site are found in and around the forested wetland area on the northeast side of the project site (near northeastern limits of disturbance area). (ECT 5/16/2017).



Photo 4. Looking north towards area of forested wetland in the northeast section of the proposed project site (ECT 5/16/2017).

Woodland Tree Replacement Chart

(from Chapter 37 Woodlands Protection)

(All canopy trees to be 2.5" cal or larger, evergreens as listed)

Common Name	Botanical Name
Black Maple	Acer nigrum
Striped Maple	Acer pennsylvanicum
Red Maple	Acer rubrum
Sugar Maple	Acer saccharum
Mountain Maple	Acer spicatum
Ohio Buckeye	Aesculus glabra
Downy Serviceberry	Amelanchier arborea
Yellow Birch	Betula alleghaniensis
Paper Birch	Betula papyrifera
American Hornbeam	Carpinus caroliniana
Bitternut Hickory	Carya cordiformis
Pignut Hickory	Carya glabra
Shagbark Hickory	Carya ovata
Northern Hackberry	Celtis occidentalis
Eastern Redbud	Cercis canadensis
Yellowwood	Cladrastis lutea
Beech	Fagus sp.
Thornless Honeylocust	Gleditsia triacanthos inermis
Kentucky Coffeetree	Gymnocladus dioica
Walnut	Juglans sp.
Eastern Larch	Larix laricina
Sweetgum	Liquidambar styraciflua
Tuliptree	Liriodendron tulipifera
Tupelo	Nyssa sylvatica
American Hophornbeam	Ostrya virginiana
White Spruce_(1.5:1 ratio) (6' ht.)	Picea glauca
Black Spruce_(1.5:1 ratio) (6' ht.)	Picea mariana
Red Pine	Pinus resinosa
White Pine_(1.5:1 ratio) (6' ht.)	Pinus strobus
American Sycamore	Platanus occidentalis
Black Cherry	Prunus serotina
White Oak	Quercus alba
Swamp White Oak	Quercus bicolor
Scarlet Oak	Quercus coccinea
Shingle Oak	Quercus imbricaria
Burr Oak	Quercus macrocarpa
Chinkapin Oak	Quercus muehlenbergii
Red Oak	Quercus rubra
Black Oak	Quercus velutina
American Bladdernut	Staphylea trifolia
Bald Cypress	Taxodium distichum
American Basswood	Tilia americana
Hemlock (1.5:1 ratio) (6' ht.)	Tsuga canadensis

TRAFFIC REVIEW



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

Project name:
JSP17-0021 Fountain Office Building (A123)
Preliminary Traffic Review

From:
AECOM

Date:
May 18, 2017

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

CC:
Sri Komaragiri, Kirsten Mellem, George Melistas,
Theresa Bridges, Richelle Leskun, Darcy Rechten

Memo

Subject: Fountain Office Building (A123) Preliminary Traffic Review

The 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, Etkin Management, is proposing an office development in the northwest quadrant of the intersection of Cabaret Drive and Fountain Walk Avenue, south of Twelve Mile Road, and east of the railroad that crosses Twelve Mile Road near Taft Road.
2. The development will consist of two buildings: one will be used as an office/lab space and is three stories and the other will be used for assembly. The gross floor area for each use is as follows: 89,290 square feet of offices, 39,646 square feet of lab area, and 53,469 square feet for assembly; totaling 182,405 square feet.
3. The gross floor area for the assembly area is also listed as 52,911 square feet in the parking calculations. The applicant should clarify the proper square footage of the assembly area. This review will assume 53,469 square feet as it is the more conservative value. It should also be noted that the provided impact study uses 52,911 square feet for the assembly area.
4. Twelve Mile Road is under the jurisdiction of the Road Commission for Oakland County (RCOC). Cabaret Drive and Fountain Walk Avenue are under the jurisdiction of the City of Novi.
5. The site is currently zoned OST.
6. Summary of potential need for waivers/variances:
 - a. **The applicant should modify the parking layout in the area mentioned above or seek a Planning Commission waiver for the 16 consecutive spaces.**
 - b. **The applicant should update the plans to include covered bicycle parking or seek a waiver.**

TRAFFIC IMPACTS

1. AECOM performed an initial trip generation estimate based on the ITE Trip Generation Manual, 9th Edition, as follows:

ITE Code: 710 (General Office Building), 760 (Research and Development), 140 (Manufacturing)
Development-specific Quantity: 89,290 sq. ft. general office, 39,646 sq. ft. of research and development, 53,469 sq. ft. of assembly.
Zoning Change: N/A

Trip Generation Summary					
	City of Novi Threshold	General Office Building Estimated Trips	Research and Development Estimated Trips	Manufacturing Estimated Trips	Total Trips
AM Peak-Hour, Peak-Direction Trips	100	154	49	17	220
PM Peak-Hour, Peak-Direction Trips	100	149	52	31	232
Daily (One-Directional) Trips	750	1,205	322	187	1,714

2. The number of trips does exceed the City’s threshold of more than 750 trips per day or 100 trips per either the AM or PM peak hour. The applicant has provided a traffic impact study performed by Fleis and VandenBrink dated April 27, 2017. The traffic impact study will be addressed in a separate letter with comments based on the analysis and the results of the impact study.

EXTERNAL SITE ACCESS AND OPERATIONS

The following comments relate to the external interface between the proposed development and the surrounding roadway(s).

1. The applicant has proposed two access points to the development from Cabaret Drive.
2. The development meets the required frontage requirements for two driveways.
3. The Hilton Garden Inn, which is located to the north of the proposed development, installed a stub at the time of construction for purposes of future access management. The applicant should provide a connection to that stub for access management purposes.
4. Both proposed driveways do not meet City spacing standards for driveways on opposite sides of undivided roads with the driveway located on the east side of Cabaret Drive, south of Emagine Theater.
5. The driveway designs are compliant with the City of Novi Code of Ordinances.
6. Any warrants for roadway modifications such as right turn lanes or left turn passing lanes will addressed within the traffic impact study review letter.

7. It should be noted that the southbound right lane on Cabaret Drive ends just north of the proposed north driveway. The applicant should consider extending the right lane to the southern extents of the site. It should also be noted that driveways are not to be constructed along existing roadway tapers (Novi Code of Ordinances Chapter 11 Article IX Sec. 11-216.A.4).
8. The applicant shall provide details indicating that at least 410 feet (or 450 feet if the southbound right lane of Cabaret Drive is extended) of sight distance is provided at both proposed driveways (Novi Code of Ordinances Chapter 11 Article VIII Figure VIII-E).

INTERNAL SITE OPERATIONS

The following comments relate to the on-site design and traffic flow operations.

1. General Traffic Flow
 - a. Additional information is needed to assess the accessibility for large trucks and emergency vehicles in the areas of the loading zones. Also see comment C below.
 - b. The applicant should increase the turning radius at the entrance near the assembly building located to the north of the covered walkway from 10 feet to 15 feet.
 - c. The applicant is required to provide the total square footage of each loading area (Novi Zoning Ordinance Section 5.4). The applicant should also provide the intended use of each loading zone and the maximum vehicle size intended to use each loading zone.
 - d. The proposed dumpster locations may potentially block the aisle on the west side of the building during trash pick-up periods. The applicant should consider relocation of the proposed dumpster locations.
 - e. The applicant should strongly consider the addition of traffic control to the internal four-leg intersection to improve site operations and safety.
 - f. Consider increasing the turning radii near the concrete pad for shipping containers to 15 feet to ensure accessibility for large trucks to the area.
2. Parking Facilities
 - a. The City Zoning Ordinance requires one parking space for every 222 square feet of leasable floor area of office use, one space for every 700 square feet of usable floor area of lab use, and one space for every 700 square feet of assembly use OR five spaces plus one space for every employee in the largest shift OR five spaces plus one space for every 1,700 square feet of usable floor area (whichever is greater).
 - i. The applicant has indicated that one space per every 1,700 square feet is required for the assembly facility, but then uses one space per 700 square feet in their calculations. Clarification should be provided to discern which figures were intended to be used for final calculations.
 - b. The total required parking spaces for the development is 429 spaces, as indicated in the plans.
 - c. Within the parking calculations, the applicant used 52,911 square feet as the gross floor area for the assembly area. However, 53,469 square feet of gross floor area for the assembly area is used elsewhere throughout the plans. The total number of calculated parking spaces still equals 429 spaces.
 - d. The applicant used 80% of the total floor area as the usable floor area.
 - e. The applicant has provided 498 total spaces which exceeds the required amount of parking spaces by 69 spaces.
 - f. The applicant has provided 12 barrier free parking spaces, which exceeds ADA requirements. Two of these spaces are required to be van accessible.
 - g. The sign legend indicates only seven total barrier free parking signs for 12 barrier free parking spaces. The A barrier free parking sign should also be placed at each van accessible parking space and van accessible parking plaque.
 - h. Parking spaces are generally in compliance with City standards. However, in areas where parking spaces 19 feet in length are located adjacent to landscaped areas, six inch curbs are required. Four inch curbs are required for parking spaces 17 feet in length. Update the plans to include six inch curbs for parking spaces

that are 19 feet in length. The note regarding a maximum curb height of four inches on Sheets C-3.1 and C-3.2 should be removed.

- i. Along the north side of the office building, the applicant has proposed 16 consecutive spaces without a landscape island. The city allows a maximum of 15 consecutive spaces without a landscape island (Novi Zoning Ordinance 5.5.3.C.ii.i). **The applicant should modify the parking layout in the area mentioned above or seek a Planning Commission waiver for the 16 consecutive spaces.**
 - j. Parking end islands are required to be three feet shorter than the adjacent parking space. The applicant should indicate this requirement on the plans.
 - k. The applicant should provide additional details for the executive parking area and should consider providing signs as necessary.
 - l. The applicant should provide additional details for the plug in posts for electric cars. Vehicles are required to have a two foot overhang for a parking space length of 17 feet. Based on the appearance of the location of the posts on the plans, the posts may limit the overhang length.
 - m. Barrier free parking dimensions are in compliance with City and ADA standards.
 - n. The applicant is required to provide 25 bicycle parking spaces. The applicant has provided 36 bicycle parking spaces.
 - o. The applicant should show that bicycle parking is no greater than 120 feet from the entrance being served or the nearest parking space to that entrance.
 - p. Consider splitting up the bicycle parking spaces to serve more than one entrance.
 - q. The City of Novi Zoning Ordinance requires 25% of bicycle parking spaces to be covered when 20 or more bicycle parking spaces are required unless the Planning Commission chooses to waive Novi Zoning Ordinance Section 5.16.5.E. **The applicant should update the plans to include covered bicycle parking or seek a waiver.**
 - r. The access aisle between the bicycle parking racks should be at least four feet in length (Novi Zoning Ordinance Section 5.16.6).
 - s. The pavement in front of the bicycle parking spaces should be at least 6 feet in length (Novi Zoning Ordinance Section 5.16.6).
3. Sidewalk Requirements
- a. Sidewalks widths are generally in compliance with City standards. The applicant should provide a width for the proposed sidewalk along Cabaret Drive.
 - b. The applicant should consider providing a sidewalk adjacent to the north driveway connecting the proposed sidewalk on Cabaret Drive to the assembly building while also providing crosswalks as necessary.
 - c. Consider a sidewalk across from the proposed sidewalk stub on the north east corner of the building to provide a connection to the Cabaret Drive sidewalk.
 - d. ADA ramps are required at the sidewalk within the large median island in the parking lot.
 - e. The applicant should provide sidewalk ramp dimensions and details in future submittals. Ramps must also be in compliance with ADA standards.
4. All on-site signing and pavement markings shall be in compliance with the Michigan Manual on Uniform Traffic Control Devices. The following is a discussion of the proposed signing.
- a. Signing and pavement markings are generally in compliance with City standards. However, the proposed stop sign (R1-1) should be 30"x30".
 - b. The applicant should reconsider the strategy behind the layout of the no parking signs. Generally no parking signs are only needed in areas with a long curbed roadway where cars may be more likely to park.
 - c. The crosswalk detail on sheet C-7.1 details a 5 foot wide crosswalk with a 12 inch wide stripes that are 48 inches o.c. Michigan Department of Transportation standards requires the crosswalk to be six feet in width with 24 inch gaps between each stripe.
 - d. The international symbol of accessibility is required to have rounded corners.
 - e. Sign posts are required to be U-channel and either size 2# or 3#.

Memo

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

Sincerely,

AECOM

A handwritten signature in blue ink that reads "Sterling Frazier". The signature is fluid and cursive.

Sterling Frazier, E.I.T.
Reviewer, Traffic/ITS Engineer

A handwritten signature in blue ink that reads "Maureen Peters". The signature is fluid and cursive.

Maureen N. Peters, PE
Senior Traffic/ITS Engineer

TRAFFIC IMPACT STUDY REVIEW



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

Project name:
JSP17-0002 Hino Motors Traffic Impact Study
Review

From:
AECOM

Date:
May 18, 2017

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

CC:
Sri Komaragiri, Kirsten Mellem, George Melistas,
Theresa Bridges, Richelle Leskun, Darcy Rechten

Memo

Subject: A123 Traffic Impact Study Review

The traffic impact study was reviewed to the level of detail provided and AECOM **recommends denial** for the applicant to move forward with the condition that the comments provided below are adequately addressed to the satisfaction of the City. It should be noted that AECOM is requesting additional support documentation and evaluation information as part of this review letter.

GENERAL COMMENTS

1. Etkins Management is proposing an office/research and development center located in the northwest quadrant of Cabaret Drive and Fountain Walk Avenue.
2. The current site plan includes 89,290 square feet of general office building and 39,646 square feet of research and development space, and 53,469 square feet of assembly area. However, the traffic impact study uses 52,911 square feet for the assembly area, which is assumed to be an error listed in the plans.
3. The development has proposed two driveways which are both located on Cabaret Drive. One driveway is located to the north of the Emagine Theater Driveway and the other driveway is located to the South of the Emagine Theater Driveway.
4. Figures 2 and 3 should be updated to disinclude the "777/777" to indicate that turning movements are not applicable at that location for that figure.
5. The intersections included in the study are as follows:
 - a. 12 Mile Road and Cabaret Drive
 - b. Donelson Drive and Fountain Walk Drive
 - c. Cabaret Drive and the Emagine Theater Driveway
 - d. Both site access locations on Cabaret Drive.

Existing Conditions

1. Turning movement counts were collected by Traffic Data Collection, Inc. on Tuesday, April 11, 2017. Turning movement counts were collected for both the AM and PM peak periods at the intersections of 12 Mile Road & Cabaret Drive and Donelson Drive & Fountain Walk Drive.
2. 24-hour traffic counts were also collected at locations on Cabaret Drive north of the Emagine Theater driveway and at Fountain Walk Avenue east of Cabaret Drive.

3. The study incorporates dummy intersections where access is provided between study intersections (i.e. the Emagine Theater driveway) in order to account for sink and source volumes.
4. The study analyzes the existing peak hour delays and Levels of Service (LOS) of the study intersections under existing conditions. Typically, a LOS of D is considered the lowest acceptable LOS. The results of the Synchro (traffic analysis software) analysis indicate that the majority of the approaches from the study intersections operate at LOS D or better. The sole approach that operated below LOS D is the westbound 12 Mile Road crossover (i.e. the southbound approach of the intersection of 12 Mile Road and Cabaret Drive). Under existing conditions, the westbound 12 Mile Road crossover operates at LOS E during the AM peak hour.
5. The study suggests removing the flash operations during the AM peak hour at the intersection of 12 Mile and Cabaret Drive in order to increase the LOS for the westbound 12 Mile Road crossover. Currently, the westbound 12 Mile Road crossover and the northbound Cabaret Drive approach are under stop-control from the flash operations. Results indicate that removing the signal from flash will increase the LOS to D. However, the study does not indicate which timing plan was applied to the signal in order to produce this LOS. It should be noted that the corresponding LOS for delay differs between signalized and stop control approaches and that removing flash operations would increase the amount of delay for the westbound 12 Mile Road crossover, but it would decrease the LOS for that approach.

Background Traffic

1. The study reviews historical traffic volume data in order to determine a growth rate to adjust traffic volumes for the build-out year of 2018. Based on the historical growth rates for 12 Mile Road and expected population and employment growth within the City of Novi to the year 2040, the study determined that a background growth rate should not be applied.
2. The study incorporated expected traffic from future planned developments in the vicinity of the study area. The expected traffic volumes from both future developments, Commerce Park and Dixon Meadows, were obtained from their individual traffic impact studies and were added to the existing 12 Mile Road volumes. The study intersections were then re-analyzed to account for the expected traffic from these developments.
3. The volume added to Twelve Mile Road from the Commerce Park impact study is inconsistent with the site generated traffic provided in the study for the PM peak hour.
4. Figure 3 should indicate that existing traffic volumes are also included in the turning movement counts.
5. The results of the background traffic analysis indicate that the intersection of 12 Mile Road and Cabaret Drive will operate in a similar manner to existing conditions and increases in delay from future developments is minimal. This was the only study intersection affected by background traffic. All other study intersections are expected to operate as described in existing conditions.
6. The delay for the crossover decreased from existing conditions to background conditions, while the volumes increased. The LOS for the crossover is LOS E as in existing conditions. The study should go into greater detail on this item or correct any errors that may have occurred in the results.
7. The study re-analyzed the signal under background traffic conditions while removing the signal at 12 Mile Road and Cabaret Drive from flash operations. The results indicated that the LOS for the crossover is expected to be improved from LOS E to LOS D. However, the study does not indicate which timing plan was applied to the signal in order to produce this LOS.

Trip Generation

1. The 9th edition of the ITE *Trip Generation Manual* was used to estimate the number of daily and AM and PM peak hour trips to the proposed development. Land uses 710 (General Office Building) and 760 (Research and Development Center), and Manufacturing (140) were used to estimate the number of trips.
2. Some of the trip generation estimates in Table 6 were calculated using incorrect methods. The average daily trips for the research and development land use was calculated using the fitted curve equation; however, the trips for that

land use should have been calculated using the average rate based on the Trip Generation Handbook Guidelines. It should be noted that this results in 144 less trips per day for the research and development land use. The same error also applies to the AM peak hour trips for the Manufacturing land use. It should be noted that this results in an increase of 25 trips during the AM peak hour for the manufacturing land use.

3. As mentioned in the general comments section, there is a discrepancy in the square footage for the manufacturing land use in the plans. A square footage of 52,911 and 53,469 are both listed for the manufacturing land use. Until further clarification is provided by the developer, the more conservative square footage of 53,469 should be used, which will increase the number of estimated trips for the land use.
4. The letter should further discuss how the trip distribution percentages were calculated. The percentages show the majority of the traffic coming from eastbound 12 Mile; however, the existing volumes given in the report do not support that large of a percentage.
5. The report states that the site generates an estimated 247 total trips during the AM peak hour and 264 total trips during the PM peak hour. The report also states that the site is expected to generate 1,856 daily total trips.

Future Conditions

1. The estimated site-generated trips were added to the background traffic volumes and the delay and LOS for each study intersection was analyzed.
2. Generally, approaches for all study intersections operate at an acceptable LOS. However, it is anticipated that the westbound 12 Mile Road crossover at Cabaret Drive will operate at LOS F with a significant amount of delay during the AM peak period. Because of the crossover approach, the entire intersection of 12 Mile Road of Cabaret Drive is also anticipated to operate at LOS E during the AM peak period.
3. It should be noted that although the delay is extremely high for the westbound 12 Mile Road crossover at Cabaret Drive, the study notes that queues are not anticipated to exceed six vehicles. The storage length of the crossover is approximately 300 feet.
4. In order to attempt to improve the poor LOS of the 12 Mile Road crossover approach, the intersection was re-analyzed during the AM peak without the signal in flash operations. The delay decreased significantly and the LOS increased to D, which is an acceptable level. However, the study does not indicate which timing plan was applied to the signal in order to produce this LOS.
5. The text indicates that all approaches operate under LOS C or better for both peak periods under fewer conditions; however Table 9 indicates that two approaches operate at LOS D.

Conclusions and Recommendations

6. The study analyzed the proposed driveway spacing against the City of Novi's Code of Ordinances. The two proposed driveways exceed the same-side driveway spacing requirement by 175 feet. The Emagine Theater driveway is located between the two driveways on the opposite side of Cabaret Drive. The south driveway meets the City's opposite-side driveway requirements, but the north driveway was 50 feet short of meeting the required 200 feet which is required in the City's Code of Ordinances.
7. Because the north site driveway did not meet opposite-side spacing requirements, the study evaluated left turns for the north site driveway and the Emagine Theater driveway. The analysis resulted in findings that indicated that there is minimal queuing and left turn conflicts do not exist in the area of the two driveways that do not meet spacing standards.
8. The study evaluated the warrants for left and right turn lanes at the site driveways. The north site driveway warranted a right turn taper.
9. The study evaluated sight distance at both site driveways the study found that the line of site for both driveways exceeds the required 410 feet.

10. Overall, the majority of the intersection approaches, with the exception of the westbound 12 Mile Road crossover, operate at LOS D or better during both the AM and PM peak hour. In order to increase the LOS of the westbound 12 Mile Road crossover at Cabaret Drive the report suggests removing the signal from flash operations for the AM peak hour. However, the study does not indicate which timing plan was applied to the signal in order to produce this LOS.
11. The report suggests that network simulations indicate that significant vehicle queues are not expected; however, the report should address vehicle queues at the approaches of the site driveways in order to ensure that the maximum queue length does not interfere with parking or internal traffic operations.
12. Overall, AECOM requires additional information to provide clarification to the comments above before approving the traffic impact study. The information required includes:
 - a. Updated trip generation numbers using the correct methodologies and gross floor areas.
 - b. Insight for how the background delay at 12 Mile Road and Cabaret Drive decreased when adding additional background traffic.
 - c. Insight for how the trip distribution percentages were established.
 - d. The signal timings used to produce the LOS stated in the improvement analyses.

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

Sincerely,

AECOM



Sterling J. Frazier, E.I.T.
Reviewer, Traffic/ITS Engineer



Maureen N. Peters, PE
Senior Traffic/ITS Engineer

TRAFFIC IMPACT STUDY FROM APPLICANT

RECEIVED

APR 28 2017

CITY OF NOVI
COMMUNITY DEVELOPMENT



Memo

VIA EMAIL

To: Mr. Josh Suardini
Etkin, LLC

From: Michael J. Labadie, PE
Brandon M. Hayes, PE, P.Eng.
Fleis & VandenBrink

Date: April 27, 2017

Re: Fountain Office Park
City of Novi, Michigan
Traffic Impact Study

Introduction

This memorandum presents the results of the Traffic Impact Study (TIS) for the proposed Fountain Office Park development. The project site is located in the northwest quadrant of Cabaret Drive & Fountain Walk Drive in Novi, Michigan. The site is currently zoned OST (Office Service and Technology). The project site is currently undeveloped and the proposed project includes 89,290 SF of office space, 39,646 SF of lab space, and 52,911 SF of assembly space, for a grand total of 181,847 SF. Site access is proposed via two site driveways; one access north of the existing intersection of Cabaret Drive & Fountain Walk Drive and one access north of the intersection of the Emagine Theater driveway on Cabaret Drive. Per the City of Novi Community Development Department's *Site Plan and Development Manual (Section 1)*, and as noted in the Pre-Application review meeting letter dated March 24, 2017, a Traffic Impact Study (TIS) is required.

12 Mile Road is under the jurisdiction of the Road Commission for Oakland County (RCOC), while Cabaret Drive and Fountain Walk Drive are under the jurisdiction of the City of Novi. This TIS has been completed to identify the impacts (if any) of the proposed development on the following study intersections:

- 12 Mile Road & Cabaret Drive,
- Donelson Drive & Fountain Walk Drive,
- Cabaret Drive & Emagine Theater Drive,
- The proposed site access location on Cabaret Drive.

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

Data Collection

The existing weekday turning movement traffic volume data were collected by F&V subconsultant Traffic Data Collection, Inc. (TDC) on Tuesday, April 11, 2017. Intersection turning movement counts were collected during the weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods the study intersections of 12 Mile Road & Cabaret Drive, and Donelson Drive & Fountain Walk Drive. In addition, 24-hour ATR counts were collected on Cabaret Drive (north of the Emagine Theatre driveway) and on Fountain Walk Drive (east of Cabaret Drive). This data was used as a baseline to establish existing traffic conditions

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without the proposed development. The peak hour volumes for each intersection were utilized for this study and the volumes were balanced upward through the study network. At locations where access is provided between study intersections, “dummy” intersections were used to account for sink and source volumes, and through volumes were carried along the main study roadways. Additionally, F&V collected an inventory of existing lane use and traffic controls and obtained existing traffic signal timing information from RCOC. The applicable data referenced in this memorandum are attached.

Existing Conditions

Existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 10) traffic analysis software. This analysis was based on the existing lane use and traffic control shown on the attached Figure 1, the existing peak hour traffic volumes shown on the attached Figure 2, and the methodologies presented in the *Highway Capacity Manual, 6th Edition (HCM6)*. Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. Additionally, SimTraffic network simulations were reviewed to evaluate network operations and vehicle queues. The existing conditions results are attached and summarized in Table 1.

Table 1: Existing Intersection Operations

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	Free		3.0	A
		NB	18.9	C	41.8	D
		X/O	40.2	E	43.2	D
		Overall	2.4	A	12.2	B
2. Cabaret Drive & Emagine Theatre Drive	STOP (Minor)	WB	8.8	A	9.2	A
		NB	Free		Free	
		SB LT	0.0**	A	0.0**	A
3. Fountain Walk Drive & Donelson Drive	STOP (All-Way)	EB	7.3	A	7.4	A
		WB	7.2	A	7.2	A
		SB	6.6	A	6.7	A

The results of the existing conditions analysis show that nearly all approaches and movements at the study intersections currently operate at a LOS D or better during both peak periods. The only exception is the southbound approach at the 12 Mile Road and Cabaret Drive intersection. This signalized intersection uses flash operation during the AM peak hour, with the eastbound 12 Mile Road intersection operating as a free-flow movement. Therefore, this signalized intersection was analyzed as a two-way stop-controlled intersection, causing the southbound crossover movement to operate at a LOS E.

Existing Conditions Improvements

In order to improve traffic operations to a LOS D or better for all intersection approaches and movements, mitigation measures were evaluated, as summarized below.

12 Mile Road & Cabaret Drive

Signal timing adjustments are expected to mitigate critical LOS under existing conditions. The following improvements should be implemented:

- Remove traffic signal flash operation and operate as a two-phase signal during the AM peak hour.

The existing intersection operations with the proposed mitigation measures are summarized in Table 2.



Table 2: Existing Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak	
			Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	4.2	A
		NB	44.2	D
		X/O	41.8	D
		Overall	8.0	A

The results of the existing conditions analysis with improvements show that the signalized study intersection approaches and movements are expected to operate acceptably at a LOS D or better during the AM peak period. A review of network simulations showed acceptable traffic operations during the AM peak hour.

Background Conditions

Historical traffic volume data was reviewed in order to determine the applicable growth rate for the existing traffic volumes to the project build-out year of 2018. The historical growth rates for 12 Mile Road were referenced. RCOC data indicates that between 2010 and 2012, the Average Annual Daily Traffic (AADT) volumes were stagnant. In addition, the SEMCOG community profile for the City of Novi was reviewed; this showed a declining population growth from 2015 to 2040 and a marginal employment growth from 2010 to 2040. Therefore, no background traffic growth was assumed for this study for the analysis of background conditions *without the proposed development*.

In addition to background growth, it is important to account for traffic that is expected to be generated by approved developments within the vicinity of the study area that have yet to be constructed or are currently under construction. The City's traffic consultant (AECOM) identified two background developments near the study area and requested that they be included in the analysis of background conditions:

- The *Commerce Park* rezoning application was in the southwest quadrant of 12 Mile Road & Taft Road. Tetra Tech completed the rezoning study traffic analysis and identified a maximum allowable Research & Development Center building size of 240,000 SF. The trip generation analysis completed by Tetra Tech has been reproduced in **Table 3** below.
- The *Dixon Meadows* development in the northeast quadrant of the 12 Mile Road & Dixon Road will include 95 single family homes. The TIS for this development was completed by Fleis & VandenBrink. The projected site traffic volumes illustrated in the *Dixon Meadows* TIS were used for the analysis of background conditions in the Fountain Office Park TIS.

A review of these background traffic studies revealed that impacts to the Fountain Office Park study area would be limited to 12 Mile Road. Therefore, only the intersection of 12 Mile Road & Cabaret Drive was analyzed under background conditions.

Table 3: Commerce Park Rezoning Background Site Trip Generation

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Research & Development	760	240,000	SF	1,947	232	47	279	41	232	273

Background Operations

Background peak hour vehicle delays and LOS were calculated based on the existing lane use and traffic control shown on the attached Figure 1, the background traffic volumes shown on the attached Figure 3, and the methodologies presented in the HCM. The results of the background conditions assessment are attached and summarized in Table 4.



Table 4: Background Intersection Operations

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	Free		3.2	A
		NB	19.3	C	42.4	D
		X/O	37.2	E	42.7	D
		Overall	3.3	A	11.9	B

The results are summarized in Table 3 and show that all study intersection approaches and movements are expected to continue to operate in a manner similar to existing conditions during both the AM and PM peak hours and minor increases in delay will not be discernable. Review of network simulations also indicates traffic operations will be similar to existing conditions.

Background Conditions Improvements

In order to improve traffic operations to a LOS D or better for all intersection approaches and movements under background conditions, mitigation measures that were identified under existing conditions were applied. The results of the background conditions assessment with improvements are attached and summarized in Table 5.

Table 5: Background Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak	
			Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	4.3	A
		NB	44.1	D
		X/O	41.6	D
		Overall	9.0	A

The results of the background conditions analysis with improvements show that all study intersection approaches and movements are expected to operate acceptably at a LOS C or better during both peak periods. A review of network simulations showed acceptable traffic operations during both peak hours.

Site Trip Generation Analysis

The number of AM and PM peak hour vehicle trips that would be generated by the proposed development was forecast based on data published by ITE in the *Trip Generation Manual, 9th Edition*. The site trip generation forecast for the proposed development is summarized in Table 6.

Table 6: Site Trip Generation

Land Use	ITE		Average Daily Traffic	AM Peak Hour			PM Peak Hour			
	Code	Amount		In	Out	Total	In	Out	Total	
General Office Building	710	89,290	SF	1,205	154	21	175	30	148	178
Research & Development	760	39,646	SF	466	48	10	58	9	52	61
Manufacturing	140	52,911	SF	185	11	3	14	9	16	25
New Trips				1,856	213	34	247	48	216	264

The vehicle trips that would be generated by the proposed development were assigned to the study road network based on existing peak hour traffic patterns, the proposed site plan, and the methodologies published by ITE. This methodology indicates that new trips will return to their direction of origin. The site trip distributions used in the analysis are summarized in Table 7.

Table 7: Site Trip Distribution

To / From	New Trips Via	AM	PM
North / East	12 Mile Road X/O	45%	45%
South / East	Fountain Walk Drive	23%	23%
West	12 Mile Road	32%	32%
		100%	100%

The site-generated vehicle trips were assigned to the study road network based on these trip distribution patterns and are shown on the attached Figure 4. The site-generated trips were added to the background traffic volumes to calculate the future peak hour traffic volumes shown on the attached Figure 5.

Future Conditions

Future peak hour vehicle delays and LOS *with the proposed development* were calculated based on the existing lane use and traffic control, the future traffic volumes, the proposed site access plan, and the methodologies presented in the HCM. Additionally, SimTraffic simulations were reviewed to evaluate network operations and vehicle queues. The results of the future conditions analysis are attached and are summarized in Table 8.

Table 8: Future Intersection Operations

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	Free		6.3	A
		NB	22.0	C	52.2	D
		X/O	389.0	F	34.8	C
		Overall	48.6	E	19.8	B
2. Cabaret Drive & Emagine Theatre Drive	STOP (Minor)	WB	9.3	A	9.5	A
		NB	Free		Free	
		SB LT	0.0**	A	0.0**	A
3. Fountain Walk Drive & Donelson Drive	STOP (All-Way)	EB	7.4	A	7.8	A
		WB	7.7	A	7.4	A
		SB	6.8	A	6.8	A
4. Cabaret Drive & N. Site Drive	STOP (Minor)	EB	10.2	B	10.2	B
		NB LT	7.7	A	7.4	A
		SB	Free		Free	
5. Cabaret Drive & S. Site Drive	STOP (Minor)	EB	8.7	A	9.2	A
		NB LT	7.3	A	7.4	A
		SB	Free		Free	

The results show that all study intersection approaches and movements are expected to continue to operate in a manner similar to background conditions during both the AM and PM peak hours with the exception of the southbound approach at the 12 Mile Road & Cabaret Drive intersection, which now operates at a LOS F. With the addition of the proposed development, all approaches at both site driveways operate at a LOS B or better during the AM and PM peak hours.

A review of network simulations showed traffic operations which are generally similar to background conditions. No significant vehicle queues are expected at any of the study intersections. Although delays are

high on the southbound approach at the 12 Mile Road & Cabaret Drive intersection, queues at this location generally did not exceed six vehicles.

Future Conditions Improvements

In order to improve traffic operations to a LOS D or better for all intersection approaches and movements under future conditions, mitigation measures that were identified under existing conditions were applied. The results of the future conditions assessment with improvements are attached and summarized in Table 8.

The results of the future conditions analysis with improvements show that all study intersection approaches and movements are expected to operate acceptably at a LOS C or better during both peak periods. A review of network simulations showed acceptable traffic operations during both peak hours.

Table 9: Future Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak	
			Delay (s/veh)	LOS
1. 12 Mile Road & Cabaret Drive	Signalized	EB	6.1	A
		NB	40.6	D
		X/O	43.0	D
		Overall	13.2	B

Access Management

Driveway Spacing

The proposed site driveways on Cabaret Drive were evaluated according to the commercial driveway spacing requirements outlined in Section 11-216 of the City Ordinance. These requirements indicate that the driveways on the same side of the street should provide a back-to-back curb spacing of 185 feet. The proposed distance between the N. and S. Site Driveways is 360 feet, and therefore exceeds the recommended spacing.

The Emagine Theatre Drive is located between the N. and S. Site Driveways on the opposite side of Cabaret Drive. The City of Novi Ordinance recommends 200 feet upstream, and 150 feet downstream driveway spacing on the opposite side of the road. The distance from the Emagine Theatre Drive to the N. Site Driveway (upstream) is 150 and 180 from the S. Site Driveway (downstream).

The S. Site Driveway exceeds the recommended spacing. The N. Site Driveway was further reviewed and since the concern with offset driveways is left-turn interlock, the northbound and southbound left-turns were evaluated. The results of the analysis shows there is minimal queuing and no conflicting left-turn movements. Therefore, the proposed driveways as shown on the site plan will operate well and no changes to locations as shown are necessary for the safe operations of the site.

Turn Lanes

The City of Novi warrants for left and right-turn lanes and tapers were evaluated at the proposed Site Driveways. The results of this analysis shows that only right-turn deceleration taper is warranted at the proposed N. Site Drive. The City of Novi Turn Lane Warrants at both site driveways are attached.

Sight Distance

The City of Novi intersection sight distances were reviewed. The speed limit on Cabaret Drive is 40 mph, therefore a clear sight line of 410 feet is required at both proposed site driveways. Cabaret Drive is generally straight and flat adjacent to the proposed site, therefore the sight distance evaluation essentially evaluated clear vision at the site driveways, as illustrated on Figure 6. The results shows that there is adequate sight distance at the proposed site access drives.

Conclusions

The conclusions of this Traffic Impact Study are as follows:

1. The results of the existing conditions analysis show that nearly all approaches and movements at the study intersections currently operate at a LOS D or better during both peak periods, with the exception of the southbound approach at the 12 Mile Road & Cabaret Drive intersection. A review of vehicle simulations indicated that significant vehicle queues are not present during the peak periods.
2. The following mitigation measures are recommended under existing conditions in order to improve traffic operations to a LOS D or better for all intersection approaches and movements.

12 Mile Road & Cabaret Drive

- Remove traffic signal flash operation and operate as a two-phase signal during the AM peak hour.
3. The analysis of background conditions **without the proposed development** show operations similar to existing conditions and any increases in delay would not be discernable.
 4. The analysis of future conditions **with the proposed development** shows that operations would be similar to background conditions. A review of network simulations showed traffic operations which are similar to background conditions with acceptable traffic operations observed during both the AM and PM peak hours. Two-phase signal operation of the 12 Mile Road and Cabaret Drive traffic signal will mitigate critical LOS at this location.
 5. The proposed site development is not expected to have a significant impact on the study intersections.
 6. The proposed driveways as shown on the site plan will operate well and no changes to locations as shown are necessary for the safe operations of the site.

Attached: Figures 1-6
Traffic Volume Data
SEMCOG Data
Synchro / SimTraffic Results
RCOC Auxiliary Lane Warrants

BMH:mjl:jmk

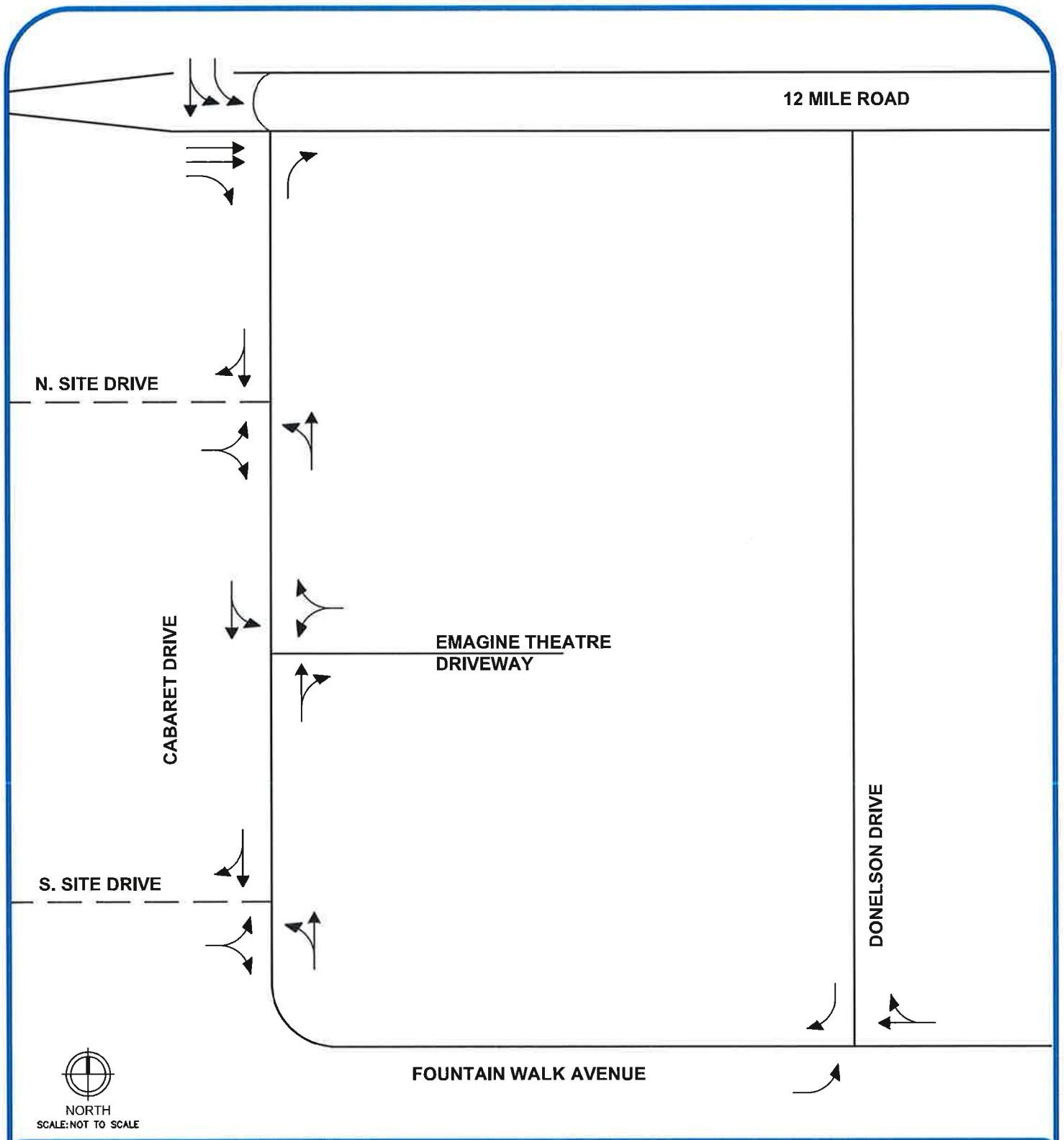


FIGURE 1 LANE USE AND TRAFFIC CONTROL

FOUNTAIN OFFICE PARK TIS - NOVI, MI

LEGEND

- ROADS
- LANE USE
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

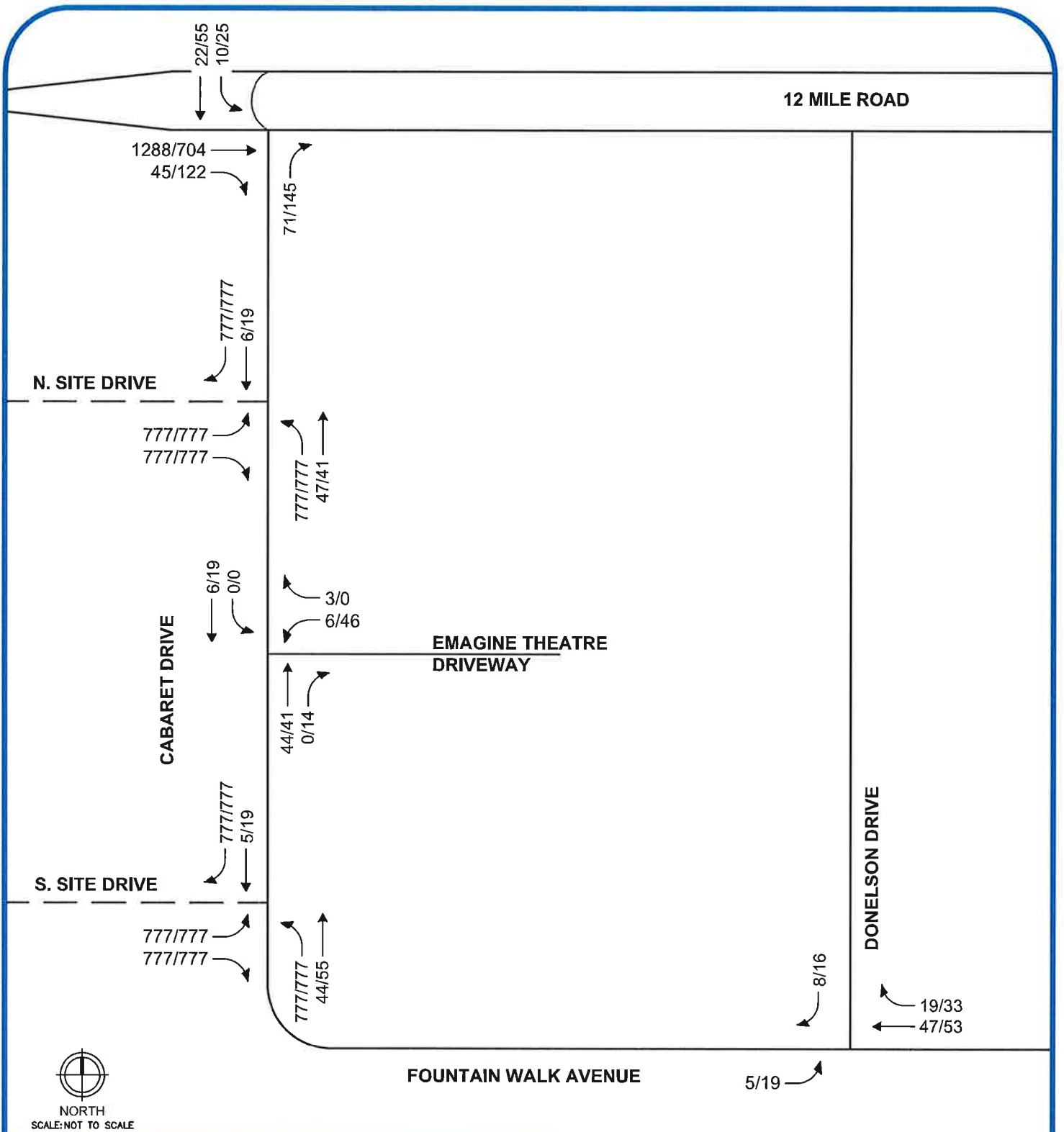


FIGURE 2 EXISTING TRAFFIC VOLUMES

FOUNTAIN OFFICE PARK TIS - NOVI, MI

LEGEND

- ROADS
- TRAFFIC VOLUMES (AM/PM)
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

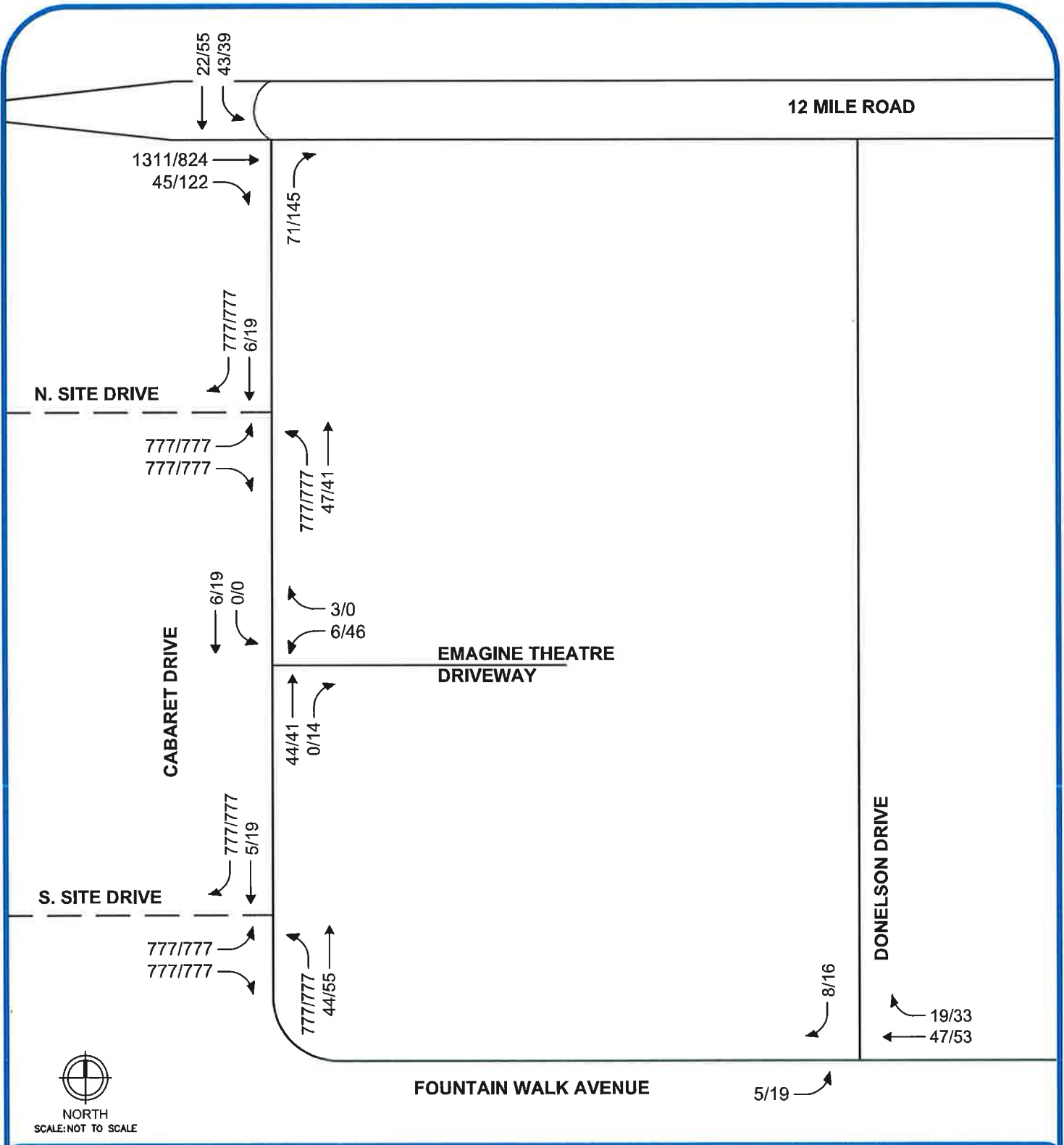


FIGURE 3 BACKGROUND TRAFFIC VOLUMES

FOUNTAIN OFFICE PARK TIS - NOVI, MI

LEGEND

- ROADS
- TRAFFIC VOLUMES (AM/PM)
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

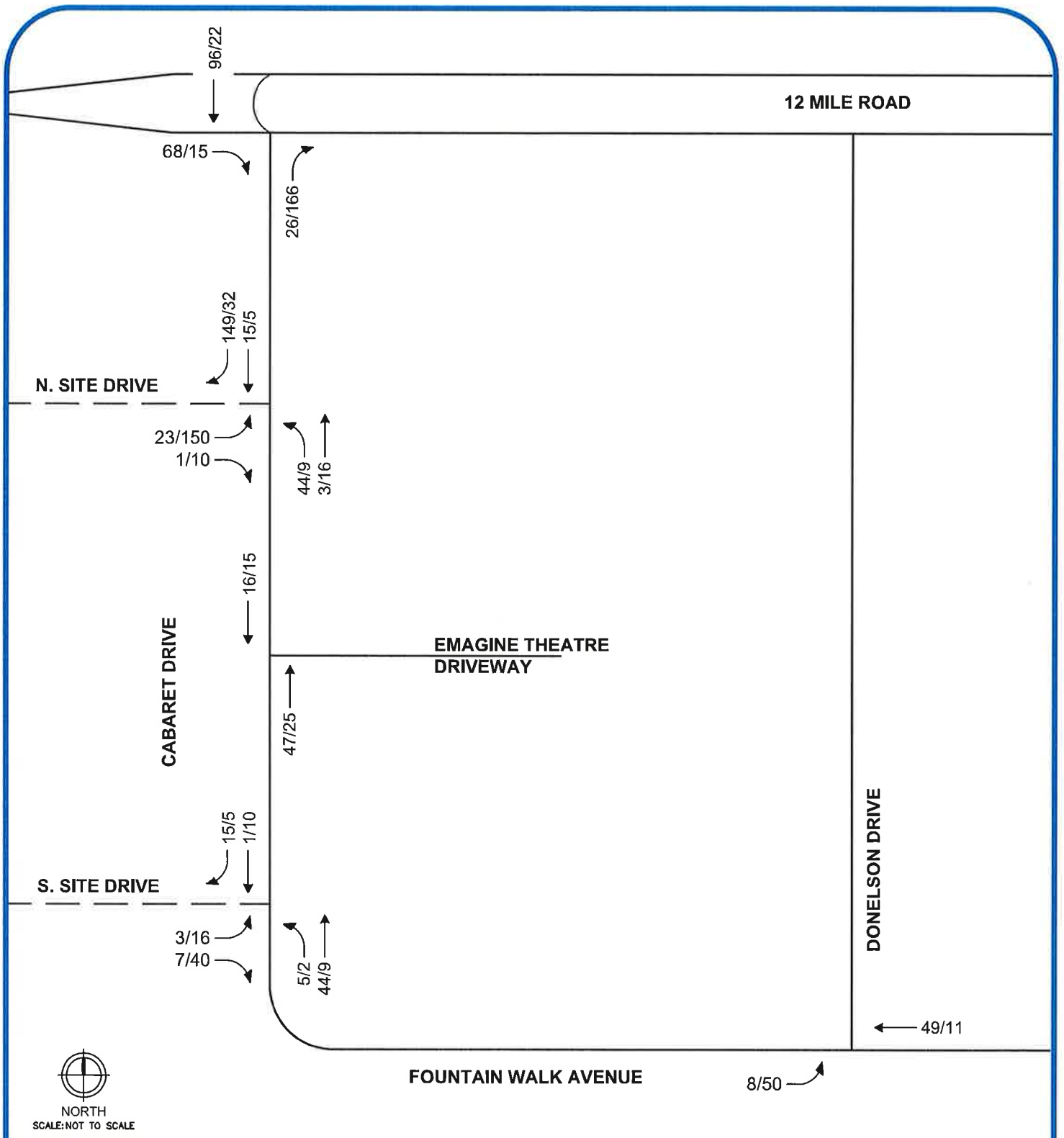


FIGURE 4
SITE-GENERATED
TRAFFIC VOLUMES
 FOUNTAIN OFFICE PARK TIS - NOVI, MI

LEGEND

- ROADS
- TRAFFIC VOLUMES (AM/PM)
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

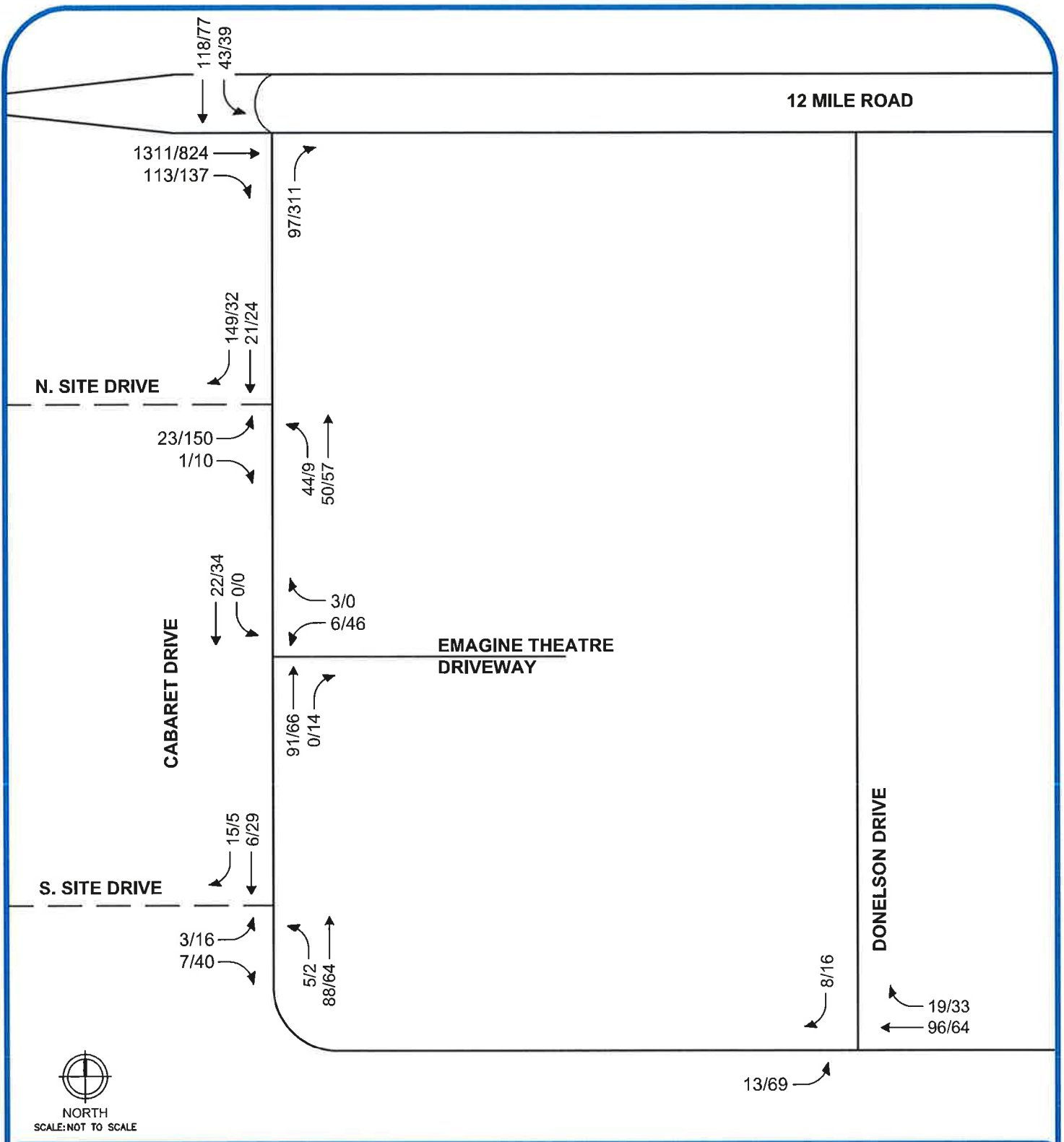
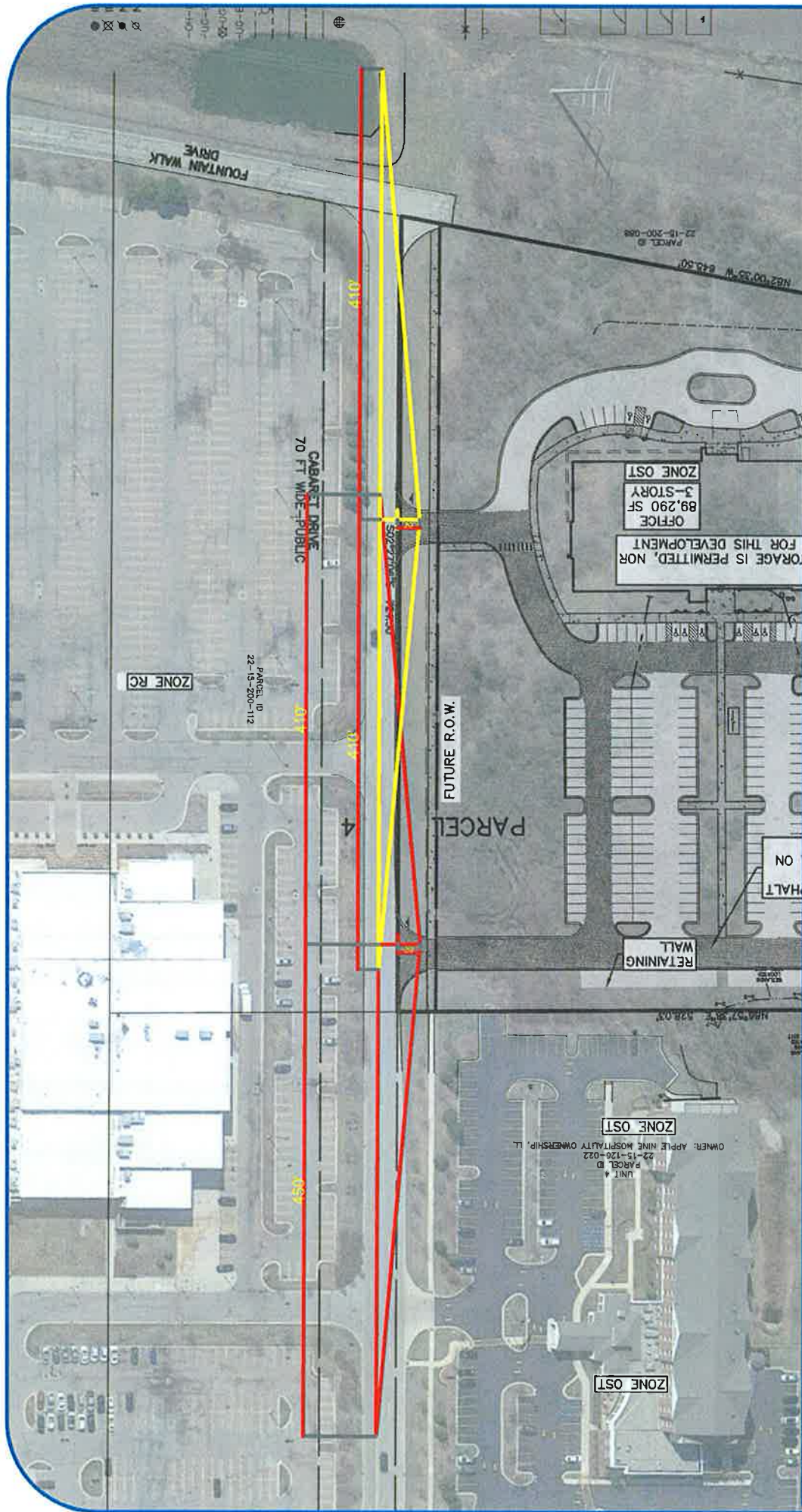


FIGURE 5
FUTURE TRAFFIC
VOLUMES

FOUNTAIN OFFICE PARK TIS - NOVI, MI





NORTH
SCALE: NOT TO SCALE

FIGURE 6
SIGHT DISTANCE
FOUNTAIN OFFICE PARK TIS - NOVI, MI

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tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
 Type: 4 Hr. Video Turning Movement Count
 Weather: Cldy, Dry Deg. 40's
 Count By: Miovision Video SCU 5DV

File Name : TMC_1 EB12Mile & Cabaret_4-11-17
 Site Code : TMC_1
 Start Date : 4/11/2017
 Page No : 1

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

Start Time	WB-EB Crossover																				Int. Total
	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	
07:00 AM	0	1	1	0	2	0	0	0	0	0	9	0	0	0	9	5	232	0	0	237	248
07:15 AM	0	3	3	0	6	0	0	0	0	0	23	0	0	0	23	3	289	0	0	292	321
07:30 AM	0	2	1	0	3	0	0	0	0	0	29	0	0	0	29	5	317	0	0	322	354
07:45 AM	0	2	3	0	5	0	0	0	0	0	36	0	0	0	36	10	323	0	0	333	374
Total	0	8	8	0	16	0	0	0	0	0	97	0	0	0	97	23	1161	0	0	1184	1297
08:00 AM	0	5	1	0	6	0	0	0	0	0	28	0	0	0	28	8	325	0	0	333	367
08:15 AM	0	5	0	0	5	0	0	0	0	0	20	0	0	0	20	10	305	0	0	315	340
08:30 AM	0	4	5	0	9	0	0	0	0	0	13	0	0	0	13	14	298	0	0	312	334
08:45 AM	0	8	4	0	12	0	0	0	0	0	10	0	0	0	10	13	360	0	0	373	395
Total	0	22	10	0	32	0	0	0	0	0	71	0	0	0	71	45	1288	0	0	1333	1436
**** BREAK ****																					
04:00 PM	0	8	3	0	11	0	0	0	0	0	40	0	0	0	40	22	112	0	0	134	185
04:15 PM	0	10	3	0	13	0	0	0	0	0	32	0	0	0	32	24	134	0	0	158	203
04:30 PM	0	14	4	0	18	0	0	0	0	0	45	0	0	0	45	24	169	0	0	193	256
04:45 PM	0	13	7	0	20	0	0	0	0	0	24	0	0	0	24	27	156	0	0	183	227
Total	0	45	17	0	62	0	0	0	0	0	141	0	0	0	141	97	571	0	0	668	871
05:00 PM	0	11	4	0	15	0	0	0	0	0	34	0	0	0	34	23	193	0	0	216	265
05:15 PM	0	17	10	0	27	0	0	0	0	0	42	0	0	0	42	48	186	0	0	234	303
05:30 PM	0	10	2	0	12	0	0	0	0	0	47	0	0	0	47	29	153	0	0	182	241
05:45 PM	0	17	2	0	19	0	0	0	0	0	31	0	0	0	31	33	154	0	0	187	237
Total	0	55	18	0	73	0	0	0	0	0	154	0	0	0	154	133	686	0	0	819	1046
Grand Total	0	130	53	0	183	0	0	0	0	0	463	0	0	0	463	298	3706	0	0	4004	4650
Apprch %	0	71	29	0		0	0	0	0		100	0	0	0		7.4	92.6	0	0		
Total %	0	2.8	1.1	0	3.9	0	0	0	0	0	10	0	0	0	10	6.4	79.7	0	0	86.1	
Pass Cars	0	129	52	0	181	0	0	0	0	0	459	0	0	0	459	297	3665	0	0	3962	4602
% Pass Cars	0	99.2	98.1	0	98.9	0	0	0	0	0	99.1	0	0	0	99.1	99.7	98.9	0	0	99	99
Single Units	0	1	1	0	2	0	0	0	0	0	3	0	0	0	3	1	34	0	0	35	40
% Single Units	0	0.8	1.9	0	1.1	0	0	0	0	0	0.6	0	0	0	0.6	0.3	0.9	0	0	0.9	0.9
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	7	0	0	7	8
% 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
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments: 4 hour traffic study conducted during typical weekday (Tuesday) from 7:00-9:00 AM morning & (Tuesday) 4:00-6:00 PM afternoon peak hours, while school was in session. Signalized intersection, with push button ped. signals for north leg. Video SCU camera located with SE intersection quadrant.

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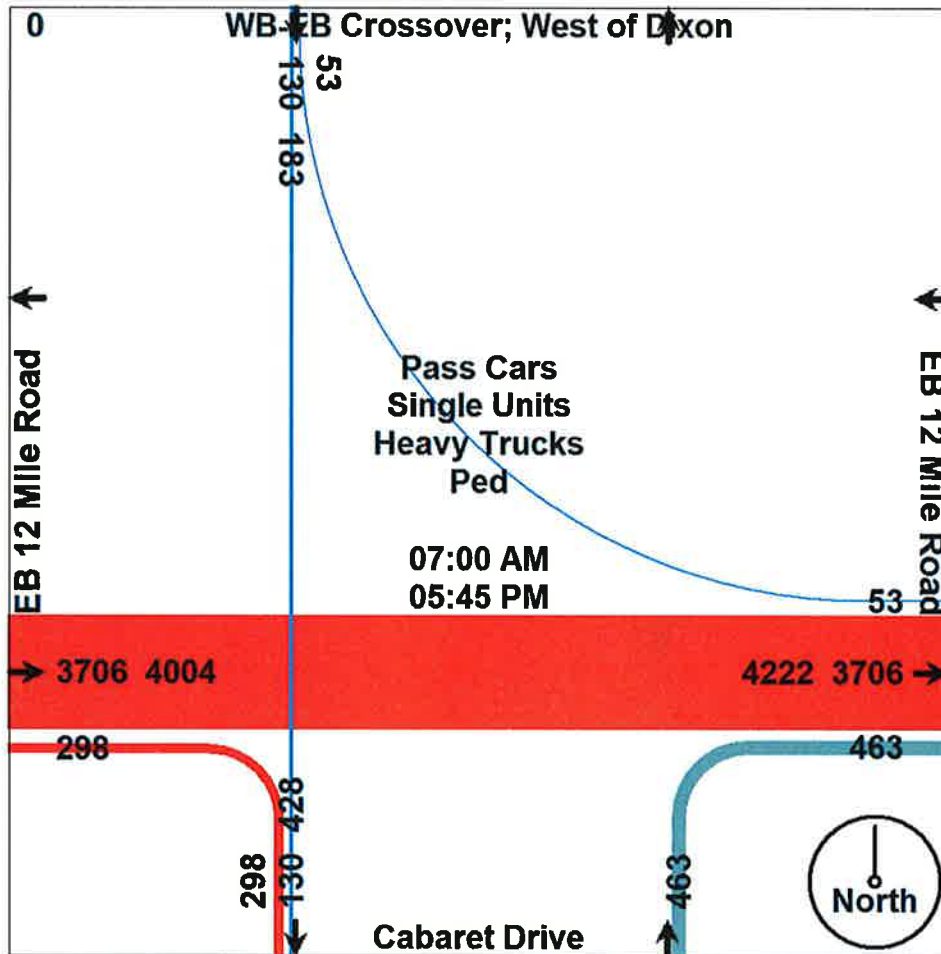
Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Cldy, Dry Deg. 40's
Count By: Miovision Video SCU 5DV

File Name : TMC_1 EB12Mile & Cabaret_4-11-17
Site Code : TMC_1
Start Date : 4/11/2017
Page No : 2



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Traffic Study Performed For:

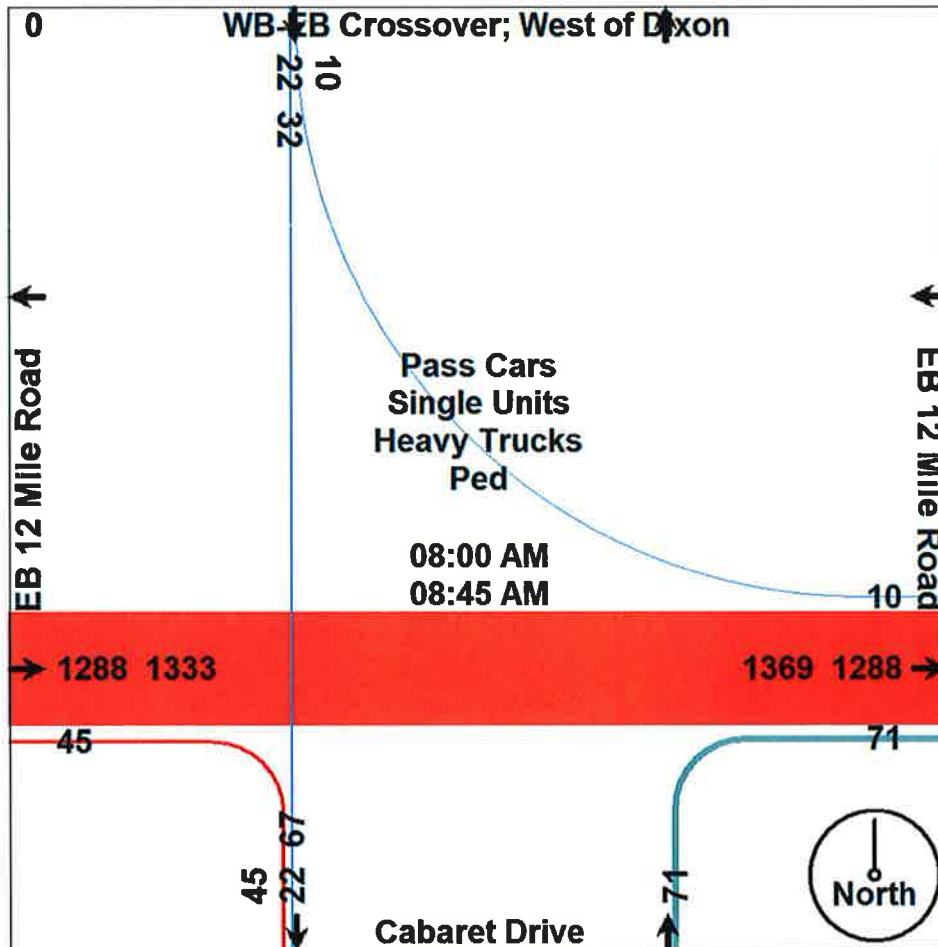
Fleis & VandenBrink



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 Type: 4 Hr. Video Turning Movement Count
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File Name : TMC_1 EB12Mile & Cabaret_4-11-17
 Site Code : TMC_1
 Start Date : 4/11/2017
 Page No : 3

Start Time	WB-EB Crossover				Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Int. Total
	Rgt	Thru	Left	App. Total													
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	5	1	6	0	0	0	0	28	0	0	28	8	325	0	333	367
08:15 AM	0	5	0	5	0	0	0	0	20	0	0	20	10	305	0	315	340
08:30 AM	0	4	5	9	0	0	0	0	13	0	0	13	14	298	0	312	334
08:45 AM	0	8	4	12	0	0	0	0	10	0	0	10	13	360	0	373	395
Total Volume	0	22	10	32	0	0	0	0	71	0	0	71	45	1288	0	1333	1436
% App. Total	0	68.8	31.2		0	0	0	0	100	0	0		3.4	96.6	0		
PHF	.000	.688	.500	.667	.000	.000	.000	.000	.634	.000	.000	.634	.804	.894	.000	.893	.909
Pass Cars	0	21	10	31	0	0	0	0	70	0	0	70	45	1275	0	1320	1421
% Pass Cars	0	95.5	100	96.9	0	0	0	0	98.6	0	0	98.6	100	99.0	0	99.0	99.0
Single Units	0	1	0	1	0	0	0	0	1	0	0	1	0	11	0	11	13
% Single Units	0	4.5	0	3.1	0	0	0	0	1.4	0	0	1.4	0	0.9	0	0.8	0.9
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.2	0.1
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

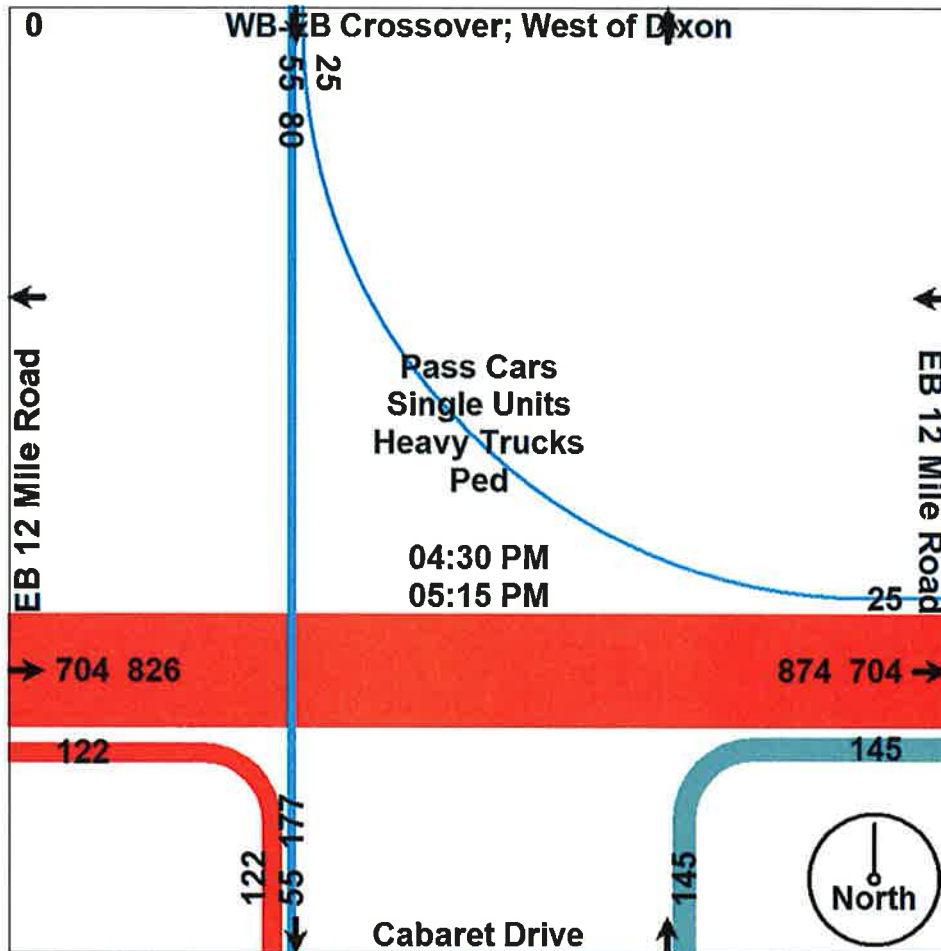
Fleis & VandenBrink



Project : Novi Traffic Impact Study
 Type : 4 Hr. Video Turning Movement Count
 Weather : Cldy, Dry Deg. 40's
 Count By : Miovision Video SCU 5DV

File Name : TMC_1 EB12Mile & Cabaret_4-11-17
 Site Code : TMC_1
 Start Date : 4/11/2017
 Page No : 4

Start Time	WB-EB Crossover																Int. Total
	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	14	4	18	0	0	0	0	45	0	0	45	24	169	0	193	256
04:45 PM	0	13	7	20	0	0	0	0	24	0	0	24	27	156	0	183	227
05:00 PM	0	11	4	15	0	0	0	0	34	0	0	34	23	193	0	216	265
05:15 PM	0	17	10	27	0	0	0	0	42	0	0	42	48	186	0	234	303
Total Volume	0	55	25	80	0	0	0	0	145	0	0	145	122	704	0	826	1051
% App. Total	0	68.8	31.2		0	0	0		100	0	0		14.8	85.2	0		
PHF	.000	.809	.625	.741	.000	.000	.000	.000	.806	.000	.000	.806	.635	.912	.000	.882	.867
Pass Cars	0	55	24	79	0	0	0	0	144	0	0	144	121	697	0	818	1041
% Pass Cars	0	100	96.0	98.8	0	0	0	0	99.3	0	0	99.3	99.2	99.0	0	99.0	99.0
Single Units	0	0	1	1	0	0	0	0	1	0	0	1	1	6	0	7	9
% Single Units	0	0	4.0	1.3	0	0	0	0	0.7	0	0	0.7	0.8	0.9	0	0.8	0.9
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	0.1	0	0.1	0.1
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Phone: (586) 786-5407

Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
 Type: 4 Hr. Video Turning Movement Count
 Weather: Cldy, Dry Deg. 40's
 Count By: Miovision Video SCU 1US

File Name : TMC_2 Donelson & FountainWalk_4-11-17
 Site Code : TMC_2
 Start Date : 4/11/2017
 Page No : 1

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Ped

Start Time	Donelson Drive Southbound					Fountain Walk Westbound					NA Northbound					Fountain Walk Eastbound					InL Total
	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	Rgt	Thru	Left	Peds	App. Total	
07:00 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	0	0	2	0	2	8
07:15 AM	0	0	0	0	0	5	5	0	0	10	0	0	0	0	0	0	0	0	0	0	10
07:30 AM	1	0	0	0	1	1	11	0	0	12	0	0	0	0	0	0	0	3	0	3	16
07:45 AM	1	0	0	0	1	1	5	0	0	6	0	0	0	0	0	0	0	3	0	3	10
Total	3	0	0	0	3	7	26	0	0	33	0	0	0	0	0	0	0	8	0	8	44
08:00 AM	1	0	0	0	1	4	9	0	0	13	0	0	0	0	0	0	0	1	0	1	15
08:15 AM	1	0	0	0	1	4	9	0	0	13	0	0	0	0	0	0	0	1	0	1	15
08:30 AM	3	0	0	0	3	5	18	0	0	23	0	0	0	0	0	0	0	1	0	1	27
08:45 AM	3	0	0	0	3	6	11	0	0	17	0	0	0	0	0	0	0	2	0	2	22
Total	8	0	0	0	8	19	47	0	0	66	0	0	0	0	0	0	0	5	0	5	79
**** BREAK ****																					
04:00 PM	1	0	0	0	1	3	14	0	0	17	0	0	0	0	0	0	0	5	0	5	23
04:15 PM	1	0	0	0	1	8	9	0	0	17	0	0	0	0	0	0	0	7	0	7	25
04:30 PM	5	0	0	0	5	12	15	0	0	27	0	0	0	0	0	0	0	3	0	3	35
04:45 PM	5	0	0	0	5	9	18	0	0	27	0	0	0	0	0	0	0	4	0	4	36
Total	12	0	0	0	12	32	56	0	0	88	0	0	0	0	0	0	0	19	0	19	119
05:00 PM	5	0	0	0	5	4	11	0	0	15	0	0	0	0	0	0	0	5	0	5	25
05:15 PM	3	0	0	0	3	3	7	0	0	10	0	0	0	0	0	0	0	7	0	7	20
05:30 PM	3	0	0	0	3	6	8	0	0	14	0	0	0	0	0	0	0	11	0	11	28
05:45 PM	2	0	0	0	2	9	12	0	0	21	0	0	0	0	0	0	0	10	0	10	33
Total	13	0	0	0	13	22	38	0	0	60	0	0	0	0	0	0	0	33	0	33	106
Grand Total	36	0	0	0	36	80	167	0	0	247	0	0	0	0	0	0	0	65	0	65	348
Apprch %	100	0	0	0		32.4	67.6	0	0		0	0	0	0		0	0	100	0		
Total %	10.3	0	0	0	10.3	23	48	0	0	71	0	0	0	0	0	0	0	18.7	0	18.7	
Pass Cars	35	0	0	0	35	77	162	0	0	239	0	0	0	0	0	0	0	65	0	65	339
% Pass Cars	97.2	0	0	0	97.2	96.2	97	0	0	96.8	0	0	0	0	0	0	0	100	0	100	97.4
Single Units	1	0	0	0	1	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	6
% Single Units	2.8	0	0	0	2.8	1.2	2.4	0	0	2	0	0	0	0	0	0	0	0	0	0	1.7
Heavy Trucks	0	0	0	0	0	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0	3
% Heavy Trucks	0	0	0	0	0	2.5	0.6	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0.9
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments: 4 hour traffic study conducted during typical weekday (Tuesday) from 7:00-9:00 AM morning & (Tuesday) 4:00-6:00 PM afternoon peak hours, while school was in session. Non-signalized "T" intersection. Video SCU camera located with NE intersection quadrant.

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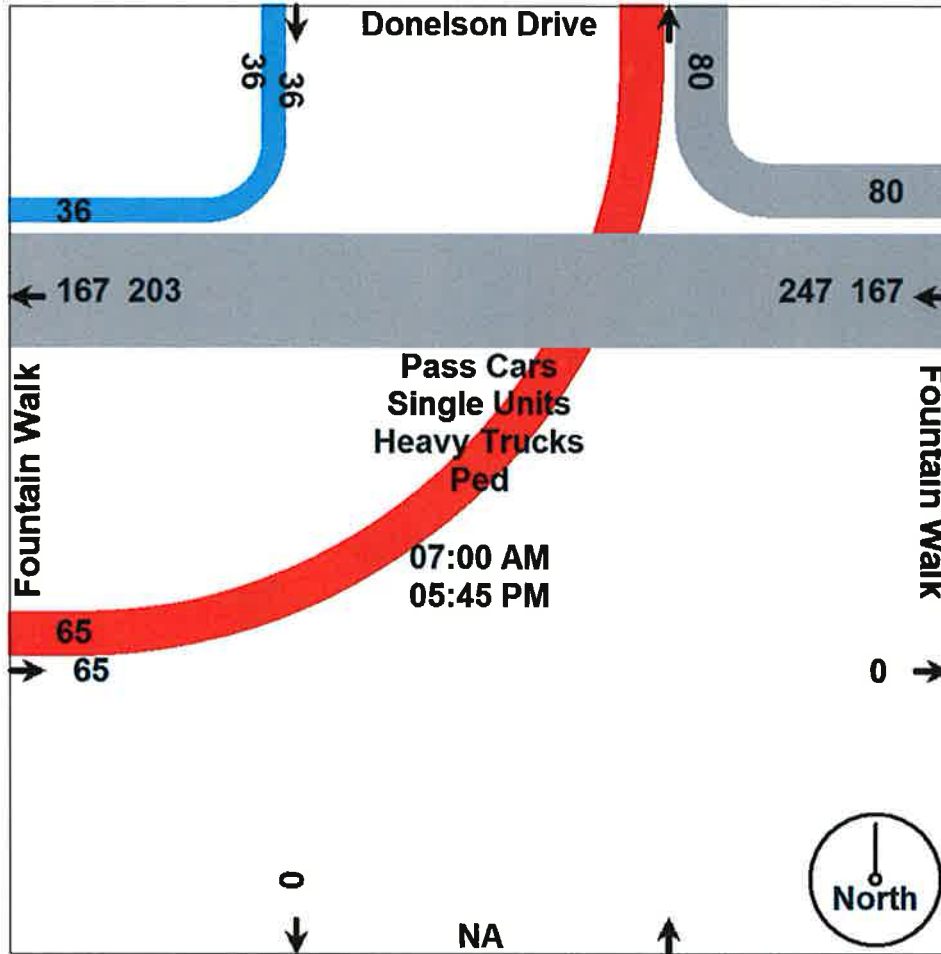
Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Cldy, Dry Deg. 40's
Count By: Miovision Video SCU 1US

File Name : TMC_2 Donelson & FountainWalk_4-11-17
Site Code : TMC_2
Start Date : 4/11/2017
Page No : 2



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Traffic Study Performed For:

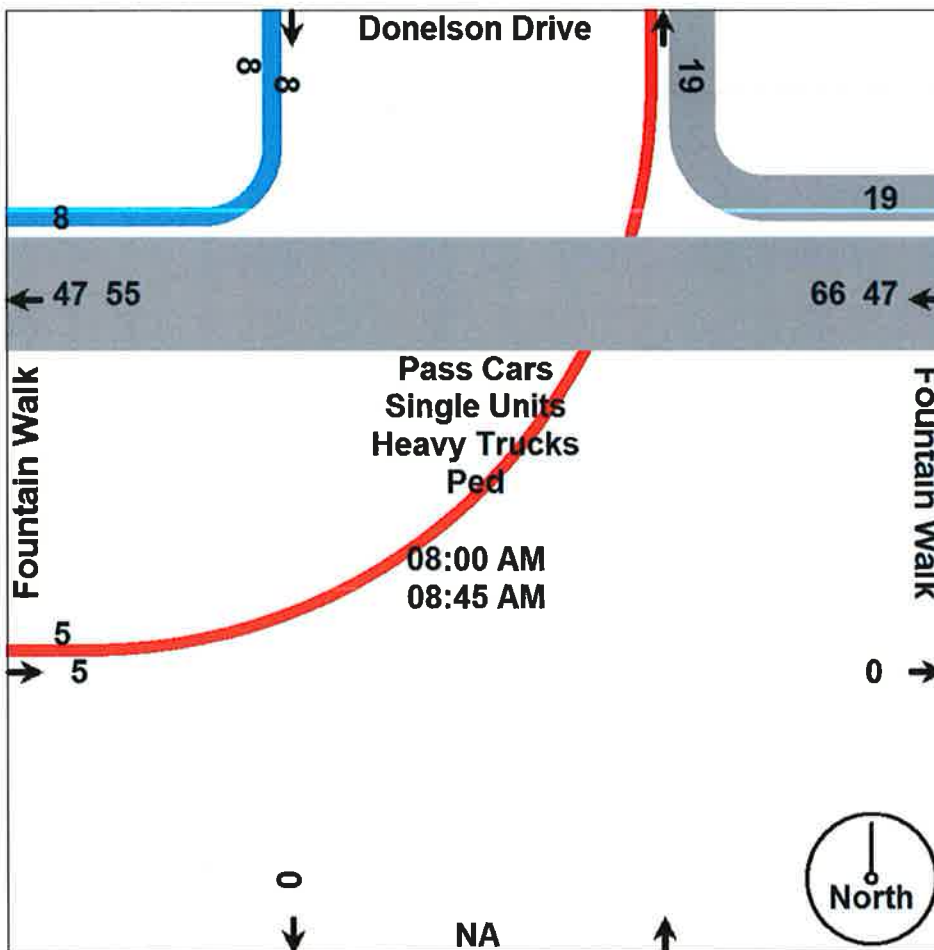
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 Site Code : TMC_2
 Start Date : 4/11/2017
 Page No : 3

Start Time	Donelson Drive Southbound				Fountain Walk Westbound				NA Northbound				Fountain Walk Eastbound				InL. Total
	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	1	0	0	1	4	9	0	13	0	0	0	0	0	0	1	1	15
08:15 AM	1	0	0	1	4	9	0	13	0	0	0	0	0	0	1	1	15
08:30 AM	3	0	0	3	5	18	0	23	0	0	0	0	0	0	1	1	27
08:45 AM	3	0	0	3	6	11	0	17	0	0	0	0	0	0	2	2	22
Total Volume	8	0	0	8	19	47	0	66	0	0	0	0	0	0	5	5	79
% App. Total	100	0	0		28.8	71.2	0		0	0	0		0	0	100		
PHF	.667	.000	.000	.667	.792	.653	.000	.717	.000	.000	.000	.000	.000	.000	.625	.625	.731
Pass Cars	8	0	0	8	17	46	0	63	0	0	0	0	0	0	5	5	76
% Pass Cars	100	0	0	100	89.5	97.9	0	95.5	0	0	0	0	0	0	100	100	96.2
Single Units	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	2
% Single Units	0	0	0	0	5.3	2.1	0	3.0	0	0	0	0	0	0	0	0	2.5
Heavy Trucks	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
% Heavy Trucks	0	0	0	0	5.3	0	0	1.5	0	0	0	0	0	0	0	0	1.3
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

tdccounts.com

Phone: (586) 786-5407

Traffic Study Performed For:

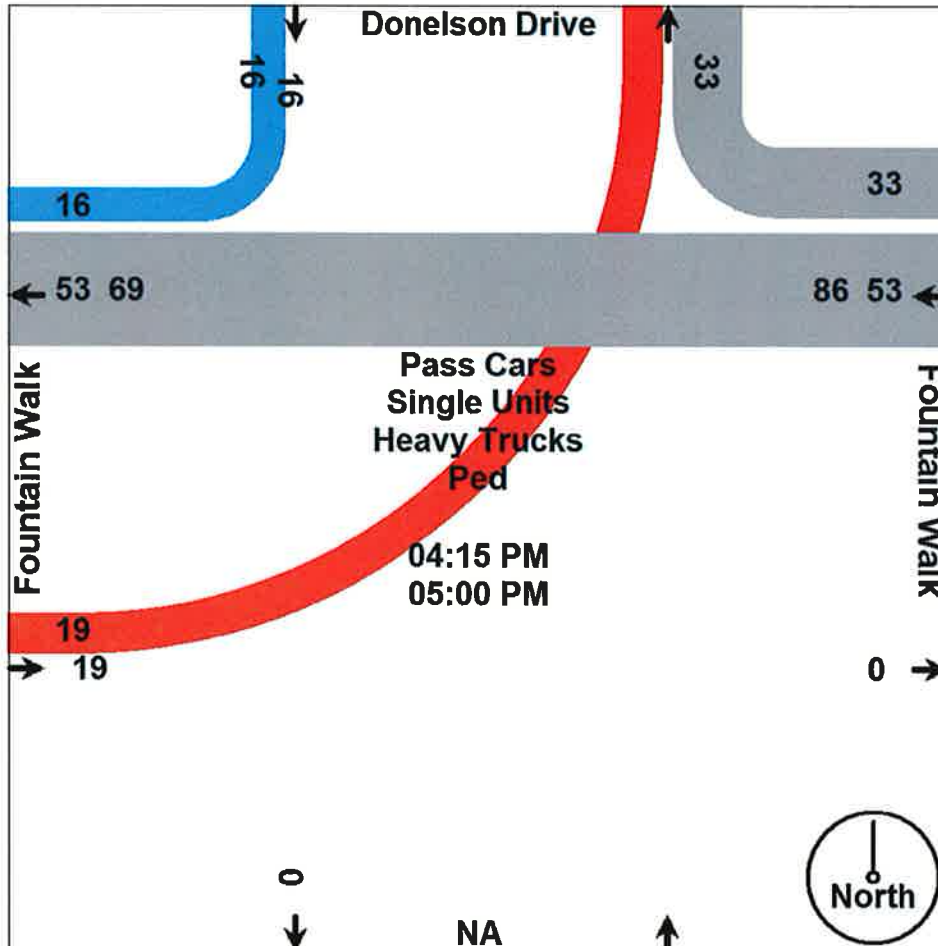
Fleis & VandenBrink



Project: Novi Traffic Impact Study
 Type: 4 Hr. Video Turning Movement Count
 Weather: Cldy, Dry Deg. 40's
 Count By: Miovision Video SCU 1US

File Name : TMC_2 Donelson & FountainWalk_4-11-17
 Site Code : TMC_2
 Start Date : 4/11/2017
 Page No : 4

Start Time	Donelson Drive Southbound				Fountain Walk Westbound				NA Northbound				Fountain Walk Eastbound				Int. Total
	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	Rgt	Thru	Left	App. Total	
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	1	0	0	1	8	9	0	17	0	0	0	0	0	0	7	7	25
04:30 PM	5	0	0	5	12	15	0	27	0	0	0	0	0	3	3	35	
04:45 PM	5	0	0	5	9	18	0	27	0	0	0	0	0	4	4	36	
05:00 PM	5	0	0	5	4	11	0	15	0	0	0	0	0	5	5	25	
Total Volume	16	0	0	16	33	53	0	86	0	0	0	0	0	19	19	121	
% App. Total	100	0	0	100	38.4	61.6	0	98.8	0	0	0	0	0	100	100	99.2	
PHF	.800	.000	.000	.800	.688	.736	.000	.796	.000	.000	.000	.000	.000	.679	.679	.840	
Pass Cars	16	0	0	16	33	52	0	85	0	0	0	0	0	19	19	120	
% Pass Cars	100	0	0	100	100	98.1	0	98.8	0	0	0	0	0	100	100	99.2	
Single Units	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	
% Single Units	0	0	0	0	0	1.9	0	1.2	0	0	0	0	0	0	0	0.8	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Ped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



Traffic Data Collection (TDC)

Project: Novi Traffic Impact Study
 Count Type: 24 Hr. ATR Count
 Weather: Cld, Dry 40's Degs.
 Count By: M.Matich Pav't : Asphalt 2 Lanes

tdcounts.com
 Phone (586) 786-5407

Traffic Study Performed For:
Fleis & VandenBrink



ATR_1 Cabaret_N_Fountain Walk_4-11-17
 Cabaret Drive
 (850' North of Fountain Walk)
 Station ID: 2-Way Volume Ct.
 Site Code: ATR 1
 Date Start: Monday, April 10, 2017

Start Time	Monday, A		SB		NB		Combined		Tuesda	SB		NB		Combined	
	Mon		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		Tue	A.M.	P.M.	A.M.	P.M.	A.M.
12:00			0		8		8		0	1	4	7		4	8
12:15			3		9		12		0	2	0	2		0	4
12:30			2		5		7		1	2	0	8		1	10
12:45			4		4		8		0	3	1	3		1	6
01:00			1		7		8		0	1	0	5		0	6
01:15			2		8		10		0	2	2	3		2	5
01:30			1		3		4		0	1	0	8		0	9
01:45			0		7		7		0	3	1	9		1	12
02:00			1		5		6		0	4	1	7		1	11
02:15			2		7		9		0	3	3	9		3	12
02:30			1		3		4		0	8	1	6		1	14
02:45			3		6		9		0	1	0	6		0	7
03:00			1		6		7		0	4	0	7		0	11
03:15			0		11		11		1	3	1	10		2	13
03:30			2		13		15		1	1	0	7		1	8
03:45			4		9		13		0	3	0	8		0	11
04:00			2		11		13		0	4	0	12		0	16
04:15			1		9		10		0	2	0	10		0	12
04:30			3		14		17		0	3	0	10		0	13
04:45			2		13		15		0	3	0	14		0	17
05:00			2		9		11		0	4	0	9		0	13
05:15			1		9		10		0	10	2	6		2	16
05:30			2		8		10		1	2	2	12		3	14
05:45			3		11		14		0	6	1	7		1	13
06:00			2		10		12		0	0	0	12		0	12
06:15			2		15		17		0	4	2	11		2	15
06:30			1		16		17		1	6	0	11		1	17
06:45			4		13		17		3	2	4	14		7	16
07:00			5		10		15		2	2	6	18		8	20
07:15			1		10		11		0	2	5	13		5	15
07:30			0		4		4		3	4	11	12		14	16
07:45			1		11		12		3	0	4	11		7	11
08:00			1		11		12		2	1	9	10		11	11
08:15			0		9		9		0	2	11	20		11	22
08:30			1		11		12		1	1	13	4		14	5
08:45			1		10		11		3	1	13	6		16	7
09:00			1		11		12		2	2	10	11		12	13
09:15			2		10		12		0	0	9	10		9	10
09:30			2		6		8		1	3	8	7		9	10
09:45			1		4		5		3	0	7	8		10	8
10:00			1		7		8		2	0	5	9		7	9
10:15			4		6		10		2	2	4	3		6	5
10:30			0		4		4		0	1	1	5		1	6
10:45			1		4		5		0	0	6	5		6	5
11:00			1		2		5		1	0	5	4		6	4
11:15			1		0		3		1	1	5	2		6	3
11:30			0		3		6		0	0	3	5		3	5
11:45			2		0		1		1	0	6	2		7	2
Total			4	76	17	392	21	468		35	110	166	398	201	508
Day Total			80		409		489			145		564		709	
% Total			0.8%	15.5%	3.5%	80.2%			4.9%	15.5%	23.4%	56.1%			
Peak	-		11:00	06:15	11:00	06:00	11:00	06:15	-	06:45	05:00	08:15	06:45	08:15	06:15
Vol.	-		4	12	17	54	21	66	-	8	22	47	57	53	68
P.H.F.			0.500	0.600	0.708	0.844	0.750	0.971		0.667	0.550	0.904	0.792	0.828	0.850



Traffic Data Collection (TDC)

tdcounts.com

Phone (586) 786-5407

Traffic Study Performed For:

Fleis & VandenBrink

Project: Novi Traffic Impact Study
 Count Type: 24 Hr. ATR Count
 Weather: Cldy, Dry 40's Degs.
 Count By: M.Match Pav't : Conc 2 Lanes

ATR_2 Fountain_E_ Cabaret_4-11-17
 Fountain Walk
 (450' East of Cabaret Drive)
 Station ID: 2-Way Volume Ct.
 Site Code: ATR 2
 Date Start: Monday, April 10, 2017

Start Time	Monday, A		EB		WB		Combined		Tuesda Tue	EB		WB		Combined				
	Mon		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.			
12:00			*	4	*	9	*	13		0	6	9	11	9	17			
12:15			*	7	*	11	*	18		1	3	2	4	3	7			
12:30			*	5	*	11	*	16		1	5	2	11	3	16			
12:45			*	5	*	5	*	10		0	10	2	12	2	22			
01:00			*	2	*	16	*	18		0	11	3	12	3	23			
01:15			*	2	*	11	*	13		0	5	3	10	3	15			
01:30			*	2	*	6	*	8		0	5	1	9	1	14			
01:45			*	2	*	9	*	11		0	6	4	19	4	25			
02:00			*	4	*	8	*	12		0	6	2	12	2	18			
02:15			*	4	*	9	*	13		0	5	2	11	2	16			
02:30			*	3	*	8	*	11		0	10	2	10	2	20			
02:45			*	2	*	6	*	8		0	3	2	7	2	10			
03:00			*	3	*	9	*	12		1	4	1	10	2	14			
03:15			*	2	*	14	*	16		1	4	1	14	2	18			
03:30			*	4	*	14	*	18		1	11	0	14	1	25			
03:45			*	7	*	18	*	25		0	12	0	10	0	22			
04:00			*	7	*	15	*	22		0	7	0	22	0	29			
04:15			*	4	*	12	*	16		0	3	0	12	0	15			
04:30			*	10	*	22	*	32		0	12	0	18	0	30			
04:45			*	13	*	13	*	26		0	9	0	13	0	22			
05:00			*	5	*	14	*	19		0	9	0	14	0	23			
05:15			*	7	*	15	*	22		0	20	2	10	2	30			
05:30			*	16	*	8	*	24		1	16	2	18	3	34			
05:45			*	14	*	16	*	30		0	20	1	13	1	33			
06:00			*	11	*	16	*	27		0	8	0	16	0	24			
06:15			*	6	*	15	*	21		0	16	2	15	2	31			
06:30			*	7	*	16	*	23		4	12	0	19	4	31			
06:45			*	9	*	19	*	28		1	10	3	22	4	32			
07:00			*	12	*	11	*	23		2	5	7	30	9	35			
07:15			*	5	*	15	*	20		0	8	4	23	4	31			
07:30			*	4	*	18	*	22		3	6	13	25	16	31			
07:45			*	3	*	15	*	18		4	3	5	19	9	22			
08:00			*	4	*	19	*	23		1	4	9	24	10	28			
08:15			*	3	*	21	*	24		2	10	10	36	12	46			
08:30			*	4	*	18	*	22		1	3	11	10	12	13			
08:45			*	3	*	22	*	25		3	2	12	19	15	21			
09:00			*	3	*	14	*	17		6	4	11	23	17	27			
09:15			*	3	*	23	*	26		1	3	7	20	8	23			
09:30			*	1	*	42	*	43		3	7	9	15	12	22			
09:45			*	2	*	18	*	20		3	5	8	18	11	23			
10:00			*	2	*	16	*	18		7	4	3	14	10	18			
10:15			*	5	*	10	*	15		2	3	4	11	6	14			
10:30			*	0	*	8	*	8		1	4	2	10	3	14			
10:45			*	1	*	4	*	5		1	0	6	12	7	12			
11:00			*	4	*	5	*	10		1	2	6	13	7	15			
11:15			*	5	*	9	*	14		7	1	7	4	14	5			
11:30			*	5	*	5	*	10		6	0	4	10	10	10			
11:45			*	10	*	7	*	17		5	1	9	6	14	7			
Total			21	252	231	26	680	654	47	885	70	393	323	193	903	710	263	1033
Day Total			2.3%	24.8%	2.8%	70.2%					5.4%	24.9%	14.9%	54.8%				
Peak	-		11:00	05:15	11:00	08:45	11:00	08:45	-	11:00	05:00	08:15	07:30	08:15	06:15			
Vol.	-		21	48	26	101	47	111	-	19	65	44	104	56	129			
P.H.F.			0.525	0.750	0.722	0.601	0.691	0.645		0.679	0.813	0.917	0.722	0.824	0.921			

Search...

YOU ARE VIEWING DATA FOR:

City of Novi

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

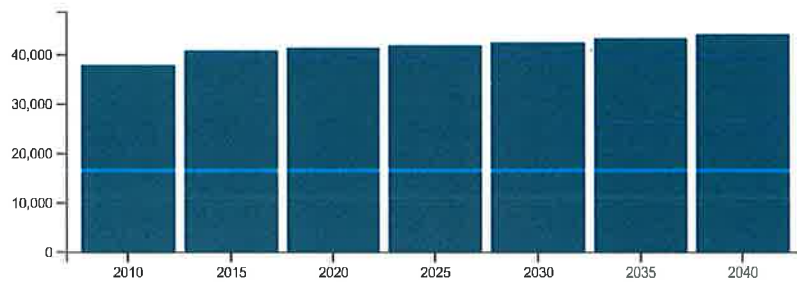


Census 2010 Population:
55,374
Area: 31.2 square miles

Economy & Jobs

Link to American Community Survey (ACS) Profiles: **Select a Year** **Economic**

Forecasted Jobs



Source: SEMCOG 2040 Forecast produced in 2012.

Forecasted Jobs by Industry

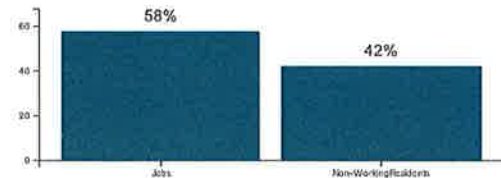
Forecasted Jobs By Industry	2010	2015	2020	2025	2030	2035	2040	Change 2010 - 2040
Forecasted Jobs By Industry	2010	2015	2020	2025	2030	2035	2040	Change 2010 - 2040
Natural Resources, Mining, & Construction	1,559	1,828	1,904	1,933	1,940	2,009	1,917	358
Manufacturing	1,719	1,807	1,764	1,670	1,639	1,547	1,436	-283
Wholesale Trade, Transportation, Warehousing, & Utilities	4,114	4,268	4,145	4,126	4,064	4,225	4,227	113
Retail Trade	7,823	7,723	7,561	7,569	7,507	7,476	7,413	-410
Knowledge-based Services	6,982	8,035	8,346	8,456	8,398	8,473	8,858	1,876
Services to Households & Firms	3,593	4,064	4,183	4,364	4,697	4,855	4,832	1,239
Private Education & Healthcare	5,342	6,164	6,657	6,914	7,235	7,522	8,026	2,684
Leisure & Hospitality	5,109	5,328	5,133	5,160	5,220	5,473	5,710	601
Government	1,687	1,685	1,726	1,757	1,782	1,801	1,808	121
Total	37,928	40,902	41,419	41,949	42,482	43,381	44,227	6,299

Source: SEMCOG 2040 Forecast produced in 2012.

Note: "C" indicates data blocked due to confidentiality concerns of ES-202 files.

Daytime Population

Daytime Population	SEMCOG and ACS 2010
Jobs	37,928
Non-Working Residents	27,701
Age 15 and under	13,391
Not in labor force	12,488
Unemployed	1,822
Daytime Population	65,629



Source: SEMCOG 2040 Forecast produced in 2012, U.S Census Bureau, and 2010 American Community Survey 5-Year Estimates.

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.

Search...

YOU ARE VIEWING DATA FOR:

City of Novi

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

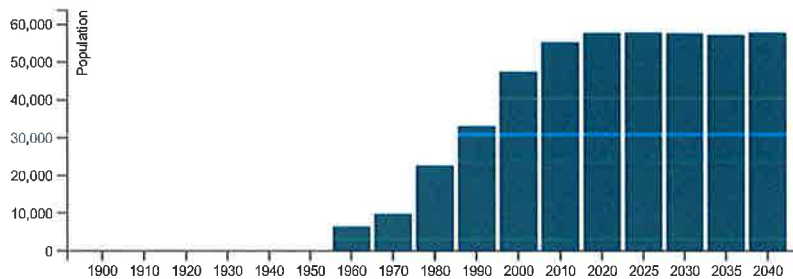


Census 2010 Population:
55,374
Area: 31.2 square miles

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** **Social | Demographic**
Population and Household Estimates for Southeast Michigan, August 2016

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	Census 2000-2005 Avg.	Change 2000-2006-2010 Avg.	Pct Change 2000-2010	SEMCOG Jul 2016	SEMCOG 2040
Total Population	55,374	7,795	16.4%	59,324	57,897
Group Quarters Population	360	93	34.8%	360	407
Household Population	55,014	7,702	16.3%	58,964	57,490
Housing Units	24,286	4,569	23.2%	25,735	-
Households (Occupied Units)	22,317	3,525	18.8%	24,237	24,234
Residential Vacancy Rate	8.1%	3.4%	-	5.8%	-
Average Household Size	2.47	-0.05	-	2.43	2.37

Source: U.S. Census Bureau and SEMCOG 2040 Forecast produced in 2012.

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.
Natural Increase (Births - Deaths)	326	280
Births	586	587
Deaths	260	307
Net Migration (Movement In - Movement Out)	598	355
Population Change (Natural Increase + Net Migration)	924	635

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

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Exhibit 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

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

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

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

Source: Highway Capacity Manual, 2010. 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. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in Exhibit 16-2. 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 very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Exhibit 16-2. Level-of-Service Criteria for Signalized Intersections

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: [Highway Capacity Manual, 2010](#). Transportation Research Board, National Research Council

HCM 6th TWSC
1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Existing Conditions
AM Peak Hour

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Vol, veh/h	0	1288	45	0	0	0	0	0	71	10	22	0
Future Vol, veh/h	0	1288	45	0	0	0	0	0	71	10	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	350	-	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	92	92	92	63	63	63	67	67	67
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	0	1447	51	0	0	0	0	0	113	15	33	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	724	724	1498	-
Stage 1	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	724	1498	-
Critical Hdwy	-	-	-	-	-	6.92	7.56	6.56	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	3.31	3.53	4.03	-
Pot Cap-1 Maneuver	0	-	-	0	0	370	311	120	0
Stage 1	0	-	-	0	0	-	-	-	0
Stage 2	0	-	-	0	0	-	381	182	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	370	216	120	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	216	120	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	265	182	-

Approach	EB	NB	SB
HCM Control Delay, s	0	18.9	40.2
HCM LOS		C	E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1	SBLn2
Capacity (veh/h)	370	-	-	216	127
HCM Lane V/C Ratio	0.305	-	-	0.046	0.298
HCM Control Delay (s)	18.9	-	-	22.5	44.9
HCM Lane LOS	C	-	-	C	E
HCM 95th %tile Q(veh)	1.3	-	-	0.1	1.2

HCM 6th TWSC
2: Cabaret Drive & Emagine Theater Drive

Existing Conditions
AM Peak Hour

Intersection						
Int Delay, s/veh	1.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	6	3	44	0	0	6
Future Vol, veh/h	6	3	44	0	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	68	68	68	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	4	65	0	0	8
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	73	65	0	0	65	0
Stage 1	65	-	-	-	-	-
Stage 2	8	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	931	999	-	-	1537	-
Stage 1	958	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	931	999	-	-	1537	-
Mov Cap-2 Maneuver	931	-	-	-	-	-
Stage 1	958	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	8.8		0		0	
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	953	1537	-	
HCM Lane V/C Ratio	-	-	0.013	-	-	
HCM Control Delay (s)	-	-	8.8	0	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0	0	-	

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A



















Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations		TL			TL				TL
Traffic Vol, veh/h	0	5	0	0	47	19	0	0	8
Future Vol, veh/h	0	5	0	0	47	19	0	0	8
Peak Hour Factor	0.92	0.63	0.63	0.92	0.72	0.72	0.92	0.67	0.67
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	8	0	0	65	26	0	0	12
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.3	7.2	6.6
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	0%
Vol Thru, %	0%	71%	0%
Vol Right, %	0%	29%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	5	66	8
LT Vol	5	0	0
Through Vol	0	47	0
RT Vol	0	19	8
Lane Flow Rate	8	92	12
Geometry Grp	1	1	1
Degree of Util (X)	0.009	0.096	0.012
Departure Headway (Hd)	4.224	3.789	3.505
Convergence, Y/N	Yes	Yes	Yes
Cap	850	951	1018
Service Time	2.238	1.792	1.538
HCM Lane V/C Ratio	0.009	0.097	0.012
HCM Control Delay	7.3	7.2	6.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.3	0


















HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Existing Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (veh/h)	0	704	122	0	0	0	0	0	145	25	55	0
Future Volume (veh/h)	0	704	122	0	0	0	0	0	145	25	55	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1984	1984	0
Adj Flow Rate, veh/h	0	800	139				0	0	179	34	74	0
Peak Hour Factor	0.88	0.88	0.88				0.81	0.81	0.81	0.74	0.74	0.74
Percent Heavy Veh, %	0	1	1				0	0	1	1	1	0
Cap, veh/h	0	0	0				0	0	0	153	132	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.07	0.07	0.00
Sat Flow, veh/h		0						0		1215	1984	0
Grp Volume(v), veh/h		0.0						0.0		34	74	0
Grp Sat Flow(s),veh/h/ln										1215	1984	0
Q Serve(g_s), s										2.7	3.6	0.0
Cycle Q Clear(g_c), s										2.7	3.6	0.0
Prop In Lane										1.00		0.00
Lane Grp Cap(c), veh/h										153	132	0
V/C Ratio(X)										0.22	0.56	0.00
Avail Cap(c_a), veh/h										364	476	0
HCM Platoon Ratio										1.00	1.00	1.00
Upstream Filter(I)										1.00	1.00	0.00
Uniform Delay (d), s/veh										44.8	45.3	0.0
Incr Delay (d2), s/veh										0.7	3.7	0.0
Initial Q Delay(d3),s/veh										0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln										0.8	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh										45.6	48.9	0.0
LnGrp LOS										D	D	A
Approach Vol, veh/h											108	
Approach Delay, s/veh											47.9	
Approach LOS											D	
Timer - Assigned Phs												
Phs Duration (G+Y+Rc), s											12.7	
Change Period (Y+Rc), s											6.0	
Max Green Setting (Gmax), s											24.0	
Max Q Clear Time (g_c+I1), s											5.6	
Green Ext Time (p_c), s											0.4	
Intersection Summary												
HCM 6th Ctrl Delay											47.9	
HCM 6th LOS											D	

HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Existing Conditions
 PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	0	704	122	0	0	0	0	0	145	25	55	0	
Future Volume (vph)	0	704	122	0	0	0	0	0	145	25	55	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0		
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00		
Frt		1.00	0.85						0.86	1.00	1.00		
Flt Protected		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (prot)		3762	1683						1713	1881	1980		
Flt Permitted		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (perm)		3762	1683						1713	1881	1980		
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81	0.74	0.74	0.74	
Adj. Flow (vph)	0	800	139	0	0	0	0	0	179	34	74	0	
RTOR Reduction (vph)	0	0	29	0	0	0	0	0	162	31	0	0	
Lane Group Flow (vph)	0	800	110	0	0	0	0	0	17	3	74	0	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	1%	1%	1%	
Turn Type		NA	Perm						Prot	Perm	NA		
Protected Phases		2							8		4		
Permitted Phases			2								4		
Actuated Green, G (s)		78.9	78.9						9.3	9.3	9.3		
Effective Green, g (s)		78.9	78.9						9.3	9.3	9.3		
Actuated g/C Ratio		0.79	0.79						0.09	0.09	0.09		
Clearance Time (s)		5.8	5.8						6.0	6.0	6.0		
Vehicle Extension (s)		3.0	3.0						3.0	3.0	3.0		
Lane Grp Cap (vph)		2968	1327						159	174	184		
v/s Ratio Prot		c0.21							0.01		c0.04		
v/s Ratio Perm			0.07							0.00			
v/c Ratio		0.27	0.08						0.10	0.02	0.40		
Uniform Delay, d1		2.8	2.4						41.5	41.2	42.7		
Progression Factor		1.00	1.00						1.00	1.00	1.00		
Incremental Delay, d2		0.2	0.1						0.3	0.0	1.4		
Delay (s)		3.1	2.5						41.8	41.2	44.2		
Level of Service		A	A						D	D	D		
Approach Delay (s)		3.0			0.0			41.8				43.2	
Approach LOS		A			A			D				D	
Intersection Summary													
HCM 2000 Control Delay			12.2									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.28										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	11.8
Intersection Capacity Utilization			41.7%									ICU Level of Service	A
Analysis Period (min)			15										
c	Critical Lane Group												

HCM 6th TWSC
2: Cabaret Drive & Emagine Theater Drive

Existing Conditions
PM Peak Hour

Intersection						
Int Delay, s/veh	3.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	46	0	41	14	0	19
Future Vol, veh/h	46	0	41	14	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	81	81	81	75	75
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	61	0	51	17	0	25
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	85	60	0	0	68	0
Stage 1	60	-	-	-	-	-
Stage 2	25	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	919	1008	-	-	1540	-
Stage 1	965	-	-	-	-	-
Stage 2	1000	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	919	1008	-	-	1540	-
Mov Cap-2 Maneuver	919	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	1000	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	9.2		0		0	
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	919	1540	-	-
HCM Lane V/C Ratio	-	-	0.067	-	-	-
HCM Control Delay (s)	-	-	9.2	0	-	-
HCM Lane LOS	-	-	A	A	-	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-	-

HCM 6th AWSC
3: Fountain Walk Avenue & Donelson Drive

Existing Conditions
PM Peak Hour

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A



















Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations									
Traffic Vol, veh/h	0	19	0	0	53	33	0	0	16
Future Vol, veh/h	0	19	0	0	53	33	0	0	16
Peak Hour Factor	0.92	0.68	0.68	0.92	0.80	0.80	0.92	0.80	0.80
Heavy Vehicles, %	2	0	0	2	1	1	2	0	0
Mvmt Flow	0	28	0	0	66	41	0	0	20
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.4	7.2	6.7
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	0%
Vol Thru, %	0%	62%	0%
Vol Right, %	0%	38%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	19	86	16
LT Vol	19	0	0
Through Vol	0	53	0
RT Vol	0	33	16
Lane Flow Rate	28	108	20
Geometry Grp	1	1	1
Degree of Util (X)	0.033	0.112	0.02
Departure Headway (Hd)	4.216	3.743	3.534
Convergence, Y/N	Yes	Yes	Yes
Cap	851	961	1006
Service Time	2.234	1.754	1.579
HCM Lane V/C Ratio	0.033	0.112	0.02
HCM Control Delay	7.4	7.2	6.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.4	0.1

HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Existing Conditions w/ Improvements
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (veh/h)	0	1288	45	0	0	0	0	0	71	10	22	0
Future Volume (veh/h)	0	1288	45	0	0	0	0	0	71	10	22	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1953	1953	0
Adj Flow Rate, veh/h	0	1447	51				0	0	113	15	33	0
Peak Hour Factor	0.89	0.89	0.89				0.63	0.63	0.63	0.67	0.67	0.67
Percent Heavy Veh, %	0	1	1				0	0	1	3	3	0
Cap, veh/h	0	0	0				0	0	0	137	101	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.05	0.05	0.00
Sat Flow, veh/h		0						0		1270	1953	0
Grp Volume(v), veh/h		0.0						0.0		15	33	0
Grp Sat Flow(s),veh/h/ln										1270	1953	0
Q Serve(g_s), s										1.1	1.6	0.0
Cycle Q Clear(g_c), s										1.1	1.6	0.0
Prop In Lane										1.00		0.00
Lane Grp Cap(c), veh/h										137	101	0
V/C Ratio(X)										0.11	0.33	0.00
Avail Cap(c_a), veh/h										377	469	0
HCM Platoon Ratio										1.00	1.00	1.00
Upstream Filter(I)										1.00	1.00	0.00
Uniform Delay (d), s/veh										45.5	45.8	0.0
Incr Delay (d2), s/veh										0.3	1.9	0.0
Initial Q Delay(d3),s/veh										0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln										0.4	0.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh										45.9	47.6	0.0
LnGrp LOS										D	D	A
Approach Vol, veh/h											48	
Approach Delay, s/veh											47.1	
Approach LOS											D	
Timer - Assigned Phs												
Phs Duration (G+Y+Rc), s				11.2								
Change Period (Y+Rc), s				6.0								
Max Green Setting (Gmax), s				24.0								
Max Q Clear Time (g_c+I1), s				3.6								
Green Ext Time (p_c), s				0.1								
Intersection Summary												
HCM 6th Ctrl Delay			47.1									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Existing Conditions w/ Improvements
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Volume (vph)	0	1288	45	0	0	0	0	0	71	10	22	0
Future Volume (vph)	0	1288	45	0	0	0	0	0	71	10	22	0
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0	
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00	
Fr't		1.00	0.85						0.86	1.00	1.00	
Flt Protected		1.00	1.00						1.00	0.95	1.00	
Satd. Flow (prot)		3762	1683						1713	1845	1942	
Flt Permitted		1.00	1.00						1.00	0.95	1.00	
Satd. Flow (perm)		3762	1683						1713	1845	1942	
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.63	0.63	0.63	0.67	0.67	0.67
Adj. Flow (vph)	0	1447	51	0	0	0	0	0	113	15	33	0
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	48	14	0	0
Lane Group Flow (vph)	0	1447	40	0	0	0	0	0	65	1	33	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Turn Type		NA	Perm						Prot	Perm	NA	
Protected Phases		2							8		4	
Permitted Phases			2							4		
Actuated Green, G (s)		78.7	78.7						9.5	9.5	9.5	
Effective Green, g (s)		78.7	78.7						9.5	9.5	9.5	
Actuated g/C Ratio		0.79	0.79						0.10	0.10	0.10	
Clearance Time (s)		5.8	5.8						6.0	6.0	6.0	
Vehicle Extension (s)		3.0	3.0						3.0	3.0	3.0	
Lane Grp Cap (vph)		2960	1324						162	175	184	
v/s Ratio Prot		c0.38							c0.04		0.02	
v/s Ratio Perm			0.02							0.00		
v/c Ratio		0.49	0.03						0.40	0.01	0.18	
Uniform Delay, d1		3.7	2.3						42.6	41.0	41.7	
Progression Factor		1.00	1.00						1.00	1.00	1.00	
Incremental Delay, d2		0.6	0.0						1.6	0.0	0.5	
Delay (s)		4.3	2.4						44.2	41.0	42.1	
Level of Service		A	A						D	D	D	
Approach Delay (s)		4.2		0.0			44.2				41.8	
Approach LOS		A		A			D				D	
Intersection Summary												
HCM 2000 Control Delay			8.0				HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)		11.8			
Intersection Capacity Utilization			53.5%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC

1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

04/26/2017

Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Vol, veh/h	0	1311	45	0	0	0	0	0	71	43	22	0
Future Vol, veh/h	0	1311	45	0	0	0	0	0	71	43	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	350	-	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	92	92	92	63	63	63	67	67	67
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	0	1473	51	0	0	0	0	0	113	64	33	0













Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	737	737	1524	-
Stage 1	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	737	1524	-
Critical Hdwy	-	-	-	-	-	6.92	7.56	6.56	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	3.31	3.53	4.03	-
Pot Cap-1 Maneuver	0	-	-	0	0	363	305	116	0
Stage 1	0	-	-	0	0	-	-	-	0
Stage 2	0	-	-	0	0	-	374	177	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	363	210	116	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	210	116	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	258	177	-

Approach	EB	NB	SB
HCM Control Delay, s	0	19.3	37.2
HCM LOS		C	E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1	SBLn2
Capacity (veh/h)	363	-	-	210	141
HCM Lane V/C Ratio	0.31	-	-	0.204	0.385
HCM Control Delay (s)	19.3	-	-	26.5	45.7
HCM Lane LOS	C	-	-	D	E
HCM 95th %tile Q(veh)	1.3	-	-	0.7	1.6













HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Background Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Volume (veh/h)	0	824	122	0	0	0	0	0	145	39	55	0
Future Volume (veh/h)	0	824	122	0	0	0	0	0	145	39	55	0
Initial Q (Qb), veh	0	0	0						0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1984	1984	0
Adj Flow Rate, veh/h	0	936	139				0	0	179	53	74	0
Peak Hour Factor	0.88	0.88	0.88				0.81	0.81	0.81	0.74	0.74	0.74
Percent Heavy Veh, %	0	1	1				0	0	1	1	1	0
Cap, veh/h	0	0	0				0	0	0	155	135	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.07	0.07	0.00
Sat Flow, veh/h		0						0		1215	1984	0
Grp Volume(v), veh/h		0.0						0.0		53	74	0
Grp Sat Flow(s),veh/h/ln										1215	1984	0
Q Serve(g_s), s										4.3	3.6	0.0
Cycle Q Clear(g_c), s										4.3	3.6	0.0
Prop In Lane										1.00		0.00
Lane Grp Cap(c), veh/h										155	135	0
V/C Ratio(X)										0.34	0.55	0.00
Avail Cap(c_a), veh/h										364	476	0
HCM Platoon Ratio										1.00	1.00	1.00
Upstream Filter(I)										1.00	1.00	0.00
Uniform Delay (d), s/veh										45.4	45.1	0.0
Incr Delay (d2), s/veh										1.3	3.5	0.0
Initial Q Delay(d3),s/veh										0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln										1.3	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh										46.7	48.6	0.0
LnGrp LOS										D	D	A
Approach Vol, veh/h											127	
Approach Delay, s/veh											47.8	
Approach LOS											D	
Timer - Assigned Phs												4
Phs Duration (G+Y+Rc), s												12.8
Change Period (Y+Rc), s												6.0
Max Green Setting (Gmax), s												24.0
Max Q Clear Time (g_c+I1), s												6.3
Green Ext Time (p_c), s												0.5
Intersection Summary												
HCM 6th Ctrl Delay												47.8
HCM 6th LOS												D













HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Background Conditions
 PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑	↗						↖	↘	↑		
Traffic Volume (vph)	0	824	122	0	0	0	0	0	145	39	55	0	
Future Volume (vph)	0	824	122	0	0	0	0	0	145	39	55	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0		
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00		
Fr _t		1.00	0.85						0.86	1.00	1.00		
Fl _t Protected		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (prot)		3762	1683						1713	1881	1980		
Fl _t Permitted		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (perm)		3762	1683						1713	1881	1980		
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81	0.74	0.74	0.74	
Adj. Flow (vph)	0	936	139	0	0	0	0	0	179	53	74	0	
RTOR Reduction (vph)	0	0	30	0	0	0	0	0	146	48	0	0	
Lane Group Flow (vph)	0	936	109	0	0	0	0	0	33	5	74	0	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	1%	1%	1%	
Turn Type		NA	Perm						Prot	Perm	NA		
Protected Phases		2							8		4		
Permitted Phases			2							4			
Actuated Green, G (s)		78.7	78.7						9.5	9.5	9.5		
Effective Green, g (s)		78.7	78.7						9.5	9.5	9.5		
Actuated g/C Ratio		0.79	0.79						0.10	0.10	0.10		
Clearance Time (s)		5.8	5.8						6.0	6.0	6.0		
Vehicle Extension (s)		3.0	3.0						3.0	3.0	3.0		
Lane Grp Cap (vph)		2960	1324						162	178	188		
v/s Ratio Prot		c0.25							0.02		c0.04		
v/s Ratio Perm			0.06							0.00			
v/c Ratio		0.32	0.08						0.21	0.03	0.39		
Uniform Delay, d ₁		3.0	2.4						41.8	41.1	42.5		
Progression Factor		1.00	1.00						1.00	1.00	1.00		
Incremental Delay, d ₂		0.3	0.1						0.6	0.1	1.4		
Delay (s)		3.3	2.5						42.4	41.1	43.9		
Level of Service		A	A						D	D	D		
Approach Delay (s)		3.2		0.0			42.4				42.7		
Approach LOS		A		A			D				D		
Intersection Summary													
HCM 2000 Control Delay			11.9		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.32										
Actuated Cycle Length (s)			100.0		Sum of lost time (s)					11.8			
Intersection Capacity Utilization			45.6%		ICU Level of Service					A			
Analysis Period (min)			15										
c Critical Lane Group													

HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

04/26/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Volume (veh/h)	0	1311	45	0	0	0	0	0	71	43	22	0
Future Volume (veh/h)	0	1311	45	0	0	0	0	0	71	43	22	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No					No				No	
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1953	1953	0
Adj Flow Rate, veh/h	0	1473	51				0	0	113	64	33	0
Peak Hour Factor	0.89	0.89	0.89				0.63	0.63	0.63	0.67	0.67	0.67
Percent Heavy Veh, %	0	1	1				0	0	1	3	3	0
Cap, veh/h	0	0	0				0	0	0	158	132	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.07	0.07	0.00
Sat Flow, veh/h		0						0		1270	1953	0
Grp Volume(v), veh/h		0.0						0.0		64	33	0
Grp Sat Flow(s),veh/h/ln										1270	1953	0
Q Serve(g_s), s										5.0	1.6	0.0
Cycle Q Clear(g_c), s										5.0	1.6	0.0
Prop In Lane										1.00		0.00
Lane Grp Cap(c), veh/h										158	132	0
V/C Ratio(X)										0.41	0.25	0.00
Avail Cap(c_a), veh/h										377	469	0
HCM Platoon Ratio										1.00	1.00	1.00
Upstream Filter(I)										1.00	1.00	0.00
Uniform Delay (d), s/veh										45.8	44.2	0.0
Incr Delay (d2), s/veh										1.7	1.0	0.0
Initial Q Delay(d3),s/veh										0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln										1.6	0.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh										47.5	45.2	0.0
LnGrp LOS										D	D	A
Approach Vol, veh/h												97
Approach Delay, s/veh												46.7
Approach LOS												D
Timer - Assigned Phs	4											
Phs Duration (G+Y+Rc), s	12.7											
Change Period (Y+Rc), s	6.0											
Max Green Setting (Gmax), s	24.0											
Max Q Clear Time (g_c+I1), s	7.0											
Green Ext Time (p_c), s	0.3											
Intersection Summary												
HCM 6th Ctrl Delay	46.7											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

04/26/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑	↗						↗	↘	↑		
Traffic Volume (vph)	0	1311	45	0	0	0	0	0	71	43	22	0	
Future Volume (vph)	0	1311	45	0	0	0	0	0	71	43	22	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0		
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00		
Frt		1.00	0.85						0.86	1.00	1.00		
Flt Protected		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (prot)		3762	1683						1713	1845	1942		
Flt Permitted		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (perm)		3762	1683						1713	1845	1942		
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.63	0.63	0.63	0.67	0.67	0.67	
Adj. Flow (vph)	0	1473	51	0	0	0	0	0	113	64	33	0	
RTOR Reduction (vph)	0	0	11	0	0	0	0	0	45	45	0	0	
Lane Group Flow (vph)	0	1473	40	0	0	0	0	0	68	19	33	0	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%	
Turn Type		NA	Perm							Prot	Perm	NA	
Protected Phases		2								8		4	
Permitted Phases			2								4		
Actuated Green, G (s)		78.5	78.5						9.7	9.7	9.7		
Effective Green, g (s)		78.5	78.5						9.7	9.7	9.7		
Actuated g/C Ratio		0.78	0.78						0.10	0.10	0.10		
Clearance Time (s)		5.8	5.8						6.0	6.0	6.0		
Vehicle Extension (s)		3.0	3.0						3.0	3.0	3.0		
Lane Grp Cap (vph)		2953	1321						166	178	188		
v/s Ratio Prot		c0.39							c0.04		0.02		
v/s Ratio Perm			0.02							0.01			
v/c Ratio		0.50	0.03						0.41	0.11	0.18		
Uniform Delay, d1		3.8	2.4						42.5	41.2	41.5		
Progression Factor		1.00	1.00						1.00	1.00	1.00		
Incremental Delay, d2		0.6	0.0						1.6	0.3	0.4		
Delay (s)		4.4	2.4						44.1	41.5	41.9		
Level of Service		A	A						D	D	D		
Approach Delay (s)		4.3		0.0				44.1			41.6		
Approach LOS		A		A				D			D		
Intersection Summary													
HCM 2000 Control Delay			9.0									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.49										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	11.8
Intersection Capacity Utilization			54.2%									ICU Level of Service	A
Analysis Period (min)			15										
c Critical Lane Group													

HCM 6th TWSC
1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Future Conditions
AM Peak Hour

Intersection												
Int Delay, s/veh	48.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Vol, veh/h	0	1311	113	0	0	0	0	0	97	43	118	0
Future Vol, veh/h	0	1311	113	0	0	0	0	0	97	43	118	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	350	-	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	92	92	92	63	63	63	67	67	67
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	3	3	3
Mvmt Flow	0	1473	127	0	0	0	0	0	154	64	176	0
Major/Minor	Major1			Minor1			Minor2					
Conflicting Flow All	-	0	0	-	-	737	-	-	737	1600	-	-
Stage 1	-	-	-	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	-	-	-	737	1600	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.92	7.56	6.56	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.56	5.56	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.31	3.53	4.03	-
Pot Cap-1 Maneuver	0	-	-	-	-	-	0	0	363	305	~ 104	0
Stage 1	0	-	-	-	-	-	0	0	-	-	-	0
Stage 2	0	-	-	-	-	-	0	0	-	374	~ 162	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	363	176	~ 104	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	176	~ 104	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	215	~ 162	-
Approach	EB			NB			SB					
HCM Control Delay, s	0			22			\$ 389					
HCM LOS				C			F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	SBLn1	SBLn2							
Capacity (veh/h)	363	-	-	176	109							
HCM Lane V/C Ratio	0.424	-	-	0.243	1.812							
HCM Control Delay (s)	22	-	-	31.9	466.3							
HCM Lane LOS	C	-	-	D	F							
HCM 95th %tile Q(veh)	2	-	-	0.9	15.8							
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

Intersection

Int Delay, s/veh 0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			P
Traffic Vol, veh/h	6	3	91	0	0	22
Future Vol, veh/h	6	3	91	0	0	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	68	68	68	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	4	134	0	0	31

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	165	134	0
Stage 1	134	-	-
Stage 2	31	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	826	915	1451
Stage 1	892	-	-
Stage 2	992	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	826	915	1451
Mov Cap-2 Maneuver	826	-	-
Stage 1	892	-	-
Stage 2	992	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	855	1451	-
HCM Lane V/C Ratio	-	-	0.015	-	-
HCM Control Delay (s)	-	-	9.3	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations		↘			↗				↗
Traffic Vol, veh/h	0	13	0	0	96	19	0	0	8
Future Vol, veh/h	0	13	0	0	96	19	0	0	8
Peak Hour Factor	0.92	0.63	0.63	0.92	0.72	0.72	0.92	0.67	0.67
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	21	0	0	133	26	0	0	12
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.4	7.7	6.8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	0%
Vol Thru, %	0%	83%	0%
Vol Right, %	0%	17%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	115	8
LT Vol	13	0	0
Through Vol	0	96	0
RT Vol	0	19	8
Lane Flow Rate	21	160	12
Geometry Grp	1	1	1
Degree of Util (X)	0.025	0.172	0.012
Departure Headway (Hd)	4.275	3.872	3.643
Convergence, Y/N	Yes	Yes	Yes
Cap	837	931	969
Service Time	2.302	1.879	1.714
HCM Lane V/C Ratio	0.025	0.172	0.012
HCM Control Delay	7.4	7.7	6.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.6	0

Intersection

Int Delay, s/veh 2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Traffic Vol, veh/h	23	1	44	50	21	149
Future Vol, veh/h	23	1	44	50	21	149
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1	48	54	23	162

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	254	104	185
Stage 1	104	-	-
Stage 2	150	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	735	951	1390
Stage 1	920	-	-
Stage 2	878	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	709	951	1390
Mov Cap-2 Maneuver	709	-	-
Stage 1	887	-	-
Stage 2	878	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	3.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBTEBLn1	SBT	SBR
Capacity (veh/h)	1390	-	717	-
HCM Lane V/C Ratio	0.034	-	0.036	-
HCM Control Delay (s)	7.7	0	10.2	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-

Intersection							
Int Delay, s/veh	0.9						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			↑	↑		
Traffic Vol, veh/h	3	7	5	88	13	15	
Future Vol, veh/h	3	7	5	88	13	15	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	0	-	-	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	92	92	92	92	92	92	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	3	8	5	96	14	16	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	128	22	30	0	-	0	
Stage 1	22	-	-	-	-	-	
Stage 2	106	-	-	-	-	-	
Critical Hdwy	6.42	6.22	4.12	-	-	-	
Critical Hdwy Stg 1	5.42	-	-	-	-	-	
Critical Hdwy Stg 2	5.42	-	-	-	-	-	
Follow-up Hdwy	3.518	3.318	2.218	-	-	-	
Pot Cap-1 Maneuver	866	1055	1583	-	-	-	
Stage 1	1001	-	-	-	-	-	
Stage 2	918	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	863	1055	1583	-	-	-	
Mov Cap-2 Maneuver	863	-	-	-	-	-	
Stage 1	998	-	-	-	-	-	
Stage 2	918	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	8.7		0.4		0		
HCM LOS	A						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1583	-	989	-	-		
HCM Lane V/C Ratio	0.003	-	0.011	-	-		
HCM Control Delay (s)	7.3	0	8.7	-	-		
HCM Lane LOS	A	A	A	-	-		
HCM 95th %tile Q(veh)	0	-	0	-	-		

HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Future Conditions
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑	↑	↑	
Traffic Volume (veh/h)	0	824	137	0	0	0	0	0	311	39	77	0
Future Volume (veh/h)	0	824	137	0	0	0	0	0	311	39	77	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No					No			No		
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1984	1984	0
Adj Flow Rate, veh/h	0	936	156				0	0	384	53	104	0
Peak Hour Factor	0.88	0.88	0.88				0.81	0.81	0.81	0.74	0.74	0.74
Percent Heavy Veh, %	0	1	1				0	0	1	1	1	0
Cap, veh/h	0	0	0				0	0	0	150	153	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.08	0.08	0.00
Sat Flow, veh/h		0					0		1007	1984	0	
Grp Volume(v), veh/h		0.0					0.0		53	104	0	
Grp Sat Flow(s),veh/h/ln									1007	1984	0	
Q Serve(g_s), s									5.1	5.1	0.0	
Cycle Q Clear(g_c), s									5.1	5.1	0.0	
Prop In Lane									1.00		0.00	
Lane Grp Cap(c), veh/h									150	153	0	
V/C Ratio(X)									0.35	0.68	0.00	
Avail Cap(c_a), veh/h									314	476	0	
HCM Platoon Ratio									1.00	1.00	1.00	
Upstream Filter(l)									1.00	1.00	0.00	
Uniform Delay (d), s/veh									45.0	45.0	0.0	
Incr Delay (d2), s/veh									1.4	5.2	0.0	
Initial Q Delay(d3),s/veh									0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln									1.3	2.7	0.0	
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh									46.4	50.2	0.0	
LnGrp LOS									D	D	A	
Approach Vol, veh/h										157		
Approach Delay, s/veh										48.9		
Approach LOS										D		
Timer - Assigned Phs												
Phs Duration (G+Y+Rc), s				13.7								
Change Period (Y+Rc), s				6.0								
Max Green Setting (Gmax), s				24.0								
Max Q Clear Time (g_c+I1), s				7.1								
Green Ext Time (p_c), s				0.7								
Intersection Summary												
HCM 6th Ctrl Delay				48.9								
HCM 6th LOS				D								

HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Future Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations		↑↑	↑						↑	↑	↑			
Traffic Volume (vph)	0	824	137	0	0	0	0	0	311	39	77	0		
Future Volume (vph)	0	824	137	0	0	0	0	0	311	39	77	0		
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000		
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0			
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00			
Fr't		1.00	0.85						0.86	1.00	1.00			
Flt Protected		1.00	1.00						1.00	0.95	1.00			
Satd. Flow (prot)		3762	1683						1713	1881	1980			
Flt Permitted		1.00	1.00						1.00	0.95	1.00			
Satd. Flow (perm)		3762	1683						1713	1881	1980			
Peak-hour factor, PHF	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81	0.74	0.74	0.74		
Adj. Flow (vph)	0	936	156	0	0	0	0	0	384	53	104	0		
RTOR Reduction (vph)	0	0	47	0	0	0	0	0	131	43	0	0		
Lane Group Flow (vph)	0	936	109	0	0	0	0	0	253	10	104	0		
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	1%	1%	1%		
Turn Type		NA	Perm						Prot	Perm	NA			
Protected Phases		2							8		4			
Permitted Phases			2							4				
Actuated Green, G (s)		69.7	69.7						18.5	18.5	18.5			
Effective Green, g (s)		69.7	69.7						18.5	18.5	18.5			
Actuated g/C Ratio		0.70	0.70						0.18	0.18	0.18			
Clearance Time (s)		5.8	5.8						6.0	6.0	6.0			
Vehicle Extension (s)		3.0	3.0						3.0	3.0	3.0			
Lane Grp Cap (vph)		2622	1173						316	347	366			
v/s Ratio Prot		c0.25							c0.15		0.05			
v/s Ratio Perm			0.06							0.01				
v/c Ratio		0.36	0.09						0.80	0.03	0.28			
Uniform Delay, d1		6.1	4.9						39.0	33.4	35.1			
Progression Factor		1.00	1.00						1.00	1.00	1.00			
Incremental Delay, d2		0.4	0.2						13.2	0.0	0.4			
Delay (s)		6.5	5.1						52.2	33.4	35.5			
Level of Service		A	A						D	C	D			
Approach Delay (s)		6.3			0.0			52.2				34.8		
Approach LOS		A			A			D				C		
Intersection Summary														
HCM 2000 Control Delay			19.8									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.45											
Actuated Cycle Length (s)			100.0								11.8			
Intersection Capacity Utilization			56.5%										ICU Level of Service	B
Analysis Period (min)			15											
c	Critical Lane Group													

HCM 6th TWSC
2: Cabaret Drive & Emagine Theater Drive

Future Conditions
PM Peak Hour

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↑			↕
Traffic Vol, veh/h	46	0	66	14	0	34
Future Vol, veh/h	46	0	66	14	0	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	81	81	81	75	75
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	61	0	81	17	0	45

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	135	90	98
Stage 1	90	-	-
Stage 2	45	-	-
Critical Hdwy	6.41	6.21	4.11
Critical Hdwy Stg 1	5.41	-	-
Critical Hdwy Stg 2	5.41	-	-
Follow-up Hdwy	3.509	3.309	2.209
Pot Cap-1 Maneuver	861	971	1501
Stage 1	936	-	-
Stage 2	980	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	861	971	1501
Mov Cap-2 Maneuver	861	-	-
Stage 1	936	-	-
Stage 2	980	-	-

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

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	861	1501
HCM Lane V/C Ratio	-	-	0.071	-
HCM Control Delay (s)	-	-	9.5	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0

HCM 6th AWSC
 3: Fountain Walk Avenue & Donelson Drive

Future Conditions
 PM Peak Hour

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations		↵			↵				↵
Traffic Vol, veh/h	0	69	0	0	64	33	0	0	16
Future Vol, veh/h	0	69	0	0	64	33	0	0	16
Peak Hour Factor	0.92	0.68	0.68	0.92	0.80	0.80	0.92	0.80	0.80
Heavy Vehicles, %	2	0	0	2	1	1	2	0	0
Mvmt Flow	0	101	0	0	80	41	0	0	20
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	1
HCM Control Delay	7.8	7.4	6.8
HCM LOS	A	A	A

Lane	EBLn1	WBLn1	SBLn1
Vol Left, %	100%	0%	0%
Vol Thru, %	0%	66%	0%
Vol Right, %	0%	34%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	69	97	16
LT Vol	69	0	0
Through Vol	0	64	0
RT Vol	0	33	16
Lane Flow Rate	101	121	20
Geometry Grp	1	1	1
Degree of Util (X)	0.119	0.129	0.02
Departure Headway (Hd)	4.226	3.824	3.678
Convergence, Y/N	Yes	Yes	Yes
Cap	849	936	955
Service Time	2.248	1.852	1.772
HCM Lane V/C Ratio	0.119	0.129	0.021
HCM Control Delay	7.8	7.4	6.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.4	0.4	0.1

Intersection

Int Delay, s/veh 6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	150	10	9	57	24	32
Future Vol, veh/h	150	10	9	57	24	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	11	10	62	26	35

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	126	44	61
Stage 1	44	-	-
Stage 2	82	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	869	1026	1542
Stage 1	978	-	-
Stage 2	941	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	863	1026	1542
Mov Cap-2 Maneuver	863	-	-
Stage 1	971	-	-
Stage 2	941	-	-













Approach	EB	NB	SB
HCM Control Delay, s	10.2	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1542	-	872	-	-
HCM Lane V/C Ratio	0.006	-	0.199	-	-
HCM Control Delay (s)	7.4	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection							
Int Delay, s/veh	2.6						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			↑	↑		
Traffic Vol, veh/h	16	40	2	64	75	5	
Future Vol, veh/h	16	40	2	64	75	5	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	0	-	-	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	92	92	92	92	92	92	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	17	43	2	70	82	5	
Major/Minor	Minor2	Major1			Major2		
Conflicting Flow All	159	85	87	0	-	0	
Stage 1	85	-	-	-	-	-	
Stage 2	74	-	-	-	-	-	
Critical Hdwy	6.42	6.22	4.12	-	-	-	
Critical Hdwy Stg 1	5.42	-	-	-	-	-	
Critical Hdwy Stg 2	5.42	-	-	-	-	-	
Follow-up Hdwy	3.518	3.318	2.218	-	-	-	
Pot Cap-1 Maneuver	832	974	1509	-	-	-	
Stage 1	938	-	-	-	-	-	
Stage 2	949	-	-	-	-	-	
Platoon blocked, %				-	-	-	
Mov Cap-1 Maneuver	831	974	1509	-	-	-	
Mov Cap-2 Maneuver	831	-	-	-	-	-	
Stage 1	937	-	-	-	-	-	
Stage 2	949	-	-	-	-	-	
Approach	EB	NB			SB		
HCM Control Delay, s	9.2	0.2			0		
HCM LOS	A						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR		
Capacity (veh/h)	1509	-	928	-	-		
HCM Lane V/C Ratio	0.001	-	0.066	-	-		
HCM Control Delay (s)	7.4	0	9.2	-	-		
HCM Lane LOS	A	A	A	-	-		
HCM 95th %tile Q(veh)	0	-	0.2	-	-		













HCM 6th Signalized Intersection Summary
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Future Conditions w/ Improvements
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗						↗	↘	↑	
Traffic Volume (veh/h)	0	1311	113	0	0	0	0	0	97	43	118	0
Future Volume (veh/h)	0	1311	113	0	0	0	0	0	97	43	118	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	0	1984	1984				0	0	1984	1953	1953	0
Adj Flow Rate, veh/h	0	1473	127				0	0	154	64	176	0
Peak Hour Factor	0.89	0.89	0.89				0.63	0.63	0.63	0.67	0.67	0.67
Percent Heavy Veh, %	0	1	1				0	0	1	3	3	0
Cap, veh/h	0	0	0				0	0	0	215	229	0
Arrive On Green	0.00	0.00	0.00				0.00	0.00	0.00	0.12	0.12	0.00
Sat Flow, veh/h		0						0		1223	1953	0
Grp Volume(v), veh/h		0.0						0.0		64	176	0
Grp Sat Flow(s),veh/h/ln										1223	1953	0
Q Serve(g_s), s										4.9	8.7	0.0
Cycle Q Clear(g_c), s										4.9	8.7	0.0
Prop In Lane										1.00		0.00
Lane Grp Cap(c), veh/h										215	229	0
V/C Ratio(X)										0.30	0.77	0.00
Avail Cap(c_a), veh/h										366	469	0
HCM Platoon Ratio										1.00	1.00	1.00
Upstream Filter(I)										1.00	1.00	0.00
Uniform Delay (d), s/veh										41.1	42.8	0.0
Incr Delay (d2), s/veh										0.8	5.4	0.0
Initial Q Delay(d3),s/veh										0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln										1.5	4.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh										41.9	48.3	0.0
LnGrp LOS										D	D	A
Approach Vol, veh/h											240	
Approach Delay, s/veh											46.6	
Approach LOS											D	
Timer - Assigned Phs												4
Phs Duration (G+Y+Rc), s												17.7
Change Period (Y+Rc), s												6.0
Max Green Setting (Gmax), s												24.0
Max Q Clear Time (g_c+I1), s												10.7
Green Ext Time (p_c), s												1.0
Intersection Summary												
HCM 6th Ctrl Delay			46.6									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis
 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Future Conditions w/ Improvements
 AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑	↑						↑	↑	↑		
Traffic Volume (vph)	0	1311	113	0	0	0	0	0	97	43	118	0	
Future Volume (vph)	0	1311	113	0	0	0	0	0	97	43	118	0	
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Total Lost time (s)		5.8	5.8						6.0	6.0	6.0		
Lane Util. Factor		0.95	1.00						1.00	1.00	1.00		
Frt		1.00	0.85						0.86	1.00	1.00		
Flt Protected		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (prot)		3762	1683						1713	1845	1942		
Flt Permitted		1.00	1.00						1.00	0.95	1.00		
Satd. Flow (perm)		3762	1683						1713	1845	1942		
Peak-hour factor, PHF	0.89	0.89	0.89	0.92	0.92	0.92	0.63	0.63	0.63	0.67	0.67	0.67	
Adj. Flow (vph)	0	1473	127	0	0	0	0	0	154	64	176	0	
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	43	43	0	0	
Lane Group Flow (vph)	0	1473	94	0	0	0	0	0	111	21	176	0	
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%	
Turn Type		NA	Perm							Prot	Perm	NA	
Protected Phases		2								8		4	
Permitted Phases			2								4		
Actuated Green, G (s)		73.9	73.9							14.3	14.3	14.3	
Effective Green, g (s)		73.9	73.9							14.3	14.3	14.3	
Actuated g/C Ratio		0.74	0.74							0.14	0.14	0.14	
Clearance Time (s)		5.8	5.8							6.0	6.0	6.0	
Vehicle Extension (s)		3.0	3.0							3.0	3.0	3.0	
Lane Grp Cap (vph)		2780	1243							244	263	277	
v/s Ratio Prot		c0.39								0.06		c0.09	
v/s Ratio Perm			0.06								0.01		
v/c Ratio		0.53	0.08							0.46	0.08	0.64	
Uniform Delay, d1		5.6	3.6							39.3	37.1	40.4	
Progression Factor		1.00	1.00							1.00	1.00	1.00	
Incremental Delay, d2		0.7	0.1							1.4	0.1	4.7	
Delay (s)		6.3	3.7							40.6	37.3	45.1	
Level of Service		A	A							D	D	D	
Approach Delay (s)		6.1			0.0			40.6				43.0	
Approach LOS		A			A			D				D	
Intersection Summary													
HCM 2000 Control Delay			13.2									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.55										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	11.8
Intersection Capacity Utilization			59.2%									ICU Level of Service	B
Analysis Period (min)			15										
c	Critical Lane Group												

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	NB	SB	SB
Directions Served	R	L	LT
Maximum Queue (ft)	55	28	60
Average Queue (ft)	19	6	15
95th Queue (ft)	40	24	44
Link Distance (ft)	599	28	28
Upstream Blk Time (%)		3	7
Queuing Penalty (veh)		0	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	8
95th Queue (ft)	30
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	29	55	28
Average Queue (ft)	3	28	6
95th Queue (ft)	17	48	25
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 2

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	127	117	58	163	46	82
Average Queue (ft)	58	25	18	83	14	37
95th Queue (ft)	110	77	46	143	38	74
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)					4	36
Queuing Penalty (veh)					1	15
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	54
Average Queue (ft)	27
95th Queue (ft)	49
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	31	40	33
Average Queue (ft)	14	28	9
95th Queue (ft)	37	44	31
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 16

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	160	115	29	127	28	59
Average Queue (ft)	70	42	4	46	5	16
95th Queue (ft)	133	97	19	95	22	48
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)					2	21
Queuing Penalty (veh)					0	3
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	8
95th Queue (ft)	31
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	29	55	28
Average Queue (ft)	4	28	6
95th Queue (ft)	19	46	24
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 4

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	NB	SB	SB
Directions Served	R	L	LT
Maximum Queue (ft)	56	49	54
Average Queue (ft)	21	22	19
95th Queue (ft)	46	43	48
Link Distance (ft)	599	28	28
Upstream Blk Time (%)		14	11
Queuing Penalty (veh)		5	4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	8
95th Queue (ft)	30
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	28	55	27
Average Queue (ft)	4	27	7
95th Queue (ft)	19	50	26
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 8

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	155	119	52	183	45	81
Average Queue (ft)	72	33	17	88	19	39
95th Queue (ft)	127	89	44	157	43	80
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)					7	37
Queuing Penalty (veh)					3	18
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	53
Average Queue (ft)	25
95th Queue (ft)	49
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	31	50	29
Average Queue (ft)	12	30	9
95th Queue (ft)	35	45	30
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 21

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	164	132	27	135	60	64
Average Queue (ft)	67	44	4	42	24	20
95th Queue (ft)	135	105	19	100	51	54
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)					13	22
Queuing Penalty (veh)					4	7
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	7
95th Queue (ft)	29
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	29	49	28
Average Queue (ft)	4	28	6
95th Queue (ft)	20	48	24
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 12

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	NB	SB	SB
Directions Served	T	T	R	L	LT
Maximum Queue (ft)	10	4	128	62	94
Average Queue (ft)	0	0	33	25	55
95th Queue (ft)	4	3	90	53	93
Link Distance (ft)	402	402	599	28	28
Upstream Blk Time (%)				15	51
Queuing Penalty (veh)				13	42
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	9
95th Queue (ft)	32
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	29	67	28
Average Queue (ft)	8	35	6
95th Queue (ft)	29	52	25
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Cabaret Drive & N. Site Drive

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	40	63	9
Average Queue (ft)	17	9	0
95th Queue (ft)	44	37	4
Link Distance (ft)	343	110	162
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Cabaret Drive & S. Site Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	31	6
Average Queue (ft)	9	0
95th Queue (ft)	32	4
Link Distance (ft)	342	97
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 55

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	186	146	58	436	48	84
Average Queue (ft)	103	56	28	219	19	45
95th Queue (ft)	166	125	56	435	42	82
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)				1	7	41
Queuing Penalty (veh)				2	4	24
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	44
Average Queue (ft)	24
95th Queue (ft)	48
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	44	62	29
Average Queue (ft)	26	32	12
95th Queue (ft)	43	51	34
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Cabaret Drive & N. Site Drive

Movement	EB
Directions Served	LR
Maximum Queue (ft)	81
Average Queue (ft)	42
95th Queue (ft)	66
Link Distance (ft)	335
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Cabaret Drive & S. Site Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	48	6
Average Queue (ft)	26	0
95th Queue (ft)	48	4
Link Distance (ft)	310	97
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 30

Intersection: 1: Cabaret Drive/WB to EB XO & EB 12 Mile Road

Movement	EB	EB	EB	NB	SB	SB
Directions Served	T	T	R	R	L	T
Maximum Queue (ft)	207	162	52	158	61	95
Average Queue (ft)	100	65	18	57	21	64
95th Queue (ft)	178	139	45	125	50	99
Link Distance (ft)	402	402		599	28	28
Upstream Blk Time (%)					11	58
Queuing Penalty (veh)					9	47
Storage Bay Dist (ft)			350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cabaret Drive & Emagine Theater Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	8
95th Queue (ft)	31
Link Distance (ft)	334
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Fountain Walk Avenue & Donelson Drive

Movement	EB	WB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	30	69	28
Average Queue (ft)	7	35	6
95th Queue (ft)	27	54	25
Link Distance (ft)	562	388	400
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Cabaret Drive & N. Site Drive

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	53	45	14
Average Queue (ft)	18	9	0
95th Queue (ft)	46	34	6
Link Distance (ft)	343	110	162
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Cabaret Drive & S. Site Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	31	6
Average Queue (ft)	7	0
95th Queue (ft)	29	4
Link Distance (ft)	342	97
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 56

CABARET DRIVE & N. SITE DRIVE LT LANE WARRANT

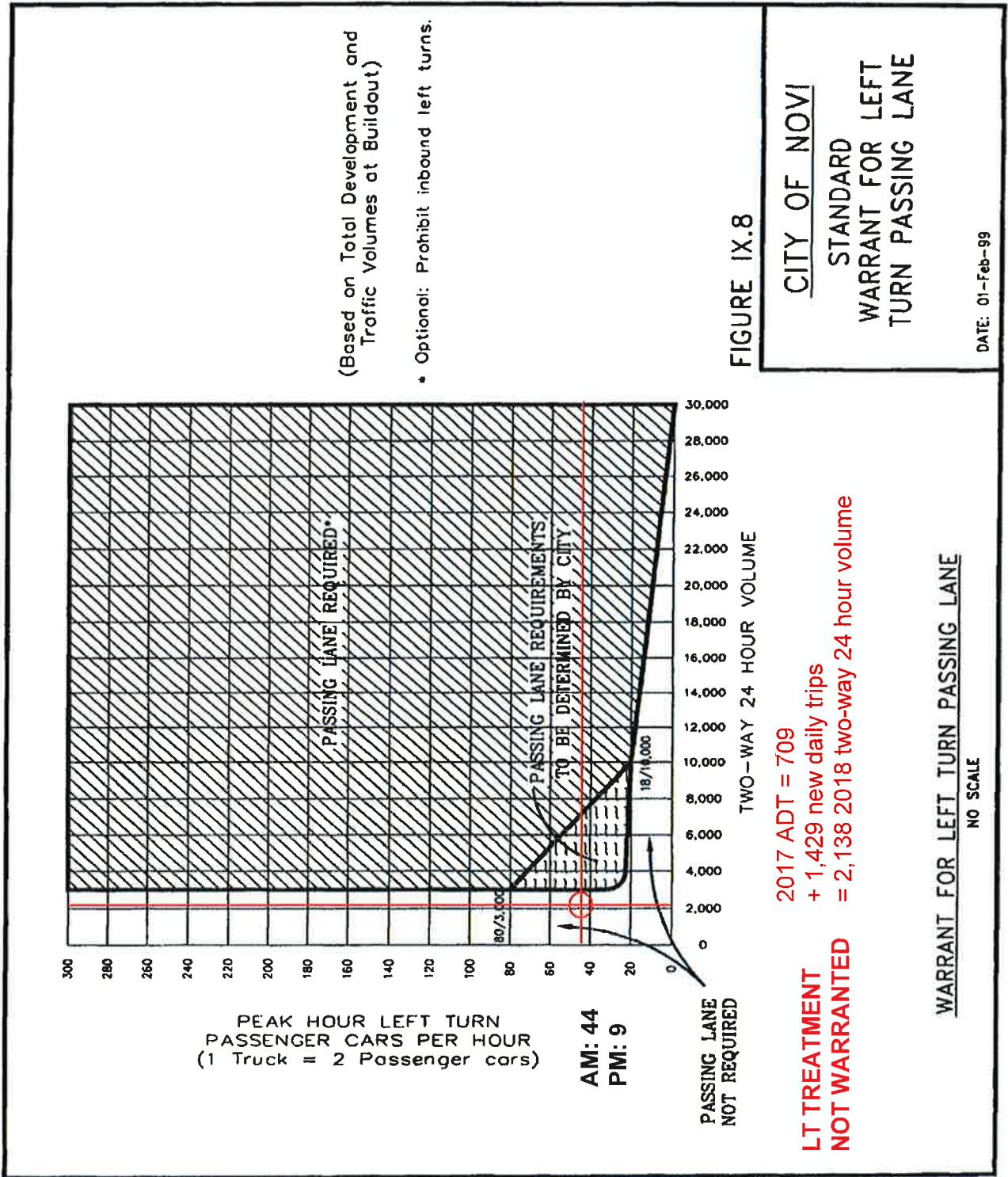
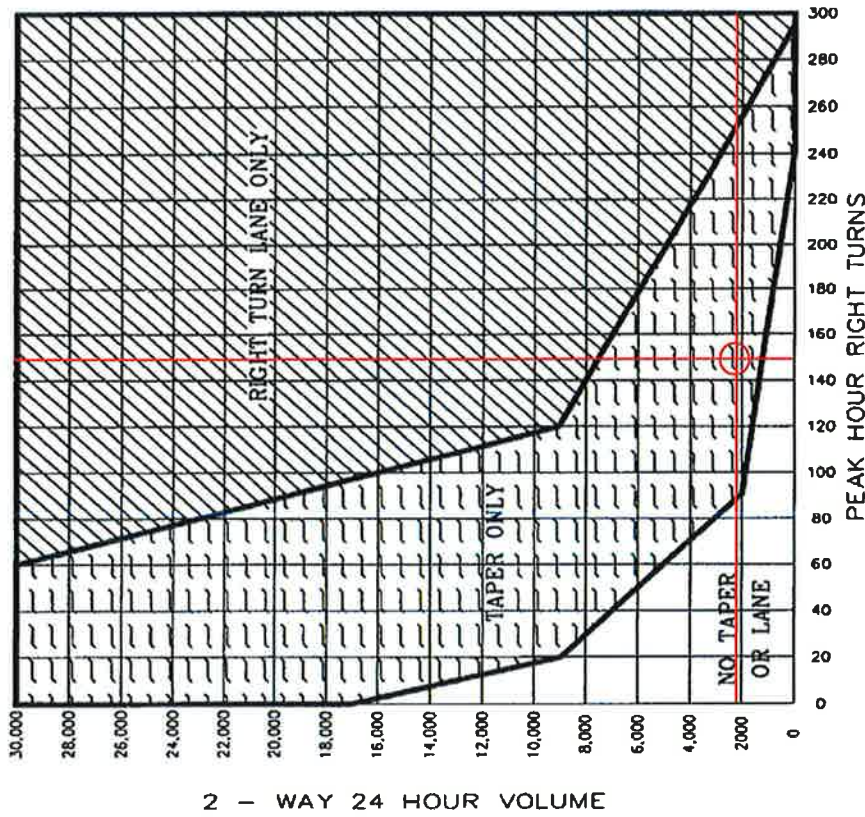


Figure IX.8

(Ord. No. 99-124.11, Pt. XXXIII, 7-26-99)

CABARET DRIVE & N. SITE DRIVE RT LANE WARRANT

2017 ADT = 709
+ 1,429 new daily trips
= 2,138 2018 two-way 24 hour volume



AM: 149
PM: 32
RT DECELERATION
TAPER WARRANTED

WARRANT FOR RIGHT TURN DECELERATION LANE OR TAPER
NO SCALE

FIGURE IX.10

CITY OF NOVI
STANDARD WARRANT
FOR RIGHT TURN
DECELERATION LANE
OR TAPER

DATE: 27-Jan-99

Figure IX.10

(Ord. No. 99-124.11, Pt. XXXIII, 7-26-99)

CABARET DRIVE & S. SITE DRIVE LT LANE WARRANT

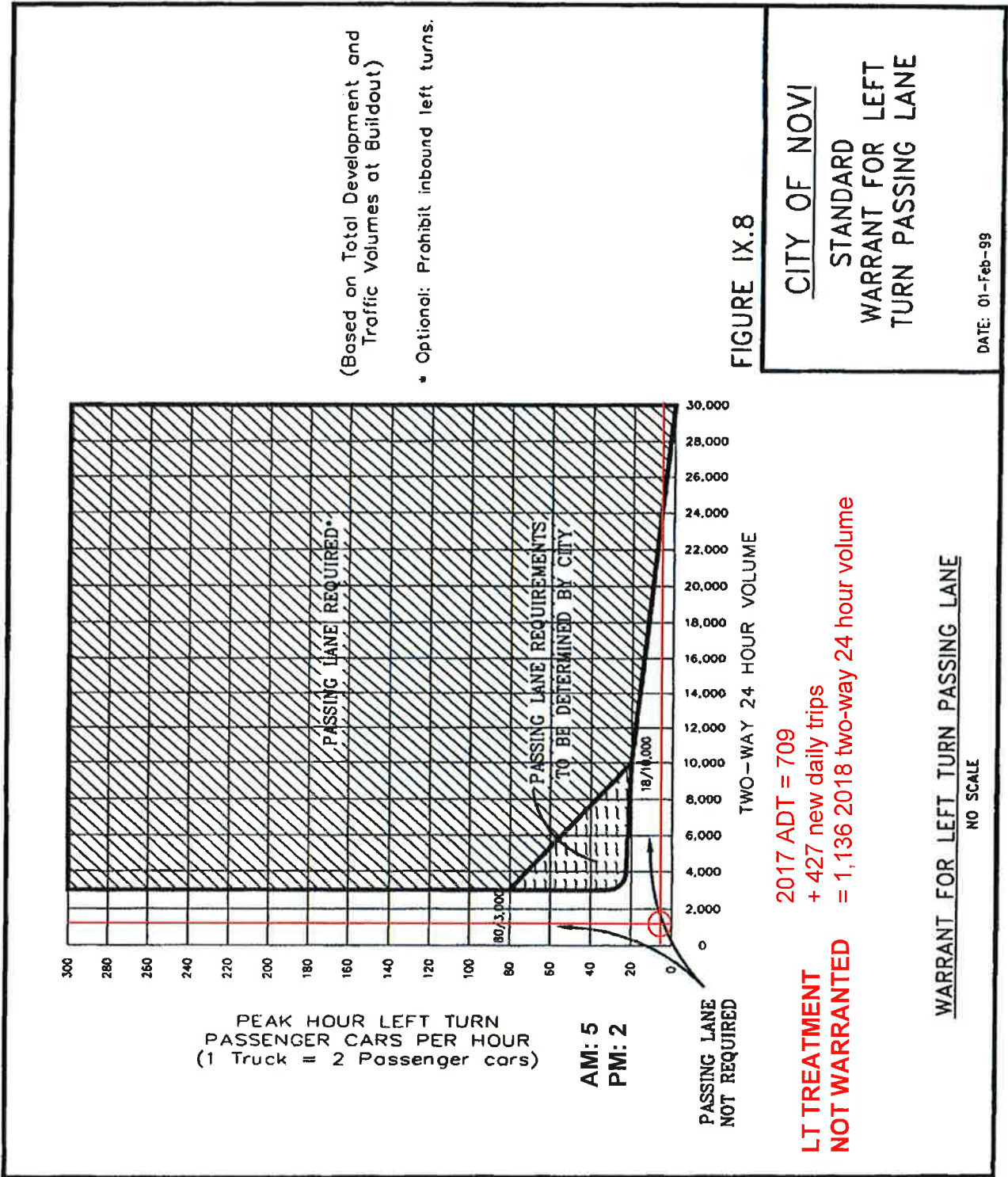


Figure IX.8

(Ord. No. 99-124.11, Pl. XXXIII, 7-26-99)

CABARET DRIVE & S. SITE DRIVE RT LANE WARRANT

2017 ADT = 709
 + 427 new daily trips
 = 1,136 2018 two-way 24 hour volume

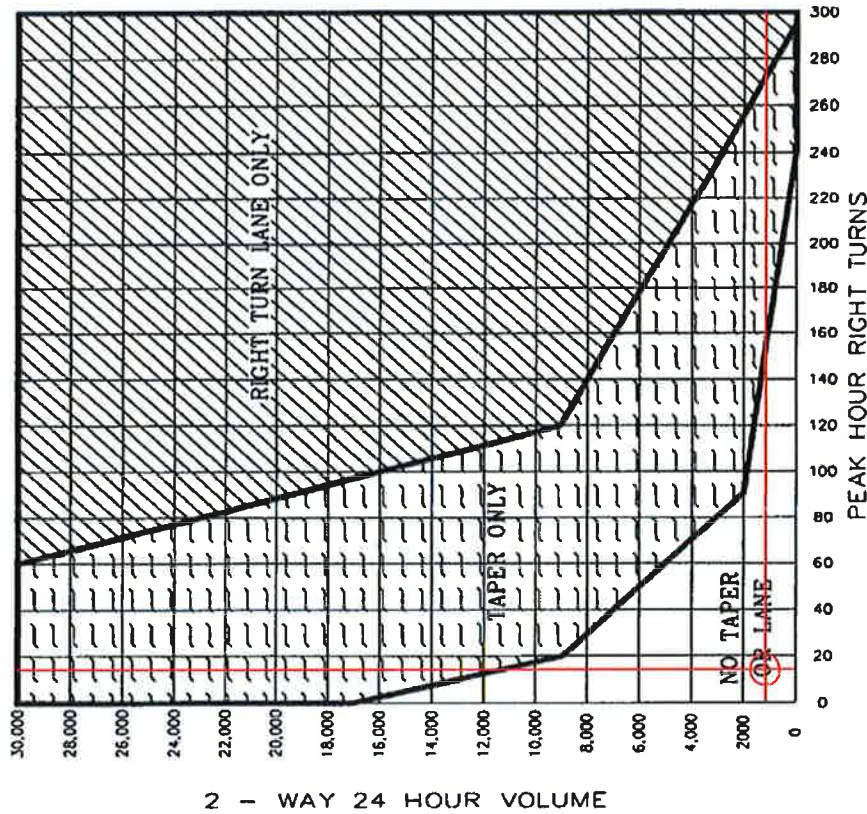


FIGURE IX.10

CITY OF NOVI
 STANDARD WARRANT
 FOR RIGHT TURN
 DECELERATION LANE
 OR TAPER

DATE: 27-Jan-99

AM: 15
 PM: 5
 RT DECELERATION
 TAPER NOT WARRANTED

WARRANT FOR RIGHT TURN DECELERATION LANE OR TAPER
 NO SCALE

Figure IX.10

(Ord. No. 99-124.11, Pt. XXXIII, 7-26-99)

FAÇADE REVIEW



May 17, 2017

Façade Review Status Summary:
Approved, Full Compliance

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

Re: **FACADE ORDINANCE - Façade Review**
A123 Systems, PSP17-0067
 Façade Region: 2, Zoning District: OST

Dear Ms. McBeth;

The following is the Façade Review for Final Site Plan Approval of the above referenced project based on the drawings prepared by Faudie Architects, dated 4/28/17. The percentages of materials proposed for each façade are as shown on the table below. The maximum percentages allowed by the Schedule Regulating Façade Materials (AKA Façade Chart) of Ordinance Section 5.15 are shown in the right hand column. Materials in non-compliance with the Façade Chart, if any, are highlighted in bold.

Office / Lab Bldg. (Façade Region 2)	South (Front)	West	North	East	Ordinance Maximum (Minimum)
Spandrel Glass	30%	23%	27%	15%	50%
Flat Metal Panels (Roof Screens)	10%	8%	6%	5%	50%
Aluminum Composite Material (ACM)	40%	22%	25%	30%	50%

Pack Assembly Bldg. (Façade Region 2)	South (Front)	West	North	East	Ordinance Maximum (Minimum)
Spandrel Glass	5%	0%	0%	1%	50%
Flat Metal Panels (Roof Screens)	40%	50%	50%	50%	50%
Split Faced CMU	45%	50%	50%	49%	50%

As shown above, all proposed materials are in full compliance with the Façade Ordinance. It is noted that the drawings have conflicting notes regarding the Concrete Masonry Units (CMU); Split Faced CMU vs. Painted Smooth Faced CMU. Painted Smooth Faced CMU is not allowed by the Façade ordinance in any Façade Region. This review is based on the use of Split Faced CMU. The applicant should clarify that Split Faced CMU will in fact be used and not the Painted Smooth Faced CMU.

Recommendation - The building exhibits well balanced proportions and composition of materials. The colored rendering provided appears to indicate carefully coordinated earth-toned colors. A sample board was not provided at the time of this review. The sample board should be provided not less than 5 days prior to the Planning Commission meeting to more fully illustrate the proposed colors and textures of materials. The dumpster enclosure is indicated to be brick to match the building. The design is in full compliance with the Façade Ordinance and will harmonize well with other buildings in the surrounding area. Approval is recommended for the reasons stated above.

Notes to the Applicant:

1. Façade Ordinance requires inspection(s) for all projects. Materials displayed on the approved sample board will be compared to materials delivered to the site. It is the applicant's responsibility to request the inspection of each façade material at the appropriate time. 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 & Associates, Architects PC



Douglas R. Necci, AIA

FIRE REVIEW



May 11, 2017

TO: Barbara McBeth- City Planner
Sri Ravali Komaragiri- Plan Review Center
Kirsten Mellem- Plan Review Center

CITY COUNCIL

Mayor
Bob Gatt

Mayor Pro Tem
Dave Staudt

Gwen Markham

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Director of EMS/Fire Operations
Jeffery R. Johnson

Assistant Chief of Police
Erick W. Zinser

Assistant Chief of Police
Jerrold S. Hart

RE: A123 Systems

PSP# 17-0067

Project Description:

Erect a three story office building 128,936 sq. ft. with an out building 53,469 sq. ft. at the corner of Cabaret Dr. and Fountain Walk Ave.

Comments:

MUST add hydrants around both buildings to keep hydrant spacing at or below 300'. City Ordinance 11-68.f(1).c.

Recommendation:

APPROVED WITH CONDITIONS ABOVE ARE MET

Sincerely,

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

cc: file

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

cityofnovi.org

APPLICANT RESPONSE LETTER



June 7, 2017

PEA Project No: 2016-312

Ms. Kirsten Mellem, Planner

City of Novi

45175 W. 10 Mile Road

Novi, MI 48375

RE: Fountain Office Park, Preliminary Site Plan Comments

Dear Ms. Mellem:

In response to the comments received from various City departments during the Preliminary Site Plan process for Site Plan approval, we offer the following responses:

Planning Review Comments dated May 19, 2017:

Responses are offered for only those items where a plan revision or typed response was necessary.

1. The storage containers are actually mobile self-contained battery test modules that are housed in a standard 40 foot sea container. These containers will be screened with appropriate plantings.
2. The nitrogen tanks will be fully screened with materials to match the building materials with the Final Plan submittal.
3. The parking will be revised to show no more than 15 spaces per bay.
4. We would like to formally request the waiver for covered bike parking as none is proposed at this time.
5. Additional width will be provided to maintain the required maneuvering width.
6. Details will be provided with the Final Site Plan submittal.
7. Details will be provided with the Final Site Plan submittal.
8. Details will be provided with the Final Site Plan submittal.
9. Signage will be provided with the Final Site Plan Submittal.
10. Location details will be provided with the Final Site Plan Submittal.
11. The path along 12 Mile Road may be constructed when additional phases of the project move forward.
12. The basketball court is for employee use only.
13. Noted.
14. Noted.
15. Noted.
16. Once the project is completed it will employ 300-400 persons. Total anticipated cost for the project is approximately \$27.2 Million.
17. A parcel split is not proposed.
18. Will be addressed with the Final Site Plan submittal.
19. Notes will be added to the plan for the Final Site Plan submittal.
20. Security lights will be indicated on the Final Site Plan submittal.
21. Photometric data to the lot line will be provided with the Final Site Plan submittal.

Engineering Preliminary Site Plan Review Comments dated May 15, 2017:

1. The note will be added to the plans.
2. Comment noted.
3. An overall legal description will be added to the plans.
4. The ROW for 12 Mile Road was previously dedicated.
5. The ROW for Caberet Drive will be dedicated with the Final Site Plan Submittal.
6. Comment noted
7. A hydrant will be added to the plans.
8. The size of the water main will be added to the plans. If smaller than 8", the line will be replaced as an 8".
9. The proposed water main will be moved for the Final Site Plan submittal.
10. The existing water main easement will be added for the Final Site Plan submittal.
11. The existing water main easement will be added for the Final Site Plan submittal.
12. Comment noted.
13. The existing sanitary sewer easement will be added for the Final Site Plan submittal.
14. Comment noted.
15. Storm water sediment control will be shown on the Final Site Plan submittal.
16. A maintenance route to the detention basin outlet will be shown on the Final Site Plan submittal.
17. A 25' detention buffer dimension will be added to the Final Site Plan submittal.
18. Comment noted.
19. Comment noted.
20. Comment noted.
21. The elevation of the existing drive does not allow a direct connection to this property. A cross access drive to that site will not be provided on the proposed plans.
22. Comment noted.
23. Comment noted.
24. Comment noted.
25. A construction cost estimate will be provided with the Final Site Plan submittal.
26. Comment noted.
27. Comment noted.
28. Comment noted.
29. Comment noted.
30. Comment noted.
31. Comment noted.
32. Comment noted.
33. Comment noted.
34. Comment noted.
35. Comment noted.
36. Comment noted.
37. Comment noted.
38. Comment noted.
39. Comment noted.
40. Comment noted.
41. Comment noted.
42. Comment noted.
43. Comment noted.
44. Comment noted.
45. Comment noted.

Landscape Preliminary Site Plan Review Comments dated May 5, 2017:

1. All proposed utilities, hydrants and surrounding zoning labels will be shown clearly on L-1.
2. Regulated woodland boundaries will be shown, tree tag numbers larger, more legible on T-1.0.
3. Will revise the landscape requirement calculations to reflect “not” adjacent to parking landscape requirements.
4. Will provide a berm south of the southern driveway on Cabaret.
5. Will locate the address to the building and provide clear views to it.
6. Noted: change from 16 trees instead of 21 required.
7. Will add parking SF numbers to islands.
8. Perimeter evergreen trees will be changed to canopy trees with noted canopy size.
9. Will add parking SF numbers to foundation landscaping areas.
10. At the storm basin, the HWL will be shown.
11. At the storm basin, 70-75% native shrubs will be shown, with count and species.
12. Seed mixes will be added to the plan, at the basin. Hatches will be shown with more differentiation.
13. Utility box locations will be added with the required city screening.
14. Plant list, details and notations will be revised as noted in landscape chart.
15. The cost estimate will be adjusted as noted.
16. Irrigation plan will be submitted for final site plan.
17. Topo at 2' intervals noted.
18. Snow deposit areas, landscaping will be placed so it won't be harmed during snow storage.
19. Corner clearance shown.

Wetland Review Comments dated May 18, 2017:

1. Will add the 25' wetland buffer setback to the plans.
2. The plans will show all existing wetlands, and wetland buffers in SF or acres and all impacts both permanent and temporary in SF and volume.
3. Comment noted
4. Comment noted
5. Wetland conservation easements will not be provided as the remainder of the property may be developed in future phases of the project.

Woodland Review Comments dated May 18, 2017:

1. Tree tag numbers will be shown larger, more legible on T-1.0.
2. Noted that ECT will provide recommendations for trees that are considered exempt, poor less than 50% healthy.
3. Column will be added to the Existing tree list; showing credits, as noted.
4. Woodland replacement trees will be indicated, and indicated in Plant list.
5. Noted, 2.5" cal. deciduous trees count as 1:1 replacement and min. 6' ht. evergreen count as 1.5: 1.
6. Plant list will be revised with approved Novi native species.
7. Comment noted
8. Comment noted
9. Comment noted
10. Woodland easements may be provided if appropriate on portions of the site that may not be developed on future phases.
11. Comment noted.

Traffic Preliminary Site Plan Review Comments dated May 18, 2017:

Internal Site Operations

1. PEA will verify that there are not more than 15 consecutive spaces without an island on the final site plan.
2. A Covered bike parking waiver is being requested.

Traffic Impact Study Review Comments dated May 18, 2017:

1. See separate response prepared by Fleis & Vandenbrink dated June 2, 2017.

Facade Review Comments dated May 17, 2017:

2. Comment noted

Fire Pre-Application Review Comments dated May 11, 2017:

1. Comment noted

If you should have any further questions or comments, please contact this office.

Sincerely,

PEA, Inc.



Steven A. Sorensen, PE
Director of Engineering - Troy

June 2, 2017

VIA EMAIL

Ms. Barbara McBeth, AICP
City of Novi
45175 10 Mile Road
Novi, Michigan 48375

RE: **Response to Comments
Fountain Office Building (A123) Preliminary Traffic Review
Novi, Michigan**

Dear Ms. McBeth:

Fleis & VandenBrink (F&V) staff has completed this letter in response to the comments provided by AECOM in their review dated May 18, 2017 and a follow-up conference call between F&V and AECOM conducted on May 26, 2017. F&V's responses to these comments pursuant to the conversations and correspondence with AECOM are summarized herein.

A. Conclusions and Recommendations

12. Overall, AECOM requires additional information to provide clarification to the comments above before approving the traffic impact study. The information required includes:

a. Updated trip generation numbers using the correct methodologies and gross floor areas [for the Manufacturing Facility].

The gross floor area square footages have been updated in the attached table. The net result of the increase is one additional inbound AM peak hour trip and one additional outbound AM peak hour trip. This change is insignificant and pursuant to conversations with AECOM, no revisions to the TIS are required to reflect this change.

In addition, F&V and AECOM agreed that the trip generation methodology used in the report was correct during the May 26, 2017 conference call.

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
General Office Building	710	89,290	SF	1,205	154	21	175	30	148	178
Research & Development	760	39,646	SF	466	48	10	58	9	52	61
Manufacturing	140	53,469	SF	187	12	3	15	9	17	26
New Trips				1,858	214	34	248	48	217	265
<i>Previous Trip Generation</i>				1,856	213	34	247	48	216	264
Net Change in Trips				2	1	0	1	0	1	1

b. Insight for how the background delay at 12 Mile Road and Cabaret Drive decreased when adding additional background traffic.

Since the additional of background traffic volumes increased the proportion of vehicle trips using the SBR turn movement at the 12 Mile Road WB-to-EB cross-over which operates better than the SBT movement, the overall approach delay was decreased.

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Farmington Hills, MI 48334

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c. Insight for how the trip distribution percentages were established.

Historical traffic volumes published by RCOC were reviewed at the intersection of 12 Mile Road and Novi Road to capture all inbound and outbound traffic movements into the study area. Additional traffic was distributed to Cabaret Drive via Fountain Walk Avenue due to the direct access provided from the I-696 WB ramps.

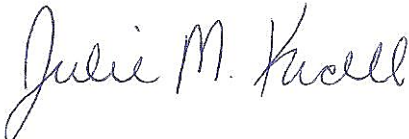
d. The signal timings used to produce the LOS stated in the improvement analyses.

The 12 Mile Road WB-to-EB cross-over signal is currently programmed for FLASH operation during the AM peak hour. Since this signal was upgraded to a SCATS controller in 2017, the signal timing and phasing were optimized to best model expected future traffic conditions.

If you have any questions or concerns, please contact our office.

Sincerely,

FLEIS & VANDENBRINK ENGINEERING, INC.



Julie M. Kroll, PE, PTOE
Sr. Project Manager

**Attached: RCOC Traffic Data
Updated Figures 2 & 3**

BMH:jmk

List View All DIRs

All Approaches

Record 1 of 1 Goto Record go

Location ID	7292	MPO ID	315
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	01	Route Type	
AF Group		Route	
GF Group			
Class Dist Grp			
WIM Group			
Funct'l Class		Milepost	
Located On	TWELVE MILE		
Loc On Alias			
AT	NOVI		
	PR	MP	PT
662106	2.015	63060171	

More Detail

STATION DATA

Directions: **EB**

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2012	11,830						
2010	11,350						
2008	10,630						
2005	13,010						

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

Date	Int	Total
Tue 8/28/2012	60	13,171
Mon 5/24/2010	60	11,385
Tue 6/17/2008	60	11,798
Tue 6/14/2005	60	14,660

VOLUME TREND

Year	Annual Growth
2012	2%
2010	3%
2008	-7%

SPEED

Date	Int	Pace	85th	Total
No Data				

CLASSIFICATION

Date	Int	Total
No Data		

WEIGH-IN-MOTION

Date	Axles	Avg GVW	Total
No Data			

PER VEHICLE

Date	Axles	85th	Total
No Data			

GAP

Date	Int	Total
No Data		

PARTIAL COUNT

Date	Int	24-Hr Total

NOTES/FILES

Note	Date

List View All DIRs

All Approaches

Record 1 of 1 Goto Record go

Location ID	7293	MPO ID	405
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	01	Route Type	
AF Group		Route	
GF Group			
Class Dist Grp			
WIM Group			
Funct'l Class		Milepost	

Located On	TWELVE MILE		
Loc On Alias			
AT	NOVI		

PR	MP	PT	
662106	2.015	63060171	

More Detail

STATION DATA

Directions: **WB**

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2012	10,410						
2010	11,160						
2008	8,220						
2005	14,600						

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

Date	Int	Total
Tue 8/28/2012	60	11,541
Mon 5/24/2010	60	11,289
Tue 6/17/2008	60	9,099
Tue 6/14/2005	60	16,510

VOLUME TREND

Year	Annual Growth
2012	-3%
2010	17%
2008	-17%



SPEED

Date	Int	Pace	85th	Total
No Data				

CLASSIFICATION

Date	Int	Total
No Data		

WEIGH-IN-MOTION

Date	Axles	Avg GVW	Total
No Data			

PER VEHICLE

Date	Axles	85th	Total
No Data			

GAP

Date	Int	Total
No Data		

PARTIAL COUNT

Date	Int	24-Hr Total

NOTES/FILES

Note	Date

[List View](#)
[All DIRs](#)
[All Approaches](#)

 Record ◀◀ ◀ 1 ▶ ▶▶ of 1 Goto Record go

Location ID	7290	MPO ID	16486
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	01	Route Type	
AF Group		Route	
GF Group			
Class Dist Grp			
WIM Group			
Funct'l Class		Milepost	

Located On	NOVI
Loc On Alias	
AT	TWELVE MILE

PR	MP	PT	
621910	1.014	63060171	

[More Detail ▶](#)

STATION DATA

 Directions: **NB** [?](#)

AADT [?](#)

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2012	8,520						
2010	8,160						
2008	8,600						
2005	8,210						

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

Date	Int	Total
Tue 8/28/2012	60	9,461
Mon 5/24/2010	60	8,197
Tue 6/17/2008	60	9,526
Tue 6/14/2005	60	9,259

VOLUME TREND [?](#)

Year	Annual Growth
2012	2%
2010	-3%
2008	2%



SPEED

Date	Int	Pace	85th	Total
No Data				

CLASSIFICATION

Date	Int	Total
No Data		

WEIGH-IN-MOTION [?](#)

Date	Axles	Avg GVW	Total
No Data			

PER VEHICLE

Date	Axles	85th	Total
No Data			

GAP

Date	Int	Total
No Data		

PARTIAL COUNT

Date	Int	24-Hr Total

NOTES/FILES

Note	Date

List View All DIRs

All Approaches

Record 1 of 1 Goto Record go

Location ID	7291	MPO ID	16495
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	01	Route Type	
AF Group		Route	
GF Group			
Class Dist Grp			
WIM Group			
Funct'l Class		Milepost	
Located On	NOVI		
Loc On Alias			
AT	TWELVE MILE		

PR	MP	PT	
621910	1.014	63060171	

More Detail **STATION DATA**

Directions: SB ?

AADT ?

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2012	5,840						
2010	5,640						
2008	5,890						
2005	5,720						

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

Date	Int	Total
Tue 8/28/2012	60	6,501
Mon 5/24/2010	60	5,699
Tue 6/17/2008	60	6,531
Tue 6/14/2005	60	6,461

VOLUME TREND ?

Year	Annual Growth
2012	2%
2010	-2%
2008	1%

SPEED

Date	Int	Pace	85th	Total
No Data				

CLASSIFICATION

Date	Int	Total
No Data		

WEIGH-IN-MOTION ?

Date	Axles	Avg GVW	Total
No Data			

PER VEHICLE

Date	Axles	85th	Total
No Data			

GAP

Date	Int	Total
No Data		

PARTIAL COUNT

Date	Int	24-Hr Total

NOTES/FILES

Note	Date

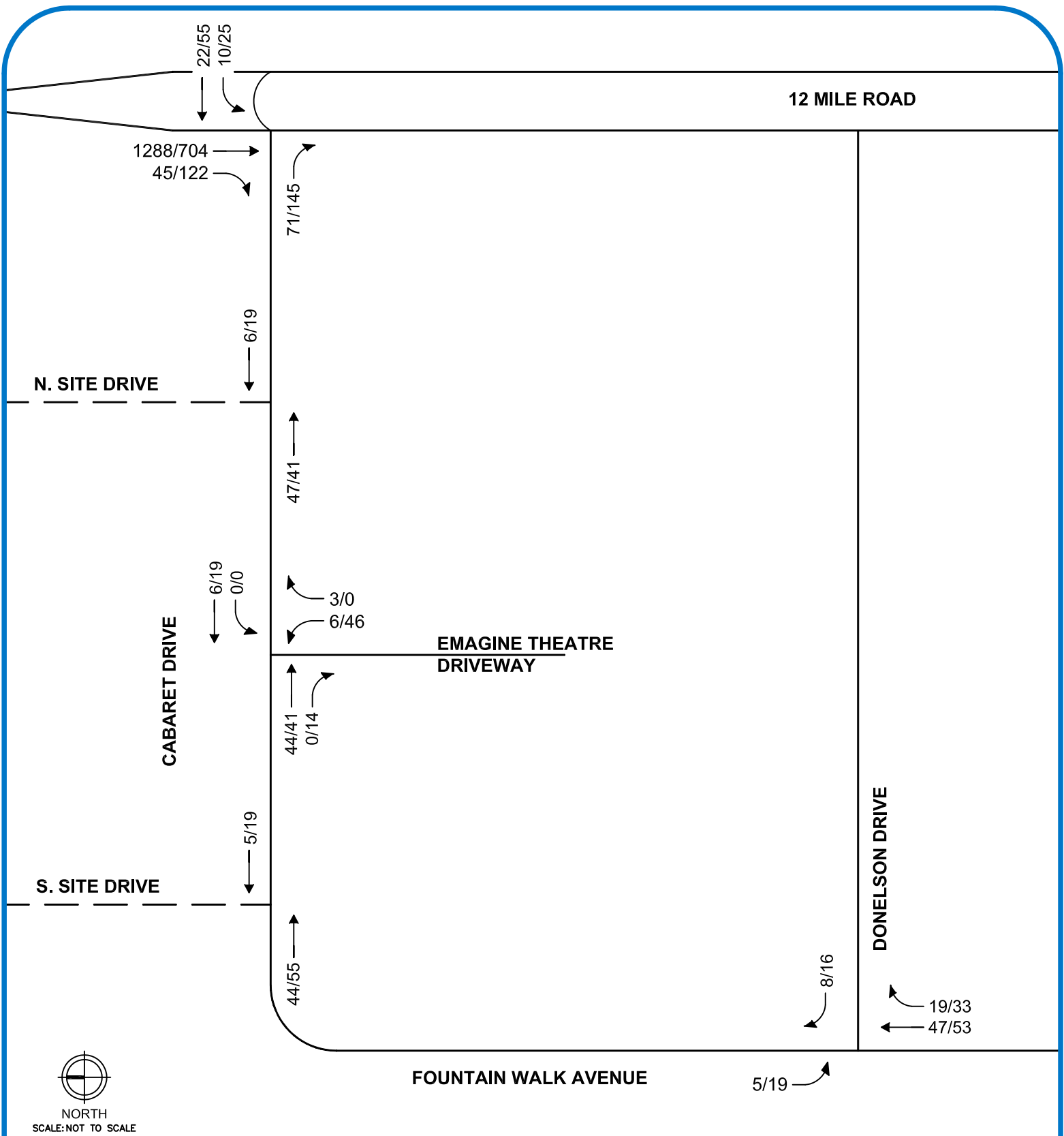


FIGURE 2
EXISTING TRAFFIC
VOLUMES
 FOUNTAIN OFFICE PARK TIS - NOVI, MI



LEGEND

- ROADS
- TRAFFIC VOLUMES (AM/PM)
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION

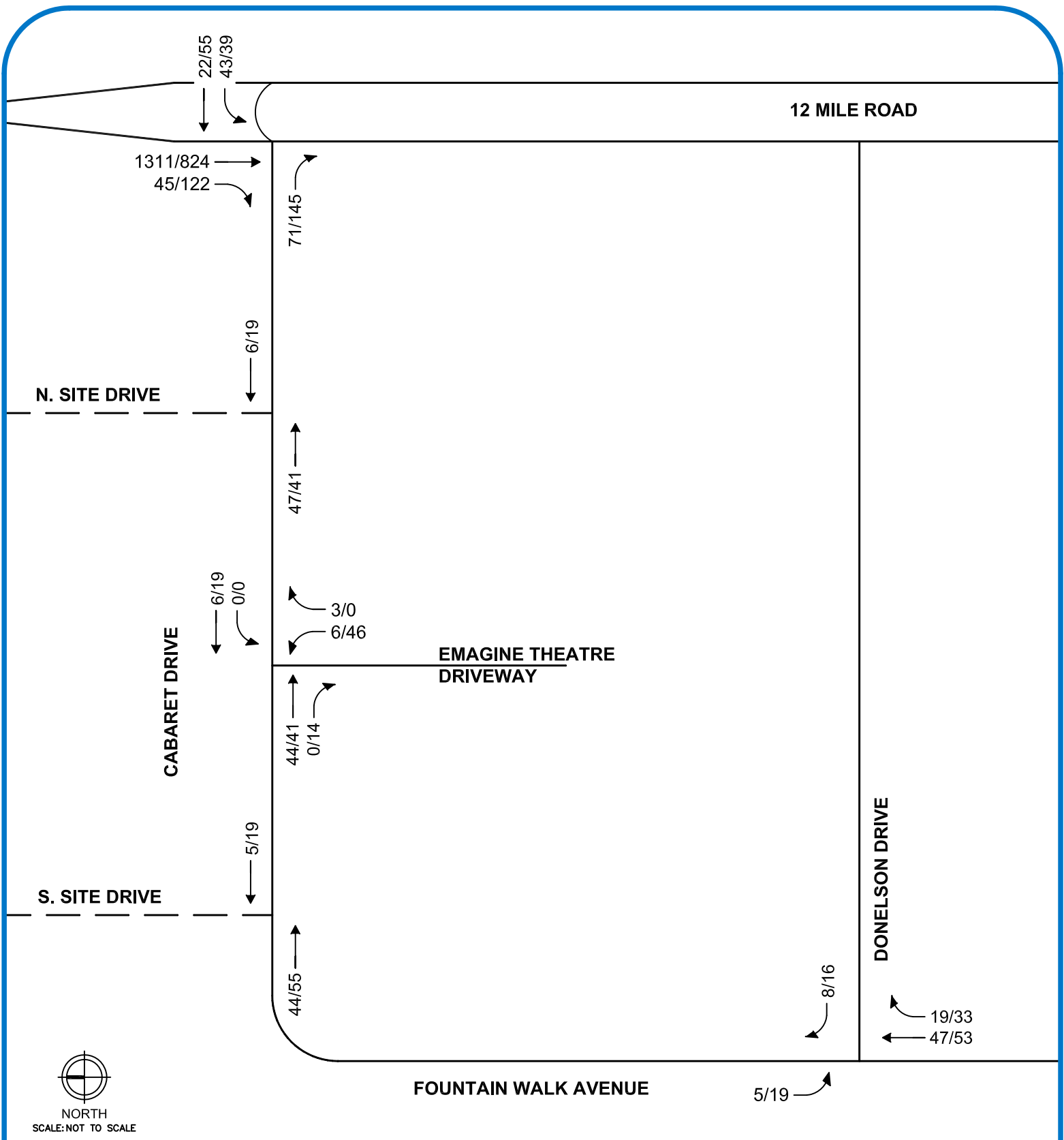


FIGURE 3
BACKGROUND TRAFFIC
VOLUMES

FOUNTAIN OFFICE PARK TIS - NOVI, MI



LEGEND

- ROADS
- TRAFFIC VOLUMES (AM/PM)
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION