



CITY of NOVI CITY COUNCIL

Agenda Item 1
April 1, 2019

SUBJECT: Approval of the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm, JSP 17-65 for a Preliminary Site Plan with a Special Development Option (SDO), Wetland Permit, Woodland Permit, and Stormwater Management Plan in the GE, Gateway East District. The subject property is 9.48 acres of land located at the southwest corner of Grand River Avenue and Meadowbrook Road, in Section 23. The applicant is proposing a 58,663 square foot car sales facility for Jaguar Land Rover.

SUBMITTING DEPARTMENT: Community Development Department - Planning Division

Bach

CITY MANAGER APPROVAL: *KPP*

BACKGROUND INFORMATION:

The subject property comprises two parcels totaling 9.48 acres. It is located on the southwest corner of Grand River Avenue and Meadowbrook Road (Section 23). The applicant is proposing to build a 58,663 square foot car sales facility for Jaguar Land Rover. The proposed facility includes sales and service areas. The concept plan proposes 138 parking spaces for employee and visitors and 287 parking spaces for storing cars for sale. A storm water pond is proposed on the south side that also acts a buffer from the residential use on south side of Cherry Hill Road. It has access from both Meadowbrook Road and Grand River Avenue.

The subject property is located at the "entry" area of the Gateway East District, since it is located on one of the four properties at the intersection of Grand River and Meadowbrook. Following a recommendation of the Planning Commission, the City Council is authorized to approve the SDO project, which contemplates a non-residential use that would not otherwise be permitted in the GE district for these properties, subject to conditions listed in Section 3.12.2.A.ii

City Council Action: Rezoning

City Council approved a rezoning request for the subject property from NCC (Non-Center Commercial) and OS-1 (Office Service) to GE (Gateway East) at their December 4, 2017 meeting. At the time of its consideration of rezoning request, the Planning Commission noted that the applicant should maintain a reasonable buffer between the parking lot and the residential uses to the south. A storm water pond is proposed on the south side that also acts a buffer from the residential use on south side of Cherry Hill Road.

City Council Action: SDO Concept Plan and Agreement

The City Council held a public hearing on the proposed Concept Plan at the November 13, 2018 City Council meeting. Tentative approval of the plan was granted at that time, subject to a number of conditions, and direction was provided for the City Attorney to prepare an SDO Agreement to be brought back before the City Council for final approval. Relevant minutes from the City Council meeting are attached.

The City Council approved the SDO Concept Plan and the SDO Agreement at their January 7, 2019 meeting.

Site Plan Approval

As noted in Section 3.12.7.B, once Concept Plan approval has been granted, the applicant may proceed to site plan review. Preliminary Site Plans will be reviewed and approved by the City Council. Final Site Plans may be reviewed and approved administratively unless the City Council directs otherwise at the time of Preliminary Site Plan approval. A public hearing has been scheduled for the April 1st City Council meeting for consideration of the Site Plan and associated permits. The attached review letters provide the City's professional staff and consultant's reviews and recommendations.

Deviations approved as part of SDO Agreement

The following deviations have been granted in the approved SDO Agreement.

- a. Planning deviation from Section 3.11.8 for absence of the required sidewalk along Cherry Hill Road due to existing wetlands;
- b. Deviations from Section 5.15. Exterior Building Wall Façade Materials for the following:
 - i. Underage of brick (30 percent minimum required, 25 percent on north façade and 28 percent on east façade proposed);
 - ii. Overage of flat metal panels (50 percent maximum allowed, 58 percent on north façade and 56 percent on east façade proposed);
 - iii. Overage of horizontal rib metal panels for roof top screening (0 percent allowed, 17 percent on north, 16 percent on east, 12 percent on south and 18 percent on west proposed);
- c. Defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City;
- d. Traffic deviation for variance from Design and Construction Standards Section 11-216(d) for not meeting the minimum distance required for same-side commercial driveways along Grand River Avenue;
- e. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Grand River Road frontage due to lack of space (8 trees required);
- f. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Cherry Hill Road frontage due to lack of space (8 trees required);
- g. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings in area of wetland in order to preserve wetland along Cherry Hill Road frontage;
- h. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings between Cherry Hill and the parking lot area not behind the wetland;

Site Plan Review Summary

The Planning review recommends approval, noting the following conditions from the SDO Agreement should be met prior to Final Site Plan approval.

- a. All loading and unloading from car carriers shall occur at non-peak traffic hours. This shall be indicated on the Final Site Plan.
- b. Remaining woodlands and wetlands areas on the southerly portion of the property are to be placed in a conservation easement, in a form and manner to

be approved by the City attorney, in accordance with applicable ordinances and regulations.

- c. Dedication of the right-of-way, to the proposed future right-of-way line, along Meadowbrook Road and along Grand River Avenue, as shown on the approved Site Plan.

The Engineering review recommends approval with additional comments to be addressed with Final Site Plan submittal.

The Landscape review recommends approval noting that the woodland replacement trees shall not be located in areas where they cannot be protected, such as in the greenbelt where utilities are nearby, in parking lot islands, etc.

The Woodland review recommends approval with additional comments to be addressed with Final Site Plan submittal. The plan indicates the removal of 150 Regulated Trees (48% of the onsite regulated trees), requiring a total of 173 Woodland Replacement Credits. The current plan does however propose to replace all required Woodland Replacement Credits through on-site planting of deciduous and coniferous tree plantings.

The Wetland review recommends approval contingent on the applicant providing a revised plan that clearly indicates the area (square feet or acres) of all wetland and wetland buffer impacts (both permanent and temporary, if applicable) and the volume (cubic yards) of all wetland impacts. The current plan appears to propose direct impact to wetland/watercourse for the removal of some existing storm water pipe and the installation of a storm water outfall pipe from the proposed detention basin.

The Traffic review recommends approval with additional comments to be addressed with Final Site Plan submittal. The Meadowbrook Road driveway is proposed at the current location of a right turn lane taper. The applicant is extending the right turn lane north of the site driveway so that it also acts as a right turn lane for the development. Traffic review suggested that the applicant should consider revising that to not allow deliveries during normal business hours so that the trucks do not block the proposed 10 parking spaces.

As part of the SDO Concept plan approval, the applicant received approval to defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site fell within the study boundaries for the Comprehensive Traffic study that was underway by the City. The applicant has provided the required Traffic study with this submittal. The City's Traffic Engineering consultant recommended approval provided that the applicant updates the study as noted in the review letter, including updating the study with newer traffic counts, working with the City's traffic consultant, AECOM, to include more background development assumptions, and developing an agreed-upon methodology and scope.

The Façade review notes that the drawings are consistent with the SDO Agreement and Concept Plan previously approved by the City Council.

The Fire review recommends approval with conditions noted in the letter.

The applicant has provided a response letter describing how the highlighted concerns will be addressed on the Final Site Plan. This letter is at the end of the packet.

RECOMMENDED ACTION:

FOUR PART MOTION

PART 1: PRELIMINARY SITE PLAN WITH SDO OPTION

Approval at the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for Preliminary Site Plan with an SDO Option for JSP17-65 Jaguar Land Rover based on and subject to the following:

- a. The applicant shall provide a revised Traffic study at the time of Final Site Plan approval; and
- b. The findings of compliance with Ordinance standards in the staff and consultant review letters, and the conditions and items listed in those letters, as well as all of the terms and conditions of the SDO Agreement as approved, with these items being addressed on the Final Site Plan.

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.

PART 2: WETLAND PERMIT

Approval at the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for Wetland Permit for JSP17-65 Jaguar Land Rover based on and subject to the following 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. This motion is made because the plan is otherwise in compliance with Chapter 12, Article V of the Code of Ordinances and all other applicable provisions of the Ordinance.

PART 3: WOODLAND PERMIT

Approval at the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for Woodland Permit for JSP17-65 Jaguar Land Rover based on and subject to 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. 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.

PART 4: STORMWATER MANAGEMENT PLAN

Approval at the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for Stormwater Management Plan for JSP17-65 Jaguar Land Rover based on and subject to 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. This motion is made because it otherwise in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.

MAPS

Location

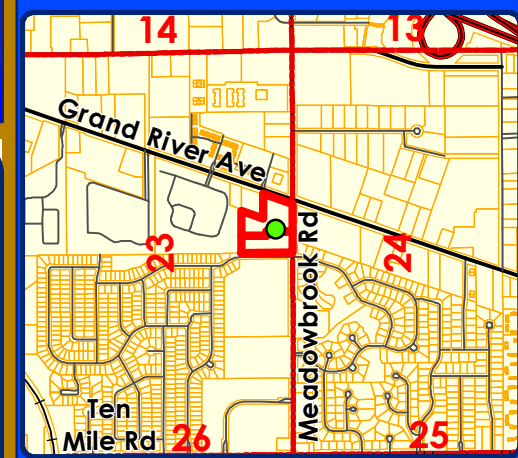
Zoning

Future Land Use


Natural Features


JSP 17-65: JAGUAR LANDROVER

Location



LEGEND


 Sections

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

Map Author: Sri Komaragiri
Date: 09/21/18
Project: JSP 17-65: JAGUAR LANDROVER
Version #: 1

0 37.5 75 150 225 Feet

1 inch = 169 feet

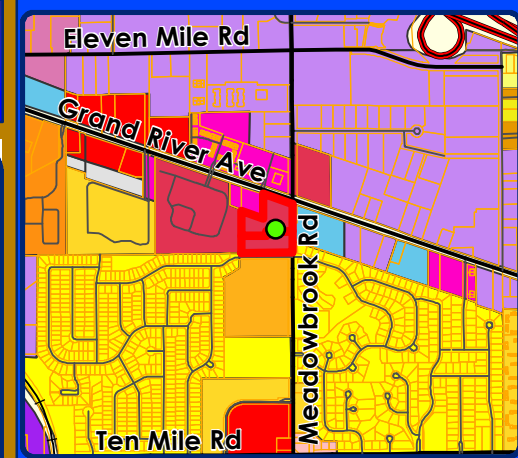
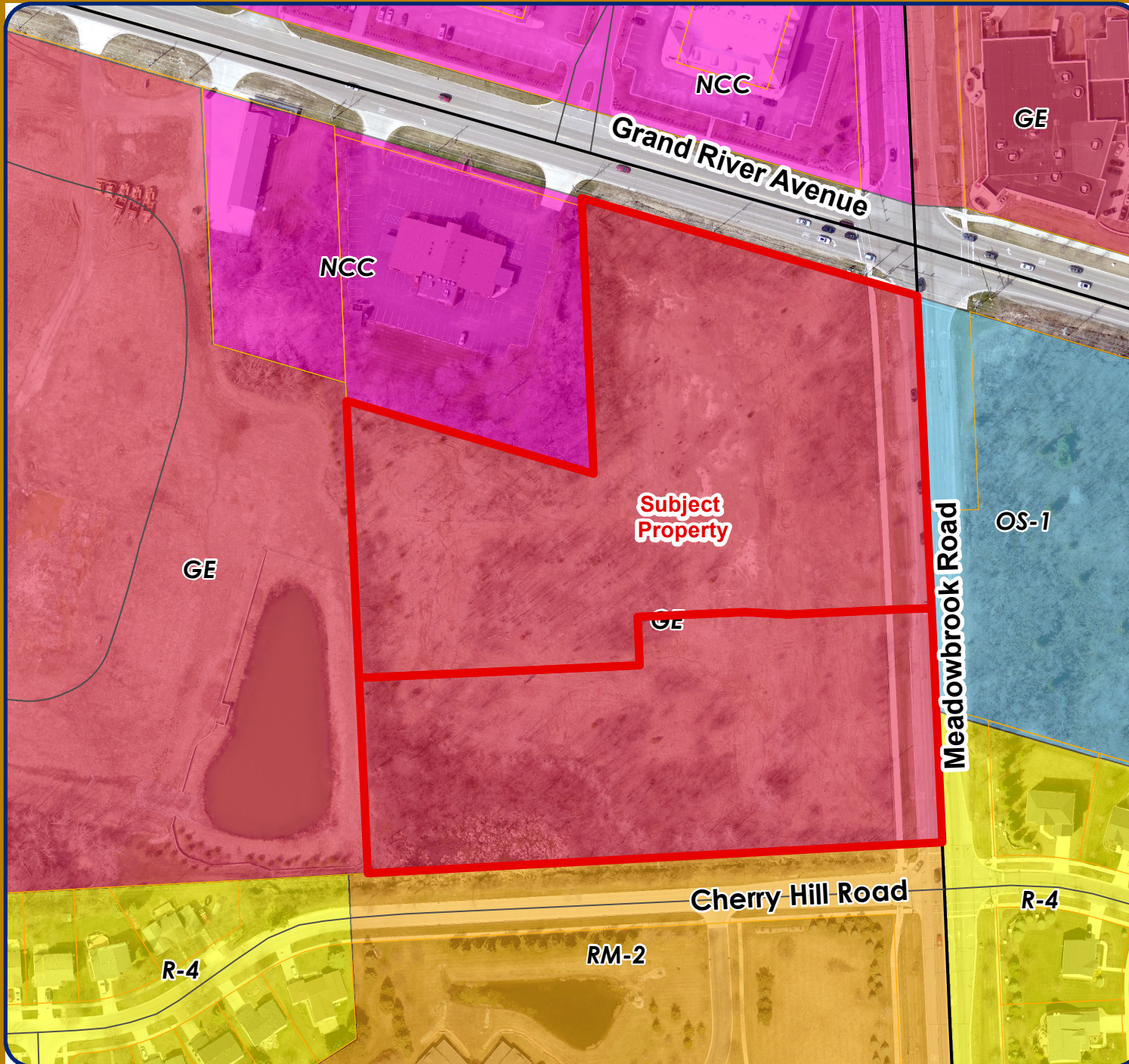


MAP INTERPRETATION NOTICE

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

JSP 17-65: JAGUAR LANDROVER

Zoning



LEGEND

- R-1: One-Family Residential District
- R-2: One-Family Residential
- R-4: One-Family Residential District
- RM-1: Low-Density Multiple Family
- RM-2: High-Density Multiple Family
- MH: Mobile Home District
- B-1: Local Business District
- B-3: General Business District
- GE: Gateway East District
- I-1: Light Industrial District
- I-2: General Industrial District
- NCC: Non-Center Commercial District
- OS-1: Office Service District
- OSC: Office Service Commercial
- P-1: Vehicular Parking District
- TC-1: Town Center -1 District

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

Map Author: Sri Komaragiri
 Date: 09/21/18
 Project: JSP 17-65: JAGUAR LANDROVER
 Version #: 1

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Feet

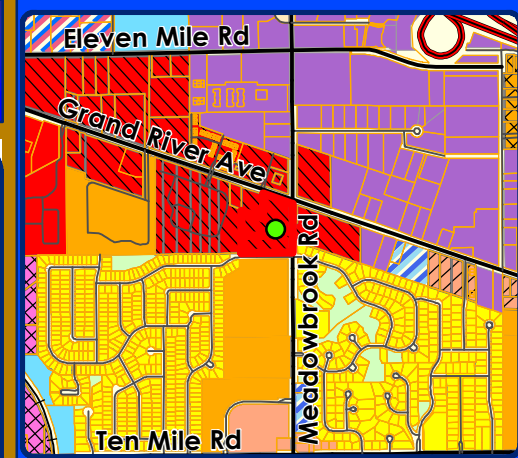
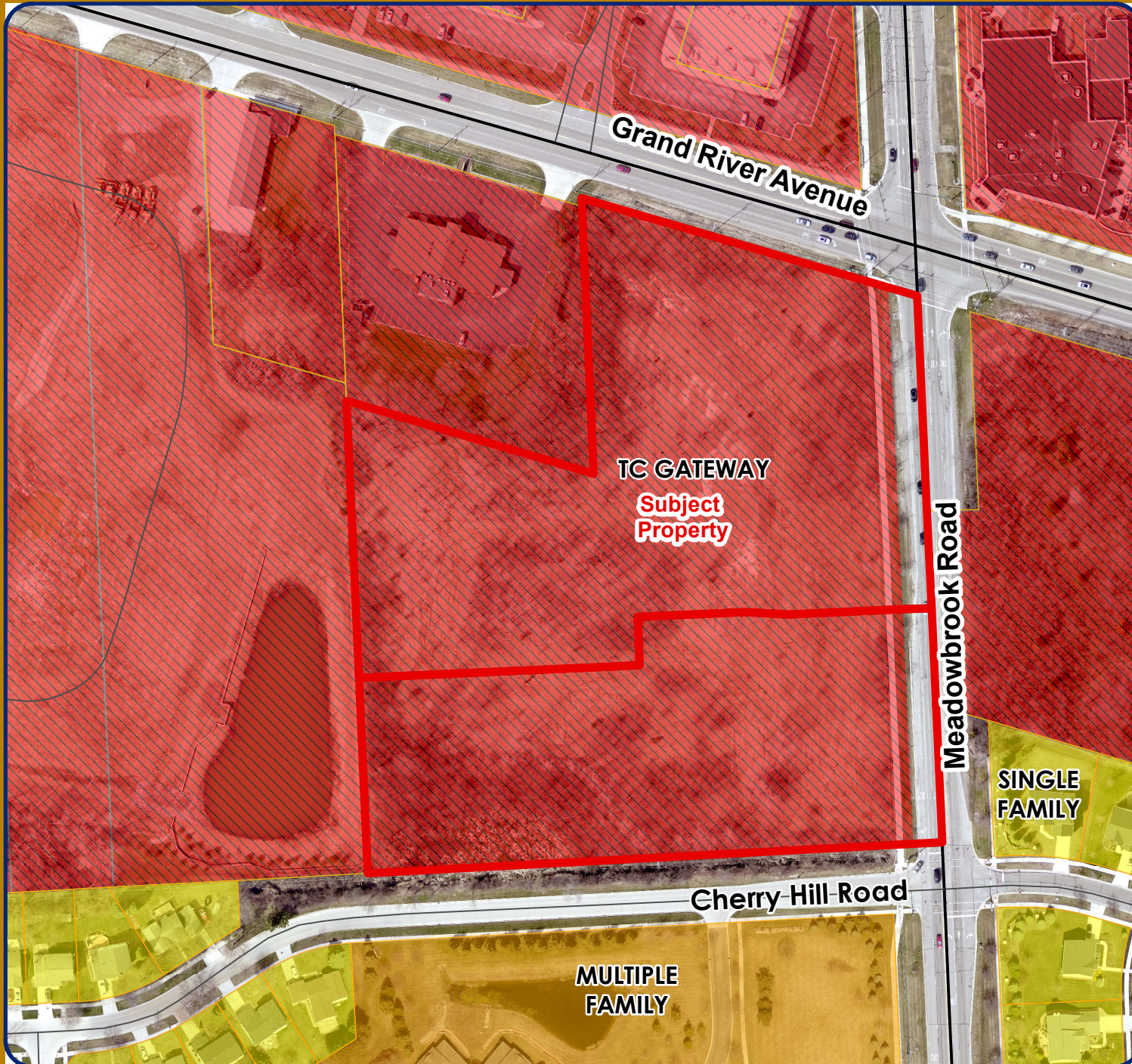
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JSP 17-65: JAGUAR LANDROVER

Future Landuse



- LEGEND**
- FUTURE LAND USE
- Single Family
 - Multiple Family
 - Mobile Home Park
 - Community Office
 - Office Commercial
 - Industrial RD Tech
 - Heavy Industrial
 - Local Commercial
 - Community Commercial
 - TC Commercial
 - TC Gateway
 - Educational Facility
 - Public
 - Private Park

CITY OF NOVI
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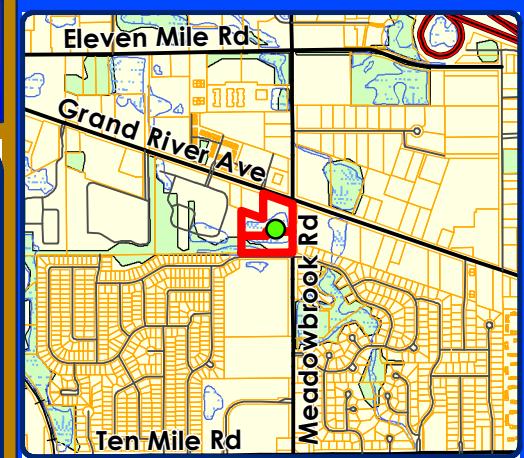
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
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JSP 17-65: JAGUAR LANDROVER

Natural Features



LEGEND

-  WETLANDS
-  WOODLANDS



City of Novi

Dept. of Community Development
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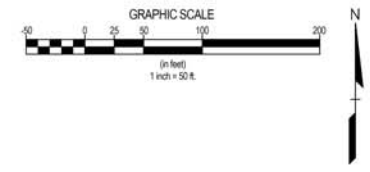
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RENDERINGS



Jaguar Land Rover of Novi

Novi, Michigan

March, 2019

PEA, Inc.
 7927 Nemco Way, Ste 115
 Brighton, MI 48116
 t: 517.548.8593
 f: 517.548.8973
 www.peainc.com





PRELIMINARY SITE PLAN

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

APPLICANT:
 ERHARD MOTOR SALES INC.
 1845 S. TELEGRAPH
 BLOOMFIELD HILLS, MICHIGAN 48302
 CONTACT: KENNETH WIDERSTEDT
 PHONE: (248) 755-6414
 EMAIL: KWIDERSTEDT@WORLDOFERHARD.COM

ARCHITECT:
 ROGVOY ARCHITECTS
 32500 TELEGRAPH ROAD, SUITE 250
 BINGHAM FARMS, MICHIGAN 48025
 CONTACT: MARK DRANE
 PHONE: (248) 540-7700 X237
 FAX: (248) 540-2710
 EMAIL: MDRANE@ROGVOY.COM

CIVIL ENGINEER:
 PEA, INC.
 2430 ROCHESTER CT, SUITE 100
 TROY, MI 48063
 CONTACT: BECKY KLEIN, PE
 PHONE: (248) 689-9090 EXT. 157
 FAX: (248) 689-1044
 EMAIL: BKLEIN@PEAINC.COM

LANDSCAPE ARCHITECT:
 PEA, INC.
 7927 NEMCO WAY, SUITE 115
 BRIGHTON, MI 48116
 CONTACT: JEFF SMITH, R.L.A., LEED AP
 PHONE: (517) 546-8583
 FAX: (517) 546-8973
 EMAIL: JSMITH@PEAINC.COM

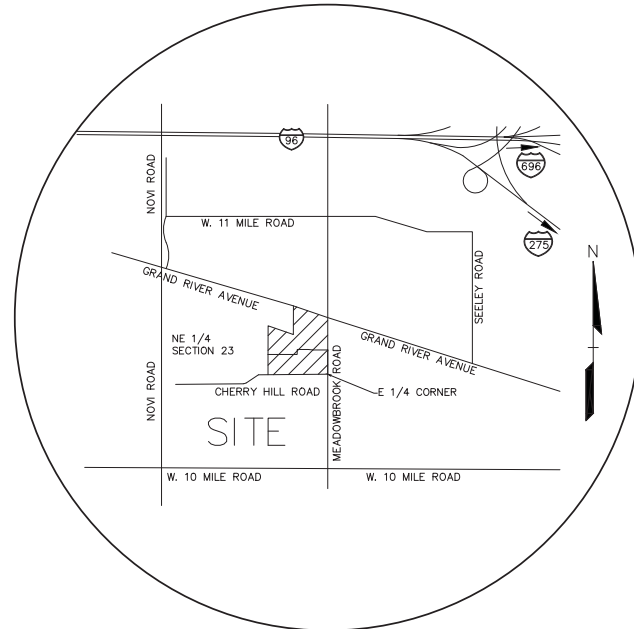
LEGAL DESCRIPTION:
 (PER ATA NATIONAL TITLE GROUP COMMITMENT FILE NO. 63-17532017-SCM, EFFECTIVE DATE MAY 03, 2017)
 THE LAND REFERRED TO IN THIS COMMITMENT IS DESCRIBED AS FOLLOWS: CITY OF NOVI, COUNTY OF OAKLAND,
 STATE OF MICHIGAN
 PARCEL 1:
 PART OF THE NORTHEAST 1/4 OF SECTION 23, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY,
 MICHIGAN: BEGINNING AT A POINT DISTANT NORTH 89 DEGREES 58 MINUTES 54 SECONDS WEST 669.86 FEET AND
 NORTH 00 DEGREES 32 MINUTES 05 SECONDS EAST 227.42 FEET FROM THE EAST 1/4 CORNER; THENCE NORTH 00
 DEGREES 32 MINUTES 05 SECONDS EAST 321.46 FEET; THENCE SOUTH 70 DEGREES 37 MINUTES 26 SECONDS EAST
 300 FEET; THENCE NORTH 00 DEGREES 32 MINUTES 05 SECONDS EAST 321.43 FEET; THENCE SOUTH 70 DEGREES
 37 MINUTES 26 SECONDS EAST 407.28 FEET; THENCE SOUTH 00 DEGREES 29 MINUTES 39 SECONDS WEST 363.23
 FEET; THENCE NORTH 89 DEGREES 30 MINUTES 21 SECONDS WEST 167 FEET; THENCE NORTH 83 DEGREES 24
 MINUTES 25 SECONDS WEST 50.27 FEET; THENCE NORTH 89 DEGREES 27 MINUTES 55 SECONDS WEST 125.65 FEET;
 THENCE SOUTH 00 DEGREES 32 MINUTES 05 SECONDS WEST 56.43 FEET; THENCE NORTH 89 DEGREES 27 MINUTES
 55 SECONDS WEST 327 FEET TO BEGINNING. 5.62 ACRES.
 PARCEL ID: 22-23-251-018
 PARCEL 2:
 PART OF THE NORTHEAST 1/4, SECTION 23, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY,
 MICHIGAN, MORE PARTICULARLY DESCRIBED AS: COMMENCING AT THE EAST 1/4 CORNER OF SAID SECTION 23 FOR A
 POINT OF BEGINNING; THENCE NORTH 89 DEGREES 58 MINUTES 54 SECONDS WEST 669.86 FEET ALONG THE EAST
 AND WEST 1/4 LINE OF SAID SECTION 23 AND THE NORTHERLY LINE OF MEADOWBROOK GLENS SUBDIVISION NO. 3,
 AS RECORDED IN LIBER 145 OF PLATS, PAGES 1, 2, 3 AND 4, OAKLAND COUNTY RECORDS; THENCE NORTH 00
 DEGREES 32 MINUTES 05 SECONDS EAST, 227.42 FEET; THENCE SOUTH 89 DEGREES 27 MINUTES 55 SECONDS
 EAST, 327.00 FEET; THENCE NORTH 00 DEGREES 32 MINUTES 05 SECONDS EAST, 56.43 FEET; THENCE SOUTH 89
 DEGREES 27 MINUTES 55 SECONDS EAST, 125.65 FEET; THENCE SOUTH 83 DEGREES 24 MINUTES 25 SECONDS EAST,
 50.27 FEET; THENCE SOUTH 89 DEGREES 30 MINUTES 21 SECONDS EAST, 167.00 FEET TO THE EAST LINE OF SAID
 SECTION 23 AND THE CENTERLINE OF MEADOWBROOK ROAD; THENCE SOUTH 00 DEGREES 29 MINUTES 39 SECONDS
 WEST, 272.63 FEET, ALONG THE EAST LINE OF SAID SECTION 23 AND THE CENTERLINE OF SAID MEADOWBROOK ROAD
 TO THE POINT OF BEGINNING. 3.86 ACRES.
 PARCEL ID: 22-23-251-019

CONSTRUCTION PLANS FOR

JAGUAR-LAND ROVER OF NOVI

SOUTHWEST CORNER OF GRAND RIVER AVENUE AND MEADOWBROOK ROAD

CITY OF NOVI, OAKLAND COUNTY, MICHIGAN



LOCATION MAP
 1" = 200'

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CITY OF NOVI WATER MAIN STANDARD DETAILS	5 SHEETS
WRC SESC DETAILS	1 OF 1

NO. OF	DATE	DESCRIPTION	DATE

REVISIONS

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ERHARD MOTOR SALES INC.
 BLOOMFIELD HILLS, MICHIGAN 48302
COVER SHEET
JAGUAR LAND ROVER OF NOVI
 PART OF THE NORTHEAST 1/4 OF SECTION 23, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN
 D.W.S. BK. 10N. CL. 103R. JOB #2017-176

ORIGINAL ISSUE DATE:
 FEBRUARY 11, 2019
 PEA JOB NO. 2017-176
 SCALE:
 DRAWING NUMBER:
C-0.0

NOT FOR CONSTRUCTION

LEGAL DESCRIPTION
(Per ATA National Title Group Commitment File No. 63-17532017-SGM, Effective date May 03, 2017)

The land referred to in this commitment is described as follows: City of Novi, County of Oakland, State of Michigan

Parcel 1: Part of the Northeast 1/4 of Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan: Beginning at a point distant North 89 degrees 08 minutes 24 seconds West 669.86 feet and North 00 degrees 32 minutes 05 seconds East 227.42 feet from the East 1/4 corner, thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence South 79 degrees 37 minutes 26 seconds East 300 feet; thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence South 79 degrees 37 minutes 26 seconds East 407.28 feet; thence South 00 degrees 29 minutes 32 seconds West 363.33 feet; thence North 89 degrees 30 minutes 21 seconds West 187 feet; thence North 83 degrees 24 minutes 25 seconds West 302.7 feet; thence North 29 degrees 27 minutes 30 seconds West 25.65 feet; thence South 00 degrees 32 minutes 05 seconds West 58.43 feet; thence North 89 degrees 27 minutes 55 seconds West 327 feet to beginning.

Parcel 2: Part of the Northeast 1/4, Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, more particularly described as: Commencing at the East 1/4 corner of said Section 23 for a point of beginning, thence North 89 degrees 38 minutes 54 seconds West 669.86 feet along the East and West 1/4 line of said Section 23 and the Northernly line of Meadowbrook Owners Subdivision No. 3, as recorded in Liber 143 of Plats, Pages 1, 2, 3 and 4, Oakland County Records; thence North 00 degrees 32 minutes 05 seconds East, 227.42 feet; thence South 89 degrees 27 minutes 55 seconds East, 327.00 feet; thence North 00 degrees 32 minutes 05 seconds East, 50.43 feet; thence South 89 degrees 27 minutes 55 seconds East, 125.85 feet; thence South 83 degrees 24 minutes 25 seconds East, 50.27 feet; thence South 89 degrees 30 minutes 21 seconds East, 327.00 feet to the East line of said Section 23 and the centerline of Meadowbrook Road, thence South 00 degrees 29 minutes 32 seconds West, 272.63 feet, along the East line of said Section 23 and the centerline of said Meadowbrook Road to the point of beginning.

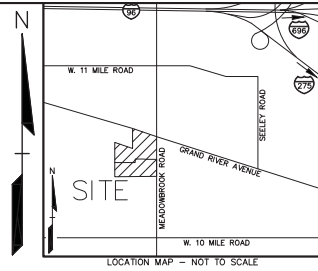
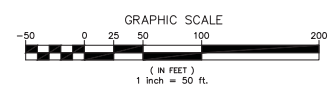
BENCHMARKS
(SPS DERIVED - NAVD83)

BM #300
DUMPLE ON THE NORTHWEST BOLT OF SIGNAL POLE LOCATED APPROX. 35' SOUTH OF THE CENTERLINE OF GRAND RIVER AVENUE AND APPROX. 60' WEST OF THE CENTERLINE OF MEADOWBROOK ROAD.
ELEV. = 886.16

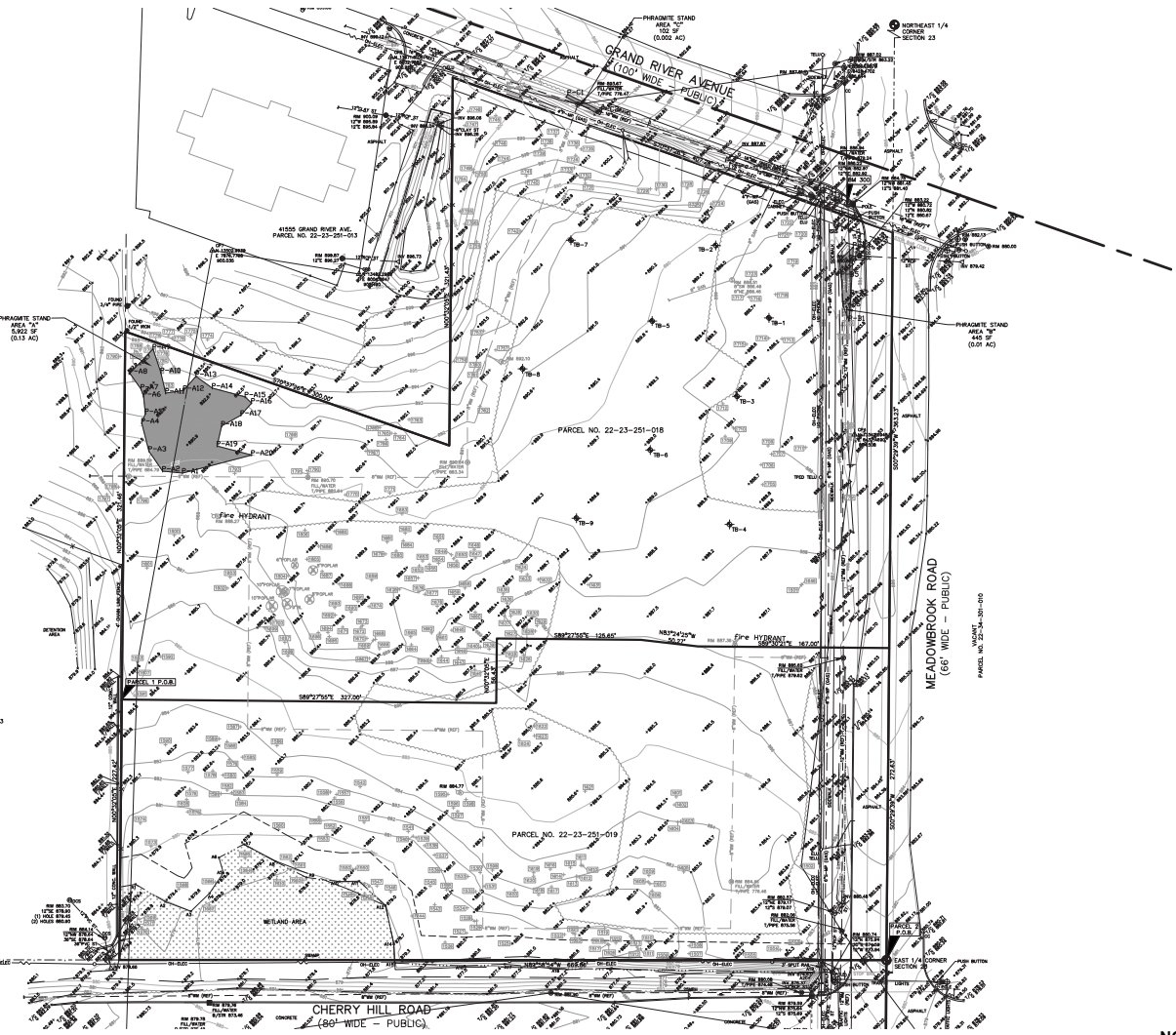
BM #301
DUMPLE ON THE NORTHEAST BOLT OF A SIGNAL POLE LOCATED APPROX. 35' WEST OF THE CENTERLINE OF MEADOWBROOK ROAD AND APPROX. 30' SOUTH OF THE CENTERLINE OF CHERRY HILL ROAD. (NOT SHOWN ON SURVEY).
ELEV. = 880.81

BM #302
DUMPLE ON A HYDRANT LOCATED APPROX. 20' NORTH OF CHERRY HILL ROAD AND APPROX. 50' SOUTHEAST OF #41728 CHERRY HILL ROAD.
ELEV. = 888.38

FLOODPLAIN NOTE:
BY GRAPHICAL PLOTTING, SITE IS WITHIN ZONE "X", AREA DETERMINED TO BE OUTSIDE OF THE 1% ANNUAL CHANCE FLOODPLAIN PER FLOOD INSURANCE RATE MAP NUMBER 26125C027F, DATED SEPTEMBER 29, 2006.



NO.	DATE	BY	REVISIONS
1	02/11/19	JAW	ISSUED FOR PERMITTING
2	02/11/19	JAW	REVISED PER COMMENTS
3	02/11/19	JAW	REVISED PER COMMENTS
4	02/11/19	JAW	REVISED PER COMMENTS
5	02/11/19	JAW	REVISED PER COMMENTS
6	02/11/19	JAW	REVISED PER COMMENTS
7	02/11/19	JAW	REVISED PER COMMENTS
8	02/11/19	JAW	REVISED PER COMMENTS
9	02/11/19	JAW	REVISED PER COMMENTS
10	02/11/19	JAW	REVISED PER COMMENTS



LEGEND

● HIGH FOUND	▲ BRIDGE PAUP SET	⊙ REC. CORNER FOUND
○ HIGH FOUND	⊙ MONUMENT FOUND	⊙ RECORDED
⊙ MAIL & CAP SET	⊙ MONUMENT SET	⊙ HEADSHEET
		⊙ CALCULATED

EXISTING

— 10'-ELEV-VA—	⊙ ELEC. POLE OR CABLE TO GUY WIRE, POLE & GUY WIRE
— 10'-CATV—	⊙ UNDERGROUND CABLE TO CITY STREET
— 10'-PHONE—	⊙ TELEPHONE GUY CABLE, POSTER & BRANCH
— 10'-ELEC-120V—	⊙ ELECTRIC 120V GUY, BRANCH, SET FOR A VEHICLE
— 10'-ELEC-240V—	⊙ 240 VOLT WIRE & GUY LINE BRANCH
— 10'-ELEC-360V—	⊙ INTERMEDIATE, 360V, GUY WIRE, TAPPING SLIDE & WIRE
— 10'-ELEC-480V—	⊙ SHUNTLY SPARK, CLAMPED & BRANCHED
— 10'-ELEC-600V—	⊙ STORM SEWER, CLAMPED & BRANCHED
— 10'-ELEC-720V—	⊙ COMBINED SEWER & BRANCHED
— 10'-ELEC-840V—	⊙ SEWER, FIBER OR REINFORCED CONCRETE, VENT, VENT DRUM
— 10'-ELEC-960V—	⊙ POST INSULATED WIRE
— 10'-ELEC-1080V—	⊙ WATER WIRE, BRANCHED, WIRE GUY, SERVICE OFFSET
— 10'-ELEC-1200V—	⊙ WALKWAY, TRANSFORMER, BREAKER CONTROL WIRE
— 10'-ELEC-1320V—	⊙ MODIFIED STRUCTURE
— 10'-ELEC-1440V—	⊙ POY LEADERS
— 10'-ELEC-1560V—	⊙ CENTER LINE

FINISH

— 10'-ELEV-VA—	⊙ GUYED PILE
— 10'-CATV—	⊙ TREE LINE
— 10'-PHONE—	⊙ TREE SHADE
— 10'-ELEC-120V—	⊙ GUY WIRING
— 10'-ELEC-240V—	⊙ STREET LIGHT
— 10'-ELEC-360V—	⊙ SIGN

CONC. CONCRETE
ASPH. ASPHALT
GRAVEL GRAVEL
BRK. BRICK
BLK. BLOCK
WEL. WELDED
WELD. WELDED

CAUTION!
This drawing is a preliminary survey and should not be used for construction purposes. It is intended for use in the permitting process only. The surveyor does not warrant the accuracy of the information shown on this drawing. The surveyor is not responsible for any errors or omissions in this drawing. The surveyor is not responsible for any damage to property or persons resulting from the use of this drawing. The surveyor is not responsible for any costs incurred by the client in connection with the use of this drawing. The surveyor is not responsible for any delays in the permitting process resulting from the use of this drawing. The surveyor is not responsible for any other consequences of the use of this drawing.

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ERHARD MOTOR SALES INC.
 BLOOMFIELD HILLS, MICHIGAN 48302
TOPOGRAPHIC SURVEY
JAGUAR LAND ROVER OF NOVI
 PART OF THE NORTHEAST 1/4 OF SECTION 23, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN
 D.E.S. BK. 10N. CL. 15UR. ZONE 2017-176
 P:\PROJECTS\2017\176\176-01-010\176-01-010.dwg

ORIGINAL ISSUE DATE:
FEBRUARY 11, 2019
 PEA JOB NO. 2017-176
 SCALE:
 DRAWING NUMBER:
C-1.0

NOT FOR CONSTRUCTION

LEGAL DESCRIPTION
 (Per AIA National Title Group Commitment File No. 63-17532017-SOM, Effective date May 03, 2017)
 The land referred to in this commitment is described as follows: City of Novi, County of Oakland, State of Michigan

Parcel 1:
 Part of the Northeast 1/4 of Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan; Beginning at a point distant North 89 degrees 08 minutes 24 seconds West 669.86 feet and North 00 degrees 32 minutes 05 seconds East 227.42 feet from the East 1/4 corner, thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence South 79 degrees 37 minutes 26 seconds East 300 feet; thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence South 79 degrees 37 minutes 26 seconds East 407.28 feet; thence South 00 degrees 32 minutes 05 seconds East 321.43 feet; thence North 89 degrees 08 minutes 24 seconds West 187 feet; thence North 89 degrees 08 minutes 24 seconds West 327 feet to beginning.

Parcel 2:
 Part of the Northeast 1/4, Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, more particularly described as: Commencing at the East 1/4 corner of said Section 23 for a point of beginning; thence North 89 degrees 08 minutes 24 seconds West 669.86 feet along the East and West 1/4 line of said Section 23 and the Northern line of Meadowbrook Drive Subdivision No. 3, as recorded in Liber 143 of Plats, Pages 1, 2, 3 and 4, Oakland County Records; thence North 00 degrees 32 minutes 05 seconds East, 227.42 feet; thence South 89 degrees 27 minutes 15 seconds East 321.43 feet; thence North 00 degrees 32 minutes 05 seconds East, 204.83 feet; thence South 89 degrees 27 minutes 15 seconds East, 125.05 feet; thence South 83 degrees 24 minutes 25 seconds East, 50.27 feet; thence South 89 degrees 30 minutes 21 seconds East, 167.03 feet to the East line of said Section 23 and the centerline of Meadowbrook Road; thence South 05 degrees 29 minutes 39 seconds West, 272.63 feet, along the East line of said Section 23 and the centerline of said Meadowbrook Road to the point of beginning.

SIGN LEGEND:

- 'NO PARKING FIRE LANE' SIGN (LR7-22) 5 EA.
- 24"x24" 'STOP' SIGN (R1-1) 2 EA.
- 'BARRIER FREE PARKING' SIGN (R7-8) 5 EA.
- 'VAN ACCESSIBLE' SIGN (R7-8A) 1 EA.
- 'NO LEFT TURN' SIGN (R3-2) 1 EA.
- 'KEEP RIGHT SIGN' (R4-7) 1 EA.

SIDEWALK RAMP LEGEND:

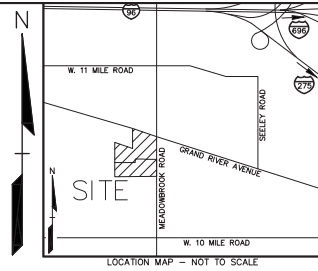
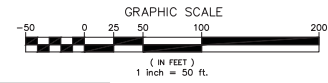
- SIDEWALK RAMP 'TYPE R' 6 EA.

REFER TO SHEET C-8.1 FOR MOOT STANDARD RAMP DETAILS.

NOTE:
 NO OUTDOOR STORAGE OTHER THAN VEHICLES FOR SALE OR SERVICE WILL BE PERMITTED ON THIS SITE.

REQUIRED WAIVERS:

- A SAME SIDE / OPPOSITE SIDE DRIVEWAY SPACING WAIVER IS REQUESTED FOR THE DRIVEWAY ON GRAND RIVER AVENUE.



NO.	DATE	DESCRIPTION



CAUTION!

THIS PLAN IS THE PROPERTY OF ERHARD MOTOR SALES, INC. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF ERHARD MOTOR SALES, INC. ANY UNAUTHORIZED USE OF THIS PLAN IS PROHIBITED AND WILL BE AT THE USER'S SOLE RISK. ERHARD MOTOR SALES, INC. ACCEPTS NO LIABILITY FOR ANY ERRORS OR OMISSIONS IN THIS PLAN. THE USER SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF ALL INFORMATION PROVIDED HEREON.

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ERHARD MOTOR SALES, INC.
 BLOOMFIELD HILLS, MICHIGAN 48302

**DIMENSION AND PAVING PLAN
 JAGUAR-LAND ROVER OF NOVI**
 PART OF THE NORTH AND WEST QUARTERS OF SECTION 23, TOWNSHIP 1 NORTH, RANGE 8 EAST, COUNTY OF OAKLAND, STATE OF MICHIGAN

D.E.S. BK. 10N. CL. 12SR. J.W. J.W. J.P.M. J.P.R.
 PREPARED FOR: ERHARD MOTOR SALES, INC. 10/26/2017

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
 PEA JOB NO. 2017-176
 SCALE:
 DRAWING NUMBER:

CITY OF NOVI FIRE DEPARTMENT NOTES:

- ALL WEATHER ACCESS ROADS CAPABLE OF SUPPORTING 35 TONS ARE TO BE PROVIDED FOR FIRE APPARATUS PRIOR TO CONSTRUCTION OF THE FOUNDATION.
- ALL WATER MAINS AND FIRE HYDRANTS ARE TO BE INSTALLED AND BE IN SERVICE PRIOR TO CONSTRUCTION ABOVE THE FOUNDATION.
- THE BUILDING ADDRESS IS TO BE POSTED FACING THE STREET THROUGHOUT THE CONSTRUCTION. THE ADDRESS IS TO BE AT LEAST 3 INCHES HIGH ON CONTRASTING BACKGROUND.

CITY OF NOVI NOTES:

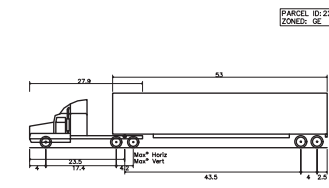
- THE OWNER OF THE PROPERTY SHALL REPORT ANY PROPOSED CHANGE IN USE OR OCCUPANCY FOR FURTHER EVALUATION.
- UNLESS OTHERWISE PROVIDED, DEALING DIRECTLY WITH CONSUMER AT RETAIL IS PROHIBITED.
- NO LONG TERM DELIVERY TRUCK PARKING IS ALLOWED ON SITE.
- THE OCCUPANT SHALL COMPLY WITH ANY CITY ORDINANCES REGARDING TOXIC OR HAZARDOUS MATERIALS.
- ALL WORK SHALL CONFORM TO THE CURRENT CITY OF NOVI STANDARDS AND SPECIFICATIONS.

REQUESTED DEVIATIONS FROM CITY OF NOVI ZONING STANDARDS:

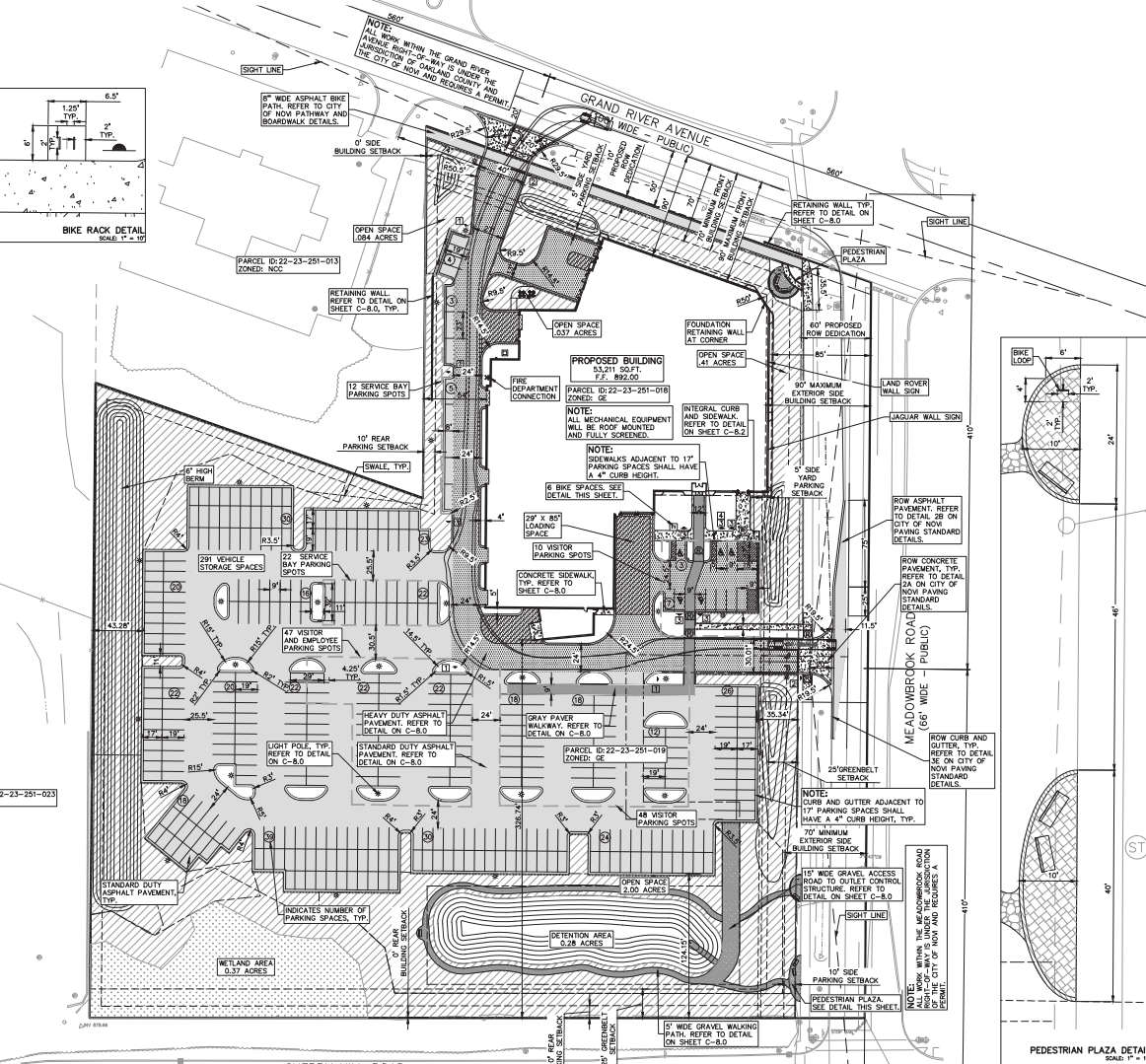
- DEVIATION FROM DESIGN AND CONSTRUCTION STANDARDS SECTION 11-216(D): SAME SIDE REQUIRED DRIVEWAYS - REQUIRED SPACING: 275 FEET. PROVIDED SPACING: 741 FEET.
- DEVIATION FROM THE REQUIREMENT FOR REQUIRED TRAFFIC IMPACT STUDY, OR DEFER IT TO THE TIME OF PRELIMINARY SITE PLAN REVIEW.
- DEVIATION FROM THE REQUIREMENT TO PROVIDE A BERM OR LANDSCAPING IN THE AREA OF THE WETLAND ALONG CHERRY HILL ROAD.
- DEVIATION FROM THE REQUIREMENT TO PROVIDE A BERM OR LANDSCAPING IN THE CHERRY HILL ROAD GREENBELT.

REQUESTED DEVIATIONS FROM CITY OF NOVI ZONING STANDARDS:

- DEVIATION FROM DESIGN AND CONSTRUCTION STANDARDS SECTION 11-216(D): SAME SIDE REQUIRED DRIVEWAYS - REQUIRED SPACING: 275 FEET. PROVIDED SPACING: 741 FEET.
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- DEVIATION FROM THE REQUIREMENT TO PROVIDE A BERM OR LANDSCAPING IN THE CHERRY HILL ROAD GREENBELT.



WB-67 - Interstate Semi-Trailer
 Overall Length: 73.501ft
 Overall Width: 8.500ft
 Overall Body Height: 8.341ft
 Max Body Ground Clearance: 8.500ft
 Max Truck Width: 8.000ft
 Lock-to-lock time: 28.40
 Max Steering Angle (Virtual): 28.40



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-8.0 FOR ON-SITE SIDEWALK RAMP DETAILS.
- 'NO PARKING-FIRE LANE' SIGNS SHALL BE POSTED ALONG ALL FIRE LINES AT 100 FOOT INTERVALS OR AS DIRECTED BY THE FIRE OFFICIAL.
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF NOVI 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 RIGHTS-OF-WAY 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 WEIRS, 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.

SITE DATA TABLE:

SITE AREA: 9.48 ACRES GROSS (8.51 NET)
 CURRENT ZONING: GE
 PROPOSED ZONING: GE
 PARCEL ID: 22-23-251-019 (5.62 ACRES ±)
 22-23-251-019 (3.86 ACRES ±)
 PROPOSED USE: BMW MOTOR SALES FACILITY

BUILDING INFORMATION:
 MAXIMUM ALLOWABLE BUILDING HEIGHT = 25 FEET (2 STORIES)
 PROPOSED BUILDING HEIGHT = 25 FEET

BUILDING FOOTPRINT AREA:
 JAGUAR-LAND ROVER FACILITY: 58,663 S.F.
 USABLE FLOOR AREA: 20,798 S.F.

NUMBER OF SERVICE BAYS: 34
 MAX FLOOR AREA RATIO = 27%
 FLOOR AREA RATIO = 15%
 NUMBER OF EMPLOYEES: XX

SETRBACK REQUIREMENTS:

GE ZONING DISTRICT	FRONT SETBACK (NORTH):	90 FEET MINIMUM REQUIRED	90.00' PROVIDED
	FRONT SETBACK (EAST):	70 FEET MINIMUM REQUIRED	85.00' PROVIDED
	SIDE SETBACK (WEST):	0 FEET REQUIRED	54' PROVIDED
	REAR SETBACK (SOUTH):	0 FEET REQUIRED	326.74' PROVIDED
	SIDE YARD PARKING SETBACK (NORTH):	5 FEET REQUIRED	38.29' PROVIDED
	SIDE YARD PARKING SETBACK (EAST):	5 FEET REQUIRED	35.34' PROVIDED
	SIDE PARKING SETBACK (EAST):	10 FEET REQUIRED	35.34' PROVIDED
	SIDE PARKING SETBACK (WEST):	10 FEET REQUIRED	43.28' PROVIDED
	REAR PARKING SETBACK (SOUTH):	10 FEET REQUIRED	124.15' PROVIDED

PARKING CALCULATIONS:
 MOTOR VEHICLE SALES & SERVICE ESTABLISHMENT:
 1 SPACE/200 S.F. OF USABLE FLOOR AREA PLUS 1 SPACE/EACH AUTO SERVICE STALL

TOTAL REQUIRED PARKING = 20,798 / 200 + 34 SPACES = 138 SPACES

TOTAL PROPOSED PARKING SPACES = 445 SPACES

REQUIRED ADA SPACES = 5, INCLUDING 1 VAN SPACES

PROVIDED ADA SPACES = 5, INCLUDING 1 VAN SPACES

REQUIRED BICYCLE PARKING = 2 SPACES

PROVIDED BICYCLE PARKING = 6 SPACES

EMPLOYEE SUMMARY:

EMPLOYEES:	58 SPACES
VISITOR:	34 SPACES
SERVICE BAY:	47 SPACES
TOTAL:	138 SPACES
STORAGE:	422 SPACES
TOTAL:	422 SPACES

OPEN SPACE:
 25% OF TOTAL SITE AREA UP TO 55% MAY BE COMPOSED OF PROTECTED WOODLANDS OR WETLANDS:
 REQUIRED OPEN SPACE = (208 x 8.51 = 2.13 ACRES)
 PROVIDED OPEN SPACE = 2.63 ACRES (EXCLUDING PARK AND WETLANDS)

SITE SOILS INFORMATION:
 ACCORDING TO THE USGS NATURAL RESOURCES CONSERVATION SERVICE WEB SOIL SURVEY FOR OAKLAND COUNTY, THE SITE CONSISTS OF THE FOLLOWING SOIL TYPES:
 10B - MARLETTE SANDY LOAM, 0 TO 6 PERCENT SLOPES
 11B - CAPAC SANDY LOAM, 0 TO 4 PERCENT SLOPES

NOT FOR CONSTRUCTION

C-3.0

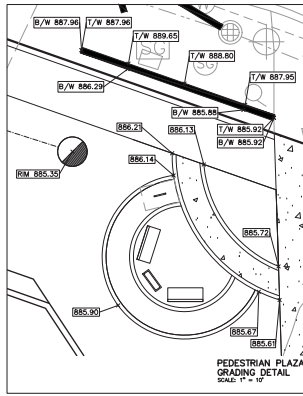
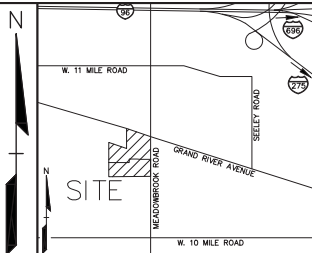
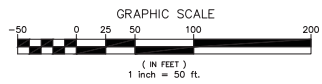
LEGAL DESCRIPTION
(Per AIA National Title Group Commitment File No. 83-17532017-SOM, Effective date May 03, 2017)
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Parcel 2:
Part of the Northeast 1/4 of Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, more particularly described as: Commencing at the East 1/4 corner of said Section 23 for a point of beginning, thence North 89 degrees 08 minutes 24 seconds West 669.86 feet along the East and West 1/4 line of said Section 23 and the Northern line of Meadowbrook Grove Subdivision No. 3, as recorded in Liber 143 of Plats, Pages 1, 2, 3 and 4, Oakland County Records, thence North 00 degrees 32 minutes 05 seconds East 227.42 feet; thence South 89 degrees 27 minutes 55 seconds East 321.43 feet; thence North 00 degrees 32 minutes 05 seconds East 50.43 feet; thence South 89 degrees 27 minutes 55 seconds East 125.65 feet; thence South 83 degrees 24 minutes 25 seconds East 50.27 feet; thence South 89 degrees 30 minutes 21 seconds East 197.00 feet to the East line of said Section 23 and the centerline of Meadowbrook Road, thence South 00 degrees 32 minutes 05 seconds East 272.63 feet, along the East line of said Section 23 and the centerline of said Meadowbrook Road to the point of beginning.

BENCHMARKS
(SPS DERIVED - NAVD88)
BM #300
DUMPLE ON THE NORTHWEST BOLT OF SIGNAL POLE LOCATED APPROX. 35' SOUTHWEST OF THE CENTERLINE OF GRAND RIVER AVENUE AND APPROX. 60% WEST OF THE CENTERLINE OF MEADOWBROOK ROAD.
ELEV. = 886.16
BM #301
DUMPLE ON THE NORTHEAST BOLT OF A SIGNAL POLE LOCATED APPROX. 35' WEST OF THE CENTERLINE OF MEADOWBROOK ROAD AND APPROX. 30' SOUTH OF THE CENTERLINE OF CHERRY HILL ROAD.
ELEV. = 880.81
BM #302
DUMPLE ON A HYDRANT LOCATED APPROX. 20' NORTH OF CHERRY HILL ROAD AND APPROX. 50' SOUTHWEST OF #1728 CHERRY HILL ROAD.
ELEV. = 886.38

FLOODPLAIN NOTE:
BY GRAPHICAL PLOTTING, SITE IS WITHIN ZONE 'X', AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOOD/AM PER FLOOD INSURANCE RATE MAP NUMBER 26125C027Z, DATED SEPTEMBER 29, 2006.



LEGEND

- FINISH FLOOR
- MONUMENT FOUND
- BENCH MARK
- EXISTING CURB AND GUTTER
- PROPOSED CURB AND GUTTER
- EXISTING SIDEWALK
- PROPOSED SIDEWALK
- EXISTING DRIVE
- PROPOSED DRIVE
- EXISTING LOT
- PROPOSED LOT
- EXISTING UTILITY
- PROPOSED UTILITY
- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- EXISTING ADJACENT PROPERTY
- PROPOSED ADJACENT PROPERTY

SYMBOLS: GRADING

- PROPOSED SPOT GRADE ELEVATION (22.50)
- PROPOSED CONTOUR LINE (922)
- ABSORPTIONS VISIBLE, IF REQUIRED FOR CLARITY:
TOP OF CURB = 1/2
OUTER GRADE = 0
TOP OF PAVEMENT = 1/2
TOP OF SIDEWALK = 1/2
TOP OF WALL = 1/2
BOTTOM OF WALL = 1/2
FINISH GRADE = F.G.
- STANDARD 4" HIGH 18" WIDE CURBS AND GUTTER PER NOW STANDARD DETAILS
- STANDARD 6" HIGH 18" WIDE CURBS AND GUTTER PER NOW STANDARD DETAILS

GENERAL GRADING AND EARTHWORK NOTES:

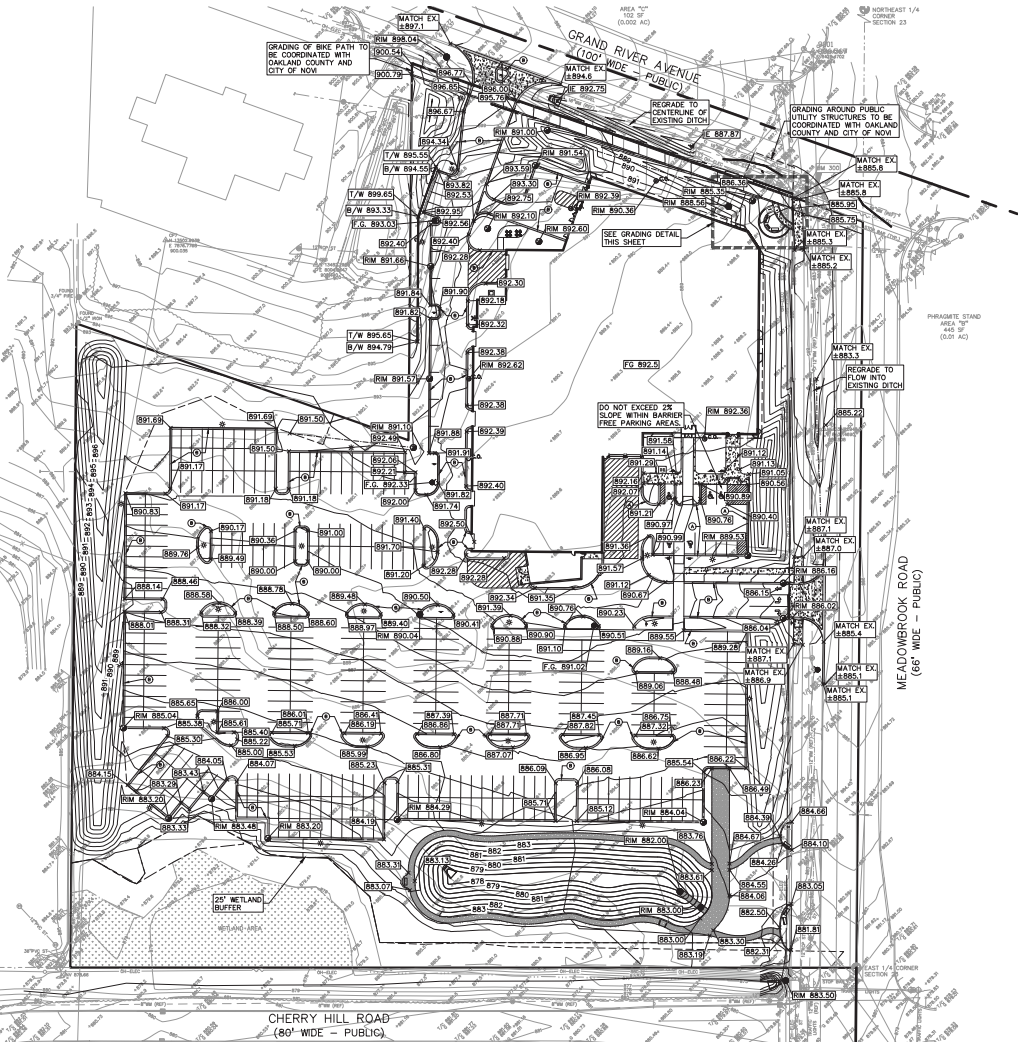
- CONTRACTOR TO FIELD VERIFY ALL EXISTING TREES AND BRUSH AND REMOVE ALL THAT ARE NECESSARY TO GRADE SITE.
- ALL GRADES ARE TO TOP OF PAVEMENT UNLESS OTHERWISE NOTED.
- THE STAGING OF CONSTRUCTION ACTIVITIES SHALL OCCUR ONLY WITHIN THE SITE BOUNDARIES. ANY CONSTRUCTION ACTIVITIES OUTSIDE OF THE SITE BOUNDARIES SHALL BE AT THE SOLE RESPONSIBILITY AND RISK OF THE CONTRACTOR.
- ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL MEET THE REQUIREMENTS OF THE CITY OF NOVI AND OAKLAND COUNTY. AN EROSION CONTROL PERMIT MUST BE SECURED FROM THE CITY PRIOR TO CONSTRUCTION.
- ALL EARTHWORK AND GRADING OPERATIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE SOILS INVESTIGATION AND REPORT PREPARED BY PEA, INC. COMPANY DATED JUNE 23, 2017.
- THE DETENTION BASIN SIDE SLOPES AND ALL SLOPE EXCEEDING 1:6 MUST BE STABILIZED BY SOODOG OR BY PLACING A MULCH BLANKET PEGGED IN PLACE OVER SEED.
- ALL DISTURBED AREAS SHALL BE SEEDS AND MULCHED OR SOODOG IN ACCORDANCE WITH THE LANDSCAPE PLANS. PROVIDE A MINIMUM OF 3" OF TOPSOIL IN THESE AREAS UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL NOTE EXISTING UNDERGROUND UTILITIES WITHIN AND ADJACENT TO THE SITE. BACKFILL FOR EXISTING UTILITY TRENCHES SHALL BE EXAMINED CRITICALLY. ANY TRENCHES FOUND TO HAVE SOFT, UNSTABLE OR UNSUITABLE BACKFILL MATERIAL. IN THE OPINION OF THE GEOTECHNICAL ENGINEERS THAT ARE TO BE WITHIN THE ZONE OF INFLUENCE OF PROPOSED BUILDINGS OR PAVEMENT SHALL BE COMPLETELY EXCAVATED AND BACKFILLED WITH SUITABLE MATERIAL.

EARTHWORK BALANCING NOTE:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPORTING OR EXPORTING ALL MATERIALS AS REQUIRED TO PROPERLY GRADE THIS PROJECT TO THE FINISHED ELEVATIONS SHOWN ON THE APPROVED PLANS. THE CONTRACTOR SHALL MAKE THEIR OWN DETERMINATION OF CUT AND FILL QUANTITIES AND ALLOW FOR REMOVAL OF EXCESS OR IMPORTATION OF ADDITIONAL MATERIAL, AT NO ADDITIONAL COST TO THE OWNER.

SIDEWALK RAMP LEGEND:

- SIDEWALK RAMP TYPE 'R' @
- REFER TO SHEET SP-6.1 FOR MDOT STANDARD RAMP DETAILS



REVISIONS

NO.	DATE	DESCRIPTION
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CAUTION:
CONTRACTOR TO FIELD VERIFY ALL EXISTING TREES AND BRUSH AND REMOVE ALL THAT ARE NECESSARY TO GRADE SITE.

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ERHARD MOTOR SALES INC.
BLOOMFIELD HILLS, MICHIGAN 48302
GRADING PLAN
JAGUAR LAND ROVER OF NOVI
PART OF THE NORTHLAND AUTO SALES CENTER, OF NOVI
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

NOT FOR CONSTRUCTION

LEGAL DESCRIPTION
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 Part of the Northeast 1/4 of Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan; Beginning at a point distant North 89 degrees 08 minutes 24 seconds West 669.86 feet and North 00 degrees 32 minutes 05 seconds East 227.42 feet from the East 1/4 corner, thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence North 79 degrees 37 minutes 26 seconds East 300 feet; thence North 00 degrees 32 minutes 05 seconds East 321.43 feet; thence South 70 degrees 37 minutes 26 seconds East 407.28 feet; thence South 00 degrees 29 minutes 32 seconds West 363.37 feet; thence North 89 degrees 08 minutes 24 seconds West 167 feet; thence North 83 degrees 24 minutes 25 seconds West 307.7 feet; thence North 29 degrees 55 seconds West 327 feet to beginning.

Parcel 2:
 Part of the Northeast 1/4, Section 23, Town 1 North, Range 8 East, City of Novi, Oakland County, Michigan, more particularly described as: Commencing at the East 1/4 corner of said Section 23 for a point of beginning; thence North 89 degrees 08 minutes 24 seconds West 669.86 feet along the East and West 1/4 line of said Section 23 and the Northern line of Meadowbrook Drive Subdivision No. 3, as recorded in Liber 143 of Plans, Pages 1, 2, 3 and 4, Oakland County Records; thence North 00 degrees 32 minutes 05 seconds East, 227.42 feet; thence South 89 degrees 27 minutes 55 seconds East, 372.00 feet; thence North 00 degrees 32 minutes 05 seconds East, 50.43 feet; thence South 89 degrees 27 minutes 55 seconds East, 125.05 feet; thence South 83 degrees 24 minutes 25 seconds East, 50.37 feet; thence South 89 degrees 27 minutes 55 seconds East, 167.00 feet to the East line of said Section 23 and the centerline of Meadowbrook Road; thence South 00 degrees 29 minutes 32 seconds West, 227.42 feet, along the East line of said Section 23 and the centerline of said Meadowbrook Road to the point of beginning.

SEQUENCE OF CONSTRUCTION:

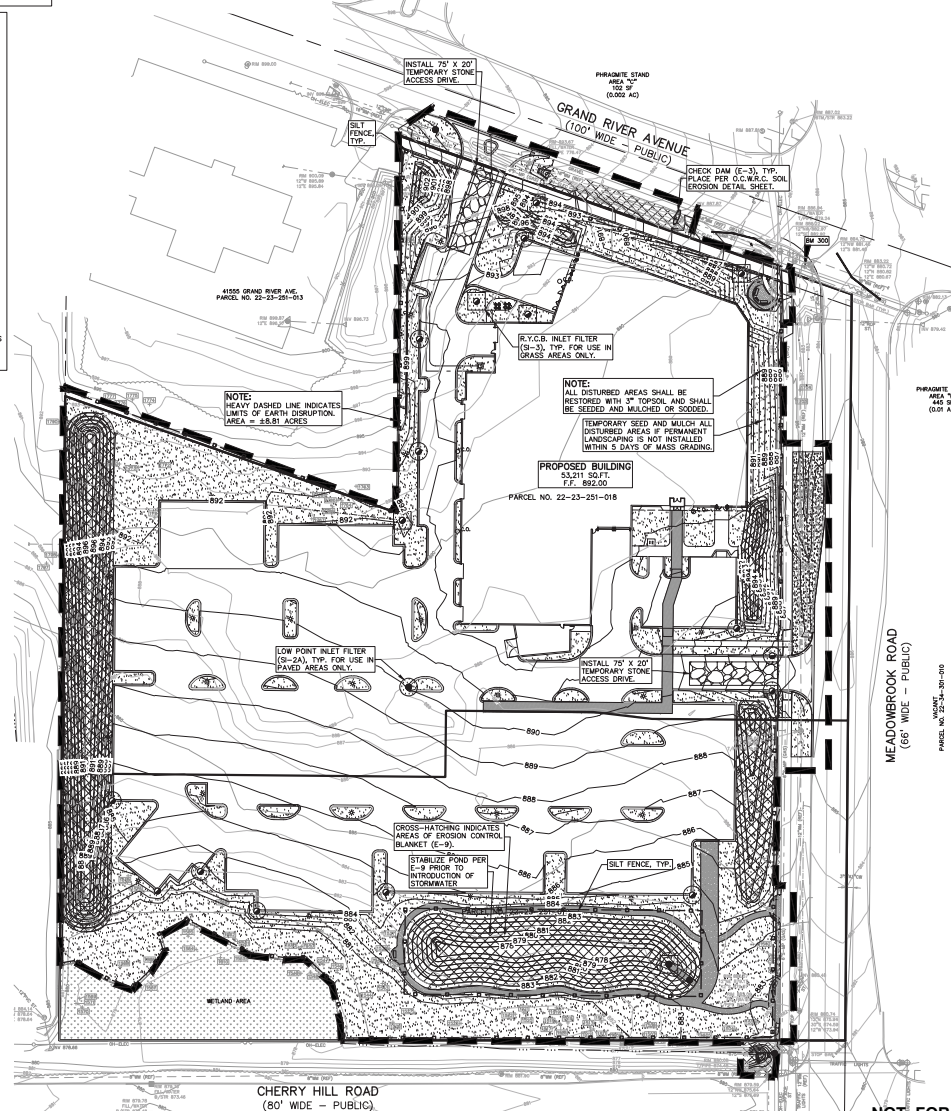
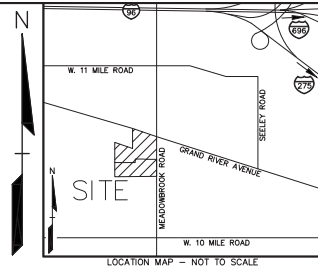
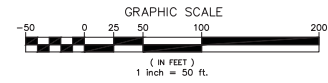
START DAY	END DAY	DESCRIPTION
1	90	INSTALL CRUSHED CONCRETE ACCESS APPROACH AT SITE ROAD APPROACH.
1	90	INSTALL TEMPORARY SOIL EROSION CONTROL, MEASURES, SILT FENCES, INLET PROTECTION, ETC. AS NECESSARY.
1	120	MAINTAIN A 25' BUFFER OF VEGETATION AROUND PERIMETER OF SITE WHERE POSSIBLE.
1	15	REMOVE ALL VEGETATION, TREES AND BRUSH FROM THE PROPOSED CONSTRUCTION AREA UNLESS MARKED TO REMAIN; STRIP AND STOOPPILE TOPSOIL AS REQUIRED RESTORATION; ALL STOOPPILES MUST BE GRADED AND SEEDED.
5	14	REMOVE ALL PAVEMENT, CURB, UTILITIES, ETC. AS REQUIRED TO INSTALL THE PROPOSED WORK AS SHOWN ON THE TOPOGRAPHIC SURVEY AND DEMOLITION PLAN.
5	14	DISPOSE OF ALL EXCESS/UNSUITABLE MATERIALS OFF SITE IN A LEGAL MANNER, NO ON-SITE BURN OR BURY PITS ALLOWED.
14	28	ROUGH GRADE SITE: SEED AND MULCH BLANKETS MUST BE INSTALLED AS SHOWN WITHIN 5 DAYS OF FINAL GRADE. REPAIR AND/OR INSTALL ANY TEMPORARY SOIL EROSION CONTROL MEASURES THAT WERE DAMAGED DURING GRADING OPERATIONS.
28	60	INSTALL SITE UTILITIES (STORM SEWER, SANITARY SEWER, WATER MAIN ETC.), INSTALL INLET PROTECTION AT ALL PROPOSED CATCH BASINS.
28	90	TEMPORARY SEEDING MUST BE PROVIDED IN AREAS NOT TO BE WORKED ON FOR 15 DAYS OR LONGER.
30	80	BEGIN CONSTRUCTION OF BUILDING.
30	80	FINE GRADE SITE AND PREPARE FOR SITE PAVING OPERATIONS.
70	110	INSTALL ALL PAVEMENT, SIDEWALKS, CURBING AS PROPOSED. IF PERMANENT LANDSCAPING IS NOT TO BE INSTALLED SOON AFTER PAVING IS COMPLETE, ALL AREAS WITHIN 20 FEET OF CURB MUST BE TEMPORARILY SEEDED. REPAIR INLET PROTECTION, SILT FENCE AND ANY OTHER DAMAGED SOIL EROSION CONTROL MEASURES AS NECESSARY.
90	119	FINAL GRADE, REDISTRIBUTE STOCKPILED TOPSOIL, ESTABLISH VEGETATION AND INSTALL ALL PERMANENT LANDSCAPING IN ALL DISTURBED AREAS NOT BUILT.
118	120	CLEAN PAVEMENT AND REMOVE ALL TEMPORARY SOIL EROSION CONTROL MEASURES. RE-ESTABLISH VEGETATION AS REQUIRED.
120	120	REMOVE SEDIMENTATION CONTROLS ONCE ENTIRE SITE HAS BEEN PERMANENTLY STABILIZED.

GENERAL SITE CONDITIONS:

- ACCORDING TO THE GEOTECHNICAL INVESTIGATION BY P.E.A. DATED JUNE 23, 2017, THE SITE CONSISTS OF THE FOLLOWING SOIL TYPES:
 LOOSE TO MEDIUM COMPACT SILTS OVERLYING STIFF CLAYS
- TOTAL DISTURBED AREA = ±8.54 ACRES
- N.P.D.E.S. NOTICE OF COVERAGE IS REQUIRED

EROSION CONTROL QUANTITIES:

SILT FENCE	2,701 LF
CHECK DAM	2 EA
R.Y.C.B. INLET FILTER	4 EA
LOW POINT INLET FILTER	10 EA
TEMPORARY CONSTRUCTION ACCESS DRIVE	2 EA
EROSION CONTROL BLANKETS	13,370 S.Y.



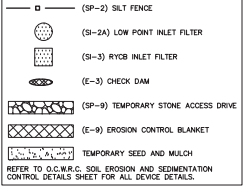
SOIL EROSION AND SEDIMENTATION CONTROL SEQUENCE OF CONSTRUCTION

- SEE OAKLAND COUNTY W.R.C. SOIL EROSION AND SEDIMENTATION CONTROL DETAILS SHEET FOR ALL SOIL EROSION RELATED DETAILS.
- PLACE SILT FENCE & INSTALL INLET FILTERS ON EXISTING STORM SEWER STRUCTURES, ACCORDING TO PLANS.
- INSTALL TEMPORARY CRUSHED CONCRETE ACCESS DRIVE AT ALL CONSTRUCTION ENTRANCES (75"x20" W/MINIMUM OF 1"-3" CRUSHED CONCRETE - NO FINES).
- REMOVE CURB, PAVEMENT, TREES, ETC. AS DIRECTED ON THE DEMOLITION PLAN.
- STRIP AND STOOPPILE TOPSOIL FOR RESTORATION REQUIREMENTS.
- DISPOSE OF ALL EXCESS UNSUITABLE MATERIALS OFF SITE IN A LEGAL MANNER, NO BURN OR BURY PITS ALLOWED.
- UNSUITABLE MATERIALS CONSIST OF, BUT ARE NOT NECESSARILY LIMITED TO THE FOLLOWING: CONCRETE, ASPHALT, TREES, BRUSH, STAMPS, ROOTS, OR OTHER MISCELLANEOUS DEBRIS OR TRASH.
- MASS GRADE THE SITE IN ACCORDANCE WITH THE PLANS.
- INSTALL SEED, MULCH AND EROSION CONTROL BLANKETS AS SHOWN ON THE PLAN WITHIN 5 DAYS OF COMPLETION OF MASS GRADING OR WHENEVER DISTURBED AREAS WILL REMAIN UNCHANGED FOR 30 DAYS OR GREATER. 3-4" TOPSOIL, WHEN USED, WHERE VEGETATION IS REQUIRED.
- COMPLETE ROUGH GRADING OF SITE AND INSTALL UTILITIES. PLACE INLET FILTERS AT ALL INLETS AND CATCH BASINS, AS SHOWN.
- FINISH GRADE AND PAVE SITE AS PROPOSED TO DRAIN TO STORM SEWER SYSTEM. REPAIR INLET FILTERS.
- APPLY TOPSOIL, SEED AND MULCH/200 TO ALL DISTURBED AREAS UPON COMPLETION OF GRADING, THE CONTRACTOR SHALL STAGE CONSTRUCTION ACTIVITIES IN ORDER TO MINIMIZE THE EXPOSURE OF UNSTABILIZED AREAS.
- CLEAN PAVEMENT AND STORM SEWERS, REMOVE SILT FENCE, AND INLET FILTERS ONCE VEGETATION HAS BEEN ESTABLISHED.
- CLEAN DETENTION BASIN AND OVERFLOW SPILLWAYS AND REPAIR RIPRAP AS NECESSARY.
- ALL DIRT AND MUD TRACKED ONTO PUBLIC ROADS SHALL BE REMOVED DAILY.
- STREET CATCH BASINS TO BE PERIODICALLY CLEANED AND FILTER CLOTH CHANGED AND MAINTAINED.

SOIL EROSION MAINTENANCE SCHEDULE AND NOTES:

- THE SOIL EROSION CONTROLS WILL BE MAINTAINED WEEKLY AND AFTER EVERY STORM EVENT BY:
 - TBD
- IF ANY DAMAGE HAS OCCURRED AS A RESULT OF STORM WATER DISCHARGE FROM THE SITE, THE FOLLOWING STEPS SHALL BE IMPLEMENTED.
- ANY DEBRIS OR DIRT ON ANY PAVED AREA RESULTING FROM CONSTRUCTION TRAFFIC SHALL BE CLEANED IN A PROMPT MANNER BY THE CONTRACTOR. THE CONSTRUCTION DRIVE SHALL BE CLEANED AT THE END OF EACH DAY.
- ALL DIRT AND MUD TRACKED ONTO PAVED AREAS SHALL BE REMOVED BY THE CONTRACTOR DAILY BY SCRAPING. STREET SWEEPING IS REQUIRED WEEKLY.
- SILT FENCE MAINTENANCE SHALL INCLUDE THE REMOVAL OF ANY BUILT UP SEDIMENT WHEN THE SEDIMENT HEIGHT ACCUMULATES TO 1/3 TO 1/2 OF THE HEIGHT OF THE FENCE. THE CONTRACTOR IS RESPONSIBLE TO REMOVE, REPLACE, REPAIR OR REINSTALL THE SILTATION FENCE SHOULD IT FALL OR BE DAMAGED DURING CONSTRUCTION.
- INLET FILTER MAINTENANCE SHALL INCLUDE THE REMOVAL OF ANY ACCUMULATED DIRT OR OTHER DEBRIS. THE REMOVAL OF SILT SHOULD BE WITH THE USE OF A STIFF BRISTLE BROOM OR SQUARE POINT SHOVEL. IF INLET FILTERS CAN NOT BE CLEANED OR ARE DAMAGED, THEN THE FABRIC MUST BE REPLACED.
- CONTRACTOR TO PROVIDE WATER TRUCK TO WATER DOWN THE SITE ON A DAILY BASIS AS REQUIRED TO MAINTAIN DUST CONTROL.
- IF HIGH GROUNDWATER IS ANTICIPATED OR ENCOUNTERED DURING CONSTRUCTION A DEWATERING PLAN MUST BE SUBMITTED TO THE CITY ENGINEERING DIVISION FOR REVIEW.

SYMBOLS: EROSION CONTROL:



NO.	DATE	DESCRIPTION



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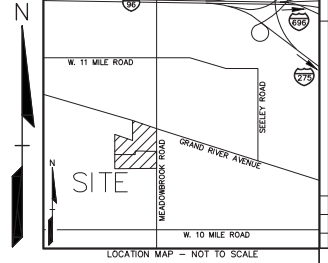
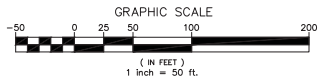
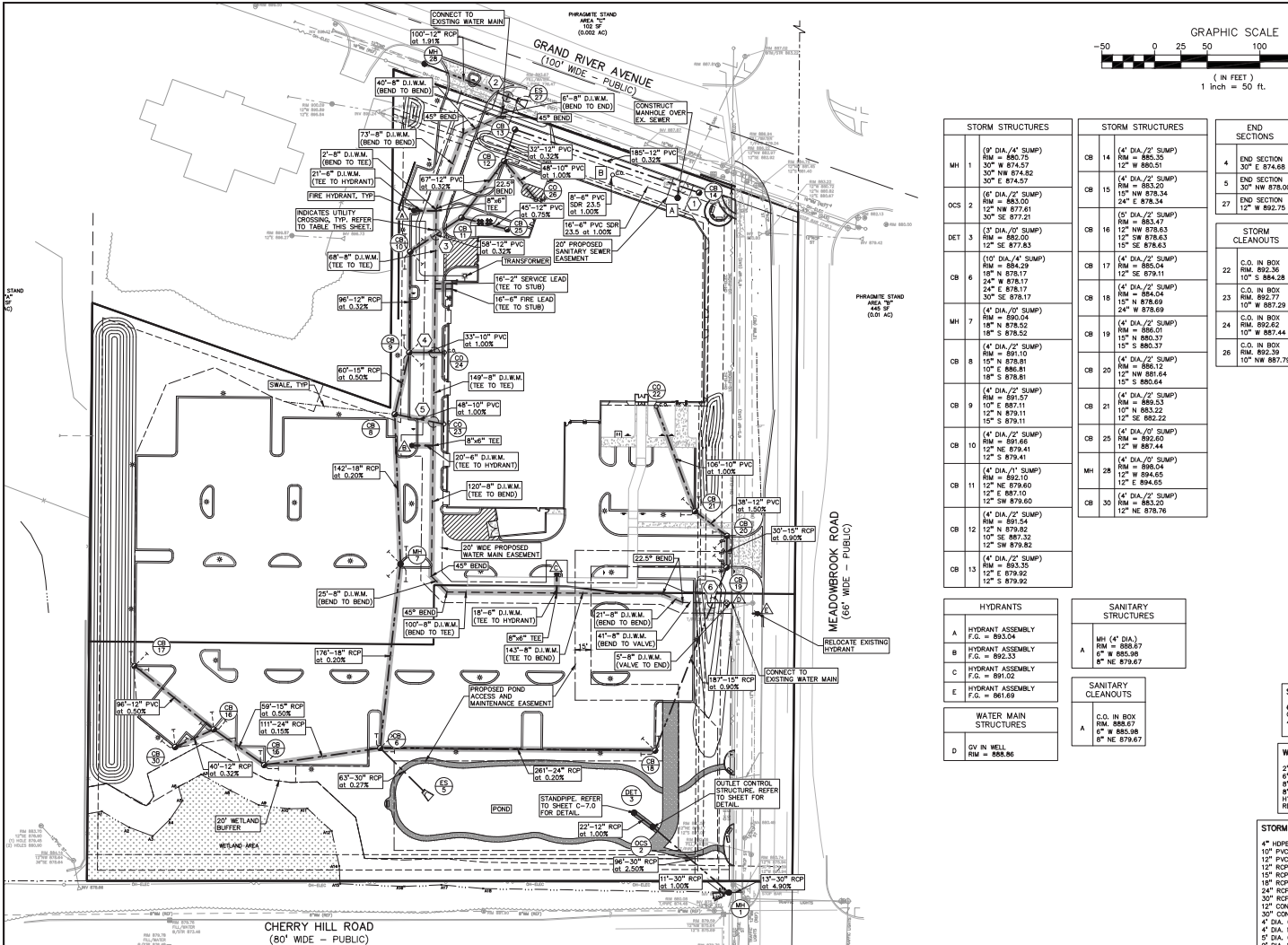
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SESC PLAN
JAGUAR LAND ROVER OF NOVI
 PART OF THE NORTHLAND AUTO CENTER, 21111 W. 14 MILE RD., NOVI, MI 48240
 D.E.S. BK. LDN. CL. SUR. J.W. J.W. J.P.M. J.P.B.
 P:\PROJECTS\2017\2017-02-28\2017-02-28-001.dwg

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
 PEA JOB NO. 2017-176
 SCALE:
 DRAWING NUMBER:
C-5.0

NOT FOR CONSTRUCTION



STORM STRUCTURES		STORM STRUCTURES		END SECTIONS	
MH 1	(8" DIA./2' SUMP) RM = 885.35 30" NW 874.52 30" E 874.57	CB 14	(4" DIA./2' SUMP) RM = 885.35 12" W 880.51	4	END SECTION 30" E 874.68
OCS 2	(6" DIA./2' SUMP) RM = 883.00 12" NW 877.61 30" SE 877.21	CB 15	(4" DIA./2' SUMP) RM = 883.30 15" W 878.34 24" E 878.34	5	END SECTION 30" W 878.00
DET 3	(12" DIA./2' SUMP) RM = 882.00 12" SE 877.83	CB 16	(4" DIA./2' SUMP) RM = 883.47 12" NW 878.63 12" SE 878.63	27	END SECTION 12" W 892.75
CB 6	(10" DIA./2' SUMP) RM = 884.29 15" W 878.17 24" E 878.17	CB 17	(4" DIA./2' SUMP) RM = 885.04 12" SE 879.11		
MH 7	(4" DIA./2' SUMP) RM = 890.04 18" W 878.52 18" S 878.81	CB 18	(4" DIA./2' SUMP) RM = 884.04 12" W 878.69 24" W 878.69		
CB 8	(4" DIA./2' SUMP) RM = 891.10 15" W 878.81 10" S 886.81	CB 19	(4" DIA./2' SUMP) RM = 883.37 15" S 880.37		
CB 9	(4" DIA./2' SUMP) RM = 891.57 10" E 887.11 15" S 879.11	CB 20	(4" DIA./2' SUMP) RM = 886.12 12" W 881.64 15" S 880.64		
CB 10	(4" DIA./2' SUMP) RM = 891.68 12" NE 879.41 12" S 878.41	CB 21	(4" DIA./2' SUMP) RM = 889.23 10" W 883.22 12" SE 882.22		
CB 11	(4" DIA./2' SUMP) RM = 892.10 12" SE 879.60 12" E 887.10	CB 25	(4" DIA./2' SUMP) RM = 896.65 12" W 887.44		
CB 12	(4" DIA./2' SUMP) RM = 891.54 12" W 879.82 12" SW 879.82	MH 28	(4" DIA./2' SUMP) RM = 894.65 12" E 894.65		
CB 13	(4" DIA./2' SUMP) RM = 893.33 12" SW 879.82 12" S 879.82	CB 30	(4" DIA./2' SUMP) RM = 883.20 12" NE 878.76		

HYDRANTS	
A	HYDRANT ASSEMBLY F.O. = 893.04
B	HYDRANT ASSEMBLY F.O. = 892.53
C	HYDRANT ASSEMBLY F.O. = 891.02
E	HYDRANT ASSEMBLY F.O. = 861.69

SANITARY STRUCTURES	
MH (4" DIA.)	RM = 888.67
A	8" W 885.98
	8" NE 879.67

SANITARY CLEANOUTS	
C.O. IN BOX	RM = 888.67
A	8" W 885.98
	8" NE 879.67

WATER MAIN STRUCTURES	
D	C.V. IN WELL RM = 898.86

SANITARY SEWER QUANTITIES:	
6" PVC SDR 23.5 PIPE	24 LF
CLEANOUT AND BOX	1 EA.
4" DIA. MANHOLE	1 EA.

WATER MAIN QUANTITIES:	
2" COPPER 1/2" WATER LEAD	16 LF
6" D.I.W.M. CLASS 54	61 LF
8" D.I.W.M. CLASS 54	797 LF
8" GATE VALVE AND WELL HYDRANT ASSEMBLY	1 EA.
RELOCATED HYDRANT	1 EA.

STORM SEWER QUANTITIES:	
4" HDPE UNDERDRAIN WITH SOCK	420 LF
12" PVC A-2000 PIPE	235 LF
15" PVC A-2000 PIPE	258 LF
12" RCP CL-V PIPE	258 LF
15" RCP CL-V PIPE	331 LF
18" RCP CL-V PIPE	318 LF
24" RCP CL-V PIPE	372 LF
30" RCP CL-V PIPE	183 LF
12" CONC. END SECTION	1 EA.
30" CONC. END SECTION	2 EA.
4" DIA. CATCH BASIN	14 EA.
4" DIA. MANHOLE	2 EA.
5" DIA. CATCH BASIN	1 EA.
10" DIA. CATCH BASIN	1 EA.
3" DIA. OUTLET CONTROL STRUCTURE	1 EA.
6" DIA. OUTLET CONTROL STRUCTURE	1 EA.

CITY OF NOVI FIRE DEPARTMENT NOTES:	
1.	ALL WEATHER ACCESS ROADS CAPABLE OF SUPPORTING 30 TONS ARE TO BE PROVIDED FOR FIRE APPARATUS PRIOR TO CONSTRUCTION ABOVE THE FOUNDATION.
2.	ALL WATER MAINS AND FIRE HYDRANTS ARE TO BE INSTALLED AND BE IN SERVICE PRIOR TO CONSTRUCTION ABOVE THE FOUNDATION.
3.	THE BUILDING ADDRESS IS TO BE POSTED FACING THE STREET THROUGHOUT THE CONSTRUCTION. THE ADDRESS IS TO BE AT LEAST 9 INCHES HIGH ON CONTRASTING BACKGROUND.

GENERAL UTILITY NOTES:

- ALL UTILITY LINES, STRUCTURES AND TRENCHES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF THE CITY OF NOVI.
- NO PHYSICAL CONNECTION TO THE EXISTING WATER MAIN CAN BE MADE UNTIL ALL NEW WATER MAIN PASSES PRESSURE AND BACTERIOLOGICAL TESTS TO THE SATISFACTION OF THE CITY OF NOVI.
- ALL WATER MAIN AND FITTINGS (3" DIAMETER AND LARGER) SHALL BE DUCTILE IRON, CLASS 54.
- WATER MAIN SERVICE LEADS SHALL BE TYPE "K" ANNEALED SEAMLESS COPPER WITH FLARED FITTINGS, UNLESS OTHERWISE NOTED.
- ALL WATER MAIN SHALL BE PROVIDED WITH 4" OF COVER UNLESS OTHERWISE NOTED.
- ALL FIRE HYDRANTS SHALL BE LEWIS "WATERMASTER" COVER MODEL #250 PER CITY OF NOVI STANDARDS.
- ALL HYDRANTS TO BE A MINIMUM OF 7" FROM BACK OF CURB, TYP.
- ALL NECESSARY FITTINGS, THRUST BLOCKS, RESTRAINING CLAMPS, BLOW OFFS, ETC. FOR WATER MAIN ARE CONSIDERED INCIDENTAL TO THIS PROJECT. THE CONTRACTOR SHALL INSTALL THESE ITEMS AS NECESSARY AND AS REQUIRED BY THE CITY OF NOVI.
- THE WATER MAIN CONTRACTOR SHALL NOTIFY THE CITY OF NOVI DEPARTMENT OF PUBLIC SERVICES AT (248) 735-5640 AT LEAST THREE WORKING DAYS IN ADVANCE OF STARTING CONSTRUCTION.
- ALL SANITARY SEWER 8" OR LARGER SHALL BE P.V.C. TRUSS PIPE (ASTM D2688) AND FITTINGS, WITH ELASTOMERIC GASKET JOINTS PER ASTM D3212 UNLESS OTHERWISE NOTED.
- ALL SANITARY SEWER LEADS SHALL BE POLYVINYL CHLORIDE (PVC) SDR 23.5 PIPE AND FITTINGS. ALL JOINTS TO BE ELASTOMERIC GASKET JOINTS PER ASTM D3212 UNLESS OTHERWISE NOTED.
- SANITARY LEADS SHALL BE PROVIDED WITH CLEANOUTS EVERY 100 FEET AND AT EVERY BEND AS SHOWN. ALL CLEANOUTS TO BE PROVIDED WITH E.L.W.M. #565 BOX OR EQUAL.
- SANITARY LEADS SHALL BE PROVIDED WITH A MINIMUM OF 5 FEET COVER WHEN LOCATED WITHIN THE INFLUENCE ZONE OF PAVEMENT.
- STORM SEWER 12" AND SMALLER SHALL MEET THE REQUIREMENTS OF ASTM D3304 AND F399 WITH PUSH-ON TYPE JOINTS MEETING THE REQUIREMENTS OF ASTM D3212 AND F477.
- ALL STORM SEWER LARGER THAN 12" DIAMETER SHALL BE REINFORCED CONCRETE PIPE (RCP) C-70 CLASS IV WITH MODIFIED TONGUE AND GROOVE JOINT WITH RUBBER GASKETS. ALL STORM SEWER 12" OR SMALLER SHALL BE ADS HIGH PERFORMANCE HDPE UNLESS SPECIFIED OTHERWISE (ASTM C-443).
- ALL STORM SEWER SHALL BE PVC SCHEDULE 40 WITH GULF JOINTS UNLESS OTHERWISE NOTED.
- PIPE LENGTHS ARE GIVEN FROM CENTER OF STRUCTURE AND TO END OF FLARED END SECTION UNLESS NOTED OTHERWISE.
- THE CITY OF NOVI STANDARD DETAIL SHEETS ARE INCORPORATED INTO AND MAKE A PART OF THESE PLANS. CONTRACTOR TO REFER TO THE CITY OF NOVI STANDARD DETAIL SHEETS FOR ALL STRUCTURE, PIPE, MATERIALS, BEDDING, TESTING, ETC. NOTES AND DETAILS.

PUBLIC UTILITY EASEMENTS:
ALL WATER MAIN SHALL BE LOCATED IN A 20' WIDE EASEMENT.

SAND BACKFILL NOTE:
ALL UTILITIES UNDER PAVEMENT OR WITHIN 3' OF THE EDGE OF PAVEMENT (OR WITHIN THE 40' LINE OF INFLUENCE OF PAVEMENT) SHALL HAVE M.D.O.T. CLASS 3 GRANULAR BACKFILL, COMPACTED TO 98% MAX. DRY DENSITY (ASTM D-1557).

NOTE:
CONTRACTOR TO VERIFY ALL QUANTITIES, ANY DEVIATIONS TO THE PLAN QUANTITIES SHALL BE BROUGHT TO THE ATTENTION OF PEA, INC. FOR VERIFICATION, PRIOR TO BEDDING.

UTILITY CROSSINGS					
CROSSING	CROSSING PIPE 1	CROSSING PIPE 2	Clearance	NOTES	
1	12" ST B/P= 880.29	8" SAN T/P= 886.70	13.58	FIELD VERIFY SAN	
2	12" ST B/P= 882.86	8" WM T/P= 887.36	5.50	FIELD VERIFY WM	
3	12" ST T/P= 880.68	8" WM B/P= 885.52	4.85		
4	10" ST B/P= 887.18	8" WM T/P= 885.68	1.50		
5	10" ST B/P= 887.02	8" WM T/P= 885.52	1.50		
6	15" ST T/P= 881.49	8" WM B/P= 884.23	2.84		

WATER MAIN BASIS OF DESIGN	
Unit Factors Based on Oakland County Unit Assignment Factors)	
AUTO SHOWROOM/DEALERSHIP	
Building Area (SF)	58,603
Unit Factor	0.37 /1,000 SF
REU	21.7
Population (P) (3.5 PEOPLE/EDU)	76.0 People
TOTAL	REU 31.7
	76 People
Average Daily Flow (150 GPCFD)	11,400 G.P.D.
	0.018 C.F.S.
	0.011 M.G.D.
Max. Daily Flow = (2"ang)	22940.0 G.P.D.
	0.035 C.F.S.
	0.023 M.G.D.
Peak Daily Flow = (3"ang)	34200.0 G.P.D.
	0.053 C.F.S.
	0.034 M.G.D.

BENCHMARKS
(GPS DERIVED - NAVD83)

BM #300
DMPLE ON THE NORTHWEST BOLT OF A SIGNAL POLE LOCATED APPROX. 35' SOUTH OF THE CENTERLINE OF GRAND RIVER AVENUE AND APPROX. 80' WEST OF THE CENTERLINE OF MEADOWBROOK ROAD.
ELEV. = 886.16

BM #301
DMPLE ON THE NORTHEAST BOLT OF A SIGNAL POLE LOCATED APPROX. 30' WEST OF THE CENTERLINE OF MEADOWBROOK ROAD AND APPROX. 30' SOUTH OF THE CENTERLINE OF CHERRY HILL ROAD. (NOT SHOWN ON SURVEY)
ELEV. = 880.81

BM #302
DMPLE ON A HYDRANT LOCATED APPROX. 20' NORTH OF CHERRY HILL ROAD AND APPROX. 50' SOUTHWEST OF #41728 CHERRY HILL ROAD.
ELEV. = 886.38

FLOODPLAIN NOTE:
BY GRAPHICAL PLOTTING, SITE IS WITHIN ZONE "X" AREA DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN PER FLOOD INSURANCE RATE MAP NUMBER 261250C627F, DATED SEPTEMBER 29, 2006.

REVISIONS

NO.	DATE	DESCRIPTION

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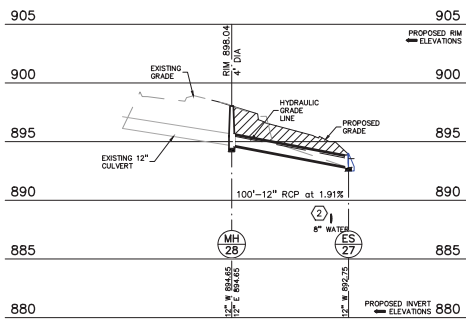
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BLOOMFIELD HILLS, MICHIGAN 48302

UTILITY LAYOUT OF JAGUAR LAND ROVER OF NOVI
A PART OF THE NORTHWEST QUARTER SECTION 16, T4N, R2W, E6E, CO. OF NOVI, MI.

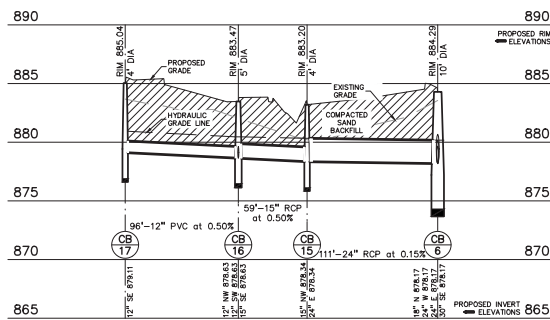
DES: BK, LDN, CL, SUR, JAW, P.M.
DATE: 11/11/2019

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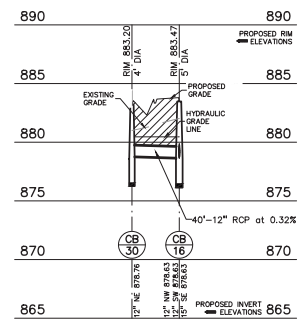
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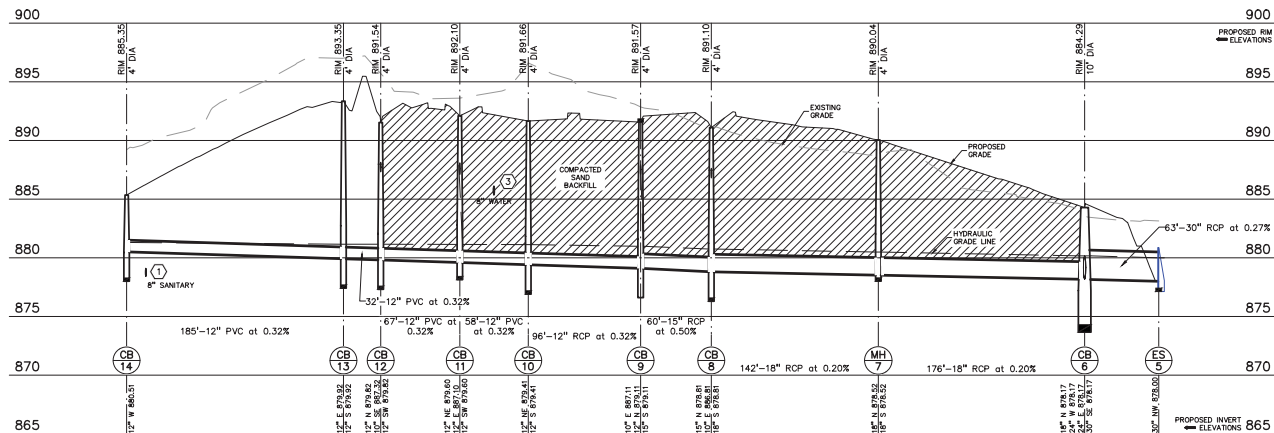
STORM SEWER PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



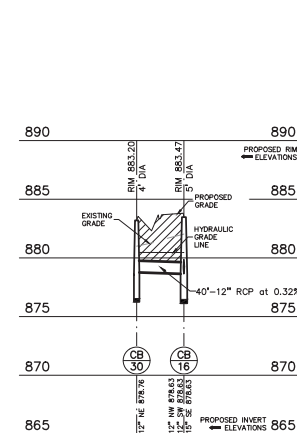
STORM SEWER PROFILE
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VERT: 1" = 5'



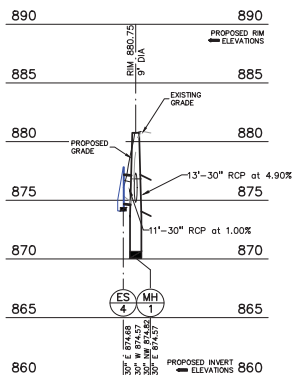
STORM SEWER PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



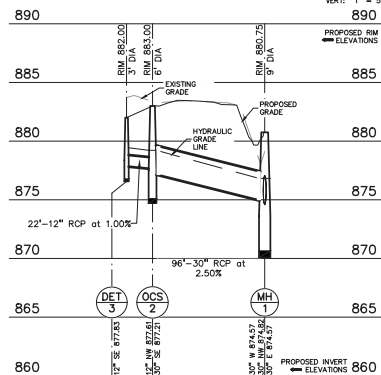
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SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



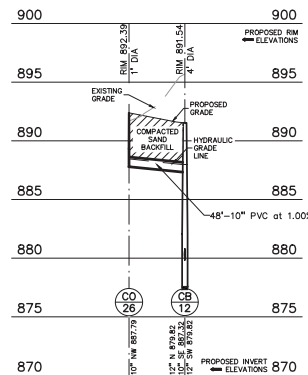
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SCALE: HORIZ: 1" = 50'
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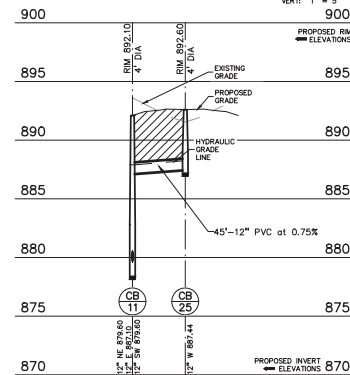
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SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



STORM SEWER PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



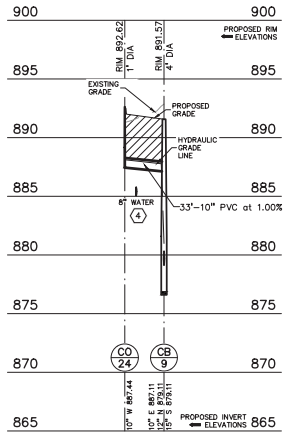
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VERT: 1" = 5'



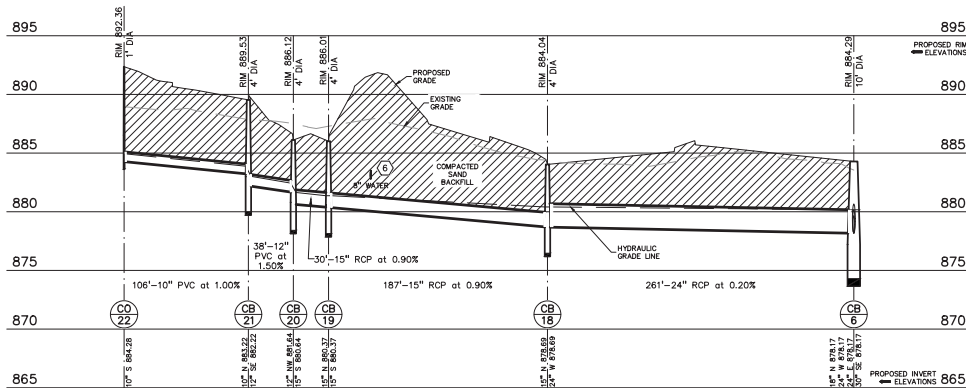
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SCALE: HORIZ: 1" = 50'
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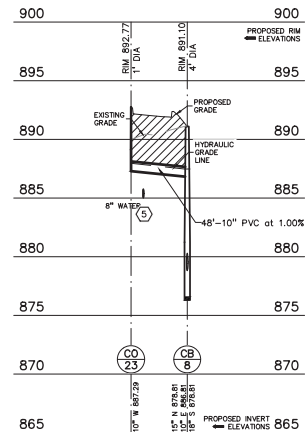
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<p>ERHARD MOTOR SALES INC. BLOOMFIELD HILLS, MICHIGAN 48302</p> <p>STORM PROFILES JAGUAR LAND ROVER OF NOVI PART OF THE NORTHWEST AUTO SECTOR OF MICHIGAN</p> <p>DRAWN: BK CHECKED: BK DATE: 02/11/2019 SCALE: 1" = 50'</p>	
<p>ORIGINAL ISSUE DATE: FEBRUARY 11, 2019 PEA JOB NO. 2017-176 SCALE: SCALE: 1" = 50' DRAWING NUMBER: C-7.1</p>	



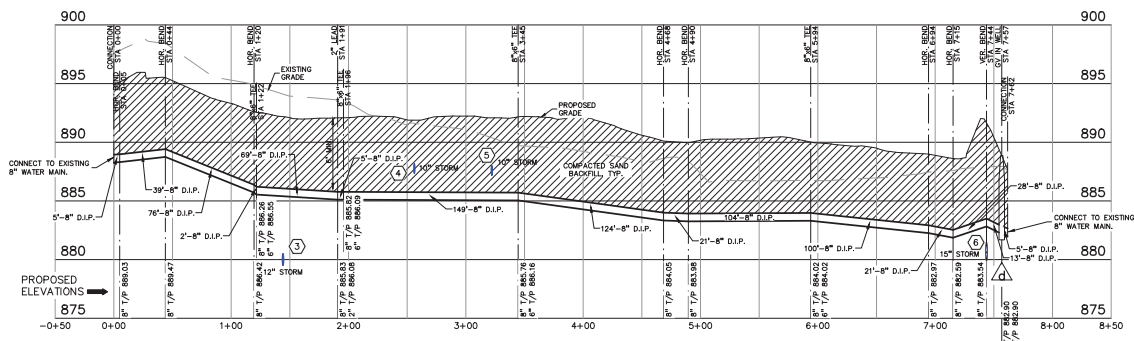
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SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



STORM SEWER PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



STORM SEWER PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'



WATER MAIN PROFILE
SCALE: HORIZ: 1" = 50'
VERT: 1" = 5'

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	DATE
	REV.
	DESCRIPTION
	REVISIONS

REBECCA KLER ENGINEERING, INC.
PROFESSIONAL ENGINEER
NO. 1045

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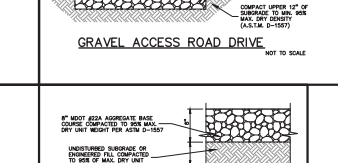
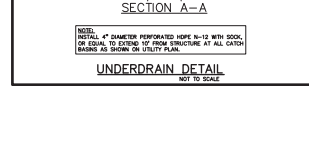
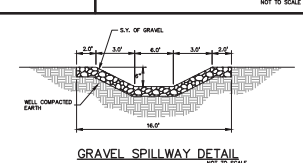
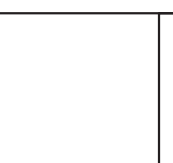
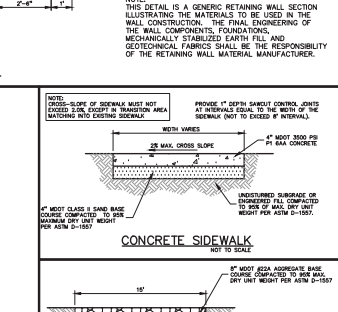
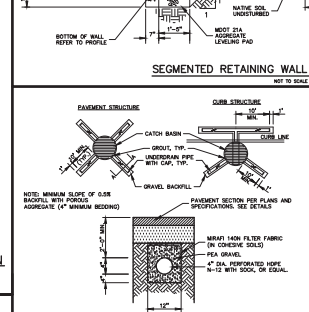
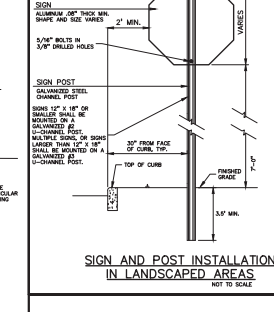
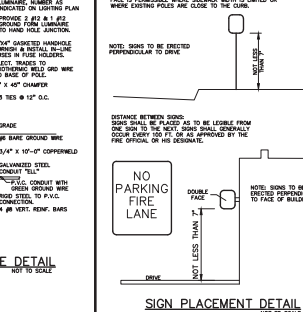
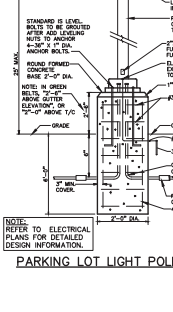
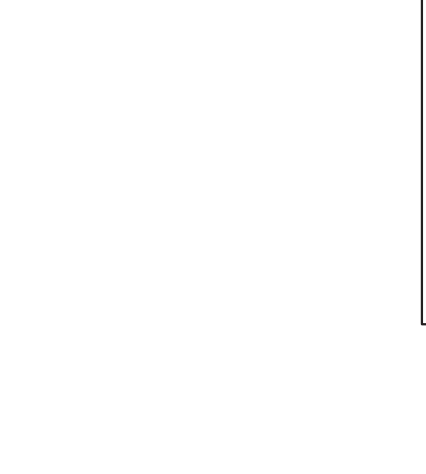
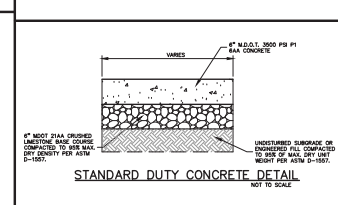
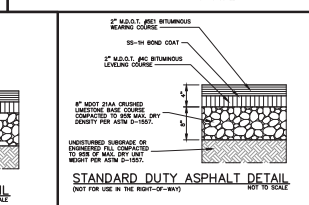
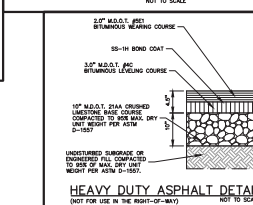
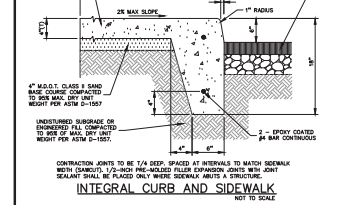
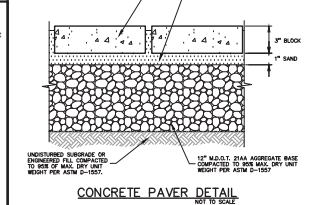
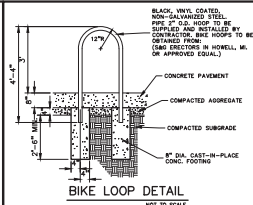
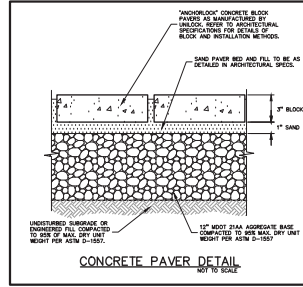
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ERHARD MOTOR SALES INC.	JAGUAR LAND ROVER OF NOVI
BLOOMFIELD HILLS, MICHIGAN 48302	30000 RIVERCHASE DR, NOVI, MI 48240
DES: BK	DATE: 11/19/19
DWN: CL	SCALE: 1" = 50'
CHK: JZ	PROJECT: JAGUAR LAND ROVER OF NOVI
APP: JZ	REV: 1
ORIGINAL ISSUE DATE: FEBRUARY 11, 2019	
PEA JOB NO. 2017-176	
SCALE: SCALE: 1" = 50'	
DRAWING NUMBER: C-7.2	

- GENERAL NOTES:**
1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF NOVI.
 2. THE CONTRACTOR MUST CONTACT THE ENGINEER SHOULD THEY ENCOUNTER ANY DESIGN ISSUES DURING CONSTRUCTION. IF THE CONTRACTOR MAKES DESIGN MODIFICATIONS WITHOUT THE WRITTEN DIRECTION OF THE DESIGN ENGINEER, THE CONTRACTOR DOES SO AT HIS OWN RISK.
 3. ALL NECESSARY PERMITS, TESTING, BONDS AND INSURANCES ETC., SHALL BE PAID FOR BY THE CONTRACTOR. THE OWNER SHALL PAY FOR ALL CITY INSPECTION FEES.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DUST CONTROL DURING THE PERIODS OF CONSTRUCTION. THIS SHALL BE CONSIDERED INCIDENTAL TO THE JOB.
 5. THE CONTRACTOR SHALL NOTIFY MSDS 001 (811) AND REPRESENTATIVES OF OTHER UTILITIES IN THE VICINITY OF THE WORK A MINIMUM OF 72 HOURS PRIOR TO START OF CONSTRUCTION (EXCLUDING WEEKENDS AND HOLIDAYS) FOR LOCATION AND STAKING OF ON-SITE UTILITY LINES. IF NO NOTIFICATION IS GIVEN AND DAMAGE RESULTS, THE CONTRACTOR SHALL BE RESPONSIBLE AT HIS OWN RISK. IF EXISTING UTILITY LINES ARE ENCOUNTERED THAT CONFLICT IN LOCATION WITH NEW CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER SO THAT THE CONFLICT MAY BE RESOLVED.
 6. CONTRACTOR TO VERIFY THAT THE PLANS AND SPECIFICATIONS ARE THE VERY LATEST PLANS AND SPECIFICATIONS AND FURTHERMORE, VERIFY THAT THESE PLANS AND SPECIFICATIONS HAVE BEEN APPROVED. ALL ITEMS CONSTRUCTED BY THE CONTRACTOR PRIOR TO RECEIVING FINAL APPROVAL, MAJOR TO BE ADJUSTED OR RE-DONE, SHALL BE AT THE CONTRACTORS EXPENSE. SHOULD THE CONTRACTOR ENCOUNTER A CONFLICT BETWEEN THESE PLANS AND/OR SPECIFICATIONS, THEY SHALL SEEK CLARIFICATION IN WRITING FROM THE ENGINEER BEFORE COMMENCEMENT OF CONSTRUCTION. FAILURE TO DO SO SHALL BE AT SOLE EXPENSE TO THE CONTRACTOR.
 7. ALL PROPERTIES OR FACILITIES IN THE SURROUNDING AREAS, PUBLIC OR PRIVATE, DESTROYED OR OTHERWISE DISTURBED DUE TO CONSTRUCTION, SHALL BE REPLACED AND/OR RESTORED TO THE ORIGINAL CONDITION BY THE CONTRACTOR.
 8. MANHOLE, CATCH BASIN, GATE VALVES AND HYDRANT FINISH GRADES MUST BE CLOSELY CHECKED AND APPROVED BY THE ENGINEER BEFORE THE CONTRACTOR'S WORK IS CONSIDERED COMPLETE.
 9. CONTRACTOR SHALL REMOVE AND DISPOSE OF OFF-SITE ANY TREES, BRUSH, STUMPS, TRASH OR OTHER UNWANTED DEBRIS AT THE OWNERS DIRECTION, INCLUDING OLD BUILDING FOUNDATIONS AND FLOORS. BURNING OF TRASH, STUMPS OR OTHER DEBRIS SHALL NOT BE PERMITTED.
 10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BARRICADE, SIGNAGE, LIGHTS AND TRAFFIC CONTROL DEVICES TO PROTECT THE WORK AND SAFELY MAINTAIN TRAFFIC IN ACCORDANCE WITH LOCAL REQUIREMENTS AND THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST EDITION). THE DESIGN ENGINEER, OWNER, CITY AND STATE SHALL NOT BE HELD LIABLE FOR ANY CLAIMS RESULTING FROM ACCIDENTS OR DAMAGES CAUSED BY THE CONTRACTORS FAILURE TO COMPLY WITH TRAFFIC AND PUBLIC SAFETY REGULATIONS DURING THE CONSTRUCTION PERIOD.
 11. ALL EXCAVATIONS SHALL BE SLOPED, SHORED OR BRACED IN ACCORDANCE WITH M-694 REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE AN ADEQUATELY CONSTRUCTED AND BRACED SHORING SYSTEM FOR EMPLOYEES WORKING IN AN EXCAVATION THAT MAY EXPOSE EMPLOYEES TO THE DANGER OF MOVING GROUND.
- PAVING NOTES:**
1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF NOVI AND M.D.O.T.
 2. IN AREAS WHERE NEW PAVEMENTS ARE BEING CONSTRUCTED, THE TOPSOIL AND SOIL CONTAINING ORGANIC MATTER SHALL BE REMOVED PRIOR TO PAVEMENT CONSTRUCTION.
 3. ON-SITE FILL CAN BE USED IF THE SPECIFIED COMPACTION REQUIREMENTS CAN BE ACHIEVED. IF ON-SITE SOIL IS USED, IT SHOULD BE CLEAN AND FREE OF FROZEN SOIL, ORGANICS, OR OTHER DELICIOUS MATERIALS.
 4. THE FINAL SUBGRADE/EXISTING AGGREGATE BASE SHOULD BE THOROUGHLY PROFILESSED USING A FULLY LOADED TANDUM AXLE TRUCK OR FRONT END LOADER UNDER THE OBSERVATION OF A GEOTECHNICAL/PAVEMENT ENGINEER. LOOSE OR YIELDING AREAS THAT CANNOT BE MECHANICALLY STABILIZED SHOULD BE REFORMED USING GEOTEXTILES OR REMOVED AND REPLACED WITH ENGINEERED FILL OR AS DICTATED BY FIELD CONDITIONS.
 5. SUBGRADE UNDERCUTTING, INCLUDING BACKFILLING SHALL BE PERFORMED TO REPLACE MATERIALS SUSCEPTIBLE TO FROST HEAVING AND UNSTABLE SOIL CONDITIONS. ANY EXCAVATIONS THAT MAY BE REQUIRED BELOW THE TOPSOIL IN FILL SECTIONS OR BELOW SUBGRADE IN CUT SECTIONS, WILL BE CLASSIFIED AS SUBGRADE UNDERCUTTING.
 6. SUBGRADE UNDERCUTTING SHALL BE PERFORMED WHERE NECESSARY AND THE EXCAVATED MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR. ANY SUBGRADE UNDERCUTTING SHALL BE BACKFILLED WITH SAND OR OTHER SIMILAR APPROVED MATERIAL. BACKFILL SHALL BE COMPACTED TO 95% OF THE MAXIMUM UNIT WEIGHT (PER ASTM D-1557) UNLESS OTHERWISE SPECIFIED.
 7. BACKFILL UNDER PAVED AREAS SHALL BE AS SPECIFIED ON DETAILS.
 8. ANY SUB-GRADE WATERING REQUIRED TO ACHIEVE REQUIRED DENSITY SHALL BE CONSIDERED INCIDENTAL TO THE JOB.
 9. FINAL PAVEMENT ELEVATIONS SHOULD BE SO DESIGNED TO PROVIDE POSITIVE SURFACE DRAINAGE. A MINIMUM SURFACE SLOPE OF 1.0 PERCENT IS RECOMMENDED.
 10. CONSTRUCTION TRAFFIC SHOULD BE MINIMIZED ON THE NEW PAVEMENT. IF CONSTRUCTION TRAFFIC IS ANTICIPATED ON THE PAVEMENT STRUCTURE, THE INITIAL LIFT THICKNESS COULD BE INCREASED AND PLACEMENT OF THE FINAL LIFT COULD BE DELAYED UNTIL THE MAJORITY OF THE CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED. THIS ACTION WILL ALLOW REPAIR OF LOCALIZED FAILURES, IF ANY DOES OCCUR, AS WELL AS REDUCE LOAD DAMAGE ON THE PAVEMENT SYSTEM.



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DATE: _____

REVISIONS

NO.	DATE	DESCRIPTION

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BLOOMFIELD HILLS, MICHIGAN 48302
NOTES AND DETAILS
JAGUAR LAND ROVER OF NOVI
PART OF THE NORTHWEST AUTO SALES GROUP OF CHRYSLER FINANCIAL GROUP

D.E.S.: BK I.D.N.: CL I.SUR.: JAW P.P.M.: JPS
P.E. REG. NO. 96542 MICH. REG. NO. 96542 MICH. REG. NO. 96542

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
PEA JOB NO. 2017-176
SCALE:
DRAWING NUMBER:
C-8.0

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Bench
Installation Guide
landscapeforms®
www.landscapeforms.com Ph: 800.521.2548

Bench options

Included components

- Assembled bench - For surface mounted options (6) with 1/2-11 x 3-1/2" hex head cap screws, drop in anchor for 1/2-11 screws and 1/2" flat washer. Setting tool for drop in anchor included.

6x -- hex head cap screw (surface mount only)
6x -- flat washer (surface mount only)
6x -- drop in anchor (surface mount only)
2x -- setting tool (surface mount only)

Tools Required

- Safety glasses
- Hammer drill with 5/8" dia masonry drill bit (for surface mount)
- Hammer (for surface mount)
- 3/4" wrench (for surface mount)

ASSEMBLY WITH CARE! Pangard 60 Polyester Powdercoat is a strong, long-lasting finish. To protect this finish during assembly, place unvarnished/unlacquered parts on packaging foam or other non-rubbing surface. Do not place or slide unvarnished parts on concrete or other hard or textured surface - this will damage the finish causing rust to occur. Use touch-up paint on any groups in the finish caused by assembly tools.

PROCEDURE FOR INSTALLATION:

- Prepare proper footing or slab as required.

Note: Landscape Forms is not responsible for footing or slab installation.

FOR SURFACE MOUNTED BENCH:

- Place unit in desired position and mark anchor locations through holes provided in base plate.
- Move unit and drill holes according to Fig. 1.
- Clear the holes of dust and debris using compressed air.
- Install drop-in anchors flush with surface of concrete.
- Expand anchor with setting tool. Anchor is properly expanded when shoulder of setting tool is flush with top of anchor.
- Place unit in desired position and install the washers and hex bolts. Tighten to 55-60 ft lbs.
- Periodically check fasteners and tighten if required.

Fig. 1 - Anchor Detail

Date: May 2011
U.S. Patent No. D453,424, D455,919, D451,296, D450,952

Page 1 of 2

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Installation Guide
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NOTE: CONCRETE SHOULD BE STEEL REINFORCED. CONCRETE: $f_c = 3000$ p.s.i.

RECOMMENDED INSTALLATION DETAIL FOR MOUNTING TO EXISTING SLAB

RECOMMENDED INSTALLATION DETAIL FOR MOUNTING TO NEW SLAB

RECOMMENDED CAST-IN-PLACE FOOTING FOR SURFACE MOUNT BENCH

RECOMMENDED CAST-IN-PLACE FOOTING FOR EMBEDDED BENCH

EXPANSION ZONE

SPACING FOR SURFACE MOUNT BENCH

Date: May 2011
U.S. Patent No. D453,424, D455,919, D451,296, D450,952

Page 2 of 2

NO.	DATE	DESCRIPTION	BY

CAUTION!

The unit shall not be used for anything other than its intended use. The manufacturer does not assume any liability for any damage or injury that may result from the use of this product in any manner other than as intended. The manufacturer shall not be held responsible for any damage or injury that may result from the use of this product in any manner other than as intended. The manufacturer shall not be held responsible for any damage or injury that may result from the use of this product in any manner other than as intended. The manufacturer shall not be held responsible for any damage or injury that may result from the use of this product in any manner other than as intended.

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JAGUAR LAND ROVER OF NOVI
PART OF THE NORTHWEST AUTO SECTOR OF THE AUTO INDUSTRY

DES: BK
DWN: BK
CL: BK
I: SUR.
T: SUR.
20W
20W
JRB

ORIGINAL ISSUE DATE:
FEBRUARY 11, 2019

PEA JOB NO. 2017-176

SCALE:

DRAWING NUMBER:
C-8.3

NOT FOR CONSTRUCTION

TREE PLANT LIST: L-1.0

QTY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT	REPLACEMENT TREE	GENUS %	SPECIES %
8	AR3	Red Maple	<i>Acer rubrum</i>	3" Cal.	B&B	Native	YES	2%	8%
23	AS1	Sugar Maple	<i>Acer saccharum</i>	3" Cal.	B&B	Native	YES	7%	28%
10	AL8	Allegheny Serviceberry	<i>Amelanchier laevis</i>	8-10" Hl.	B&B	Native	YES	7%	3%
12	BP8	Paperbark Birch	<i>Betula papyrifera</i>	8-10" Hl.	B&B	Native	YES	4%	4%
12	CA3	American Hornbeam	<i>Carpinus caroliniana</i>	3" Cal.	B&B	Native	YES	4%	4%
2	CC8	Eastern Redbud	<i>Cercis canadensis</i>	8-10" Hl.	B&B	Native	YES	1%	1%
10	CO3	Hackberry	<i>Celtis occidentalis</i>	3" Cal.	B&B	Native	YES	7%	3%
24	FO3	American Beech	<i>Fagus grandifolia</i>	3" Cal.	B&B	Native	YES	7%	7%
15	OT3	Skyline Honeylocust	<i>Gleditsia triacanthos</i>	3" Cal.	B&B	Native	YES	7%	5%
12	LT3	Tulip Tree	<i>Liriodendron tulipifera</i>	3" Cal.	B&B	Native	YES	7%	7%
15	MR3	Royal Raindrops Crabapple Malus 'JFS-KWS'	3" Cal.	B&B	Non-Native	YES	7%	5%	
9	NS3	Japanese Tree Lilac	<i>Syringa reticulata</i>	2" Cal.	B&B	Non-Native	YES	7%	3%
11	NU3	Tupelo	<i>Nyssa sylvatica</i>	3" Cal.	B&B	Native	YES	7%	3%
25	OV3	Hophornbeam	<i>Ostrya virginiana</i>	3" Cal.	B&B	Native	YES	7%	3%
10	PD3	American Sycamore	<i>Platanus occidentalis</i>	3" Cal.	B&B	Native	YES	7%	3%
14	OW3	Swamp White Oak	<i>Quercus bicolor</i>	3" Cal.	B&B	Native	YES	7%	3%
8	OS3	Scarlet Oak	<i>Quercus cocinea</i>	3" Cal.	B&B	Native	YES	7%	3%
12	OM3	Burr Oak	<i>Quercus macrocarpa</i>	3" Cal.	B&B	Native	YES	7%	3%
18	OR3	Red Oak	<i>Quercus rubra</i>	3" Cal.	B&B	Native	YES	7%	3%
18	TB3	American Basswood	<i>Tilia americana</i>	3" Cal.	B&B	Native	YES	7%	3%
13	TR3	Crimson Linden	<i>Tilia cordata</i>	3" Cal.	B&B	Non-Native	YES	7%	3%
251		TOTAL DECIDUOUS						36	TOTAL SUB CANOPY

EVERGREEN PLANT LIST:

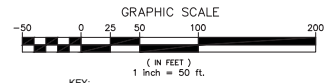
QTY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT	REPLACEMENT TREE	GENUS %	SPECIES %
13	PG8	White Spruce	<i>Picea glauca</i>	8" Hl.	B&B	Native	YES	7%	3%
9	PS8	Eastern White pine	<i>Pinus strobus</i>	8" Hl.	B&B	Native	YES	7%	3%
18	TD8	Arbutus	<i>Thuja occidentalis</i>	6" Hl.	B&B	Native	YES	7%	3%
227		TOTAL TREES						49	TOTAL EVERGREEN

SHRUB PLANT LIST:

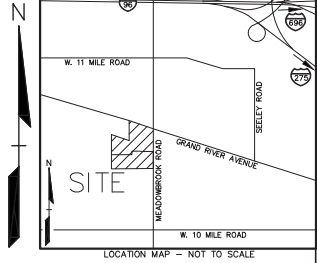
QTY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
38	AM36	Black Chokecherry	<i>Aronia melanocarpa (prunifolia)</i>	36" Hl.	Cont.	Native
25	RA36	Fragrant Sumac	<i>Rhus aromatica</i>	36" Hl.	Cont.	Native
9	TM36	Hicks Yew	<i>Taxus media Michx.</i>	36" Hl.	Cont.	Non-Native
29	VD36	Arowood Viburnum	<i>Viburnum dentatum</i>	36" Hl.	Cont.	Native

PLEASE SEE SHEET L-1.1 FOR PLANTING DETAILS, COST OPINION AND SEED MIX INFORMATION.
NOTE: PULL MULCH 3" BACK FROM TREE ROOT FLARE. PLEASE SEE PLANTING DETAILS FOR MORE INFORMATION.

NOTES PER CITY OF NOVI:
PLANT MATERIAL SHALL NOT BE PLANTED WITHIN 4' OF PROPERTY LINE.
NO TREES SHALL BE PLANTED CLOSER THAN 10' FROM OVERHEAD UTILITY, 10' FROM FIRE HYDRANT, CATCH BASIN OR MANHOLE, 5' FROM UNDERGROUND UTILITIES AND 3' OFF BACK OF CURB.
NO TREE TO BE LOCATED IN FRONT OF ANY SIGN OR NECESSARY.
ALL TRANSFORMER AND UTILITY BOXES TO BE SCREENED PER NOVI CITY DETAIL AND IN THE CASE ADDITIONAL BOXES ARE ADDED TO THE SITE AFTER PLAN APPROVAL. SEE LANDSCAPE DETAIL L-1.1.
EXISTING DISEASED TREES WILL BE REMOVED AND INFILLED WITH NEW PLANTINGS PER CITY'S APPROVAL AND DIRECTION.



- KEY:**
- GREENBELT / R.O.W. TREES
 - INTERIOR PARKING LOT TREES
 - PERIMETER PARKING LOT TREES
 - PERIMETER PARKING LOT TREES COUNTING AS GREENBELT TREE
 - TREE REPLACEMENT
 - EXISTING TREES USED FOR GREENBELT REQUIREMENT
 - EXISTING TREES USED FOR PARKING PERIMETER REQUIREMENT
 - EXISTING TREE TO REMAIN WITH TREE PROTECTION FENCE
 - FOUNDATION PLANTINGS TO BE DETERMINED
 - SHRUBS
 - IRRIGATED 500 LAWV STAKED ON SLOPES
 - NON IRRIGATED SEED LAMN WITH MAT. STAKED ON SLOPES
 - SWALE SEED MIX & STAKED EROSION MAT BY CARDNO NATIVE PLANT NURSERY PHONE: 574.588.2412
 - EMERGENT WETLAND SEED MIX & STAKED EROSION MAT BY CARDNO NATIVE PLANT NURSERY PHONE: 574.588.2412
 - ECONOMY PRAIRIE SEED MIX & STAKED EROSION MAT BY CARDNO NATIVE PLANT NURSERY PHONE: 574.588.2412



LANDSCAPE CALCULATION:
PER CITY OF NOVI ZONING ORDINANCE - ZONED NCC AND OS-1, CHANGING TO GE JAGUAR LAND ROVER, NOV-2017-176, REVISED PER COMMENTS ON 8.29.2018
PER AMENDED LANDSCAPE ORDINANCE, EFFECTIVE 7/22/17

INTERIOR PARKING LOT LANDSCAPE:
REQUIRED:
A. 5% OF PAVED AREA UNDER 50,000 SF = 50,000 X 7.5% = 3,750 SF
B. 5% OF ADDITIONAL PAVED AREA OVER 50,000 SF = 100,110 X 1% = 1,001 SF
A+B = 3,750 + 1,001 = 4,751 SF OF ISLANDS REQUIRED
E. (7,200 ÷ 225) / 200 = 24 CANOPY TREES REQUIRED
NOTE: ALL PARKING LOT LANDSCAPE ISLANDS SHALL BE A MIN. OF 200 SF, A MIN. OF 10' WIDE AND MIN. 3' BETWEEN CURB AND TREE TRUNK.

PROVIDED: 12,620 SF OF INTERIOR LANDSCAPE ISLAND AREA
24 - 3" CAL. DEC. CANOPY TREES

PARKING LOT PERIMETER:
REQUIRED: 5,075 LF OF PARKING LOT / 30 LF = 169 TREES REQUIRED
PROVIDED: 44 3" CAL. DEC. TREES, 8 PERIMETER DECIDUOUS TREES THAT ALSO COUNT AS GREENBELT TREES AND 7 EXISTING TREES

RIGHT OF WAY ADJACENT TO PARKING:
REQUIRED: 1 LARGE DEC OR EVG / 35 LF OF FRONTAGE
1 SUB CANOPY DEC TREE / 35 LF BETWEEN SIDEWALK & CURB
MEADOWBROOK ROAD: (288-30) LF / 25 = 7 LARGE DEC OR EVG. REQUIRED
(288-30) LF / 20 = 13 SUB CANOPY TREES REQUIRED
GRAND RIVER AVENUE: (90-40) LF / 25 = 1 LARGE DEC OR EVG. REQUIRED
(90-40) LF / 20 = 3 SUB CANOPY TREES REQUIRED
PROVIDED: MEADOWBROOK ROAD: 7 PERIMETER DECIDUOUS TREES THAT ALSO COUNT AS GREENBELT TREES
11 SUB CANOPY TREES
7 CANOPY TREES BETWEEN WALK AND CURB
GRAND RIVER AVENUE: 1 LARGE DEC, 1 SUB CANOPY TREE
8 TREES BTWN SIDEWALK AND CURB, INSUFFICIENT SPACE DUE TO UNDERGROUND AND OVERHEAD UTILITIES.



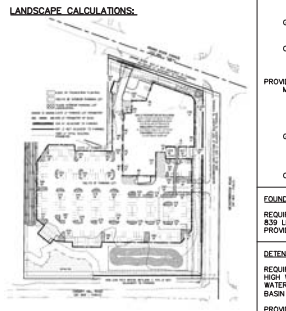
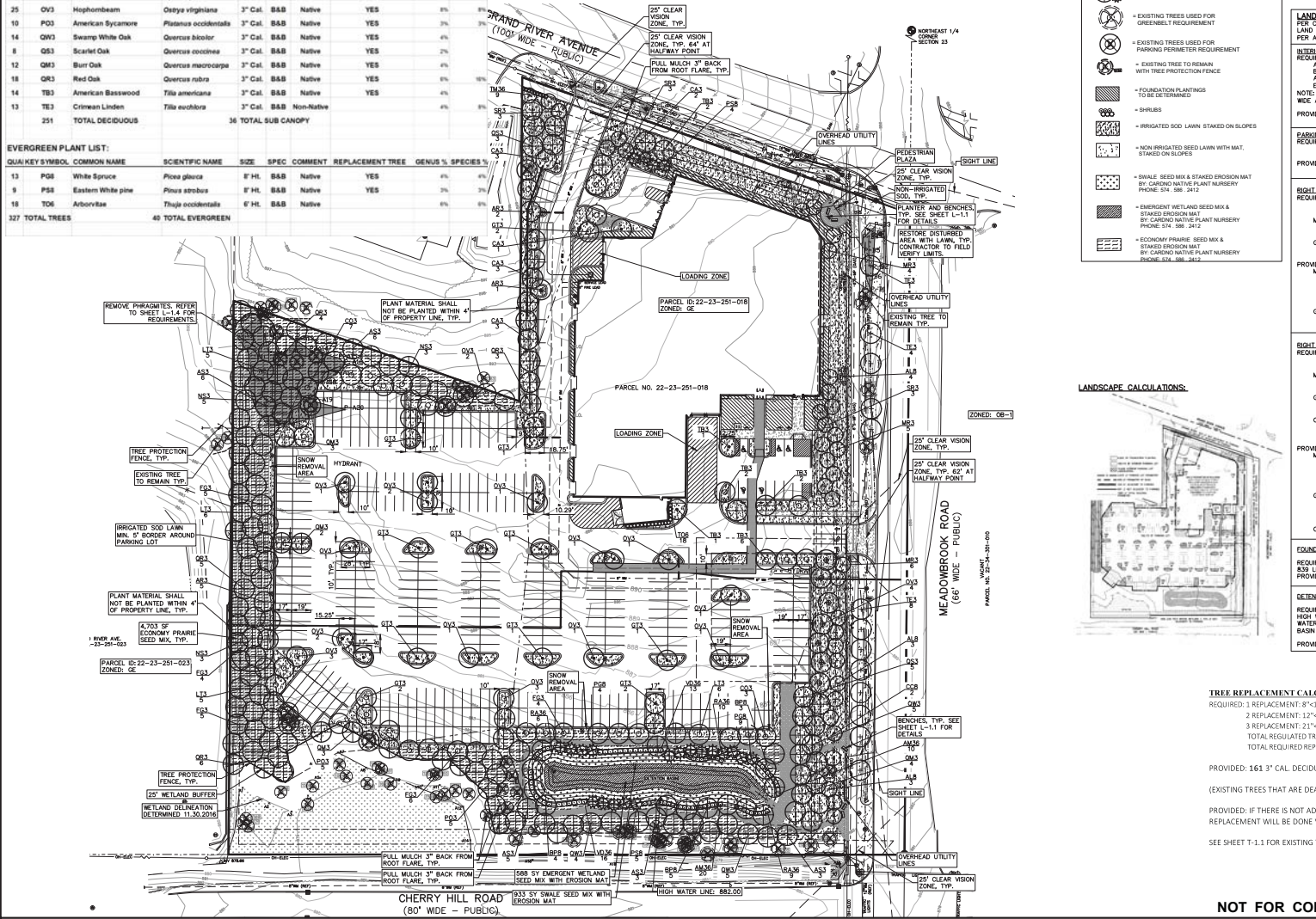
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1948 S. TELEGRAPH
BLOOMFIELD HILLS, MICHIGAN 48302
LANDSCAPE PLAN
JAGUAR-LAND ROVER OF NOVI
PART OF THE CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
PEA JOB NO. 2017-176
SCALE: 1" = 50'
DRAWING NUMBER: L-1.0



TREE REPLACEMENT CALCULATIONS
REQUIRED: 1 REPLACEMENT 8"X11" = 127 (127) REPLACEMENT REQUIRED
3 REPLACEMENT: 12"X20" = 23 (45) REPLACEMENT REQUIRED
3 REPLACEMENT: 21"X29" = 0 (0) REPLACEMENT REQUIRED
TOTAL REGULATED TREES REMOVED = 150
TOTAL REQUIRED REPLACEMENT TREES = 173

PROVIDED: 163 3" CAL. DECIDUOUS TREES & 18 (18) 1.5:1 (ratio) 8" EVERGREENS, SEE SHEET L-1.0
(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 NOVI TREE REPLACEMENT FUND.

SEE SHEET T-1.1 FOR EXISTING TREE LIST. SEE SHEET L-1.0 FOR REPLACEMENT TREES.

NOT FOR CONSTRUCTION

NO.	DATE	DESCRIPTION



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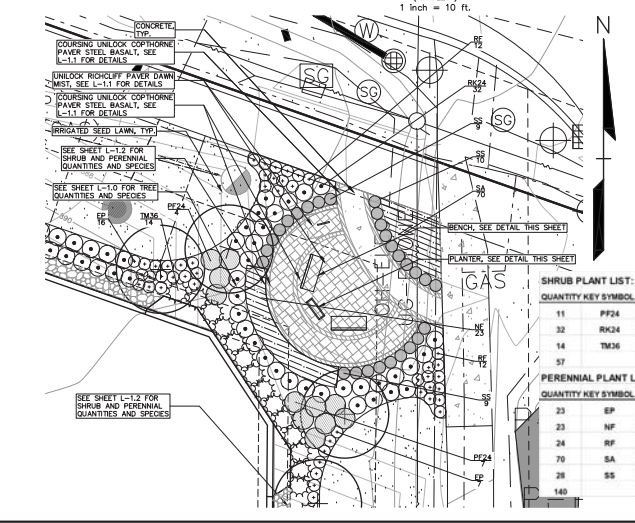
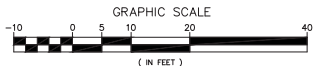
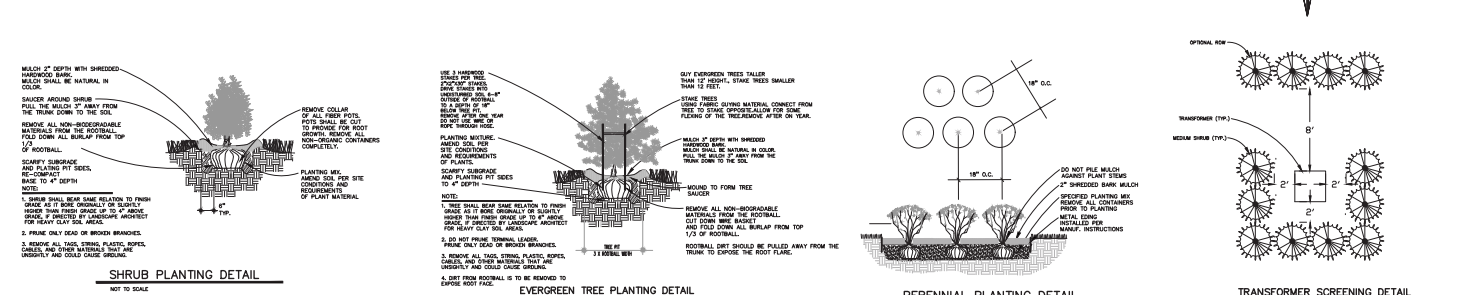
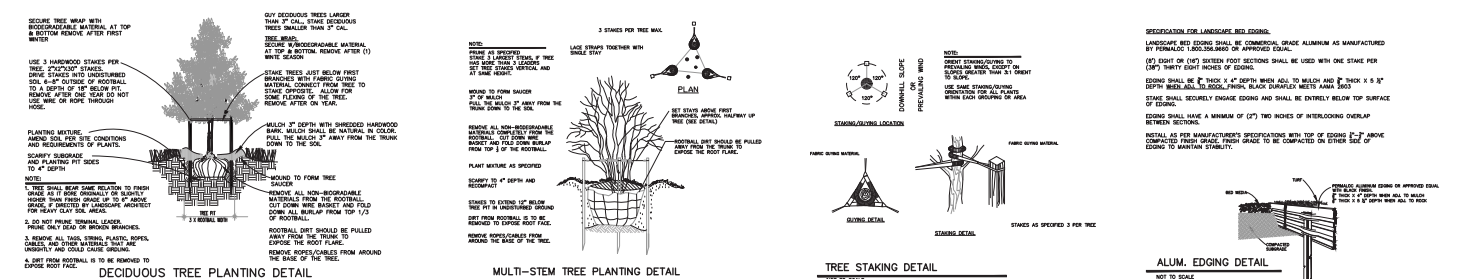
ERHARD MOTOR SALES, INC.
1942 S. TELEGRAPH RD. #302
LANDSCAPE DETAILS
JAGUAR - LAND ROVER OF NOVI
CITY OF NOVI, OHIO AND COUNTY, MICHIGAN

DES. A.E. DN. DATE SUR. AW. P.M. ITS

ORIGINAL ISSUE DATE:
FEBRUARY 11, 2019
PEA JOB NO. 2017-176
SCALE: N/A
DRAWING NUMBER: **L-1.1**

GENERAL PLANTING NOTES PER CITY OF NOVI:

- LANDSCAPE CONTRACTOR SHALL VISIT SITE, INSPECT EXISTING SITE CONDITIONS AND REVIEW PROPOSED PLANTING AND RELATED WORK IN CASE OF DISCREPANCY BETWEEN PLAN AND FIELD, IT SHALL GATHER QUANTITIES, CONTACT ARCHITECT WITH ANY CONCERNS.
- CONTRACTOR SHALL VERIFY LOCATIONS OF ALL ON SITE UTILITIES PRIOR TO BEGINNING CONSTRUCTION ON HIS/HER PHASE OF WORK. ELECTRIC, GAS, FIBER, TELEPHONE, CABLE, TELEVISION MAY BE LOCATED BY CALLING MESS DIG 1-800-462-7171. ANY DAMAGE OR INTERRUPTION OF SERVICES SHALL BE THE RESPONSIBILITY OF CONTRACTOR. CONTRACTOR SHALL COORDINATE ALL RELATED ACTIVITIES WITH OTHER TRADES ON THE JOB AND SHALL REPORT ANY UNACCEPTABLE JOB CONDITIONS OWNER'S REPRESENTATIVE PRIOR TO COMMENCING.
- ALL PLANT MATERIALS ARE TO BE NORTHERN NURSERY GROWN NO. 1 AND INSTALLED ACCORDING TO ACCEPTED PLANTING PROCEDURES. ALL PLANT MATERIAL SHALL CONFORM TO THE CURRENT (AAA) STANDARDS FOR NURSERY STOCK. THEY SHALL BE PLANTED ACCORDING TO THE CITY OF NOVI PLANTING AND SPECIFICATIONS. THE CITY SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL PRIOR TO PLANTING AND TO REJECT ANY PLANT MATERIALS DEEMED NOT TO MEET THE STANDARDS OF THE ZONING ORDINANCE.
- ALL TREES SHALL HAVE A CENTRAL LEADER AND A RADIAL BRANCHING STRUCTURE. PARK GRADE TREES ARE NOT ACCEPTABLE. ALL TREES SHALL BE BALLED AND BURLAPPED (B&B). ANY BIDDING CHAMP TREE WITH BRANCHES THAT MIGHT TEND TO DEVELOP INTO "Y" CROTCHES SHALL BE SUBORDINATED SO AS NOT TO BECOME DOMINANT BRANCHES.
- ALL MULTI STEM TREES SHALL BE HEAVILY BRANCHED AND HAVE SYMMETRICAL CROWNS. ONE SIDED TREES OR THOSE WITH TEN OR FEWER CROWNS SHALL NOT BE ACCEPTED.
- ALL EVERGREEN TREES SHALL BE HEAVILY BRANCHED AND FULL TO THE GROUND. SYMMETRICAL IN SHAPE AND NOT SHEARED FOR THE LAST FIVE GROWING SEASONS.
- NO MACHINERY IS TO BE USED WITHIN THE DRIP LINE OF EXISTING TREES; HAND GRADE ALL LAWN AREAS WITHIN THE DRIP LINE OF EXISTING TREES.
- MULCH SHALL BE NATURAL COLOR, FINELY SHREDDED HARDWOOD BARK FOR ALL PLANTINGS 2" THICK FOR TREES IN 4-10" DIAMETER CIRCLES WITH 3" PULLED AWAY FROM TRUNK. 2" FOR SHRUBS AND SHRUB BEDS AND 2" THICK BARK MULCH FOR PERENNIALS.
- ALL LAWN AREAS SHALL RECEIVE 4" COMPACTED TOSPOIL.
- ALL PLANT MATERIAL SHALL BE MAINTAINED IN A HEALTHY GROWING CONDITION INCLUDING WATERING, CULTIVATION, WEED CONTROL, AND SOIL ENRICHMENTS AS MAY BE NECESSARY.
- ALL PLANT MATERIALS ARE TO BE INSTALLED IN A SOUND WORKMANLIKE MANNER AND ACCORDANCE WITH THE CURRENT CITY OF NOVI PLANTING REQUIREMENTS.
- ALL PLANT MATERIAL SHALL BE INSTALLED BETWEEN MARCH 15TH AND NOVEMBER 15TH.
- ALL PLANT MATERIAL SHALL BE WARRANTED FOR TWO(2) FULL YEARS AFTER DATE OF ACCEPTANCE BY THE CITY OF NOVI. ALL UNLIVING AND DEAD MATERIAL SHALL BE REPLACED WITHIN THREE (3) MONTHS OF THE NEXT APPROPRIATE PLANTING PERIOD WHICH EVER COMES FIRST.
- A MINIMUM OF ONE WEED CONTROL CULIVATION PER MONTH OCCURRING IN JUNE, JULY AND AUGUST SHALL BE PERFORMED DURING THE TWO-YEAR GUARANTEE PERIOD.
- ANY SUBSTITUTIONS OR DEVIATIONS FROM THE LANDSCAPE PLAN MUST BE APPROVED IN WRITING BY THE CITY OF NOVI PRIOR TO INSTALLATION.
- ALL TREE WRAP, STAKES, AND CUTS MUST BE REMOVED BY JULY 1ST FOLLOWING THE FIRST WINTER SEASON AFTER INSTALLATION.
- ALL LANDSCAPE AREAS ARE TO BE MAINTAINED IN A HEALTHY GROWING CONDITION FREE OF DEBRIS AND RESIDUE AND IN CONFORMANCE WITH THE APPROVED LANDSCAPE PLAN.
- ALL LANDSCAPE HEADS ARE TO BE WATERED BY A FULLY AUTOMATIC IRRIGATION SYSTEM.
- CONTRACTOR TO REMOVE ALL CONSTRUCTION DEBRIS AND EXCESS MATERIALS FROM THE SITE PRIOR TO FINAL ACCEPTANCE.
- PLANT MATERIALS, EXCEPT SOIL, GROUND COVER, AND CREEPING WIRE PLANTINGS, SHALL NOT BE LOCATED WITHIN FOUR(4) FEET OF THE PROPERTY LINE.
- ALL TRANSFORMERS ARE TO BE SCREENED ON THREE SIDES (MIN.) IN ACCORDANCE WITH THE CITY OF NOVI ORDINANCE AND SO AS TO NOT CONFLICT WITH O.U.E. RESTRICTIONS. (DETAIL THIS SHEET)
- THE OWNER IS RESPONSIBLE FOR REQUEST OF FINAL INSPECTION AND ACCEPTANCE OF THE LANDSCAPE AT THE END OF THE 2-YEAR GUARANTEE PERIOD.
- THE PROVIDER OF THE FINANCIAL GUARANTEE FOR THE LANDSCAPE INSTALLATION SHALL BE FULLY RESPONSIBLE FOR COMPLETION OF THE LANDSCAPE INSTALLATION AND MAINTENANCE PER THE APPROVED LANDSCAPE PLAN AND APPLICABLE CITY ORDINANCES.



Emergent Wetland Seed Mix

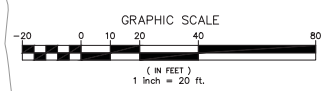
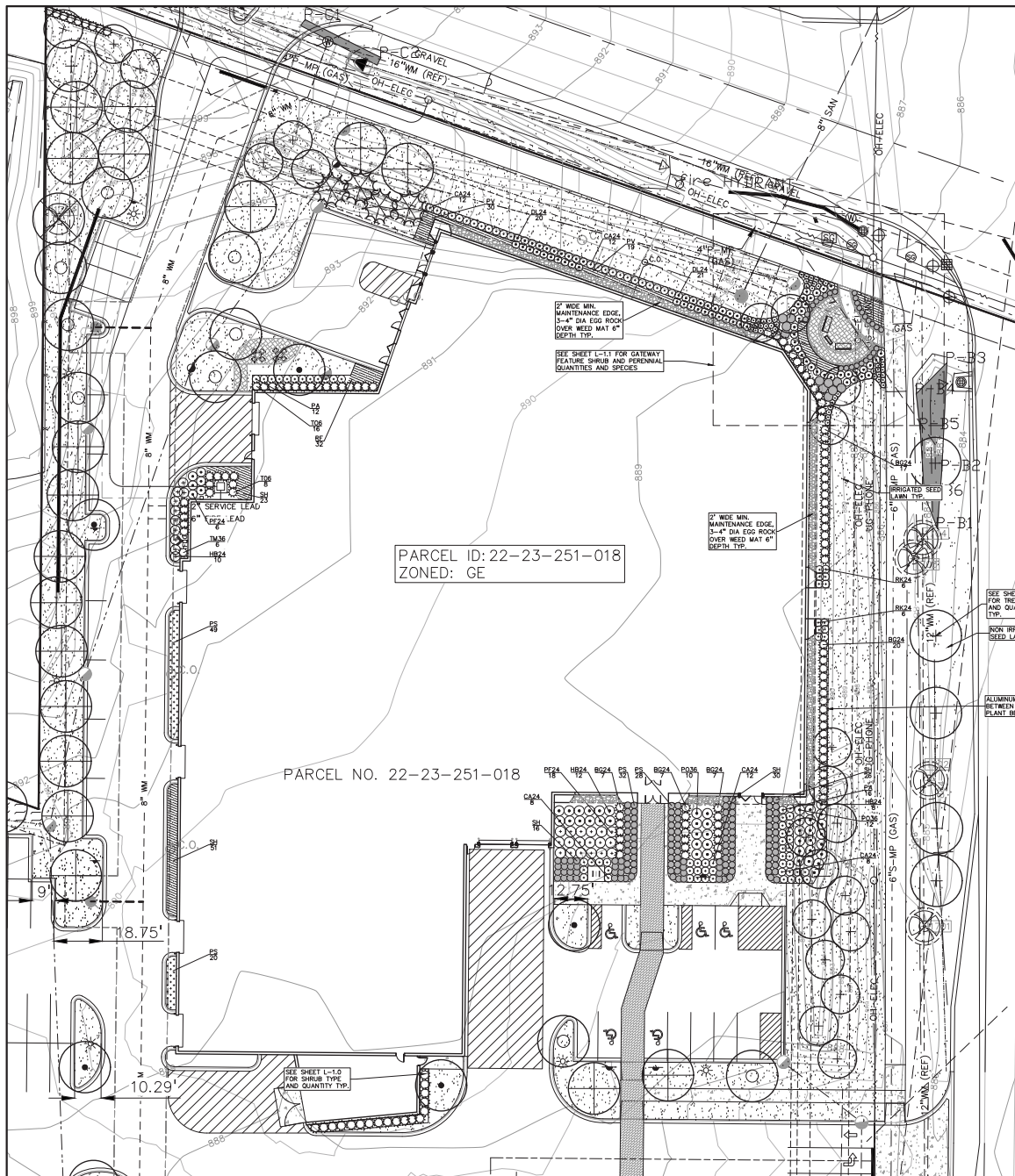
Botanical Name	Common Name
<i>Permanent Grasses/Sedges/Rushes:</i> <i>Bolboschoenus fluviatilis</i> <i>Carex comosa</i> <i>Carex lacustris</i> <i>Carex lurida</i> <i>Carex stricta</i> <i>Carex vulpocarpa</i> <i>Eleocharis palustris</i> <i>Juncus effusus</i> <i>Lyseria oryzoides</i> <i>Scleropogon americanus</i> <i>Scleropogon americanus</i> <i>Scleropogon tabernaemontani</i>	River Bulrush Bristly Sedge Common Lake Sedge Bottlebrush Sedge Common Tussock Sedge Great Spike Grass Common Rush Rice Cut Grass Hard-stemmed Bulrush Charmelark's Rush Softstem Bulrush
<i>Temporary Cover:</i> <i>Avena sativa</i> <i>Lolium multiflorum</i>	Common oat Annual Ryegrass
<i>Forbs:</i> <i>Alisma americanum</i> <i>Alisma spp.</i> <i>Asclepias incarnata</i> <i>Decodon verticillatus</i> <i>Eurostium maculatum</i> <i>Milfolium spp.</i> <i>Jis virginica</i> <i>Lobelia cardinalis</i> <i>Lobelia spicata</i> <i>Lycopus americanus</i> <i>Mentulus virgatus</i> <i>Peltandra virginica</i> <i>Perillium serridides</i> <i>Polygonum spp.</i> <i>Potentilla canadensis</i> <i>Sagittaria latifolia</i> <i>Sorghastrum nutans</i> <i>Viburnum hastata</i> <i>Viburnum hastata</i>	Sweet Flag Water Plantain (Various Mix) Swamp Milkweed Butterbursh Swamp Loosestrife Spotted Joe-Pye Weed Rosinweed (Various Mix) Blue Flag Cardinal Flower Great Blue Lobelia Common Water Horshound Monkey Flower Arrow-leaf Ditch Stonecrop Pinkweed (Various Mix) Pick-leaf Weed Common Arrowhead Common Bur Reed Blue Vervain

Swate Seed Mix

Botanical Name	Common Name
<i>Permanent Grasses/Sedges:</i> <i>Carex comosa</i> <i>Carex crinitella</i> <i>Carex lurida</i> <i>Carex spp.</i> <i>Carex vulpocarpa</i> <i>Elymus virgicus</i> <i>Glyceria striata</i> <i>Scirpus atrovirens</i> <i>Scirpus cespitosus</i> <i>Sagittaria acutata</i>	Big Bluestem Bristly Sedge Crested Oat Sedge Bottlebrush Sedge Common Tussock Sedge Great Spike Grass Common Rush Rice Cut Grass Hard-stemmed Bulrush Charmelark's Rush Sorghastrum nutans Dark Green Rush Wood Grass Prairie Cord Grass
<i>Temporary Cover:</i> <i>Avena sativa</i> <i>Lolium multiflorum</i>	Common oat Annual Ryegrass
<i>Forbs:</i> <i>Alisma spp.</i> <i>Asclepias incarnata</i> <i>Carex ripens</i> <i>Eurostium maculatum</i> <i>Jis virginica</i> <i>Mentulus spicata</i> <i>Lobelia cardinalis</i> <i>Lobelia spicata</i> <i>Lycopus americanus</i> <i>Pycnanthemum virginianum</i> <i>Rudbeckia hirta</i> <i>Sagittaria latifolia</i> <i>Senna hebecarpa</i> <i>Stigmaphonon tomentosum</i> <i>Symphoricarum nove-angliae</i> <i>Viburnum hastata</i> <i>Zizia aurea</i>	Water Plantain (Various Mix) Butterbursh Tall Coreopsis Eurostium maculatum Wild Lignue Spotted Joe-Pye Weed Blue Flag Marsh Blazing Star Cardinal Flower Great Blue Lobelia Common Water Horshound Common Mountain Mint Brown-Eyed Susan Common Arrowhead Wild Senna Prairie Dock New England Aster Blue Verain Golden Alexander

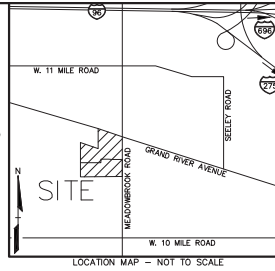
Economy Prairie Seed Mix

Botanical Name	Common Name
<i>Permanent Grasses/Sedges/Rushes:</i> <i>Andropogon gerardii</i> <i>Carex comosa</i> <i>Carex crinitella</i> <i>Carex lurida</i> <i>Carex spp.</i> <i>Carex vulpocarpa</i> <i>Elymus virgicus</i> <i>Glyceria striata</i> <i>Scirpus atrovirens</i> <i>Scirpus cespitosus</i> <i>Sagittaria acutata</i>	Big Bluestem Bottlebrush Sedge Crested Oat Sedge Bottlebrush Sedge Common Tussock Sedge Great Spike Grass Common Rush Rice Cut Grass Hard-stemmed Bulrush Charmelark's Rush Sorghastrum nutans Dark Green Rush Wood Grass Prairie Cord Grass
<i>Forbs & Shrubs:</i> <i>Asclepias syriaca</i> <i>Asclepias tuberosa</i> <i>Chamaecrista fasciculata</i> <i>Coneosus racemosa</i> <i>Echinacea purpurea</i> <i>Helopsis helanthoides</i> <i>Lupinus penninus</i> <i>Monarda fistulosa</i> <i>Penstemon digitalis</i> <i>Pycnanthemum virginianum</i> <i>Rudbeckia hirta</i> <i>Rudbeckia hirta</i> <i>Solidago spicata</i> <i>Symphoricarum laeve</i> <i>Symphoricarum nove-angliae</i>	Common Milkweed Butterfly Weed Partridge Pea Sand Coneopsis Broad-leaved Purple Coneflower Wild Lignue Yellow Bergamot Fogwove Beard Tongue Common Mountain Mint Black-eyed Susan Yellow Coneflower Black-eyed Susan Shoof Fly Smooth Blue Aster New England Aster



PROJECT NAME: Jagar Novi JOB NO. 2017-176

LANDSCAPE COST OPINION				
ESTIMATED QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	ITEM PRICE
564	S.Y.	Soil Seed Mix	\$3	\$2,292
568	S.Y.	Emergent Wetland Seed Mix	\$3	\$1,704
9,960	S.Y.	Irrigated Seed Lawn	\$6	\$53,760
1,973	S.Y.	Non-Irrigated Seed Lawn	\$3	\$5,919
4,703	S.Y.	Economy Plante Seed Mix	\$3	\$14,109
83	C.Y.	Mulch	\$15	\$1,245
331	C.Y.	Plant Mix for Plant Beds	\$12	\$3,972
19	C.Y.	2" Deep Egg Rocks	\$80	\$1,520
1,175	L.Y.	Metall Edging	\$5	\$5,875
384	E.A.	Perennials / Ornamental Grasses	\$15	\$5,760
140	E.A.	Perennials / Ornamental Grasses Gateway	\$15	\$2,100
98	E.A.	Shrub	\$90	\$8,820
57	E.A.	Gateway Feature Shrub	\$50	\$2,850
269	E.A.	Foundation Shrub	\$55	\$14,895
24	E.A.	2" Foundation Emergens	\$100	\$2,400
18	E.A.	2" Emergens	\$100	\$1,800
96	E.A.	2" Tall-Canopy Ornamental Trees	\$120	\$11,520
161	E.A.	Replacement Deciduous Trees	\$400	\$64,400
18	E.A.	Replacement Emergens Trees	\$325	\$5,850
14	E.A.	Deciduous Street Trees	\$400	\$5,600
4	E.A.	General Landscape Emergens Trees	\$325	\$1,300
90	E.A.	General Landscape Deciduous Trees	\$400	\$36,000
1	E.A.	Impatiens	\$25,000	\$25,000
TOTAL LANDSCAPING				\$251,886



KEY:

- Trees - SEE SHEET L-1.0 FOR TYPE AND QUANTITY
- Shrubs
- Perennials
- Irrigated Seed Lawn
- Non-Irrigated Seed Lawn
- 3-4" DIA. EGG ROCK OVER WEED FABRIC, 6" DEPTH

PLANT MATERIAL SHALL NOT BE PLANTED WITHIN 4'-0" OF PROPERTY LINE

SHRUBS / PERENNIAL BEDS TO BE IRRIGATED

SHRUBS / PERENNIALS NOT TO BE PLANTED UNDER OVERHEAD CABLES AND CONDUITS TO AVOID WATER SPLASH ON SHRUBS. FIELD ADJUSTMENT AS NECESSARY.

FIELD ADJUSTMENT AS NECESSARY. TREES OR SHRUBS TO AVOID BLOCKING ANY BUILDING ADDRESS, SIGNAGE OR LOGOS.

SHRUB PLANT LIST:

QUANTITY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
58	BQ24	Green Gem Boxwood	<i>Buxus x 'Green Gem'</i>	24" Ht.	Cont.	Non-Native
52	CA24	New Jersey Tea	<i>Ceanothus americanus</i>	24" Ht.	Cont.	Native
30	HB24	Bobo Hydrangea	<i>Hydrangea paniculata 'Bobo'</i>	24" Ht.	Cont.	Non-Native
41	DL24	Bush Honeysuckle	<i>Lonicera japonica</i>	24" Ht.	Cont.	Native
22	PO36	Diablo Ninebark	<i>Physocarpus opulifolius 'Monb'</i>	36" Ht.	Cont.	Native
24	FP24	Shrubby Cinqufoil	<i>Potentilla fruticosa</i>	24" Ht.	Cont.	Native
12	RK24	Knockout Rose	<i>Rosa 'Knock Out'</i>	24" Ht.	Cont.	Non-Native
24	T06	Arborvitae	<i>Thuja occidentalis</i>	6" Ht.	B&B	Native
6	TM36	Hicks Yew	<i>Taxus x media 'Hicks'</i>	36" Ht.	Cont.	Non-Native
269						

PERENNIAL PLANT LIST:

QUANTITY	KEY SYMBOL	COMMON NAME	SCIENTIFIC NAME	SIZE	SPEC	COMMENT
28	PA	Russian Sage	<i>Perovskia atropurpurea</i>	1 Gal.	Cont.	Non-Native
129	PS	Shenandoah Switch Grass	<i>Panicum virgatum 'Shenandoah'</i>	1 Gal.	Cont.	Native
49	PV	Heavy Metal Switch Grass	<i>Panicum virgatum 'Heavy Metal'</i>	1 Gal.	Cont.	Native
32	RF	Black-Eyed Susan	<i>Rudbeckia fulgida var. sulfurata 'Goldstrum'</i>	1 Gal.	Cont.	Native
146	SH	Prairie Dropseed	<i>Sporobolus heterostachyus</i>	1 Gal.	Cont.	Native
384						

REVISIONS

NO.	BY	DATE	DESCRIPTION

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ERHARD MOTOR SALES INC.
1948 S. TELEGRAPH
BLOOMFIELD HILLS, MICHIGAN 48302

FOUNDATION LANDSCAPE PLAN
JAGUAR-LAND ROVER OF NOVI
PART OF THE JAGUAR AND LAND COUNTY MICHIGAN

DES. A.E. DN. LAY. E. SUR. JW. P.M. JTS
IN PROGRESS DATE: FEB 11 2019

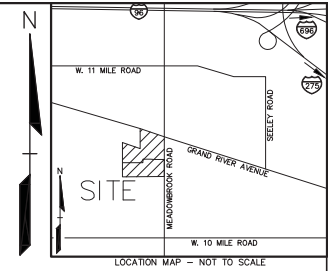
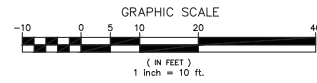
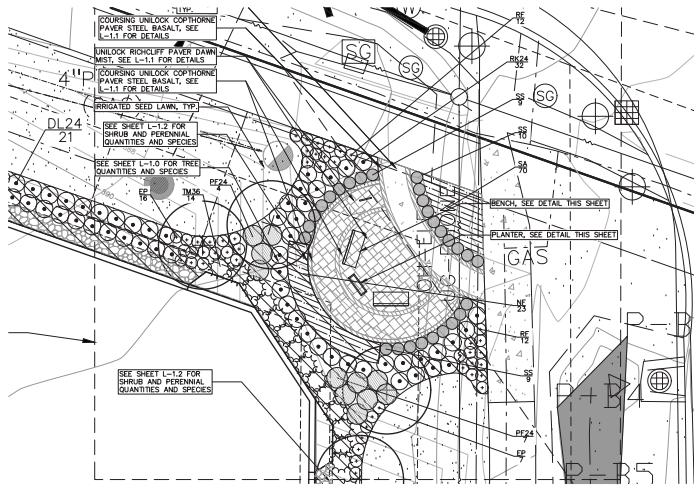
ORIGINAL ISSUE DATE: FEBRUARY 11, 2019

PEA JOB NO. 2017-176

SCALE: 1" = 20'

DRAWING NUMBER: L-1.2

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KEY:

- = TREES - SEE SHEET L-1.0 FOR TYPE AND QUANTITY
- = SHRUBS
- = PERENNIALS
- = IRRIGATED SOD LAWN
- = NON IRRIGATED SEED LAWN
- = 3/4" DIA. EGG ROCK OVER WEED FABRIC, 6" DEPTH

PLANT MATERIAL SHALL NOT BE PLANTED WITHIN 4' OF PROPERTY LINE
 SHRUBS / PERENNIAL BEDS TO BE IRRIGATED
 SHRUBS/ PERENNIALS NOT TO BE PLANTED UNDER OVERHEAD
 UTILITIES AND DOWNSPUTS TO AVOID WATER SPLASH ON SHRUBS.
 FIELD ADJUSTMENT AS NECESSARY.
 FIELD ADJUSTMENT AS NECESSARY. TREES OR SHRUBS TO AVOID
 BLOCKING ANY BUILDING ADDRESS, SIGNAGE OR LOGOS.

NO.	BY	CHK.	DESCRIPTION	DATE

CAUTION!
 THIS CONTRACT IS A STATEMENT OF DESIGN INTENT AND NOT A GUARANTEE OF THE QUALITY OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL, STATE AND FEDERAL AGENCIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL, STATE AND FEDERAL AGENCIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL, STATE AND FEDERAL AGENCIES.

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ERHARD MOTOR SALES INC.
 1945 S. TELEGRAPH
 BLOOMFIELD HILLS, MICHIGAN 48302

GATEWAY FEATURE ENLARGEMENT
JAGUAR-LAND ROVER OF NOVI
 PART OF THE ROSE
 CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

DES. A.E. | DN. LAY | SUR. JW | P.M. JTS
 IN COMPLIANCE WITH THE STATE OF MICHIGAN LANDSCAPE ARCHITECTURE ACT, LICENSE NO. 0000000000

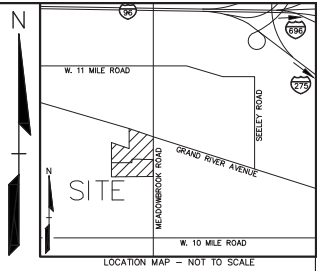
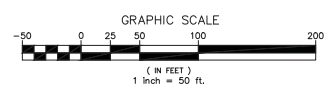
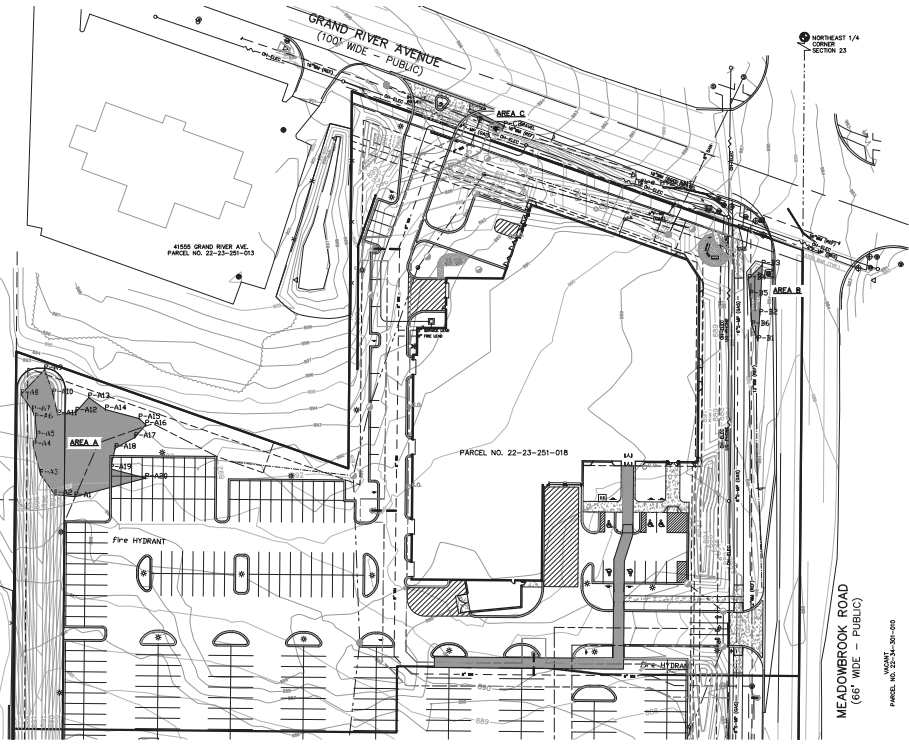
ORIGINAL ISSUE DATE:
 FEBRUARY 11, 2019

PEA JOB NO. 2017-176

SCALE: 1" = 20'

DRAWING NUMBER:
L-1.3

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NO.	DATE	DESCRIPTION



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Stand "A"- Flaga A-1 to A-20
 Stand A is located in the Northwestern corner of the property. A pocket of Phragmites was found in the area along the tree line. The delineated stand is approximately 5,922 SF (0.13 AC).
Stand "B"- Flaga B-1 to B-6
 Stand B is located on the Northeastern corner of the property along Meadowbrook Road just south of Grand River Avenue within the right-of-way. It was observed that the Phragmites were found in the drainage ditch associated with the existing culvert. The delineated stand is approximately 445 SF (0.01 AC).
Stand "C"- Flaga C-1 to C-2
 Stand C is located within the ditch within the right-of-way along Grand River Ave. on the subject property. It was observed that the Phragmites were both in the bottom of the drainage ditch and along the side slopes. The delineated stand is approximately 102 SF (0.002 AC).
Long Term Control and Maintenance Plan for Common Reed (Phragmites australis)

A. OBJECTIVE
 The objective of this Control and Maintenance Plan is to remove the presence of Phragmites within the subject property consistent with the City of Novi's ordinance, Sec 5.5.6.C. This effort will be accomplished by applying herbicide to these targeted plants and/or removing soils within the designated treatment areas.

C. TREATMENT

1. TREATMENT TECHNIQUE

a. SPECIES AND LOCATIONS TO TREAT
 Control all non-native *Phragmites* indicated on the topographical survey plan AND any new growth or single plant observed during treatment periods.

b. SPECIES-SPECIFIC TREATMENT TECHNIQUES

1. Phragmites
 Apply herbicide to the foliage of all live culms of Phragmites (*Phragmites australis*) within the designated treatment areas; even single stem plants. Foliar spraying may be used in areas where significant damage to non-target native vegetation can be avoided (i.e., in dense patches composed of 75% or more Phragmites or Phragmites stands of any density mixed with other non-native vegetation). For isolated plants or sparse patches adjacent to native vegetation, individual plants must be treated by a careful wick or hand application of herbicide to individual plants.

2. Isolated Plants
 Seed heads must also be removed from isolated Phragmites plants; this includes any stand of Phragmites with fewer than 50 tasseling culms that is at least 100 feet in any direction from the nearest Phragmites, or in an area protected from likely seed dispersal (i.e., closer than 100 feet but due to large trees, native shrubs, or topography is otherwise cut off from other Phragmites plants).

3. Treatment Timing
 Treatment must occur after the majority of Phragmites plants have tasselled (while plants are supplying nutrients to the rhizome), between **September 4 and September 29, 2018**.

2. HERBICIDES

a. The required herbicide is Rodeph®.

b. All herbicide treatments must be mixed and applied according to label specifications and performed by a certified commercial pesticide applicator. Proof of certification in appropriate categories will be required prior to start of work. Over spray onto non-target vegetation and/or soil as well as runoff of the herbicide into the ground or water must not occur.

c. All treatments must be marked in the field. An appropriate marking dye shall be used with the herbicide. Flogging may be required in some zones to document which plants have been treated.

3. ADJUVANTS
 Cygnat Plus® must be used with all herbicides at a rate of 0.85 of the mix volume.

4. PERFORMANCE MINIMUMS
 The contractor is expected to achieve a minimum of 98% treatment of the exact target species and a minimum of 85% kill of any treated plants within the mapped areas. The treatment will continue yearly until all plants are eradicated from the subject property.

- WEATHER & RE-TREATMENT**
 The contractor is responsible for re-treatment if rain occurs within six (6) hours of the original treatment for foliar and hand swipe applications and within two (2) hours of the original treatment for cut stump applications.
- APPROVED SUBSTITUTIONS**
 Proposed substitutions by a Contractor (i.e. treatment technique(s), specific herbicide(s), and surfactant(s)) must be submitted to PEA, Inc. in writing for review. Specific brand name chemical products must be listed and a brief written justification of why the change. Any herbicide or concentration other than those specified above must be approved by the PEA, Inc. and/or MDEQ prior to use.
- SIGNS/ MARKING**
 Signs must be posted by the contractor wherever chemical treatment occurs. Signage shall remain in place for the minimum length of time as determined by the herbicide label and for a maximum amount of time as agreed between the contractor and the PEA. The contractor is responsible for removing all signage.
- PERMITS/ APPROVALS**
 - A MDEQ Aquatic Nuisance Control (ANC) Certificate of Coverage may be required for the treatment of Phragmites within open water and/or state regulated wetland. In all treatment areas where an ANC permit is required and obtained, the contractor will be responsible for posting the required advisory signage as specified in the ANC permit for the site, in locations where ANC signage is required. It may be used in place of the other signage previously described above (i.e., it is not necessary to do both). ANC advisory signage must be posted surrounding the landside side of any area where chemicals will be applied over standing water or on Great Lakes bottomlands on the day of treatment (just prior to commencing spraying) at 100-foot intervals. The approved sign may be downloaded from the DEQ aquatic nuisance control web site (www.michigan.gov/Sec/0,1607,7-1103-3333-3461-710-2709--000000). The contractor is responsible for printing and duplicating the sign, attaching it to stakes (supplied by the contractor), and posting the signs at the required 100-foot intervals along the landside side of any area where chemicals will be applied over standing water or on Great Lakes bottomlands. Signage shall remain in place for the minimum length of time as determined by the herbicide label and the requirements of the ANC permit and for a maximum amount of time as agreed between the contractor and the PEA Project Manager. The contractor is responsible for removing all signage.
 - To maintain compliance with the Federal Clean Water Act, pesticide treatments that occur "in, over, or near waters of the state" will fall under a National Pollutant Discharge Elimination System (NPDES) Certificate of Coverage under the DEQ General Permit for Nuisance Plant and Algae Control (or #0020100, C00-#0020100). All treatments conducted in areas that fall under this Certificate of Coverage must follow all conditions of the NPDES general permit.
 - Pesticide treatments within any stormwater assessment areas (i.e. retention and/or detention basin) will require a permit/ approval from the City of Novi's Engineering Department.
- WEED SEED CONTROL AND CONTAMINATION**
 - All equipment, footwear, clothing, and all other materials brought onto the property for this project must be completely clean and free of ALL plant material and soil (seeds, pieces of vegetation, chunks of soil, etc.) prior to arrival at the site. These precautions are critical to preventing the spread of invasive plants and contamination of genetic material (seeds) from locations outside of the subject property.
 - In addition, while conducting the scope of work within the property ALL footwear, clothing, and equipment must be checked and cleaned of seeds, other plant fragments, and soil again before moving between work areas to prevent the spread of invasive plants from one work area to another and into un-treated areas. Travel routes and order of work between treatment areas may be dictated by PEA to further prevent the possible spread of invasive seed and plant material.
- THREATENED & ENDANGERED SPECIES**
 State-listed endangered and threatened species may occur in some treatment areas and are subject to the protection of Michigan Public Act 451 of 1994, Section 365 (Endangered Species Protection). According to Michigan Natural Features Inventory Resources, approximately 100 species of combined animal and plant species are listed for Oakland County as special concern, threatened or endangered status. A site assessment for T&E species has not been conducted. All herbicide applications working at these sites must be capable of identifying the applicable protector plants and the common native plants that could be contrast with the target species (such as blue-joint grass and native sedges).

REFERENCES:
 City of Novi Phragmites Control Ordinance (Zoning 5.5.6.C)
 1. Survey the site for any populations of common reed (*Phragmites australis*).
 2. If any *Phragmites australis* (even a single plant), show that on the topographical survey. If none are found, please add a note stating that.
 3. If *Phragmites australis* is found, please add a treatment/ control plan to the landscape plan and carry it out until the *Phragmites* are completely removed from the site.
 4. Continue to control the *Phragmites* on an on-going basis.

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PHRAGMITES CONTROL PLAN
JAGUAR-LAND ROVER OF NOVI
 PART OF THE CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

D.E.S. A.E. D.N. L.A.V. S.U.R. A.W. P.E.M. J.T.S.
 IN WASHINGTON DC BY THE STATE OF MICHIGAN REGISTERED PROFESSIONAL ENGINEER LICENSE #17183

ORIGINAL ISSUE DATE:
 FEBRUARY 11, 2019
 PEA JOB NO. 2017-176
 SCALE: 1" = 50'
 DRAWING NUMBER:
L-14

GENERAL LANDSCAPING REQUIREMENTS

- 1.0 GENERAL
1.1 SUMMARY
1.1.1 Includes But Not Limited To
1.2 PRODUCTS - Not Used
3.0 EXECUTION
3.1 PREPARATION
3.1.1 Protection
3.1.2 Spillage
3.1.3 Erosion Control
3.1.4 Take precautions necessary to prevent erosion and transportation of soil...

- 3.1.5 Finishing Grading and Topsoil Placement
3.1.6 SUBMITTALS
3.1.7 QUALITY ASSURANCE
3.1.8 DELIVERY AND STORAGE
3.1.9 PROJECT CONDITIONS
3.1.10 WARRANTY

LANDSCAPING PREPARATION

- 1.0 GENERAL
1.1 SUMMARY
1.1.1 Includes But Not Limited To
1.2 QUALITY ASSURANCE
1.2.1 Comply with all applicable local, state and federal requirements, regarding materials, methods of work, and disposal of excess and waste materials.

- 1.2.2 Obtain and pay for all required licenses, permits, and fees.
1.2.3 Provide notices required by governmental authorities.
1.3 PROJECT CONDITIONS
1.3.1 Locate and identify existing underground and overhead services and utilities within contract limit work areas.

- 1.3.2 Provide adequate means to protect utilities and services designated to remain.
1.3.3 Repair utilities damaged during site work operations at Subcontractor's expense.
1.3.4 When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company...

- 1.3.5 Locate, protect, and maintain benchmarks, monuments, control points and project engineering reference points.
1.3.6 Perform landscape work operations and the removal of debris and materials to ensure minimum interference with streets, walks, and other adjacent facilities.
1.3.7 Obtain governing authorities' written permission when required to close or obstruct streets, walks and adjacent facilities.

- 1.3.8 Protect and maintain street lights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal.
1.3.9 The General Contractor will occupy the premises and adjacent facilities during the entire period of construction.
1.3.10 Perform landscape preparation work before commencing landscape construction.

- 3.3.4 For trees, shrubs, ground cover beds and plant mix for beds see Exterior Plants section.
3.3.5 Provide earth berming where indicated on Plans.
3.3.6 Berming to be free flowing in slope and design, as indicated, and to blend into existing grading so that the toe of slope is not readily visible.
3.3.7 Regardless of finish grading elevations indicated, it is intended that grading be such that proper drainage of surface water away from buildings will occur and that no low areas are created so that the toe of slope is not readily visible.

- 3.3.8 Slope grade away from building for 12 feet minimum from walls at slope of 1/2" inch per foot minimum unless otherwise noted.
3.3.9 Rake all topsoil to remove clods, rocks, weeds, and debris.
3.3.10 Grade and slope areas to bring surfaces to true uniform planes free from irregularities and to provide proper drainage and slopes per plans.

- 3.4 CLEANING
3.4.1 Upon completion of topsoil operations, clean areas within contract limits, remove tools and equipment, and site to be clear, clean and free of materials and debris and suitable for site work operations.
3.4.2 Work notification: Notify Landscape Architect of General Contractor's representative at least seven (7) working days prior to start of seeding operation.

- 3.4.3 Protect existing utilities, paving, and other facilities from damage caused by seeding operations.
3.4.4 Perform seeding work only after planting and other work affecting ground surface has been completed.
3.4.5 Provide hose and lawn watering equipment as required.

- 3.4.6 The irrigation system will be installed prior to seeding. Locate, protect, and maintain the irrigation system during seeding operations.
3.4.7 Immediately following application of slurry mix, make separate application of wood cellulose mulch at the rate of 1,000 pounds, dry weight, per acre.
3.4.8 Apply water as that rainfall or applied water will percolate to underlying soil.

- 3.4.9 MULDING
3.4.9.1 Place straw mulch on seeded areas within 24-hours after seeding.
3.4.9.2 Place straw mulch uniformly in a continuous blanket at a rate of 2-1/2 tons per acre, or (at) 50 lb. bales per 1,000 sq. ft. of area.
3.4.9.3 Strip straw into soil by use of a "stripper".

- 3.4.10 ESTABLISH LAWN
3.4.10.1 Establish dense lawn of permanent grasses, free from lumps and depressions. Any area falling to show uniform germination to be reseeded immediately.
3.4.10.2 Damage to seeded area resulting from erosion to be repaired by Sub-Contractor.
3.4.10.3 In event Sub-Contractor does not establish dense lawn during first germination period, return to project to reseed/retire and reseed to establish dense lawn.

- 3.4.10.4 Should the seeded lawn become largely weedy after germination, Sub-Contractor is responsible for all the weeds and reseed the proposed lawn areas to produce a dense turf, as specified.
3.4.11 CLEANING
3.4.11.1 Perform Cleaning during installation of the work and upon completion of the work to the approval of the Landscape Architect.

- 3.4.11.2 Perform Cleaning during installation of the work and upon completion of the work to the approval of the Landscape Architect.
3.4.11.3 Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.
3.5 MAINTENANCE
3.5.1 See Landscape Maintenance and Warranty Section.
3.6 ACCEPTANCE
3.6.1 See Landscape Maintenance and Warranty Section.

- 3.5.2 Installation
3.5.2.1 Seeding
3.5.2.2 Seed immediately after preparation of bed.
3.5.2.3 Perform seeding operations when the soil is dry and when the weeds do not exceed five(5) inches per hour velocity.
3.5.2.4 Apply seed with a rotary or drop type distributor.

- 3.5.2.5 Sow seed at a rate of 300 lbs./acre.
3.5.2.6 After seeding, rake or drag surface of soil lightly to incorporate seed into top 1/8" of soil.
3.5.2.7 Provide soil erosion planting mat where grade conditions required to stabilize the planting area.

- 3.5.2.8 HYDRO-SEEDING
3.5.2.8.1 Hydro-seeding: The application of grass seed and a wood cellulose fiber mulch mixed green slurry shall be accomplished in one operation by use of an approved spraying machine.
3.5.2.8.2 Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce a homogeneous slurry.

- 3.5.2.8.3 Apply water as that rainfall or applied water will percolate to underlying soil.
3.5.2.9 MULDING
3.5.2.9.1 Place straw mulch on seeded areas within 24-hours after seeding.
3.5.2.9.2 Place straw mulch uniformly in a continuous blanket at a rate of 2-1/2 tons per acre, or (at) 50 lb. bales per 1,000 sq. ft. of area.

- 3.5.2.9.3 Strip straw into soil by use of a "stripper".
3.5.2.10 ESTABLISH LAWN
3.5.2.10.1 Establish dense lawn of permanent grasses, free from lumps and depressions. Any area falling to show uniform germination to be reseeded immediately.

- 3.5.2.10.2 Damage to seeded area resulting from erosion to be repaired by Sub-Contractor.
3.5.2.10.3 In event Sub-Contractor does not establish dense lawn during first germination period, return to project to reseed/retire and reseed to establish dense lawn.
3.5.2.10.4 Should the seeded lawn become largely weedy after germination, Sub-Contractor is responsible for all the weeds and reseed the proposed lawn areas to produce a dense turf, as specified.

- 3.5.2.11 CLEANING
3.5.2.11.1 Perform Cleaning during installation of the work and upon completion of the work to the approval of the Landscape Architect.
3.5.2.11.2 Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.

- 3.5.2.12 MAINTENANCE
3.5.2.12.1 See Landscape Maintenance and Warranty Section.
3.5.2.12.2 ACCEPTANCE
3.5.2.12.3 See Landscape Maintenance and Warranty Section.

- END OF SECTION
LAWN SODDING
1.0 GENERAL
1.1 SUMMARY
1.1.1 Includes But Not Limited To
1.2 QUALITY ASSURANCE
1.2.1 Sod: Comply with American Sod Producers Association (ASPA) classes of sod met.

- 1.2.2 SUBMITTALS
1.2.3 Submit sod growers certification of grass species. Identify source location.
1.2.4 Submit manufacturer's certification of fertilizer.
1.3 DELIVERY, STORAGE, AND HANDLING
1.3.1 Out, deliver, and install sod within 24 hour period.
1.3.2 Do not harvest or transport sod with moisture content may adversely affect sod survival.

- 1.3.3 Protect sod from sun, wind, and dehydration prior to installation. Do not let sod dry out and during handling and installation.
1.3.4 Sod which dries out before installation will be rejected.
1.3.5 PROJECT CONDITIONS
1.3.5.1 See Landscape Preparation section.
1.3.5.2 Work notification: Notify Landscape Architect or General Contractor's representative at least seven (7) working days prior to start of seeding operation.

- 1.3.5.3 Protect existing utilities, paving, and other facilities from damage caused by seeding operations.
1.3.5.4 Apply fertilizer to indicated turf areas at a rate equal to 1 lb. of actual nitrogen 1,000 sq. ft. (43 lbs / acre).

- 1.3.5.5 Apply limestone to supplied topsoil if required by soil test report at rate determined by the soil test, to adjust pH of topsoil to not less than 6.0 no more than 8.5. Distribute evenly by machine and incorporate thoroughly into topsoil.
1.3.5.6 Apply fertilizer to indicated turf areas at a rate equal to 1 lb. of actual nitrogen 1,000 sq. ft. (43 lbs / acre).

- 1.3.5.7 Apply fertilizer by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with soil to a depth of 1" by approved method. Fertilizer areas inaccessible to power equipment with hand tools and incorporate into soil.
1.3.5.8 After lawn areas have been prepared, take no heavy objects over them except lawn rollers.

- 1.3.5.9 After preparation of lawn areas and with topsoil in semi-dry condition, roll lawn planting areas in two directions at approximately right angles with water ballast roller weighing 100 to 300 lbs according to soil type.
1.3.5.10 Rake or scarify and roll or fill irregularities that develop as required until area is true and uniform, free from lumps, depressions, and irregularities.

- 1.3.5.11 Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to seeding.
1.3.5.12 Dampen dry soil prior to sodding.
1.3.5.13 Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod joints. Do not overlap edges. Slopper strips to offset joints in adjacent course. Remove excess sod to avoid churning of adjacent grass. Provide sod joint with adjacent curbs, sidewalks, drains, and seeded areas.

- 1.3.5.14 Do not lay dormant sod or install sod on saturated, frozen soil.
1.3.5.15 Install initial row of sod in a straight line, beginning at the bottom of the slope, perpendicular to direction of the slope area. Place subsequent rows parallel to and tightly adjacent previously installed row.
1.3.5.16 Peg and on slopes greater than 1:1 in centerline of swales to prevent slippage at a rate of 2 slopes per joint of sod.

- 1.3.5.17 Water sod thoroughly with a fine spray immediately after laying to obtain moisture penetration through sod into top 4 inches of soil.
1.3.5.18 Run with light roller in two directions perpendicular to each other to ensure contact with sub grade.
1.3.5.19 Install sod at indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operation.
1.3.5.20 Damage to seeded area resulting from erosion to be repaired by Sub-Contractor.

- 1.3.5.21 Clean up, deliver, and install sod within 24 hour period.
1.3.5.22 Do not harvest or transport sod with moisture content may adversely affect sod survival.
1.3.5.23 Protect sod from sun, wind, and dehydration prior to installation. Do not let sod dry out and during handling and installation.

- 1.3.5.24 Sod which dries out before installation will be rejected.
1.3.5.25 PROJECT CONDITIONS
1.3.5.25.1 See Landscape Preparation section.
1.3.5.25.2 Work notification: Notify Landscape Architect or General Contractor's representative at least seven (7) working days prior to start of seeding operation.

- 1.3.5.25.3 Protect existing utilities, paving, and other facilities from damage caused by seeding operations.
1.3.5.25.4 Apply fertilizer to indicated turf areas at a rate equal to 1 lb. of actual nitrogen 1,000 sq. ft. (43 lbs / acre).

Table with columns for DATE, REVISIONS, and a grid for tracking changes.



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ERHARD MOTOR SALES, INC.
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BLOOMFIELD HILLS, MICHIGAN 48302
LANDSCAPE SPECIFICATIONS
JAGUAR-LAND ROVER OF NOVI
PARTS DEPARTMENT
CANTON, OHIO
CANTON, OHIO
CANTON, OHIO

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
SCALE: N/A
JOB NO: 2017-176
DRAWING NUMBER: L-2.1

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EXTERIOR PLANTS

- 1.0 GENERAL
1.1 SUMMARY
1.2 QUALITY ASSURANCE
1.3 SUBMITTALS
1.4 DELIVERY, STORAGE, AND HANDLING
1.5 PROTECT CONDITIONS
1.6 WARRANTY
2.0 PRODUCTS
2.1 MATERIALS
2.2 MEASUREMENTS
2.3 EXECUTION
3.0 INSPECTION

- 3.1 LANDSCAPE CONTRACTOR AND APPROVED BY THE LANDSCAPE ARCHITECT
3.2 TIME OF PLANTING
3.3 PREPARATION
3.4 INSTALLATION
3.5 MAINTENANCE DURING ONE (1) YEAR PROJECT WARRANTY
3.6 PRUNING

- 3.7 WOOD
3.8 MAINTENANCE
3.9 CLEANING
END OF SECTION
LANDSCAPE MAINTENANCE AND WARRANTY STANDARDS
1.0 GENERAL
1.1 SUMMARY
2.0 PRODUCTS
3.0 EXECUTION
3.1 PERFORMANCE
3.2 PROJECT WARRANTY
3.3 MAINTENANCE DURING ONE (1) YEAR PROJECT WARRANTY

- 3.1.4 Maintenance of Seeded Lawn Areas
3.1.5 Maintenance of Sodded Lawn Areas
3.1.6 Final Acceptance Upon Conclusion of the Warranty Period
END OF SECTION
NOTE: The Owner may at their option select to utilize a Construction Manager in lieu of a General Contractor for all matters pertaining to these specifications and the site work.

Table with columns: DATE, REVISIONS, and description of changes.



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F 248.688.1044
www.peainc.com

ERHARD MOTOR SALES INC.
1948 S. TELEGRAPH
BLOOMFIELD HILLS, MICHIGAN 48302
LANDSCAPE SPECIFICATIONS
JAGUAR-LAND ROVER OF NOVI
PARTS DEPARTMENT
CITY CENTER NORTH OAKLAND COUNTY MICHIGAN

ORIGINAL ISSUE DATE: FEBRUARY 11, 2019
PEA JOB NO: 2017-176
SCALE: N/A
DRAWING NUMBER: L-2.2

NOT FOR CONSTRUCTION

THIS PROTECTION WILL BE ERECTED PRIOR TO START OF CONSTRUCTION ACTIVITIES AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.

NO PERSON MAY CONDUCT ANY ACTIVITY WITHIN THE Drip Line of ANY TREE DESIGNATED TO REMAIN, INCLUDING, BUT NOT LIMITED TO PLACING SOIL, ROCKS, BRUSH OR MATERIAL, CONSTRUCTION EQUIPMENT OR SOIL DEPOSITS WITHIN Drip Line.

GRADE CHANGES MAY NOT OCCUR WITHIN THE Drip Line of PROTECTED TREES.

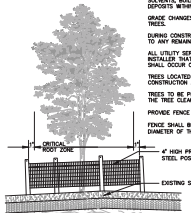
DURING CONSTRUCTION, NO PERSON SHALL ATTACH ANY DEVICE OR WIRE TO ANY REMAINING TREE.

ALL HEAVY SERVICE REQUESTS MUST INCLUDE NOTIFICATION TO THE INSTALLER THAT PROTECTED TREES MUST BE AVOIDED. ALL TRENCHING SHALL OCCUR OUTSIDE OF THE PROTECTIVE FENCING.

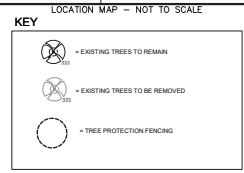
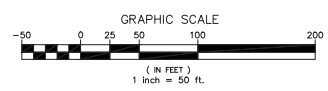
TREES LOCATED ON ADJACENT PROPERTY THAT MAY BE AFFECTED BY THE TREE CLEARING OPERATION SHALL BE IDENTIFIED WITH FLAGGING PRIOR TO THE TREE CLEARING OPERATION.

PROTECTIVE FENCE 1' OUTSIDE OF CRITICAL ROOT ZONE OF TREE.

FENCE SHALL BE PLACED IN A CIRCLE WITH A RADIUS OF 1" PER 1" DIAMETER OF THE TREE MEASURED AT 4.5' ABOVE GROUND.



TREE PROTECTION DETAIL
NOT TO SCALE



NO.	BY	DATE	DESCRIPTION



CAUTION!

THIS DRAWING IS THE PROPERTY OF PEAS, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF PEAS, INC. ANY UNAUTHORIZED REPRODUCTION OR TRANSMISSION OF THIS DRAWING IS STRICTLY PROHIBITED AND WILL BE PROSECUTED TO THE FULL EXTENT OF THE LAW.

TREE REPLACEMENT CALCULATIONS

REQUIRED: 1 REPLACEMENT: 8' < 11" = 127 (127) REPLACEMENT REQUIRED

2 REPLACEMENT: 12' < 20" = 23 (46) REPLACEMENT REQUIRED

3 REPLACEMENT: 21' < 29" = 0 (0) REPLACEMENT REQUIRED

TOTAL REGULATED TREES REMOVED = 150

TOTAL REQUIRED REPLACEMENT TREES = 173

PROVIDED: 161 3" CAL. DECIDUOUS TREES & 18 (at 1.5:1 ratio) 8' EVERGREENS, SEE SHEET L-1.0

(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 NOVI TREE REPLACEMENT FUND.

SEE SHEET T-1.1 FOR EXISTING TREE LIST. SEE SHEET L-1.0 FOR REPLACEMENT TREES.

3 FULL WORKING DAYS BEFORE YOU DIG CALL

811

Know what's below Call before you dig

MISS DIG System, Inc.
1-800-482-7171 www.missdig.net

PEA

PEA, Inc.
2430 Rochester Ct. Ste 100
Troy, MI 48063-1872
T: 248.689.9090
F: 248.689.1044
www.peainc.com

ERHARD MOTOR SALES INC.
1845 S. TELEGRAPH
BLOOMFIELD HILLS, MICHIGAN 48302

TREE PRESERVATION PLAN
JAGUAR-LAND ROVER OF NOVI
PART OF THE JAGUAR-LAND ROVER DEVELOPMENT
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

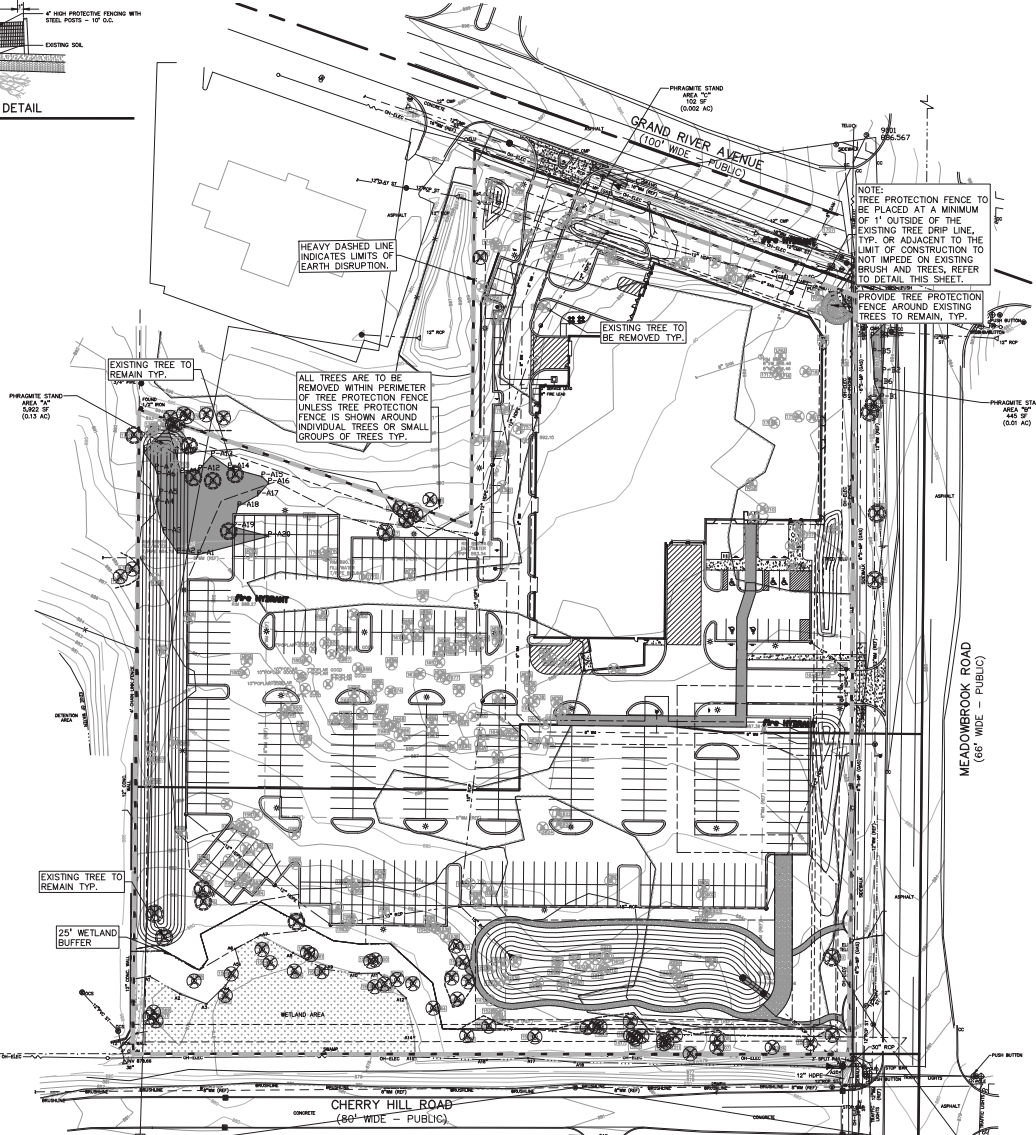
DES. A.E. DN. LAY. I. SUR. JW. P.M.
BY: [Signature]

ORIGINAL ISSUE DATE:
FEBRUARY 11, 2019

PEA JOB NO. 2017-176

SCALE: 1" = 50'

DRAWING NUMBER:
T-1.0

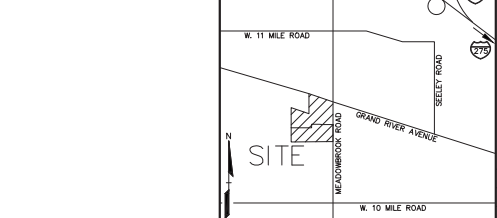


NOT FOR CONSTRUCTION

Table with columns: TAG NO, CODE, DBH, COMMON NAME, LATIN NAME, COND, COMMENT, SAVE/REMOVE. Lists plant inventory details for various tree tags.

Table with columns: TAG NO, CODE, DBH, COMMON NAME, LATIN NAME, COND, COMMENT, SAVE/REMOVE. Lists plant inventory details for various tree tags.

Table with columns: TAG NO, CODE, DBH, COMMON NAME, LATIN NAME, COND, COMMENT, SAVE/REMOVE. Lists plant inventory details for various tree tags.



NOTE: BOLD = TREE TO BE SAVED
SHRIMPHOORN = TO BE REMOVED

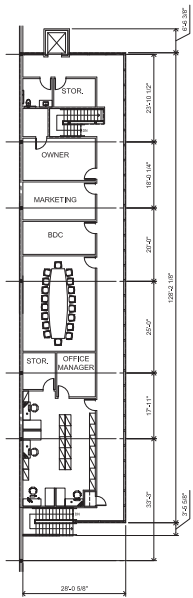


CAUTION!
This drawing contains an as-built of a portion of the project. The user of this drawing shall verify the as-built information against the current field conditions. The user of this drawing shall be responsible for the accuracy and completeness of the information. The user of this drawing shall be responsible for the accuracy and completeness of the information. The user of this drawing shall be responsible for the accuracy and completeness of the information.

3 FULL WORKING DAYS
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1-800-452-1711 www.missdigs.net

PEAX
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Call before you dig
MISSOURI System, Inc.
1-800-452-1711 www.missdigs.net

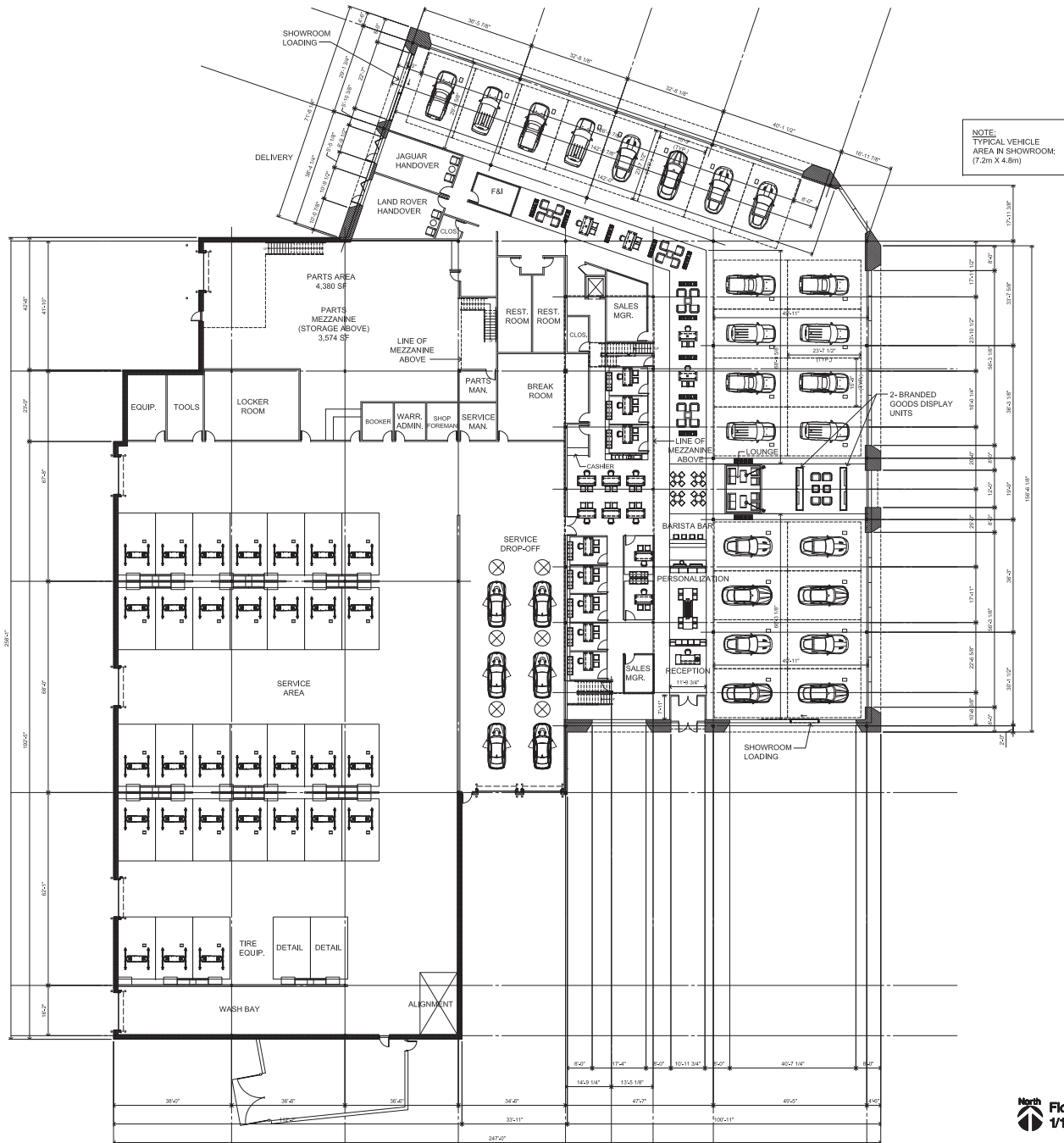
ERHARD MOTOR SALES INC.
1945 S. TELEGRAPH
BLOOMFIELD HILLS, MICHIGAN 48302
TREE PRESERVATION LIST
JAGUAR-LAND ROVER OF NOVI
PARTS & SERVICE
CITY OF NOVI, OHIO AND COUNTY OF MADISON, OHIO
PEAX Inc.
2430 Rochester Ct. Ste 100
Troy, MI 48065-9872
T 248 688 9090
F 248 688 1044
www.peaxinc.com
ORIGINAL ISSUE DATE:
FEBRUARY 11, 2019
PEA JOB NO 2017-176
SCALE: N/A
DRAWING NUMBER:
T-1.1



North Mezzanine Plan
1/16" = 1'-0"

**PROPOSED
JAGUAR LAND ROVER
DEALERSHIP
58,663 S.F.**

MAIN FLOOR : 55,247 S.F.
MEZZANINE : 3,631 S.F.
GROSS FLOOR AREA: 58,878 S.F.
USABLE FLOOR AREA: 20,798 S.F.



North Floor Plan
1/16" = 1'-0"

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Issued for:

OWNER REVIEW:	21 MAY 18
OWNER REVIEW:	22 MAY 18
OWNER REVIEW:	16 JUN 18
OWNER REVIEW:	20 JUN 18
OWNER REVIEW:	22 JUN 18
OWNER REVIEW:	24 JUN 18
SUBMITTED FOR SITE PLAN:	
REVIEW:	26 AUG 18
REVIEW:	24 AUG 18
REVIEW:	11 SEPT 18
REVIEW:	18 SEPT 18
SUBMITTED FOR SITE PLAN:	
REVIEW:	11 FEB 19

project

Proposed
Jaguar Land Rover
SVC Grand River Ave. & Meadowbrook
Novi, MI



32800 TELEGRAPH ROAD
SUITE 200
BIRMINGHAM, MICHIGAN 48002-2604
PH 248.842.7700 FX 248.842.6710
www.rogvoy.com



drawing:

Proposed
Floor Plan

DO NOT SCALE DRAWING

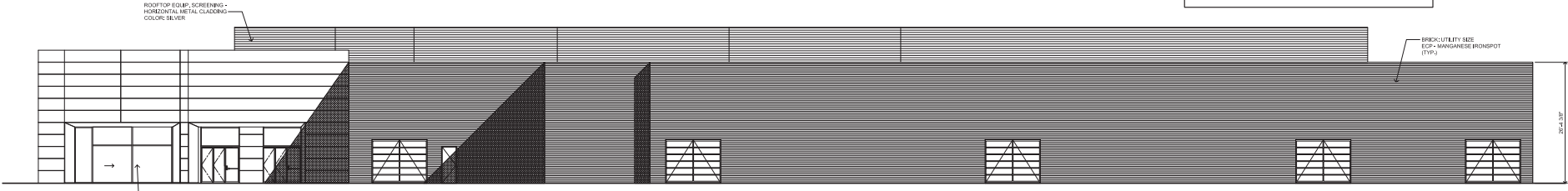
Issue date:
drawn: KL/SDB
checked: MD
approved: MD

file number: 17018

sheet:

FP-1

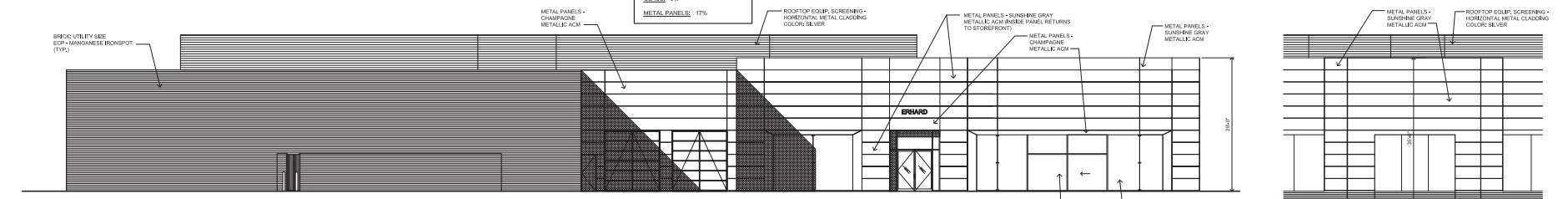
OVERALL BUILDING MATERIAL PERCENTAGES :	
BRICK:	44.5%
GLASS:	17%
METAL PANELS:	38.6%



WEST ELEVATION MATERIALS:	
BRICK:	71%
GLASS:	6%
METAL PANELS:	17%

West Elevation

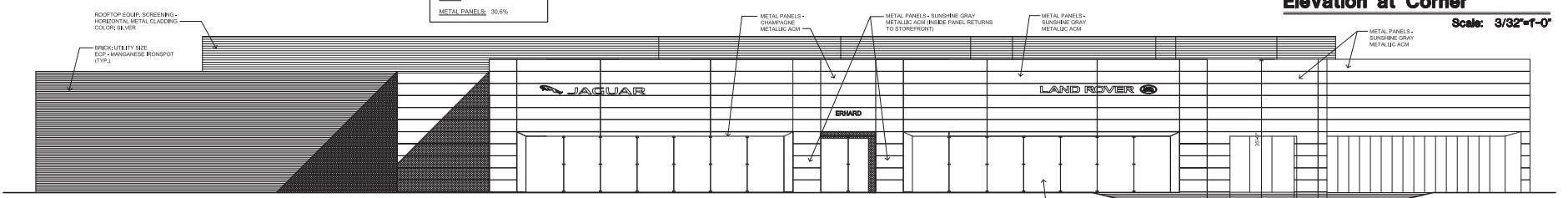
Scale: 3/32"=1'-0"



SOUTH ELEVATION MATERIALS:	
BRICK:	52%
GLASS:	17.4%
METAL PANELS:	30.6%

South Elevation

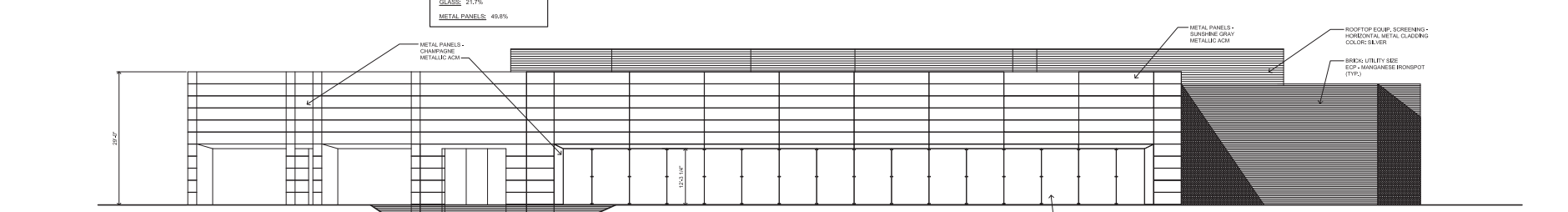
Scale: 3/32"=1'-0"



EAST ELEVATION MATERIALS:	
BRICK:	28.5%
GLASS:	21.7%
METAL PANELS:	49.8%

East (Meadowbrook Rd.) Elevation

Scale: 3/32"=1'-0"



North (Grand River Ave.) Elevation

Scale: 3/32"=1'-0"

NORTH ELEVATION MATERIALS:	
BRICK:	18.6%
GLASS:	25.2%
METAL PANELS:	56.2%

Issued for:

DATE:	21 MAY 18
REVISION:	05 JUL 18
REVISION:	18 JUL 18
REVISION:	21 JUL 18
SUBMITTED FOR SITE PLAN:	
REVISION:	08 AUG 18
REVISION:	28 AUG 18
REVISION:	11 SEPT 18
REVISION:	21 SEPT 18
REVISION:	28 SEPT 18
REVISION:	09 OCT 18
REVISION:	18 OCT 18
REVISION:	02 JAN 19
SUBMITTED FOR SITE PLAN:	
REVISION:	11 FEB 19

Project:

Proposed
Jaguar Land Rover
 SBC Grand River Ave. & Meadowbrook
 Novi, MI

ROGOVOY
 ARCHITECTS

3800 TELEGRAPH ROAD
 SUITE 200
 WARREN, MICHIGAN 48090-2604

PH 484.642.7700 FX 484.642.6710
 www.rogovoy.com



drawing:

Proposed Elevations

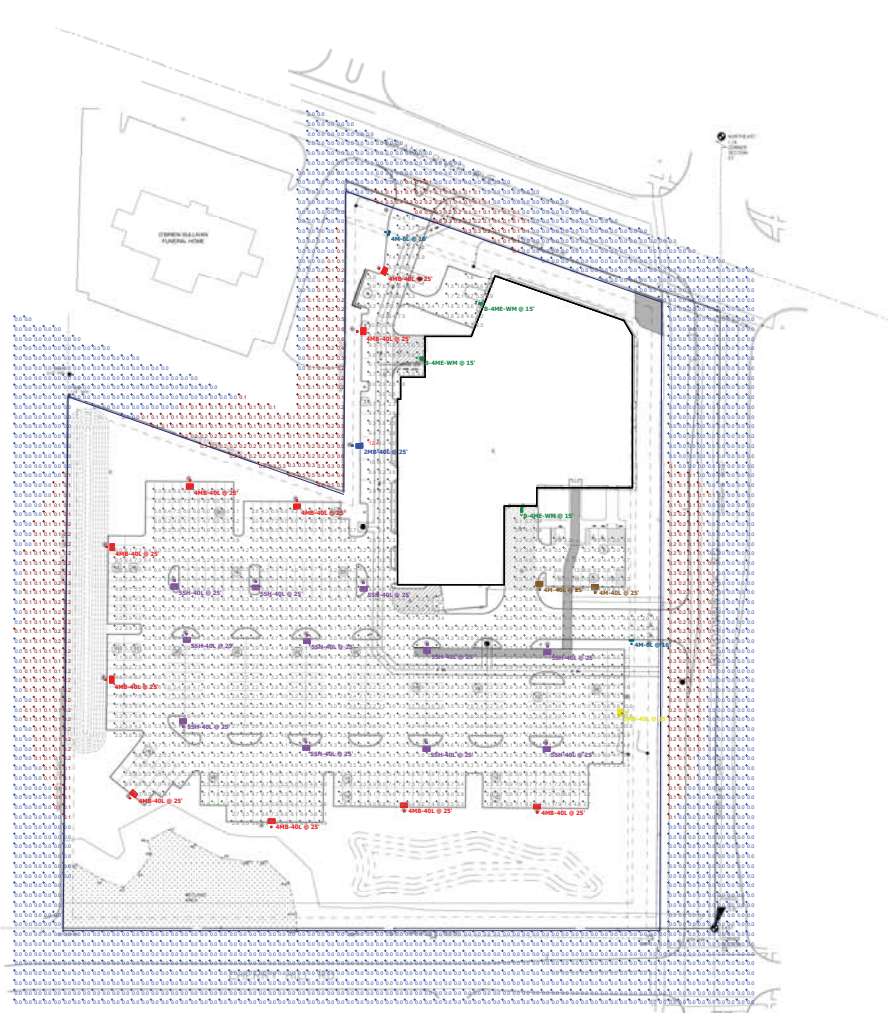
DO NOT SCALE DRAWING

Issue date:
 drawn: KL/SDB
 checked: MD
 approved: MD

No. number: **17018**

sheet

ELEV



Symbol	Quantity	Description	Notes
55H-40L	1	55H-40L	55H-40L
4MB-40L	1	4MB-40L	4MB-40L
B-4ME-40M	1	B-4ME-40M	B-4ME-40M
2MB-40L	1	2MB-40L	2MB-40L
4M-40L	1	4M-40L	4M-40L
3MB-40L	1	3MB-40L	3MB-40L
4M-6L	1	4M-6L	4M-6L

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
East Wall 1	+	3.0 fc	6.9 fc	0.2 fc	34.5:1	15.0:1
East Wall 2	+	0.2 fc	0.4 fc	0.0 fc	N/A	N/A
East Wall 3	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A
NE Wall	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A
North Wall 1	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A
North Wall 2	+	0.4 fc	1.2 fc	0.0 fc	N/A	N/A
North Wall 3	+	2.6 fc	6.1 fc	0.2 fc	30.5:1	13.0:1
NW Entry	+	2.1 fc	54.1 fc	0.0 fc	N/A	N/A
NW Service Entry	+	3.9 fc	51.3 fc	0.2 fc	256.5:1	19.5:1
Paved Areas	+	4.9 fc	12.4 fc	1.4 fc	8.9:1	3.5:1
Property Lines	+	0.0 fc	0.6 fc	0.0 fc	N/A	N/A
South Drive	+	5.6 fc	85.2 fc	0.3 fc	284.0:1	18.7:1
South Wall 1	+	1.6 fc	3.3 fc	0.4 fc	8.3:1	4.0:1
South Wall 2	+	0.6 fc	1.1 fc	0.2 fc	5.5:1	3.0:1
West Wall 1	+	0.8 fc	2.2 fc	0.1 fc	22.0:1	8.0:1
West Wall 2	+	1.6 fc	9.2 fc	0.1 fc	92.0:1	16.0:1

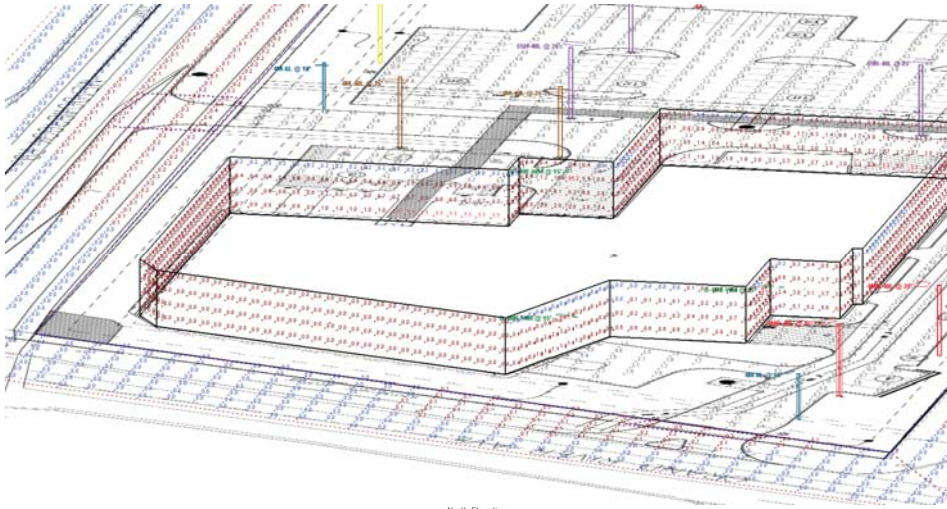
Note

- Hours of Operation:
M/TH - 7A-9P
T/W/F - 7A-6P
Saturday - 8A-4P
Sunday - Closed
- Automatic Lighting Control to reduce load by 50% during Non-Peak Business Hours
- Pole Mounted Lighting - 25' AFG Mtg Height, 14' Mtg Height
- Wall Mounted Lighting - 15' AFG Mounting Height
- Pole/Building Mounted Lighting - Full Cutoff - No Tilt
- Maximum Illumination at Commercial Property Lines: 1.0FC MAX
- Flashing Light Not Permitted
- Only Necessary Lighting for Security Purposes and Limited Operations shall be permitted.
- Electrical Service to Lighting Fixtures Shall be Placed Underground.

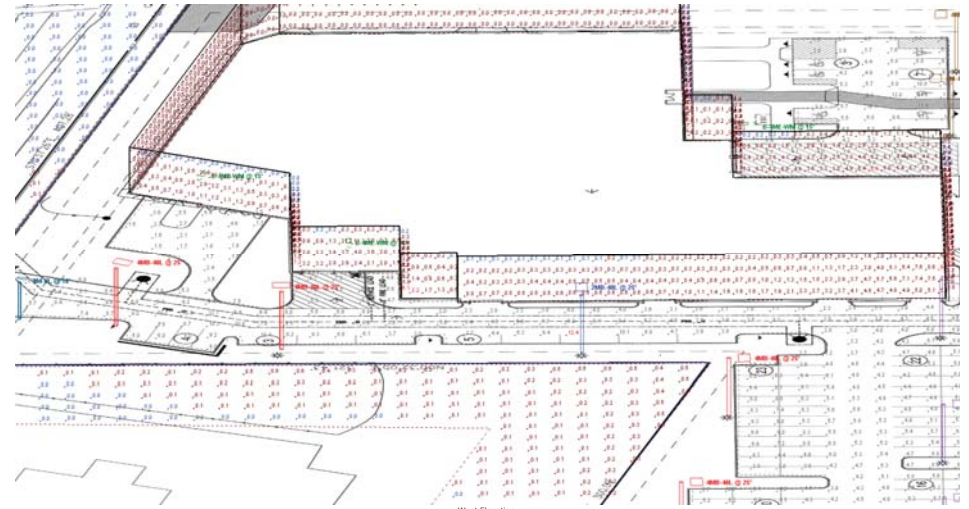
Plan View
Scale: 1" = 50'

Jaguar Land Rover
Exterior Lighting Plan
Nov/18

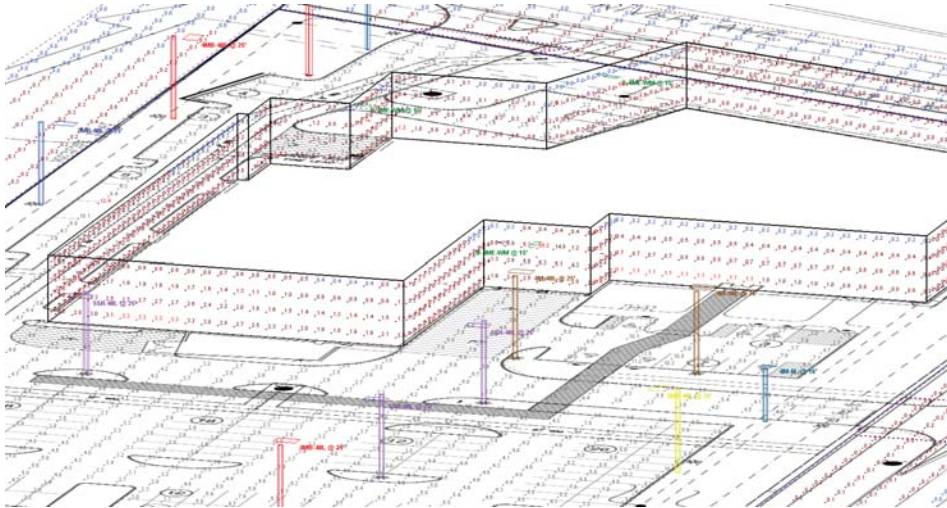
Designer
BG
Date
10/03/18
Scale
Not to Scale
Drawing No.
RE14
Summary



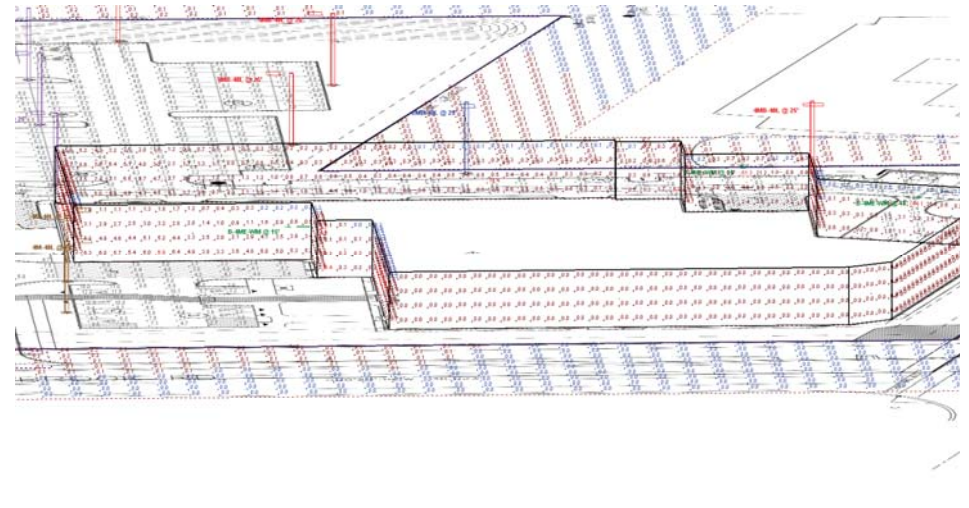
North Elevation



West Elevation



South Elevation

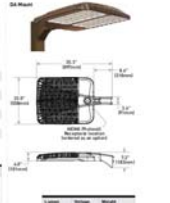


East Elevation

OSQ Series

OSQ™ High Output LED Area/Flood Luminaires featuring Cree® TrueMatrix™ Technology

Product Description
The OSQ™ High Output LED Area/Flood Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The OSQ™ High Output LED Area/Flood Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.



OSQ™ High Output LED Area/Flood Luminaires featuring Cree® TrueMatrix™ Technology

Product Specifications
The OSQ™ High Output LED Area/Flood Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The OSQ™ High Output LED Area/Flood Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.

Estimated Data

Luminaire Size	Foot Candles*					
	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
OSQ 2' x 4'	150	37	15	9	6	5
OSQ 4' x 4'	150	37	15	9	6	5

Estimated Average Foot-Candle Performance

Foot-Candle Range	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
OSQ 2' x 4'	150	37	15	9	6	5
OSQ 4' x 4'	150	37	15	9	6	5

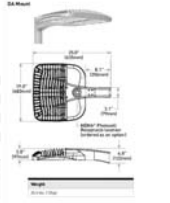
Relating Information
For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



OSQ Series

OSQ™ LED Area/Flood Luminaires - Medium

Product Description
The OSQ™ LED Area/Flood Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The OSQ™ LED Area/Flood Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.



Relating Information
For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



OSQ™ LED Area/Flood Luminaires - Medium

Product Specifications
The OSQ™ LED Area/Flood Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The OSQ™ LED Area/Flood Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.

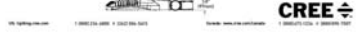
Estimated Data

Luminaire Size	Foot Candles*					
	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
OSQ 2' x 4'	150	37	15	9	6	5
OSQ 4' x 4'	150	37	15	9	6	5

Estimated Average Foot-Candle Performance

Foot-Candle Range	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
OSQ 2' x 4'	150	37	15	9	6	5
OSQ 4' x 4'	150	37	15	9	6	5

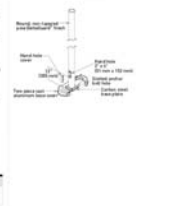
Relating Information
For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



PS Series

PS® Round Flood Lights

Product Description
The PS® Round Flood Lights feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The PS® Round Flood Lights are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.



PS® Round Flood Lights

Product Specifications
The PS® Round Flood Lights feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The PS® Round Flood Lights are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.

Estimated Data

Luminaire Size	Foot Candles*					
	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
PS 2' x 4'	150	37	15	9	6	5
PS 4' x 4'	150	37	15	9	6	5

Estimated Average Foot-Candle Performance

Foot-Candle Range	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
PS 2' x 4'	150	37	15	9	6	5
PS 4' x 4'	150	37	15	9	6	5



For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



XSP Series

XSP™ LED Wash Luminaires featuring Cree® TrueMatrix™ Technology

Product Description
The XSP™ LED Wash Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The XSP™ LED Wash Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.



Relating Information
For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



XSP™ LED Wash Luminaires

Product Specifications
The XSP™ LED Wash Luminaires feature Cree® TrueMatrix™ Technology, advanced thermal management, and a lens for uniform light distribution. The XSP™ LED Wash Luminaires are available in 2' x 4' and 4' x 4' configurations, offering a wide range of light distribution options for outdoor lighting applications.

Estimated Data

Luminaire Size	Foot Candles*					
	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
XSP 2' x 4'	150	37	15	9	6	5
XSP 4' x 4'	150	37	15	9	6	5

Estimated Average Foot-Candle Performance

Foot-Candle Range	0-10'	10-20'	20-30'	30-40'	40-50'	50-60'
XSP 2' x 4'	150	37	15	9	6	5
XSP 4' x 4'	150	37	15	9	6	5

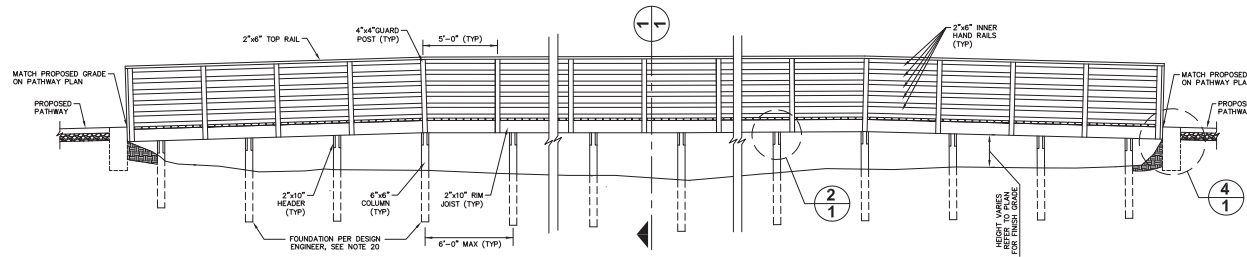
Relating Information
For more information on Cree® TrueMatrix™ Technology, visit www.cree.com.



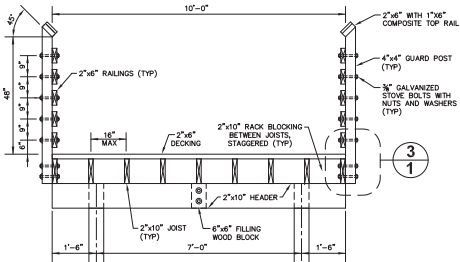


- NOTES:
1. SIGNS SHALL BE 18"x18" AND CONSTRUCTED OF .063 ENGINEERING GRADE REFLECTIVE ALUMINUM WITH 1-1/2" RADIUS AT CORNERS.
 2. SIGNS SHALL HAVE A YELLOW BACKGROUND WITH BLACK COPY AND BLACK OUTLINE.
 3. SIGN POST AND FASTENERS SHALL BE PER ROAD COMMISSION FOR OAKLAND COUNTY STANDARDS.
 4. SIGN LOCATION TO BE DETERMINED BY DESIGN ENGINEER AND APPROVED BY THE CITY.

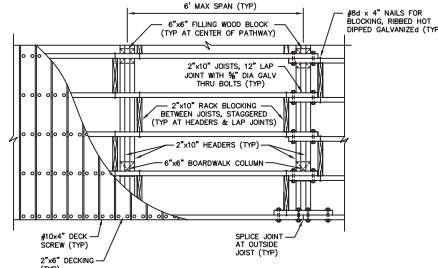
TYPICAL SIGNING
NO SCALE



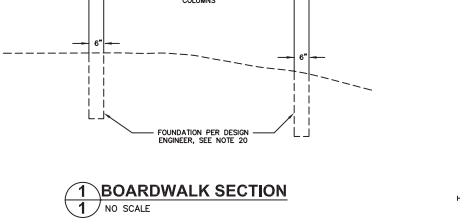
TYPICAL PROFILE FOR BOARDWALK
NO SCALE



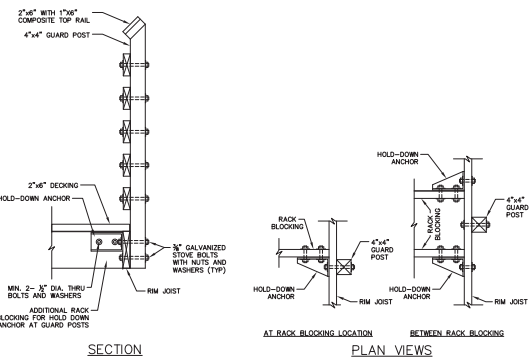
TYPICAL OUTER SIDE DETAIL & OUTSIDE JOIST BOARD JOINT SPLICE DETAIL
NO SCALE



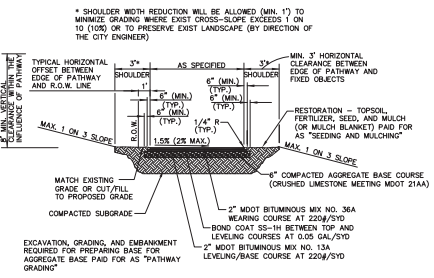
BOARDWALK DECK SUPPORT
NO SCALE



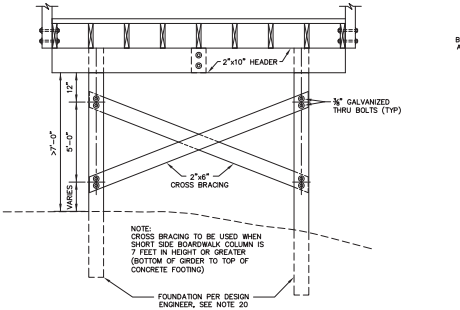
BOARDWALK SECTION
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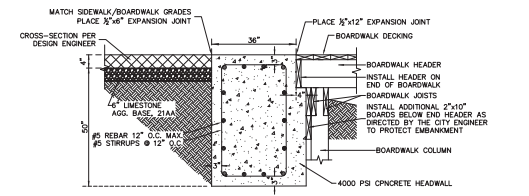
GUARD POST TO RIM JOIST DETAIL
NO SCALE



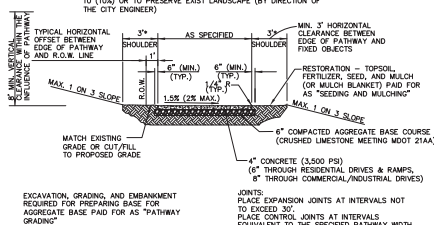
NON-MOTORIZED PATHWAY BITUMINOUS SECTION
NO SCALE



CROSS BRACING DETAIL
NO SCALE



PATHWAY / BOARDWALK INTERFACE DETAIL
NO SCALE

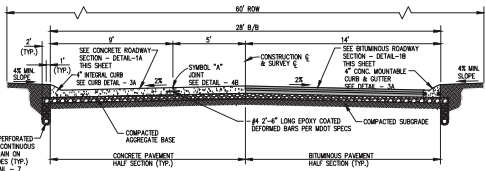


NON-MOTORIZED PATHWAY CONCRETE SECTION
NO SCALE

BOARDWALK NOTES

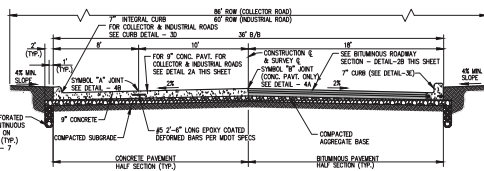
1. ALL BOARDWALK SKELETAL LUMBER SHALL BE KILN DRIED SOUTHERN YELLOW PINE #2, OR UNLESS APPROVED EQUAL. LUMBER SUPPLIER SHALL MEET THE REQUIREMENTS OF SECTION 912 OF MOST STANDARD SPECIFICATIONS FOR CONSTRUCTION (2012).
2. ALL LUMBER SHALL BE PRESSURE TREATED TO RESIST WITH WOOD PRESERVATIVE AND SUITABLE FOR GROUND CONTACT. PRESERVATIVE TREATMENT SHALL CONFORM TO ASTM D1760 AND ANPA STANDARDS M2 AND M3.
3. ALL WOOD TO BE PRESSURE TREATED TO 0.40 LBS/CF RETENTION.
4. ALL BOLTS, WASHERS AND OTHER HARDWARE SHALL BE HOT DIPPED GALVANIZED TO MINIMIZE CORROSION.
5. HOT DIPPED GALVANIZED FLAT WASHERS SHALL BE USED UNDER THE HEADS OF LAG SCREWS, BOLTS AND NUTS.
6. ALL SCREWS, NAILS, BOLTS, WASHERS AND NUTS USED WITH PRESERVATIVE TREATED WOOD SHALL BE HOT-DIPPED ZINC-COATED GALVANIZED STEEL, STAINLESS STEEL, SILICON BRONZE OR COPPER.
7. DECK SCREWS SHALL BE COMBINATION HOT DIPPED GALVANIZED PLATED OR OTHER APPROVED EQUAL. DECK SCREWS SHALL BE A MINIMUM #10 X 4-INCH WITH AN UNWEARDED SHANK TO PREVENT BUCKLING AND TO ALLOW FOR TIGHTER FASTENING. DECK SCREWS SHALL BE USED FOR FASTENING ALL BOARDWALK MEMBERS UNLESS NOTED ON THE PLAN.
8. RUST RESISTANT GALVANIZED CARTRIDGE BOLTS TO BE USED FOR ALL RAILING/POST CONNECTIONS.
9. RUST RESISTANT GALVANIZED THRU-BOLTS TO BE USED FOR ALL UNDERSTRUCTURE CONNECTIONS.
10. ALL HARDWARE AND CONNECTORS (JOIST HANGERS, POST HANGERS, ETC) SHALL BE PROTECTED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS; MINIMUM ASTM-A 653 TYPE 304 ZINC-COATED GALVANIZED STEEL.
11. ANY WOOD USED ABOVE GROUND SHALL BE NATURALLY DURABLE WOOD OR PRESERVE-TREATED WOOD, AND SHALL BE TREATED IN ACCORDANCE WITH ANPA C2, C3 OR OTHER APPLICABLE ANPA STANDARDS FOR ABOVE GROUND USE.
12. ANY WOOD PROPOSED TO BE IN CONTACT WITH THE GROUND OR FRESH WATER THAT SUPPORTS PERMANENT STRUCTURES SHALL BE NATURALLY DURABLE OR PRESERVE-TREATED WOOD AND SHALL BE TREATED IN ACCORDANCE WITH ANPA C2, C3 OR APPLICABLE ANPA STANDARD FOR SOIL OR FRESH WATER CONTACT.
13. IN AREAS FAVORABLE TO TERMITE DAMAGE, AS DETERMINED BY THE CITY, METHODS OF PROTECTION SHALL BE BY CHEMICAL SOIL TREATMENT, PRESSURE TREATED WOOD, IN ACCORDANCE WITH THE ANPA, NATURALLY TERMITE-RESISTANT WOOD OR PHYSICAL BARRIERS (SUCH AS METAL OR PLASTIC TERMITE SHIELDS) OR ANY COMBINATION OF THESE METHODS.
14. USE AT LEAST ONE (1) SIMPSON STRONG-TIE HODA ANCHOR IN A TRIPLE ZINC COATING (OR A HOT-DIPPED GALVANIZED BUCKLON BY MARSE TECHNOLOGIES AS AN APPROVED EQUIVALENT) AT ALL POST-TO-DECK ASSEMBLY POINTS. SEE GUARD POST TO DETAIL.
15. DO NOT NOTCH THE GUARDRAIL POST AROUND THE BAND JOIST.
16. COMPOSITE DECK BOARDS AND GUARDRAIL SYSTEMS MAY BE REQUIRED PER THE APPROVAL BY THE CITY. THESE MATERIALS SHALL BE CONSTRUCTED, MANUFACTURED AND FABRICATED IN ACCORDANCE WITH ASTM D7032-06A STANDARD SPECIFICATIONS.
17. COMPOSITE DECK BOARD SHALL BE GRAY SQUARE EDGE CAPPED BOARD OR APPROVED EQUAL AS DETERMINED BY THE CITY.
18. THE ENGINEER OF RECORD IS REQUIRED TO PROVIDE A SOIL BORING A MINIMUM OF ONE (1) PER EVERY 100 LINEAR FEET OF PROPOSED BOARDWALK TO HARDPAN AND PROVIDE DATA TO THE CITY FOR REVIEW OF PROPOSED BOARDWALK COLUMN DEPTH.
19. POSTS OR PERS WILL BE EXCAVATED TO A DEPTH WHERE WEIGHT BEARING SOIL IS REACHED, AT LEAST 4'-0" REFER TO GEOTECHNICAL REPORT FOR ESTIMATED DEPTH NEEDED TO SUPPORT WALKWAY PROPERLY.
20. COLUMN SUPPORT TYPE (SUCH AS DRIVEN COLUMNS, POURED FOOTINGS OR HELICAL PIER SUPPORTS) SHALL BE BASED UPON SOIL CONDITIONS AS DETERMINED BY THE DESIGN ENGINEER. SUBMIT COLUMN SUPPORT DESIGN TO THE CITY FOR REVIEW. SUBMITTED DESIGN WILL BE REQUIRED TO SHOW SUPPORT FOR A 3500 LB VEHICLE IN ADDITION TO THE DEAD LOAD OF THE BOARDWALK. ALL SUPPORT DESIGN SHALL BE SIGNED AND SEALED BY A LICENSED, QUALIFIED PROFESSIONAL ENGINEER.
21. ALTERNATIVE CABLE RAILING SYSTEM SHALL BE USED AT LOCATIONS WHERE DIRECTED BY THE CITY WHEN SIGN DISTANCE CONCERN EXIST. THE DESIGN ENGINEER SHALL PROVIDE SPECIFICATIONS AND DETAILS UPON REQUEST.

Revisions	09/10/15	AW
Drawn		
Designed		
Checked		
Scale	NO SCALE	
Date	05/04/12	
Job No.		
Sht. No.		

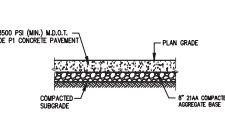


**TYPICAL CROSS SECTION DETAIL - 1
RESIDENTIAL ROAD PAVEMENT (28' B/B)**

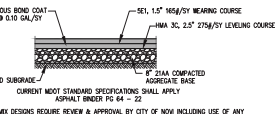
NOTE: CONCRETE PAVEMENT DETAIL SHOWN IS FOR A SINGLE FOUR CONSTRUCTION FOR A DOUBLE FOUR CONSTRUCTION. A SYMBOL "X" JOINT WILL BE LOCATED ALONG THE CENTER OF THE ROAD AND THE SYMBOL "O" JOINT WILL BE LOCATED 4' FROM BACK OF CURB.



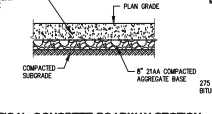
**TYPICAL CROSS SECTION DETAIL - 2
COLLECTOR AND INDUSTRIAL ROAD PAVEMENT (36' B/B)**



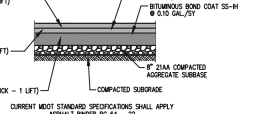
**TYPICAL CONCRETE ROADWAY SECTION FOR RESIDENTIAL ROAD
DETAIL - 1A
NOT TO SCALE**



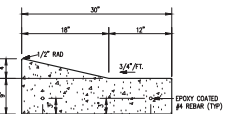
**TYPICAL BITUMINOUS ROADWAY SECTION FOR RESIDENTIAL ROAD
DETAIL - 1B
NOT TO SCALE**



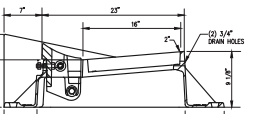
**TYPICAL CONCRETE ROADWAY SECTION FOR COLLECTOR & INDUSTRIAL ROADS
DETAIL - 2A
NOT TO SCALE**



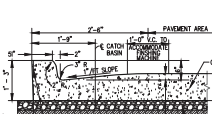
**TYPICAL BITUMINOUS ROADWAY SECTION FOR COLLECTOR & INDUSTRIAL ROADS
DETAIL - 2B
NOT TO SCALE**



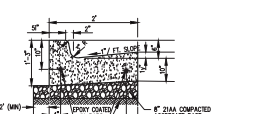
**4' MOUNTABLE CURB & GUTTER CONCRETE & BITUMINOUS ROADS
DETAIL - 3A
NOT TO SCALE**



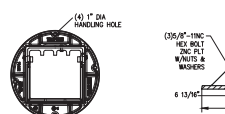
**4' INTEGRAL & MOUNTABLE CURB & GUTTER WITH EJ 7065 OR EQUIVALENT CONCRETE & BITUMINOUS ROADS
DETAIL - 3B
NOT TO SCALE**



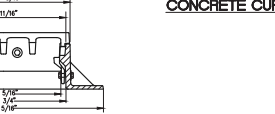
**6' INTEGRAL CURB & GUTTER
DETAIL - 3C
NOT TO SCALE**



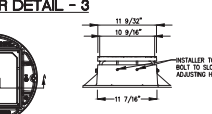
**6' CURB & GUTTER
DETAIL - 3D
NOT TO SCALE**



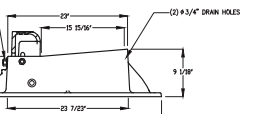
**EJ 7065 FRAME SECTION OR EQUIVALENT
DETAIL - 3E
NOT TO SCALE**



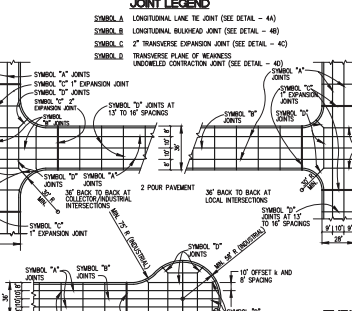
**EJ 7045 FRAME SECTION OR EQUIVALENT
DETAIL - 3F
NOT TO SCALE**



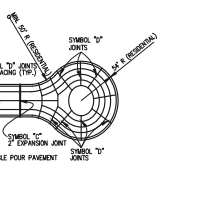
**EJ 7065 FRAME SECTION OR EQUIVALENT
DETAIL - 3G
NOT TO SCALE**



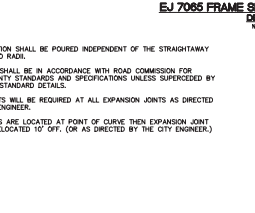
**EJ 7065 FRAME SECTION OR EQUIVALENT
DETAIL - 3H
NOT TO SCALE**



**TYPICAL PLAN OF CONCRETE PAVEMENT JOINT LAYOUT DETAILS - 4
NOT TO SCALE**



**LONGITUDINAL LANE TIE JOINT
DETAIL - 4A
NOT TO SCALE**



**TERMINAL BUTT JOINT
DETAIL - 5
NOT TO SCALE**

GENERAL NOTES

- EXISTING TORSION, VEGETATION AND ORGANIC MATERIALS SHALL BE STRIPPED AND REMOVED FROM PROPOSED PAVEMENT AREA PRIOR TO PLACEMENT OF BASE.
- EXISTING TORSION, VEGETATION AND ORGANIC MATERIALS SHALL BE STRIPPED AND REMOVED FROM PROPOSED PAVEMENT AREA PRIOR TO PLACEMENT OF BASE.
- PREPARE TO THE DEPTH OF THE FINAL SURFACE ELEVATION TO ALLOW FOR GRADE CHANGES AND THE PLACEMENT OF THE RECOMMENDED PAVEMENT SYSTEM.
- THE PAVEMENT SURFACE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY WEIGHT (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT. THE FINAL SURFACE SHALL BE THOROUGHLY MOIST-CURED IN THE PRESENCE OF A GEOTECHNICAL/PAVEMENT ENGINEER TO DETERMINE STABILITY. LOGS ON VELLING AREA SHALL BE SUBMITTED TO THE GEOTECHNICAL ENGINEER FOR REVIEW AND REPLACEMENT AS DIRECTED BY THE GEOTECHNICAL ENGINEER. ALL FILL MATERIAL AND AREA SHALL BE MECHANICALLY STABILIZED SOIL OR FILL BEING USED FOR REINFORCEMENT OF THE BASE MATERIAL AND PAVEMENT SHALL BE CERTIFIED BY SOIL TESTING FIRM. THE OWNER SHALL SUBMIT THREE COPIES OF GEOTECHNICAL AND TECHNICAL REPORTS TO THE CITY'S CONSULTANT.
- IF IN THE OPINION OF THE INSPECTOR/ENGINEER FIELD CONDITIONS WARRANT ADDITIONAL TESTING, THE DEVELOPER SHALL ARRANGE FOR AND PAY FOR ALL REQUIRED ADDITIONAL TESTING.
- 21AA AGGREGATE BASE SHALL BE COMPACTED TO ACHIEVE A 95% COMPACTION LEVEL (MODIFIED PROCTOR - ASTM D 1557-99). THE BASE SHALL EXTEND A MINIMUM OF 2 FEET BEYOND THE BACK OF CURB ON THE PAVED EDGE.
- CONCRETE PAVEMENT TESTING SHALL BE REQUIRED FOR ALL PROJECTS.
- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF NOVI, MICHIGAN AND MOST.
- FOR ANY WORK WITHIN THE PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL SECURE ALL NECESSARY PERMITS AND LICENSES NECESSARY FOR ALL INFRASTRUCTURE WITHIN PARKING AREAS (SEE DETAILS A AND B).
- 1.0 INCH AND 2.0 INCH EXPANSION JOINTS SHALL BE INSTALLED PER CITY STANDARDS PER THIS SHEET.
- FILL HEIGHT SHALL BE MACHINE COMPACTED IN UNIFORM LIFTS TO SIZE OF THE MAXIMUM DRY DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT.
- 1" UNDER DRAIN SHALL BE INSTALLED ON BOTH SIDES OF ALL ROADWAYS IN GEOTECHNICAL WARPED TRENCH. ALSO PLACE UNDER DRAIN AT ALL DRAINAGE STRUCTURES WITHIN PARKING AREAS (SEE DETAILS A AND B).
- PROVIDE MINIMUM 20' DISTANCE TO TRANSITION FROM DETAIL 3E TO DETAIL 3A CURB.
126. AT THE TIME OF RETAIL ROAD CONSTRUCTION, THE FULL CROSS SECTION MUST BE INSTALLED FOR THE APPROVED PLAN, AND ANY AND ALL DEVIATIONS TO THE PAVEMENT AND CURB MUST BE COMPLETED AT THE DIRECTION OF THE CITY ENGINEER.
126. ALTERNATIVELY, THE TOP COURSE MAY BE OMITTED UNTIL THE MAJORITY OF THE CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY IS COMPLETE. PRIOR TO STREET ACCEPTANCE THE CITY ENGINEER WILL INSPECT THE PAVEMENT AND CURB, AND WILL IDENTIFY ANY AREAS TO BE REPAIRED.
126. ALTERNATIVELY, THE TOP COURSE MAY BE OMITTED UNTIL THE MAJORITY OF THE CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY IS COMPLETE. PRIOR TO STREET ACCEPTANCE THE CITY ENGINEER WILL INSPECT THE PAVEMENT AND CURB, AND WILL IDENTIFY ANY AREAS TO BE REPAIRED.
- PROVIDE MINIMUM 20' DISTANCE TO TRANSITION FROM DETAIL 3E TO DETAIL 3A CURB.

CONCRETE PAVEMENT

- CONCRETE SHALL CONSIST OF PORTLAND CEMENT TYPE II OR III (MINIMUM) WITH A MINIMUM CEMENT CONTENT OF SIX SACKS PER CUBIC YARD, MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI AND A SLUMP OF 17" TO 3 INCHES. PAVEMENT SHALL CONFORM TO M.I.D.T. GRADE F1.
- ALL CONCRETE PAVEMENT, DRIVEWAYS, CURB & GUTTER, ETC., SHALL BE SPRAY CURED WITH WHITE MEMBRANE CURING COMPOUND IMMEDIATELY FOLLOWING FINISHING OPERATION.
- THE CONCRETE BATCH PLANT SHALL BE M.I.D.T. CERTIFIED WITH LOCATION APPROVED BY THE CITY.
- NO CONCRETE PAVING SHALL BE ALLOWED PRIOR TO MAY 1, OR AFTER NOVEMBER 1 (UNLESS APPROVED BY THE CITY).
- DO NOT PLACE CONCRETE WHEN PRECIPITATION IS IMMINENT OR WHEN MOISTURE ON THE EXISTING SURFACE WILL PREVENT SATISFACTORY CURE. TEMPERATURES AND SEASONAL REQUIREMENTS FOR PLACING CONCRETE WILL BE ACCORDING TO THE CURRENT MOST SPECIFICATIONS. PAVING WILL NOT BE ALLOWED BELOW THESE MINIMUM TEMPERATURES, NOR WHEN FROST IS ON OR IN THE GRADE OR ON THE EXISTING SURFACE.

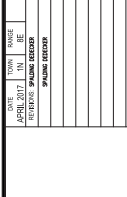
BITUMINOUS PAVEMENT

- BITUMINOUS PAVEMENT SHALL CONSIST OF LEVELING COURSE - MODIFIED BITUMINOUS MIXTURE NO. 42, LEVELING COURSE - MODIFIED BITUMINOUS MIXTURE NO. 42, WEARING COURSE - MODIFIED BITUMINOUS MIXTURE NO. 42, ASPHALT CEMENT PENETRATION GRADE 80-100 (PC 64-22) RECLAIMED ASPHALT PAVEMENT (RAP) SHALL BE REMOVED FOR APPROVAL BY THE CITY ENGINEER.
- ALL BITUMINOUS MATERIAL SHALL BE COMPACTED TO A DENSITY OF SIZE OF THE FIELD CONTROL WHICH IS DETERMINED BY THE THEORETICAL MAXIMUM DENSITY. ASPHALT IMMEDIATELY PRIOR TO PLACEMENT OF EACH COURSE OF PAVEMENT. THE ROAD COAT SHALL BE APPLIED IN A UNIFORM MANNER OVER THE SURFACE AT A RATE OF 0.15 GALLON/SY. BETWEEN LEVELING COURSES & 0.05 GALLON/SY BETWEEN WEARING COURSE AND LEVELING COURSE.
- DO NOT PLACE IMA OR APPLY ROAD COAT WHEN PRECIPITATION IS IMMINENT OR WHEN MOISTURE ON THE EXISTING SURFACE WILL PREVENT SATISFACTORY CURE. TEMPERATURES AND SEASONAL REQUIREMENTS FOR PLACING IMA WILL BE ACCORDING TO THE CURRENT MOST SPECIFICATIONS. PAVING WILL NOT BE ALLOWED BELOW THESE MINIMUM TEMPERATURES, NOR WHEN FROST IS ON OR IN THE GRADE OR ON THE EXISTING SURFACE.

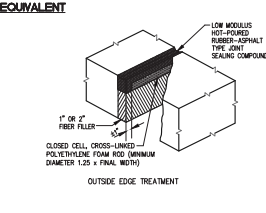


CITY OF NOVI (SOUTHWEST TOWNLINE ROAD) FROM M-108 TO M-24 (BAYVIEW) PROJECT NO. 2017-001
DATE: 05/20/2017
SCALE: 1" = 8'-0"

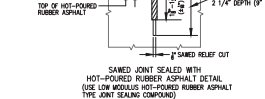
COUNTY: WAYNE
TOWNSHIP: WESTLAND
CITY: NOVI, MI
DATE: APRIL 2017
PROJECT: TOWNLINE ROAD
SHEET: 1 OF 2



**TRANSVERSE EXPANSION JOINT
DETAIL - 5F
NOT TO SCALE**

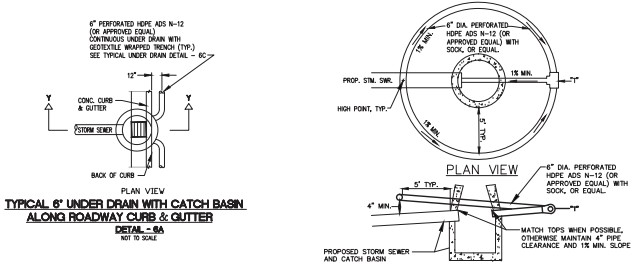


**LONGITUDINAL BULKHEAD JOINT
DETAIL - 4B
NOT TO SCALE**



**TRANSVERSE PLANE OF WEAKNESS UNWELDED CONTRACTION JOINT
DETAIL - 4D
NOT TO SCALE**

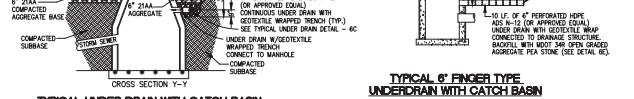
CITY OF NOVI
PAVING
STANDARD DETAILS



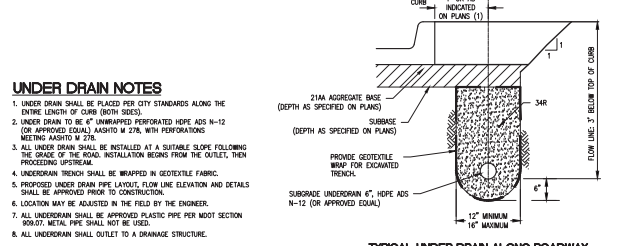
TYPICAL 6" UNDER DRAIN WITH CATCH BASIN ALONG ROADWAY CURB & GUTTER
DETAIL - 8A
NOT TO SCALE



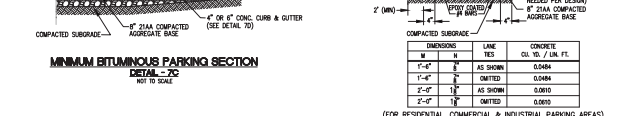
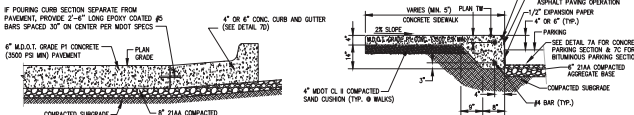
TYPICAL 6" RING UNDER DRAIN WITH CATCH BASIN
DETAIL - 8B
NOT TO SCALE



TYPICAL 6" FINGER TYPE UNDER DRAIN WITH CATCH BASIN (WITH PARKING LOT CURB CUTLINE CURB LINE)
DETAIL - 8C
NOT TO SCALE



TYPICAL UNDER DRAIN DETAILS - 6
DETAIL - 8E
NOT TO SCALE



TYPICAL PARKING AREA PAVEMENT & CURB DETAILS - 7
DETAIL - 7D
NOT TO SCALE



TYPICAL 8" CONCRETE DUMPSTER PAD
DETAIL - 8
NOT TO SCALE



TYPICAL 8" CONCRETE DRIVEWAY APPROACH PAVEMENT SECTION
DETAIL - 8B
NOT TO SCALE



SIDEWALK JOINTS NOTES

- CONTRACT TRANSVERSE AND LONGITUDINAL EXPANSION AND PLACEMENT OF WEARERS JOINTS AT INTERVALS AND LOCATIONS SHOWN ON THE PLANS. ALIGN TRANSVERSE JOINTS WITH CURB JOINTS IN ANY ADJACENT SLAB.
- CONSTRUCT JOINTS WITH FACES PERPENDICULAR TO THE SIDEWALK SURFACE.
- PLACE CONTRACTION JOINTS AT 5' MINIMUM AND 7' MAXIMUM INTERVALS. JOINTS ARE TO BE FULL WIDTH OF THE ROAD AND MINIMUM 1/4" SLAG THICKNESS DEEP AND 1/8" INCH TO 1/4" INCH WIDE. PAVEMENT MATERIAL AS SPECIFIED.
- PLACE 1/2" FIBER EXPANSION JOINT FILLERS AT MAX. 50' INTERVALS. EXTEND EXPANSION JOINT FILLER THE FULL WIDTH OF THE JOINT WITH THE SLOPE BELOW THE FINISHED SURFACE OF THE SIDEWALK.
- PLACE 1/2" FIBER EXPANSION JOINT FILLERS AT EACH SIDE OF DRIVE.
- REMOVE 1" FIBER EXPANSION JOINT FILLERS AT CURB AND BUILDING OR R.O.W. LINE.

SIDEWALK STANDARD NOTES

- CONCRETE RAMPS, CONFORMING TO PUBLIC ACT NO. 65, 1983, SHALL BE INSTALLED AS SHOWN ON THE PLANS AT ALL STREET INTERSECTIONS AND AT ALL BARREN FREE PARKING AREAS AS SPECIFIED ON THE PLANS.
- SIDEWALK AND PATHWAY RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. HANDICAP RAMPS SHALL MEET CURRENT MOOT STANDARDS AND A.D.A. BARREN FREE REQUIREMENTS.
- RAMPS SHALL BE PROVIDED AT CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB.
- SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOKING METHOXY POLYMER SANDER.
- SIDEWALK SHALL BE RAMMED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE ROAD.
- CURB SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, FREE OF SACS AND SHORT GRADE CHANGES. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.
- IF POSSIBLE, DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS, EXCEPT WHERE EXISTING DRAINAGE STRUCTURES ARE BEING UTILIZED IN THE NEW CONSTRUCTION LOCATION OF THE RAMP. SHOW THE PRECEDENCE OR LOCATION OF DRAINAGE STRUCTURE.
- THE NORMAL CUTLINE LINE PROFILE SHALL BE MAINTAINED THROUGH THE AREA OF THE RAMP.
- THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.
- ORISMAHAW AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES".
- DETECTABLE WARNING SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP.



TYPICAL 8" CONCRETE DRIVEWAY APPROACH PAVEMENT SECTION
DETAIL - 8B
NOT TO SCALE



PATHWAY STANDARD NOTES

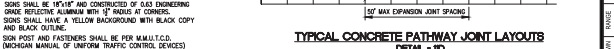
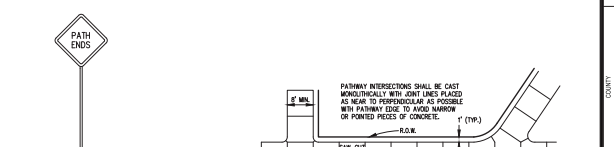
- THE MAXIMUM GRADE ALONG PATHWAY SHALL NOT EXCEED 1% OR 12".
- PROVIDE 2% MAXIMUM CROSS SLOPE (I.E. SUPER ELEVATION) OR DRAINAGE OFF AND AWAY FROM PATHWAY AND GRADED SHOULDERS.
- PROVIDE MINIMUM 4" CENTER LINE ROAD FOR PATHWAY HORIZONTAL ALIGNMENT.
- PROVIDE A MINIMUM OF 3" HORIZONTAL CLEARANCE AND 10" VERTICAL CLEARANCE FROM ALL FIXED OBJECTS AND THE EDGE OF PATHWAY SURFACE. RELOCATE EXISTING OBJECTS (I.E. WALLS, SIGNPOSTS, ETC.) IF REQUIRED.
- PROVIDE HANDICAP ACCESSIBLE RAMPS AT EXISTING PAVED DRIVEWAYS IN GOOD CONDITION AND AT STREET INTERSECTIONS.
- PATHWAY RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MOOT STANDARD PLAN R-28 SERIES.
- A CLEAR SAW CUT JOINT SHALL BE PROVIDED WHEREVER NEW PAVEMENT MATCHES EXISTING PAVEMENT.
- UTILITY STRUCTURES SHALL BE RELOCATED IN ACCORDANCE WITH CITY OF NOVI STANDARDS AND SHALL MATCH THE PROPOSED GRADE OF THE PATHWAY.
- PROVIDE 10" BETWEEN EDGE OF PATHWAY TO TOP OF BANK FOR DETENTION BASINS, OPEN GRABES, ETC.
- ADJACENT FINISHED GRADE SHALL BE SET 2" BELOW TO ACCOMMODATE SOD.

BITUMINOUS PATHWAY NOTES

- IF PATHWAY CROSSES A RESIDENTIAL DRIVEWAY, INCREASE THE THICKNESS OF BITUMINOUS LEVING/PAGE COURSE MAX. 3/8" TO 4" (9 449/3150).
- PATHWAY SHALL BE UNIFORM FREE OF BIRD BATHS - STANDING WATER.

CONCRETE PATHWAY NOTES

- FOR CONCRETE PATHWAY PROVIDE TRANSVERSE PLANE OF WEARERS SAW CUT JOINTS AT APPROXIMATELY 4' INTERVALS. SAW CUT JOINTS SHALL NOT SEAL. THE JOINTS TO BE TIGHTENED JOINTS ARE NOT ACCEPTABLE.
- PROVIDE FULL DEPTH TRANSVERSE EXPANSION JOINTS BY INSTALLING 1" THICK PERFORATED JOINT FILLER SET 1" INCH BELOW THE SURFACE OF THE CONCRETE IN THE JOINTS AT 50' INTERVALS (MAX).
- PLACE 1" FIBER EXPANSION JOINT FILLERS AT MAX. 50' INTERVALS. EXTEND EXPANSION JOINT FILLER THE FULL DEPTH OF THE JOINT WITH THE TOP SLIGHTLY BELOW THE FINISHED SURFACE OF THE PATHWAY.
- PLACE 1" FIBER EXPANSION JOINT FILLERS AT EACH SIDE OF DRIVE.
- REMOVE 1" FIBER EXPANSION JOINT FILLERS AT CURB AND BUILDING OR R.O.W. LINE.
- AT DRIVEWAYS WITH CURB & GUTTER, PROVIDE CURB DROP PER MOOT STANDARD PLAN R-28-D, DETAIL "C", EXCEPT, REPLACE 1" JOINT AT BACK OF GUTTER BY A ROUNDED VALLEY. PROVIDE 1/2" FIBER EXPANSION JOINT FILLER.
- AT UNPAVED DRIVE OR PAVED DRIVE WITH POOR CONDITION, INCREASE THE SLAG THICKNESS TO 6" OR EXISTING SLAG THICKNESS MINIMUM 6" LARGER.
- PROVIDE 10" BETWEEN EDGE OF PATHWAY TO TOP OF BANK FOR DETENTION BASINS, OPEN GRABES, ETC.
- ADJACENT FINISHED GRADE SHALL BE SET 2" BELOW TO ACCOMMODATE SOD.



PATHWAY NON-MOTORIZED PATHWAY SKINNING

PATHWAY NON-MOTORIZED PATHWAY SKINNING
DETAIL - 10
NOT TO SCALE

TYPICAL NON-MOTORIZED PATHWAY DETAILS - 11



16\"/>

16" WIDE MAINTENANCE ACCESS DRIVEWAY
DETAIL - 12
NOT TO SCALE



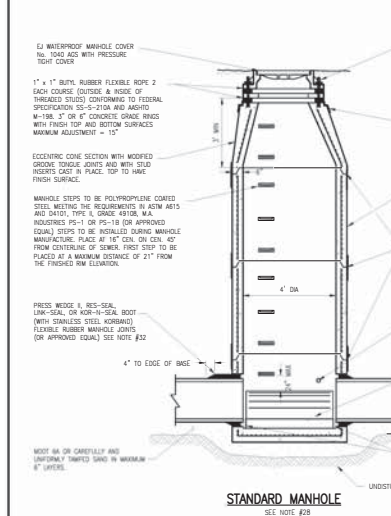
CITY OF NOVI 13150 HAWTHORNE BLVD. NOVI, MI 48240 TEL: 248.848.2000 WWW.CITYOFNOVI.COM	NOVI 13150 HAWTHORNE BLVD. NOVI, MI 48240 TEL: 248.848.2000 WWW.CITYOFNOVI.COM
PROJECT NO. _____	DATE _____
DESIGNED BY _____	DATE _____
CHECKED BY _____	DATE _____
APPROVED BY _____	DATE _____
PROJECT LOCATION CITY OF NOVI, WEST TOWN ROAD (I-96) INTERCHANGE	DATE: JAN 2012
DRAWN BY _____	SCALE: 1" = 4'
CHECKED BY _____	SCALE: 1" = 4'
APPROVED BY _____	SCALE: 1" = 4'
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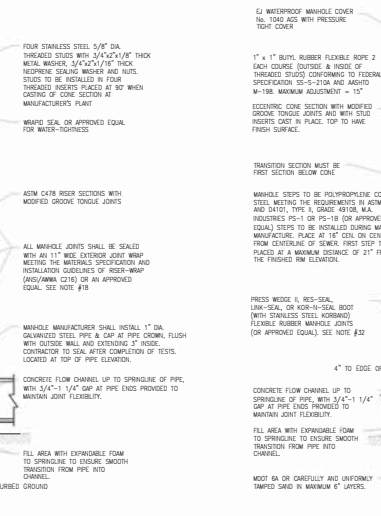
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CITY OF NOVI (458)555-2222 | 4500 E. LAFAYETTE | TROY, MI 48063 | P: (248) 347-0456 | WWW.CITYOFNOVI.COM
 COUNTY: WASHTENAW COUNTY
 DATE: 03/16/2018
 SCALE: V. N.T.S.
 PROJECT: SANITARY SEWER
 SHEET: 1 OF 3

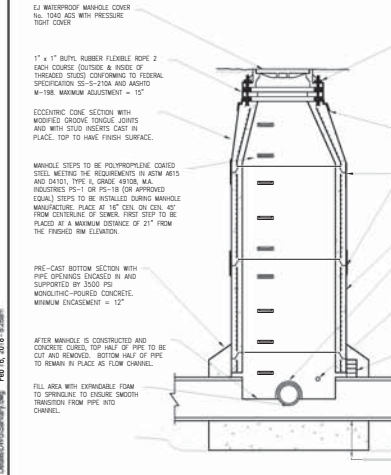


STANDARD MANHOLE
SEE NOTE #28

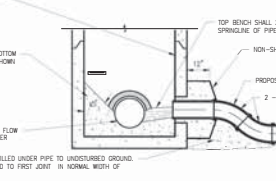


STANDARD OVERSIZED MANHOLE
SEE NOTE #28

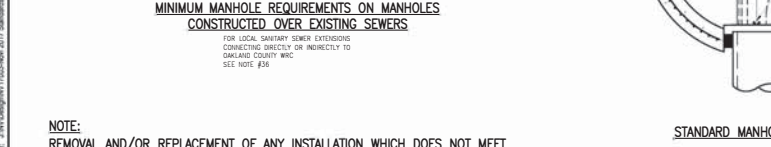
MANHOLE SIZING CHART		
MANHOLE DIA.	MAX PIPE SIZE FOR STRAIGHT THRU INST.	MAX PIPE SIZE FOR RIGHT ANGLE INST.
5'	36"	24"
6'	42"	36"
7'	60"	42"



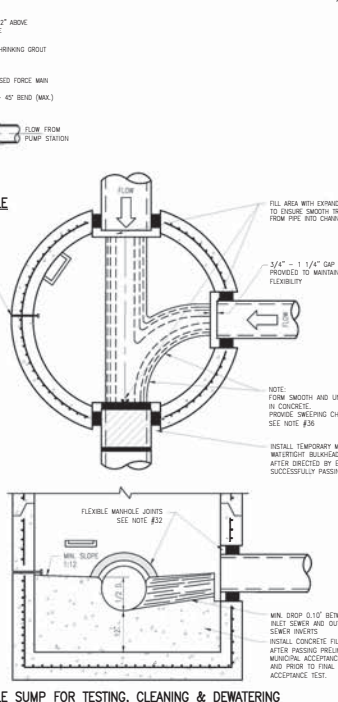
MINIMUM MANHOLE REQUIREMENTS ON MANHOLES CONNECTED OVER EXISTING SEWERS
FOR LOCAL SANITARY SEWER EXTENSIONS CONNECTING DIRECTLY OR INDIRECTLY TO SAGLAND COUNTY WAC. SEE NOTE #36



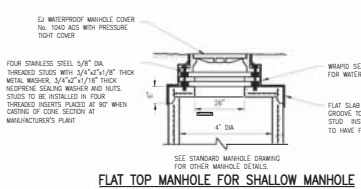
FORCE MAIN DISCHARGE TO EXISTING MANHOLE



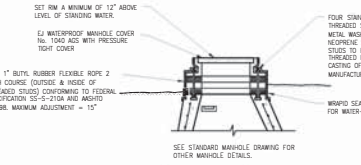
STANDARD MANHOLE CHANNEL



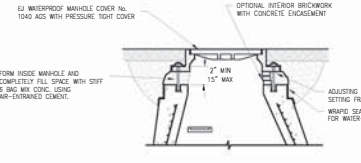
MANHOLE SUMP FOR TESTING, CLEANING & DEWATERING
SEE NOTE #7



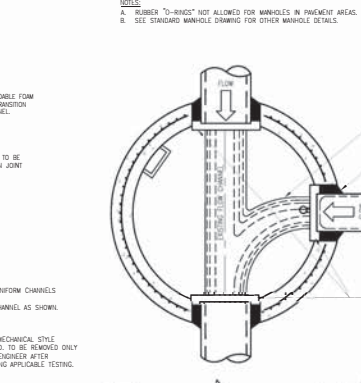
FLAT TOP MANHOLE FOR SHALLOW MANHOLE INSTALLATIONS



CONSTRUCTION DETAILS FOR MANHOLE TOPS WITHIN FLOOD PRONE AREAS



CONSTRUCTION DETAILS FOR MANHOLE TOPS WITHIN PAVEMENT AREAS



TESTING BULKHEAD WITH TAP TO EXISTING MANHOLE
SEE NOTE #7

NOTE:
REMOVAL AND/OR REPLACEMENT OF ANY INSTALLATION WHICH DOES NOT MEET THE CITY OF NOVI DESIGN MANUAL OR THESE STANDARD DETAILS MAY BE REQUIRED AT THE PROPERTY OWNER'S EXPENSE.



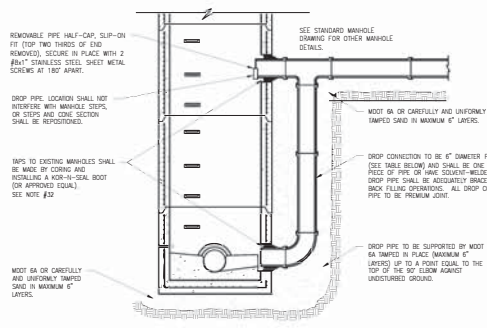
CITY OF NOVI (42718) WEST FARM ROAD, NOVI, MI 48240-3000
 DATE: _____
 DRAWN BY: _____
 CHECKED BY: _____
 APPROVED BY: _____

NOVI
 CITY OF NOVI
 SANITARY SEWER
 STANDARD DETAILS

NOVI
 CITY OF NOVI
 SANITARY SEWER
 STANDARD DETAILS

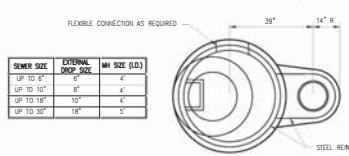
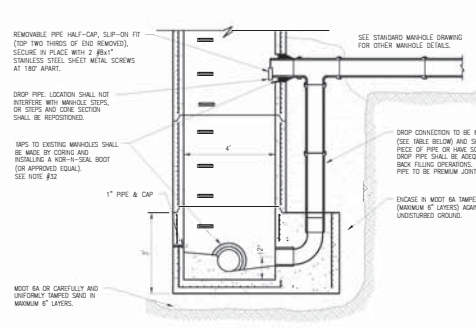
CITY OF NOVI
 SANITARY SEWER
 STANDARD DETAILS

SHEET
 2
 OF 3

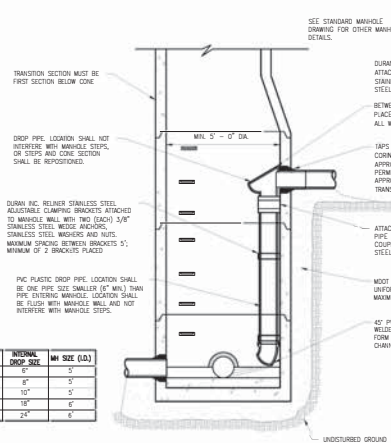


EXISTING MANHOLE EXTERNAL DROP CONNECTION

SEWER SIZE	EXTERNAL DROP SIZE	MIN SIZE (O.D.)
UP TO 6"	6"	4"
UP TO 10"	8"	4"
UP TO 18"	10"	4"
UP TO 30"	18"	5"

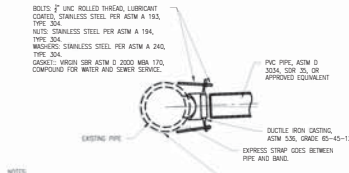


SEWER SIZE	EXTERNAL DROP SIZE	MIN SIZE (O.D.)
UP TO 6"	6"	4"
UP TO 10"	8"	4"
UP TO 18"	10"	4"
UP TO 30"	18"	5"



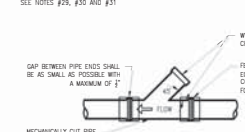
INTERNAL DROP MANHOLE CONNECTION

SEWER SIZE	INTERNAL DROP SIZE	MIN SIZE (O.D.)
UP TO 6"	6"	5"
UP TO 10"	8"	5"
UP TO 18"	10"	5"
UP TO 30"	18"	6"
UP TO 42"	24"	6"



ROMA TAP FOR PVC PIPE

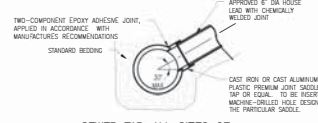
EXTERNAL DROP MANHOLE CONNECTION WITH PRECAST BASE FOR NEW SEWER SYSTEM CONSTRUCTION



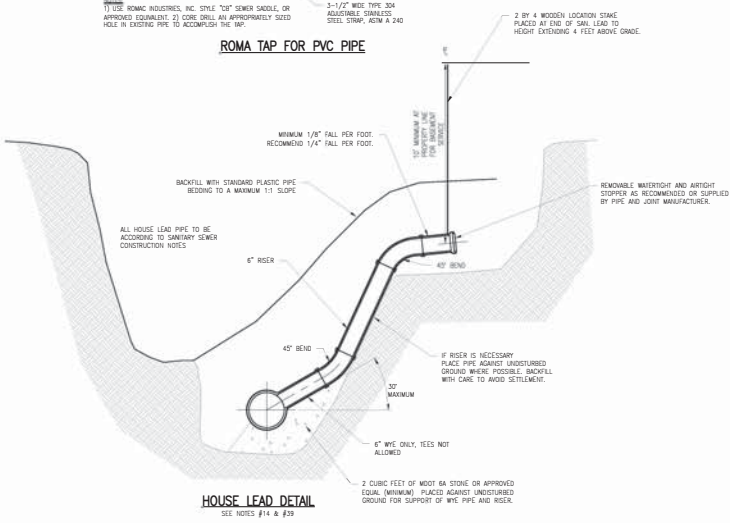
WYE PIPE INSERTION WITH FLEXIBLE COUPLINGS (RIGID PIPE)



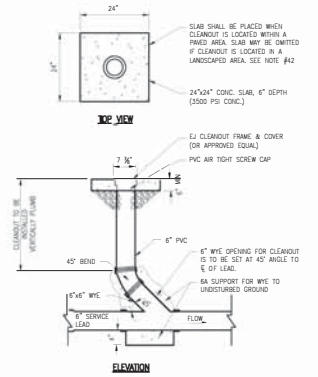
KOR-N-TEE TAP FOR CONCRETE PIPE



SEWER TAP-ALL SIZES OF MAIN SEWER, VITRIFIED CLAY PIPE



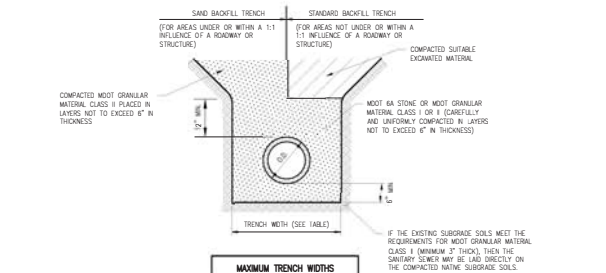
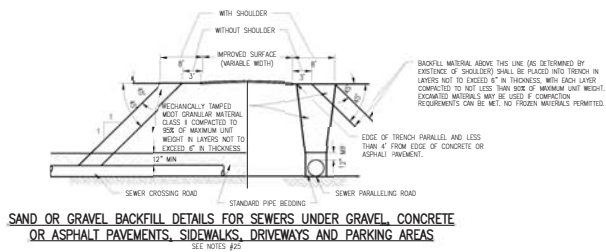
HOUSE LEAD DETAIL



DETAIL OF SANITARY SEWER CLEANOUT

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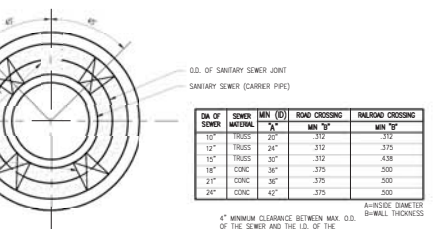
SAND OR GRAVEL BACKFILL DETAILS FOR SEWERS UNDER GRAVEL, CONCRETE OR ASPHALT PAVEMENTS, SIDEWALKS, DRIVEWAYS AND PARKING AREAS



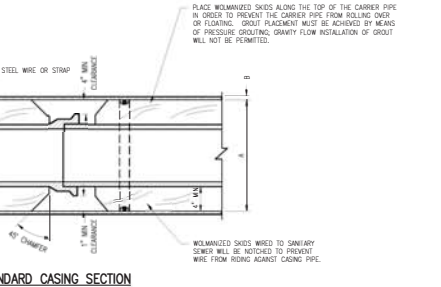
MAXIMUM TRENCH WIDTHS

LD PIPE SIZE	TRENCH WIDTH
UP TO 12"	36"
12" TO 36"	O.D. + 16"
42" OR LARGER	O.D. + 24"

BEDDING AND TRENCH BACKFILL DETAIL

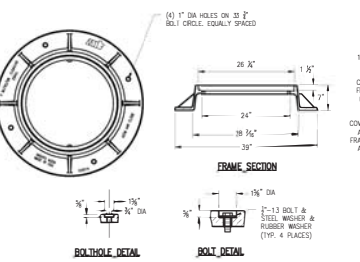
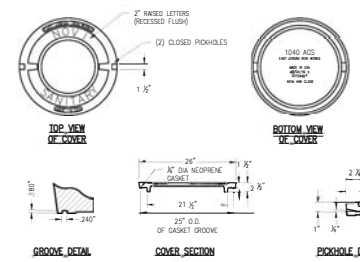
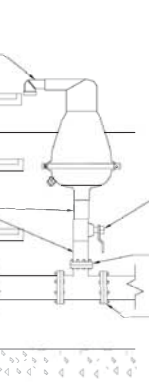


PIPE BARREL SUPPORT FOR SANITARY SEWER CONSTRUCTED IN CASING PIPE



STANDARD CASING SECTION

TYPICAL AIR VACUUM RELEASE VALVE ASSEMBLY

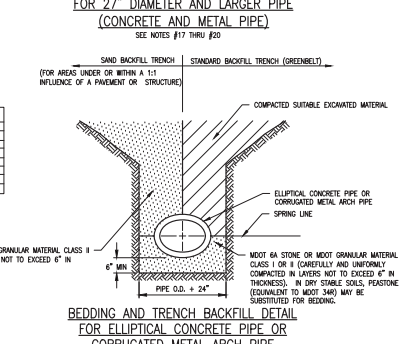
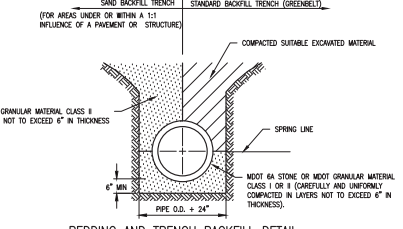
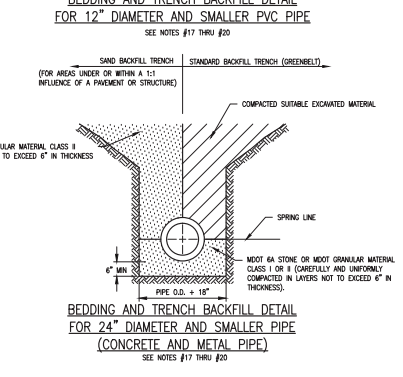
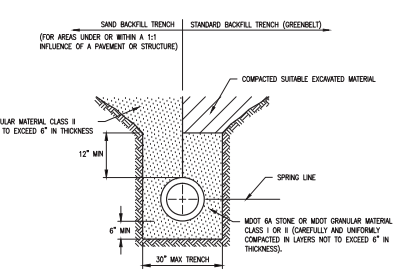
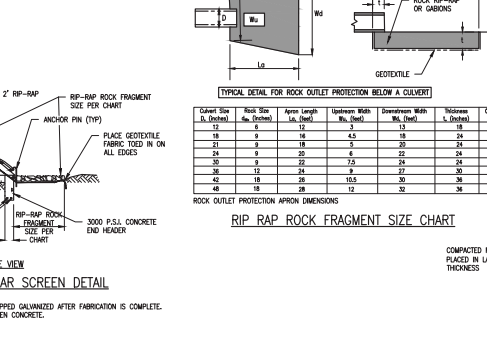
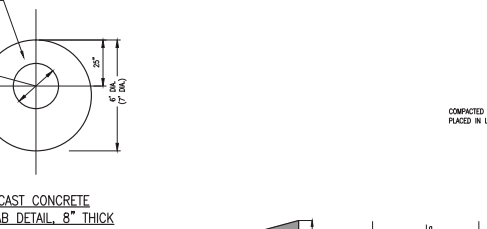
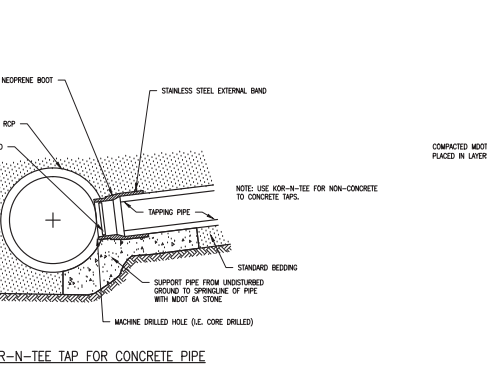
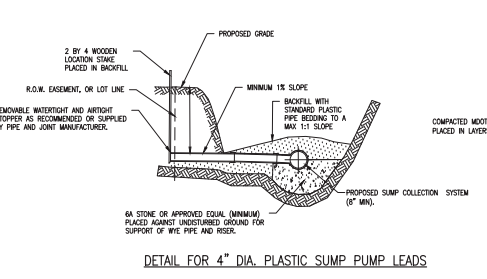
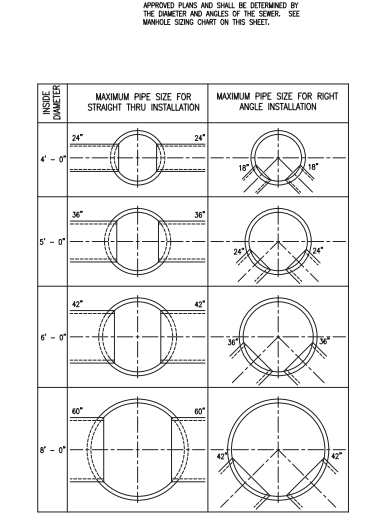
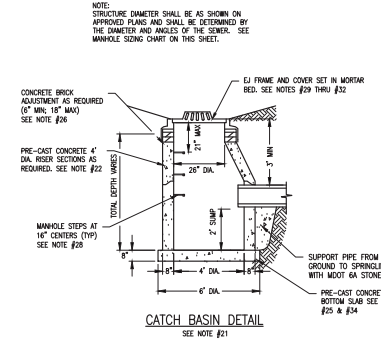
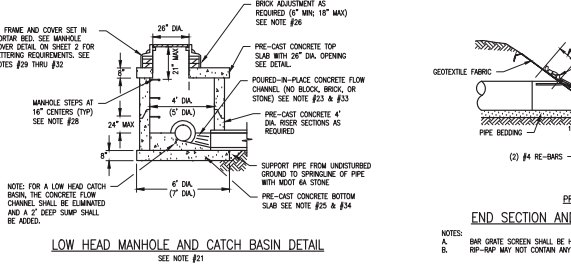
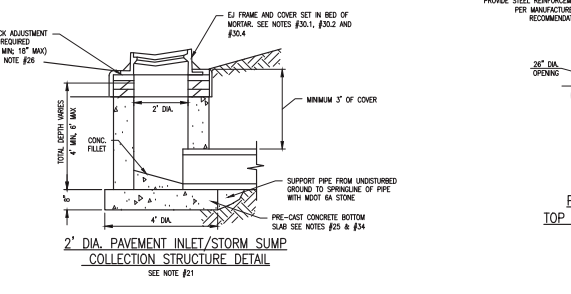
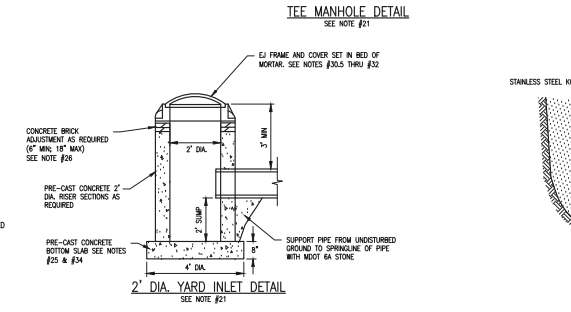
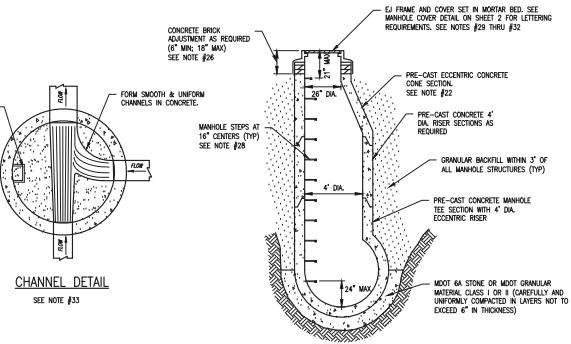
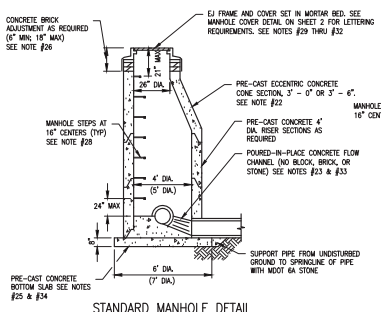


CAST IRON MANHOLE FRAME AND COVER

SANITARY SEWER CONSTRUCTION NOTES

- GENERAL NOTES:**
- All construction shall conform to the current standards and specifications of the City of Novi and the Oakland County Water Resource Commissioner (O.C.W.R.C.). All sanitary sewer construction shall have 100% inspection supervised by a State of Michigan Professional Engineer provided by, or caused to be provided by, the City of Novi. The Contractor shall contact the City Consultant to schedule inspection Two (2) full working days prior to the start of construction.
 - At all connections to O.C.W.R.C. sewers or to extension thereto, and before the start of construction, the Contractor must request and have in his possession an approved Sewer Inspection Permit issued by the O.C.W.R.C. The Contractor shall be responsible for all O.C.W.R.C. charges and shall contact O.C.W.R.C. for their fees, bonds and deposit requirements. The Contractor shall notify the City's Consultant and the O.C.W.R.C. (2400 Ross-110) three (3) full working days prior to the beginning of any construction. Final or test must be witnessed by the O.C.W.R.C. personnel and must be scheduled in advance.
 - Three (3) working days prior to construction, the Contractor shall telephone MS8 DIC (811 or 1-800-452-7171) for underground facilities locations and shall also notify representatives of other utilities located in the vicinity of the work.
 - No ground water, storm water, construction water, downspout drainage or keep the drainage shall be allowed to enter any sanitary sewer.
 - 18 inch minimum vertical separation and 10 foot minimum horizontal separation must be maintained between sanitary sewer and water main.
 - No sewer installation shall have an infiltration exceeding 100 gallons per inch diameter per mile of pipe per 24 hour period and no single run of sewer between manholes shall exceed 100 gallons per inch diameter per mile. All tests in lieu of infiltration tests shall be as specified in O.C.W.R.C. Standards. All testing devices shall be calibrated every six (6) months, with the last certification date provided to O.C.W.R.C. prior to testing. Only Modified Groove (Single, Double, Unique, A-6), Nobel, Ring-In, Fluid-Fill or equivalent, as approved by O.C.W.R.C./City of Novi may be used for sewer joints. All joints shall meet the requirements of ASTM D2081 or C443.
 - All at connections to an existing sewer or to extension thereto, a temporary watertight bulkhead with a threaded, capped or vented 1 inch diameter tap for measuring infiltration shall be provided to be removed only after directed by the engineer. A 12 inch temporary supply and a watertight mechanical bulkhead shall be installed at the first manhole upstream of the proposed connection. The temporary supply shall be fitted in either successful completion of any infiltration test up to the standard field provided for the flow channel, and the bulkhead shall be removed after directed by engineer. Infiltration testing is required for all sewers twenty-four (24) inch diameter and greater, or for all sewer pipe diameters where the ground water level is seven (7) feet above the top of the sewer pipe.
 - When connections are made to sewers carrying fluids, special care must be taken that no part of the work is built under water. A flame or dam must be installed and pumping maintained if necessary, and the new work kept dry until completed and any concrete or mortar has set up.
 - A MSDSD P&ID formatted video of the interior of sanitary sewer 8" or greater in diameter (with top lead hooding) shall be submitted to and approved by the City's Consultant prior to final acceptance. Said video shall be obtained a minimum of 30 days after construction is completed and by a MSDSD P&ID Certified CCTV Contractor. Typical items to be reviewed are the following: joint pipe connections, pipe settlement, lead connections, joints and pipe cleanliness. If the video review reveals unsatisfactory conditions, the Contractor shall correct the condition at his own cost and shall then re-view the affected pipe for review by the City's Consultant.
 - The completed installation shall at no point have out-of-round pipe deflections greater than 5%. Deflection or go/no-go gauging tests will be required prior to sewer acceptance.
 - The materials specified below may be substituted with an approved equal as determined by the City. It is at the sole discretion of the City to determine if a material is acceptable and may be used unless written authorization must be obtained prior to ordering or installing the approved equal.
- SANITARY SEWER NOTES:**
- MATERIALS AND CERTIFICATIONS:**
- Truss Pipe and Fittings shall be as described under the current ASTM D2886. Appendix K of said specification shall be as modified by the bedding requirements outlined below.
 - Solid wall pipe for 8" house connection sewers shall be PVC SDR 25.3 conforming to ASTM D2689 or ASTM D2685. Solid wall pipe shall be installed in accordance with bedding requirements outlined below.
 - Pipe material utilized for force main shall be submitted to and approved by the City prior to installation.
 - All pipe shall be certified by the manufacturer to meet the applicable ASTM specification requirements. Certification forms, together with a report of the test results, shall be provided to the inspector with pipe deliveries and copies shall be forwarded to the Engineer or the Owner. Certification forms shall include project name, location, Contractor, and lot number. Lot sizes shall be acceptable to the Engineer.
 - All pipe and fittings shall be suitably marked to provide manufacturer's name, extension code (including date and location of manufacture), ASTM specification, type of plastic, nominal diameter, and SDR number, where applicable. Fittings however, need not contain the extension code. Pipe shall have a "home" mark. Truss Pipe with an absence of filler material at the ends greater than 1/4" deep shall be subject to rejection or acceptable repair.
 - O.C.W.R.C./City of Novi approved flexible manhole joints shall be used. Where adaptors to other materials are required, only approved adaptors and joints may be used around the pipe.
 - No stop pipe will be allowed for main line sanitary sewer or for sanitary sewer leads.
- BEDDING:**
- Bedding for Truss Pipe and solid wall pipe shall be in accordance with the current ASTM D2321, except: (1) only MOC Class 1 and Class II granular materials or MOC BA stone may be used; (2) application of bedding shall be done to the top of pipe, and (3) bedding or bedding shall not be used. The use of flexible and semi-flexible pipe requires that the bedding provide any needed side support and complete bedding contact under pipe haunches. Bedding material must be properly placed and compacted to provide lateral restraint against deflection of the pipe diameter. Pipe must be bedded to the true line and grade throughout its length. Bell holes shall be provided where required.
 - Where available bottoms are encountered, the Contractor shall undercut to stable ground and construct a foundation consisting of MOC BA stone to act as an impervious mat to prevent migration or vertical movement of unstable soils or bedding materials. Where trench sheeting, piles, or a trench box are used due to severe ground conditions, all voids to the side and below the top of the pipe caused by the sheeting, piles, or box shall be completely filled and the supports left in place below the top of the pipe.
 - Due to potential damage to interior walls of Truss Pipe or solid wall pipe, particularly under cold weather conditions or when frozen material or large objects strike the pipe, the Contractor shall carefully avoid dumping any materials other than approved bedding sand or stone in the pipe until 15" concrete is placed on it, particularly under cold weather conditions. Pipe walls and ends shall also be protected from abrasion and damage during handling, and must be fully inspected just prior to placing in the trench.
- CUTTING AND HANDELING:**
- Cutting of pipe lengths, where required, shall be performed with tools or equipment that will provide a neat, perpendicular cut without damage to the plastic or the fiber material. All burrs shall be removed by the use of a file, buff, or abrasive paper. Spigot ends on cut pipe shall be beveled similar to factory beveling to prevent joint damage.
 - Banding or wrapping of Truss Pipe or solid wall pipe can occur with temperature fluctuations. The Contractor shall store and protect the pipe to minimize banded. Banded 12" or longer pipe lengths having deviations from straight greater than 1", as measured along a straight line, shall be used.
- STRUCTURAL NOTES:**
- All new manholes shall have O.C.W.R.C./City of Novi approved flexible, watertight manhole joints pass-through walls. Manholes shall be precast sections with modified tapered and groove joints with rubber gaskets and shall conform to ASTM C495. Precast manhole sections shall be O.C.W.R.C./City of Novi approved modified concrete core type. All manholes shall be provided with watertight covers.
 - All at connections to manholes on O.C.W.R.C. sewers or extensions thereto, interior drop connections will be required when there is a difference in invert elevations. The difference in the lowest elevations at a drop connection must be a minimum of 18". If an 18" minimum cannot be obtained, the sewer must be made steeper to create a positive matching invert elevations at the connection.
 - All sewer manholes requiring an exterior drop connection shall be constructed using a manhole box with a precast drop as shown on sheet 2 of these details.
 - Wherever existing manholes are to be topped, the top shall be made by coring. The contractor shall place a ROR-N-SOL boot (or approved equal) after coring is completed. Fluid drilling will only be permitted in lieu of coring with prior approval from both O.C.W.R.C. and City of Novi.
 - All manholes constructed or adjusted as part of the system maintained by the City of Novi shall be provided with watertight covers as depicted on this detail sheet.
 - New manholes constructed directly on O.C.W.R.C. sewers shall be provided with covers reading "Oakland County Water Resources Commissioner - Sanitary" in raised letters per detail in the O.C.W.R.C. specifications.
 - New manholes built over any existing sanitary sewers shall have monolithic poured bottoms.
 - A proper channel shall be constructed within the existing structure of the connection point to the existing system. Channel shall be constructed to create the least amount of turbulence. Any portion of the existing structure which would interfere with such construction shall be removed. When forming a concrete channel in a precast structure that utilizes a flexible joint pipe connector, the channel shall be placed so as not to interfere in any way with the flexibility of the joint. The channel shall be constructed the same size as the inside diameter of the existing pipe.
- SEWER SEWER LEAK NOTES:**
- All building leak work must be performed under City of Novi Inspection. The Department of Public Service conducts inspection of lead from main sewer to ROW line. The Building Department conducts inspection of lead from ROW line to building connection.
 - No sanitary sewer may be used as a downspout outlet.
 - All building leads and risers shall be 6" SDR 25.3 PVC with rubber gasket joint (ASTM D2685), or a City of Novi approved equal pipe and joint. Sewer pipe weep openings shall contain factory installed premium joint material of the type identical to that of the building lead pipe used. Building leads will be furnished with removable or tight and watertight stoppers. Taps to existing PVC or Truss Pipe shall be made with eye saddle taps.
 - Where an existing building lead is being extended, dual-size types and sizes of pipe shall be joined using an O.C.W.R.C./City of Novi approved adaptor. Allowable types of sewer pipe adaptors are the Femco Adaptor or the Femco Flexible Coupling.
 - Field taps of existing sanitary sewers shall be made by installing a weep fitting for house connections. Femco fittings with stainless steel bands shall be used to secure the weep fitting to the sanitary sewer pipe. Bedding for house connection sewers shall conform to the weep of the main sewer fitting. Risers in deep and unstable trenches shall be bedded in MOC BA stone, or an approved equal, to avoid settlement. Concrete shall not be used for bedding. End caps or sleeves shall be broed or epoxied to withstand soil lat pressures. Caps or plugs shall not be chemically welded in place.
 - Where sanitary sewer cleanouts fall within a paved area (parking lot, service drive area, etc.), the cleanout shall have a cast iron cover that is contained in a 2'x2' (min.) concrete slab having a compressive strength of 3000 psi at 28-day cure time.

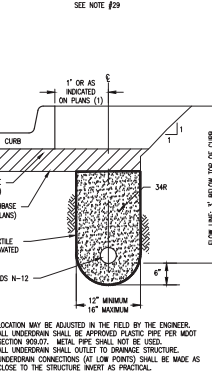
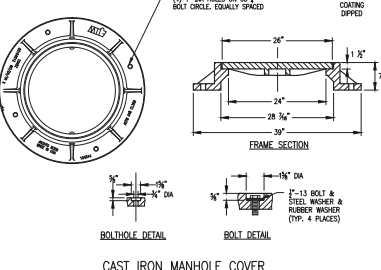
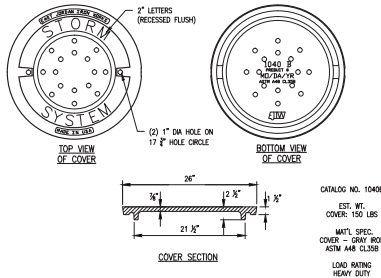
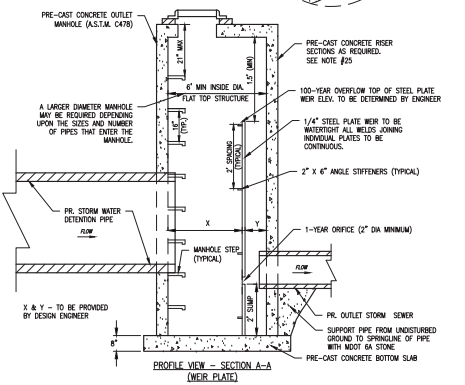
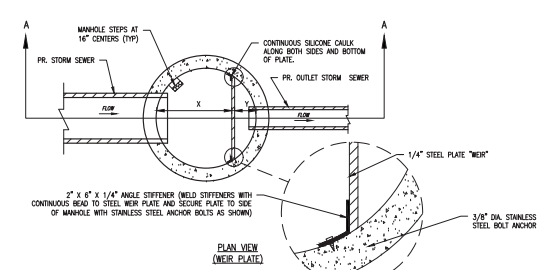
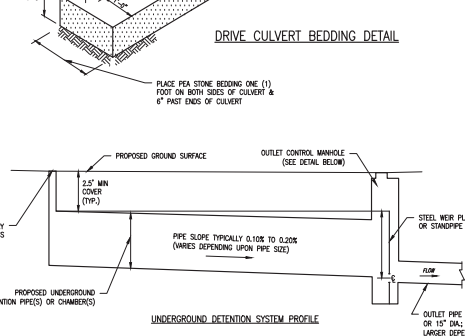
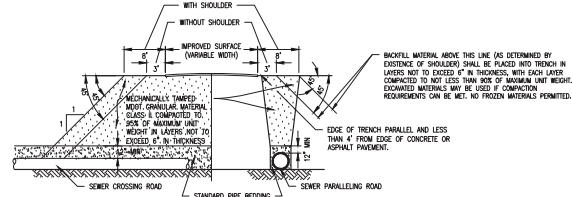
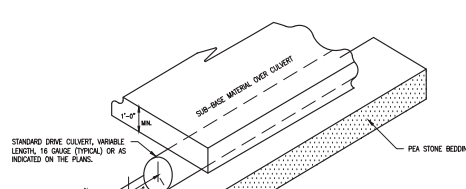




TYPICAL DETAIL FOR ROCK OUTLET PROTECTION BELOW A CULVERT

Culvert Size (D, Depth)	Rock Size (D, Depth)	Apron Length (L _a , Feet)	Upstream Width (W _u , Feet)	Downstream Width (W _d , Feet)	Thickness (H, Inches)	Quantity (Cu Yds)
12	6	17	2	13	18	15
18	9	16	4.5	18	24	20
24	9	18	5	20	24	26
24	9	20	6	22	24	40
30	9	20	10	24	24	75
36	12	24	8	27	30	100
42	18	25	16.5	30	36	160
48	18	28	12	32	36	215

ROCK OUTLET PROTECTION APRON DIMENSIONS

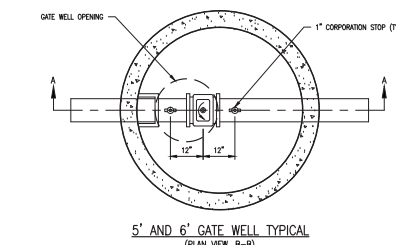
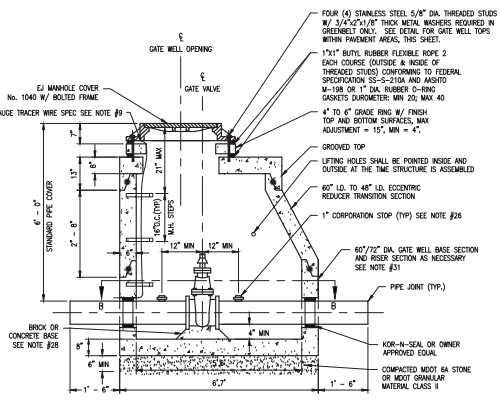


STORM SEWER CONSTRUCTION NOTES

- GENERAL NOTES:**
- All materials and workmanship shall be in accordance with the standards and specifications of the City of Novi.
 - No storm sewer to be installed without the City's inspector present.
 - Three (3) working days prior to construction, the Contractor shall telephone MISS DE (981 or 1-800-482-7171) for underground facilities locations and shall also notify representatives of other utilities located in the vicinity of the work.
 - Trenches that are to be left open overnight shall be enclosed with suitable fencing and lighted barricades.
 - The materials specified below may be substituted with an approved equal as determined by the City. It is at the sole discretion of the City to determine if a material is acceptable and can be utilized. Written authorization must be obtained prior to ordering or installing the approved equal.
- STORM SEWER NOTES:**
- Type and class of pipe shall be as specified on plans.
- Concrete Pipe Requirements**
- All masonry concrete pipe (MCP) shall meet the requirements of ASTM C78 with modified tongue and groove joints with rubber gaskets manufactured to meet the requirements of ASTM C443. Catch basin sewers shall be Class IV RCP.
 - The inside joint of pipe over 36" diameter shall be pointed with mortar upon completion of bedding operations.
 - All elliptical reinforced concrete pipe shall meet the requirements of ASTM C507 with tongue and groove joints with Whitnouth (Detail #10) joint material meeting the requirements of C443. Elliptical concrete pipe joints shall also be wrapped per ASTM C877. In addition, elliptical concrete pipe of 42" equivalent size and larger shall require inside concrete pointing.
- Plastic Pipe Requirements**
- Per City standards, the maximum allowable pipe size for plastic storm sewer is 12" diameter. Larger diameter plastic storm sewer may be approved by the City, depending on site conditions.
 - All plastic storm sewer pipe shall have a smooth interior.
 - PVC pipe shall meet the requirements of ASTM D3034 and F949 with push-on joints meeting the requirements of ASTM D3212 and F477.
 - HDPE pipe shall meet the requirements of MS070 M294 and ASTM D3550 with push-on type joints meeting the requirements of ASTM D3212 and F477.
 - ADS pipe shall meet the requirements of MS070 M294 and ASTM F2306 with joints meeting the requirements of MS070 M294, MS070, or F2306.
 - Plastic pipe will not be permitted in the right-of-way.
- Bedding Requirements**
- Bedding shall be used as called for on the details.
 - Where untoward ground conditions are encountered, stone bedding shall be used as directed by the Engineer in order to provide a stable foundation for pipe and manholes.
- Backfill Requirements**
- Backfill shall be compacted above pipe as indicated on construction drawings. Trench backfill shall be of a suitable material and shall be free of any organic materials and rocks larger than 3" in size. Backfill shall be rammed into trench and compacted with a small roller or other approved method.
 - Where trench is within a 1:1 influence of streets, alleys, sidewalks, driveways, parking areas and structures, sand backfill shall be used which shall consist of most granular material class II compacted in layers not to exceed 4" in thickness to a density of 98% as determined by MS070 T95.
 - When backfilling trench of PVC or HDPE pipe, manufacturer's specifications must be strictly adhered to.
 - No frozen material shall be buried more than 4" below the final elevation of the ground.
- Drainage Structure Requirements:**
- Shop drawings shall be submitted to and approved by the City's Consultant for each proposed structure prior to installation.
 - Recent reinforced concrete structures with modified tongue and groove joint and rubber gaskets shall conform to ASTM C-478. Concrete section shall be eccentric and have stud inserts cast in place with a flush top surface.
 - Pipe shall be flush with the inside wall of structure and shall not protrude more than 4" into the structure. Pipe shall be pointed up inside and outside with a smooth fillet at its intersection with the structure wall.
 - No openings shall be made in precast units which would leave less than 6" of undisturbed precast structure wall between pipes (as measured between outside pipe
- Walls**) or would remove more than 40% of the circumference along any horizontal plane.
- Precast floor placed on the concrete base shall be set in a full bed of mortar. All joints & finishes shall be pointed up with mortar on the outside and inside.
 - Plaster all outside masonry surfaces with 1/2" masonry cement (Type II) 1/2" thick.
 - All manholes and catch basins shall be 4' or 5' in diameter unless otherwise indicated on construction drawings. Lower diameter drainage structures (8", 10", 12", 15", and 18" diameter) may be needed for large storm sewer pipe or for situations where the angles between existing pipes require a larger diameter structure. In order to maintain at least 4" of structure wall between the pipes, 2" diameter catch basins and inlets may be used where approved by the City Engineer.
 - Structural steps are to be installed at the plant by the manufacturer of the structure. The steps are to be 16 inches on center located 97 from the centerline of the main sewer line. The steps shall be made of No. 4 deformed steel rod encased with copolymer polypropylene plastic and must meet the requirements of ASTM D4101, Type II, Grade 49108 or approved equal.
 - Manhole frame and cover shall be EJ 1040, type "B" 16 hole cover or as per construction drawings. Lettering shall be per detail site sheet.
 - Catch Basin and Inlet frame and cover shall be:
 - EJ 7045, type "M" cover and type "T1" back set (also "Dump No Waste" logo) with straight face curb and gutter.
 - EJ 7065, type "M" cover and 7060 "T1" back set (also "Dump No Waste" logo) with mountable curb and gutter and integral curb and gutter.
 - EJ 1040, type "T2" cover (beetle grate) to be used on structures located in ditches, swales and rear yard catch basins. If within 8' of road, type "T2" cover (beetle grate) shall be used. If 1040 casting is used in pavement, type "M1" grate must be provided.
 - EJ 1000, type "X" solid cover to be used on all 2' diameters and structures not located at storm water collection points. EJ 1000, type "X" solid cover may also be used on sump pump collection structures.
 - EJ 1000, type "Y1" cover (beetle grate) to be used on all 2' structures located in ditches, swales and rear yard catch basins.
 - The City reserves the right to require a change in structure covers upon final grade and walk-through inspection if deemed necessary due to site conditions.
 - Frames shall be set in full bed of mortar and the side shall be developed to prevent leakage.
 - A proper channel shall be constructed within the existing manhole or other structure at which the connection is to be made to direct the flow to the existing outlet in a manner that will tend to create the least amount of turbulence. The channel shall be constructed to the same size as the inside diameter of the existing pipes, and shall be built to height of 1/3 the existing pipe diameter with a minimum of six steps on the benches.
 - Concrete base for manhole, catch basin, and inlet shall be MSOT grade 309, 8" thick, 3000 psi.
 - When tapping into an existing structure a brick color shall be placed 12" thick around the pipe and extended 15" beyond the opening. If pre-cast section is tapped, bond mesh and use as reinforcement with brick color. Taps through structure joints or cone sections are prohibited unless approved by the City.
 - The final acceptable structure prior to discharge into a forebay or detention basin shall contain a permanent 4" deep sump.
 - A 4" diameter Oil/Gas Separator Structure shall be installed prior to discharge into a forebay, detention basin or open drainage course as directed by the City.
- SUMP PUMP LEAK REQUIREMENTS:**
- All sump pump leaks connected to a drain shall be pre-manufactured.
 - Sump pump leads shall be (1) PVC Sch. 40 (2) PVC Truss Pipe, or (3) approved equal, with permanent joints.
 - Sump collection system pipes shall be connected at drainage structures and shall be bored or precast. Taps to 12" storm sewer may be made with a Fernco EZ Tap or approved equal. Taps to other size storm sewer may be made with a Fernco, sdnco, WDR-N-TEE lateral connector for concrete pipe, or approved equal.
 - Ends of all 4" sump pump leads shall be temporarily capped and their location stated, whenever not required.
 - All sump pumps leads are to be taken to the property line, easement line or as indicated on the plan.
 - Sump pump deposits shall be a minimum inside diameter of 2" and be constructed of changes of alignment ends of sump pump leads or as indicated on approved plans.
- Oil/Gas Separator Detail for 18" Diameter and Smaller Outlet Pipe**
- (FOR OUTLET PIPES LARGER THAN 18" IN DIAMETER AN ALTERNATE DESIGN MUST BE APPROVED BY THE CITY ENGINEER)
- SEE NOTE #37
- RETAIL 2" VENT PIPE ON 8" BULKHEAD TO RELIEVE VACUUM PRESSURE. HEIGHT OF VENT PIPE SHALL BE 2' IN LENGTH. VENT PIPE TO BE FASTENED TO THE INSIDE WALL OF THE STRUCTURE. AT LEAST ONE FASTENER IS REQUIRED.
- SCH. 40 PVC (90° ELBOW) SIZE OF ELBOW VARIES DEPENDING UPON SIZE OF OUTLET PIPE BUT MAY NOT BE MORE THAN ONE PIPE SIZE SMALLER THAN OUTLET PIPE
- BULKHEAD
- CONC. PIPE INLET
- CONC. PIPE OUTLET
- MIN 12" LENGTH OF PVC SLEEVE GROTTED INTO PLACE
- MANHOLE STEPS AT 16" CENTERS (TYP) SEE NOTE #32
- 5' OR 6" DIA. MIN.
- 8"
- PROFILE VIEW
- PLAN VIEW
- INLET
- OUTLET

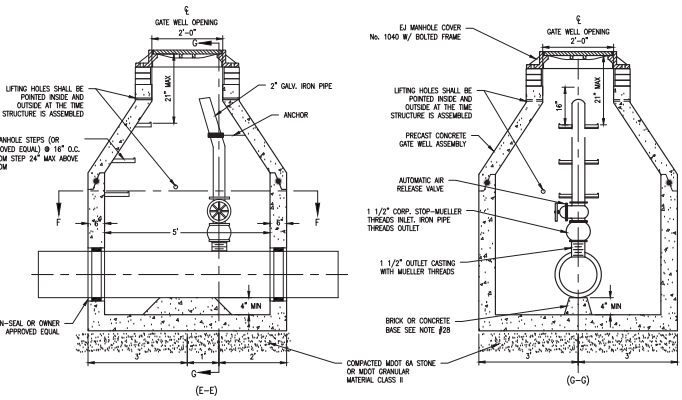


CITY OF NOVI	DATE	SCALE	COUNTY	PROJECT NAME	PROJECT NO.
CITY OF NOVI 555 WEST WALKER ROAD, SUITE 200, NOVI, MI 48240		V. N.T.S.	OAKLAND COUNTY	STORM SEWER	2123200
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	APPROVED BY	
JUN 2012	JUN 2012	JUN 2012	JUN 2012		



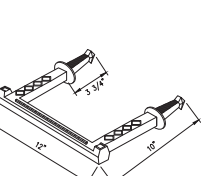
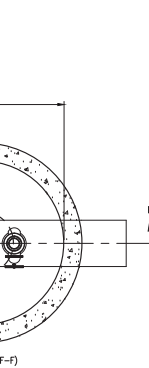
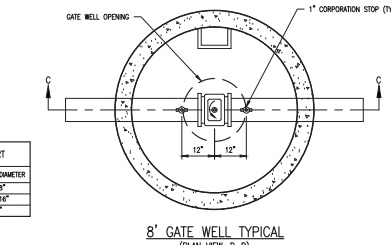
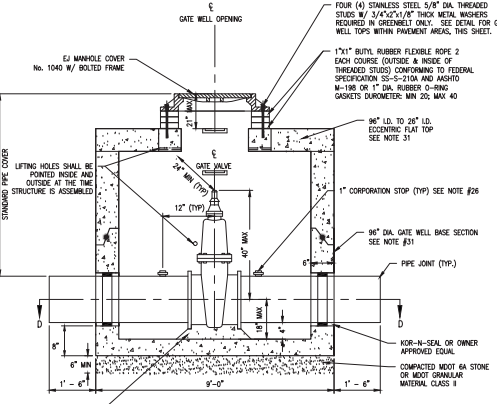
GATE WELL SIZING CHART

MINIMUM GATE WELL INSIDE DIAMETER	WATER MAIN DIAMETER
5'	6" - 8"
6'	12" - 16"
8'	18" - 24"



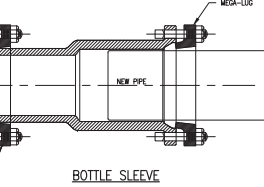
STANDARD AIR RELEASE VALVE & WELL

NOTE: ALL AIR RELEASE VALVES SHALL BE AUTOMATIC PER CITY OF NOVI REQUIREMENTS.



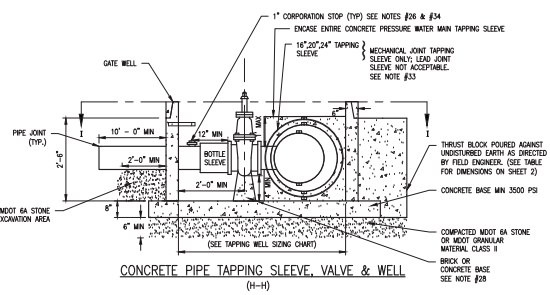
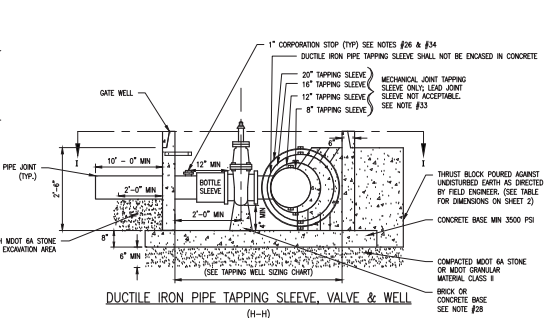
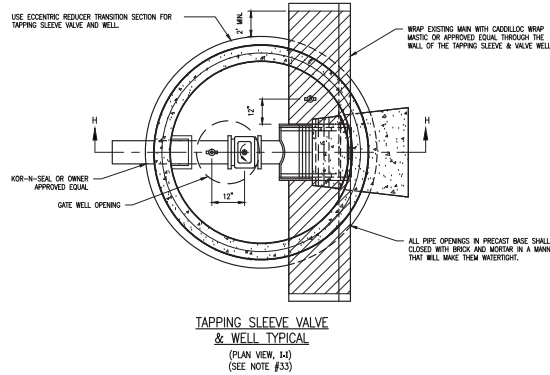
MANHOLE STEP

NOTE: MANHOLE STEPS TO BE POLYPROPYLENE COATED STEEL MEETING THE REQUIREMENTS IN ASTM A615 AND A4101. TYPE II GRADE 4019C B.A. INDUSTRIES PS-1 OR PS-1B (OR APPROVED EQUAL) STEPS TO BE INSTALLED DURING MANHOLE MANUFACTURING. PLACE 10" CELS OR CCL 407 FROM CENTERLINE OF WATER MAIN. FIRST STEP TO BE PLACED AT A MAXIMUM DISTANCE OF 24" FROM THE FINISHED FINE ELEVATION.



BOTTLE SLEEVE

NOTE: TOLER UNION MJ x PE DUAL-PURPOSE CUTTING-IN SLEEVE OR APPROVED EQUAL.



TAPPING SLEEVE SIZING CHART

MINIMUM GATE WELL INSIDE DIAMETER	WATER MAIN DIAMETER
5'	6" - 8"
6'	12" - 16"
8'	18" - 24"



GATE WELLS TOPS WITHIN PAVEMENT AREAS

NOTE: RUBBER O-RINGS SHALL NOT BE USED IN PAVEMENT.



CITY OF NOVI (WEST TOWLE ROAD) (NOVI, MICHIGAN) (P. 488) (AFC-06) (WWW.CITYOFNOVI.ORG)
 DATE: _____
 REVISION: _____
 COUNTY: _____
 TOWN: _____
 PROJECT: _____
 DRAWN BY: _____
 CHECKED BY: _____
 DATE: 10/20/2018
 PROJECT: 17002008
 PLANNING DEPARTMENT
 N. N.E.S. SCALE: _____
 Y. N.T.S.

**CITY OF NOVI
 WATER MAIN
 STANDARD DETAILS**

BEND ANGLES (degrees)		PIPE DIAMETER (inches)													
		3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"
11.25°	1	2	2	3	4	4	5	6	7	7	9	11	13	15	
22.5°	3	3	5	6	8	9	10	12	13	15	17	21	25	29	
30°	4	4	6	8	10	12	14	16	18	20	23	29	34	40	
45°	6	7	10	13	16	19	22	25	28	31	36	45	53	61	
60°	8	10	14	18	22	26	30	34	39	43	51	62	74	85	
90°	14	17	24	31	38	46	53	60	67	74	88	108	128	148	
Unit Frictional Force (ft/lbs)		124	151	217	284	349	415	481	547	613	679	811	1,005	1,203	1,398
Unit Bearing Resistance (ft/lbs)		152	185	268	354	437	523	611	699	789	879	1,064	1,344	1,639	1,939

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)

PIPE DIAMETER OF BRANCH RUN (inches)		PIPE DIAMETER OF MAIN PIPE RUN (inches)													
		3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"
3"	8	7	6	4	2	1	0	0	0	0	0	0	0	0	
4"	10	9	6	6	5	3	2	0	0	0	0	0	0	0	
6"			16	15	14	13	12	11	10	9	7	4	1	0	
8"				22	22	21	20	19	19	18	16	14	11	8	
10"					28	27	27	26	26	25	24	22	19	17	
12"						34	33	33	32	32	31	29	27	25	
14"							40	39	39	38	37	36	35	33	
16"								45	45	45	44	43	41	40	
18"									52	51	51	49	48	47	
20"										58	57	56	55	54	
24"											69	68	68	67	
30"												87	86	85	
36"													104	104	
42"														122	
Unit Frictional Force (ft/lbs)		249	302	434	569	697	829	961	1,093	1,225	1,357	1,621	2,011	2,406	2,796
Unit Bearing Resistance (ft/lbs)		152	185	268	354	437	523	611	699	789	879	1,064	1,344	1,639	1,939

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)

BEND ANGLES (degrees)		PIPE DIAMETER (inches)													
		3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"
11.25°	1	2	2	3	4	4	5	6	7	7	9	11	13	15	
22.5°	3	3	5	6	8	9	10	12	13	15	17	21	25	29	
30°	4	4	6	8	10	12	14	16	18	20	23	29	34	40	
45°	6	7	10	13	16	19	22	25	28	31	36	45	53	61	
60°	8	10	14	18	22	26	30	34	39	43	51	62	74	85	
90°	14	17	24	31	38	46	53	60	67	74	88	108	128	148	
Unit Frictional Force (ft/lbs)		124	151	217	284	349	415	481	547	613	679	811	1,005	1,203	1,398
Unit Bearing Resistance (ft/lbs)		152	185	268	354	437	523	611	699	789	879	1,064	1,344	1,639	1,939

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)

DIAMETER OF SMALLER PIPE (inches)		DIAMETER OF LARGER PIPE (inches)												
		3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"
3"		4	13	21	27	34	40	46	53	59	71	89	107	124
4"			10	18	25	32	39	45	52	58	70	88	106	124
6"				11	19	27	34	41	48	55	67	86	104	122
8"					11	20	29	37	45	50	64	83	102	120
10"						11	20	29	37	45	59	79	99	117
12"							11	21	30	38	54	75	95	114
14"								11	21	30	47	69	91	110
16"									11	21	40	63	85	106
18"										11	31	57	80	101
20"											22	49	73	96
24"												31	59	83
30"													33	60
36"														32
42"														
Unit Frictional Force (ft/lbs)		302	434	569	697	829	961	1,093	1,225	1,357	1,621	2,011	2,406	2,796

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)

BEND ANGLES (degrees)		PIPE DIAMETER (inches)													
		3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"
11.25°	2	3	4	5	6	7	8	10	11	12	14	18	21	25	
22.5°	4	5	8	10	12	15	17	19	22	24	29	36	43	50	
30°	6	7	10	14	17	20	23	26	29	33	39	48	58	67	
45°	9	11	16	21	26	31	36	41	45	50	60	75	89	104	
60°	13	16	22	29	36	43	50	57	63	70	84	104	124	145	
90°	22	27	39	51	62	74	86	98	110	122	145	180	215	250	
Unit Frictional Force (ft/lbs)		124	151	217	284	349	415	481	547	613	679	811	1,005	1,203	1,398
Unit Bearing Resistance (ft/lbs)		152	185	268	354	437	523	611	699	789	879	1,064	1,344	1,639	1,939

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)

Pipe Diameter (inches)	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"
	Restraint Length (feet)	11	14	19	25	31	37	43	49	55	61	73	90	108
Unit Frictional Force (ft/lbs)	249	302	434	569	697	829	961	1,093	1,225	1,357	1,621	2,011	2,406	2,796

Assumptions: Cover = 6.0 feet
 Design Pressure = 150 psi
 Safety Factor = 1.5
 Laying Condition = Type 3
 Soil Designation = Clay 1
 Non-Polywrapped Pipe

* Data Table acquired from the Ductile Iron Pipe Research Association (DIPRA)



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 11500 WOODLAND AVENUE, SUITE 100
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HIGH-DENSITY POLYETHYLENE (HDPE) WATER MAIN NOTES

In addition to the water main notes listed on sheet 3 of the standard details, the following notes all apply to construction projects using HDPE water main:

1. HDPE pipe, appurtenances, and installation methods shall conform to the most current edition of AWWA standard C306.

2. HDPE pipe shall be manufactured out of virgin material as defined in ASTM D3500. The pipe shall be made from high density PE 100 polyethylene resin and the material used must be listed and approved for use under NSF/ANSI Standard 14 and 61. HDPE pipe shall have a standard dimension ratio (SDR) of 11 or less, a hydrostatic design basis (HDB) of 1600 psi for water at 73.4°F and a minimum working pressure rating of 160 psi. No remark except that obtained from the manufacturer's own production of the same formulation shall be used. The pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign materials, blisters, or other deleterious faults. A "Certificate of Compliance" shall be furnished for all materials supplied.

3. The physical appearance of the pipe having deformations such as concentrated ridges, discoloration, excessive spot roughness, pitting, varying wall thickness, etc. shall constitute sufficient basis for rejection. Pipe with gashes, nicks, abrasions or any physical damage that occurred during storage and/or handling which are wider or deeper than 10% of the wall thickness shall not be used and must be removed from the construction site. Any pipe that has been damaged or does not meet the City's approval shall be replaced at the Contractor's expense.

4. Mechanical fittings used with HDPE pipe shall be specifically designed for or tested and found to be acceptable for use with HDPE by the fitting manufacturer. Mechanical fittings designed for other materials shall not be used.

5. Water service saddles on HDPE water main shall be "W" Distribution Service Saddles by Friction, Inc. or approved equal.

6. The mechanical joint fittings must conform to outside diameter requirements of ANSI/AWWA C111/A21 or ANSI/AWWA C153/A21.5.3 depending size. But fusion fittings shall meet AWWA C306 dimensional requirements.

7. Bells, nuts, gaskets, and glands meeting ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.5.3 are required. Mechanical joint components shall be installed in accordance with manufacturer's recommendations.

8. Pipe and fittings must be marked as prescribed by AWWA C306 and NSF. Pipe markings shall include nominal size, OD, bore, diameter ratio, pressure class, manufacturer's name, AWWA C306, material code designation PE 100, manufacturer's name, manufacturer's production code including day, month, year, extruder, and manufacturer's plant and extrusion line, and NSF logo. Permanent identification of piping shall be provided by co-extruding longitudinal blue stripes into the outside surface of the pipe (before printed or painted shall be acceptable) or the pipe material shall be black with a blue shell.

9. Tracing wire shall be provided for all water main, regardless of pipe material. Brass wedges are not permitted. Wire shall be copper, 8-gauge stranded, blue insulated per City requirements, or Copeland Industries #8 AWG Blue Coated shielded steel wire strength tracer wire. Connection is required at all service nodes, hydrants, and gate wells. Wire shall be brought through each gate well and connected to the top side. All wire exposed above ground surface shall be encased in 1" metal conduit. The conduit should extend 12" below the ground surface. Conduits shall be tested by the contractor prior to acceptance of the main. All splices shall be made using a gel-coe product which provides a water proof seal, such as 304 Direct Bury Splice US or approved equal. Sanitary Sewer Force Main, Directional Drilled Water Main and Bore & Jack Water Main must be provided with two tracer wires per above specifications. For sanitary sewer force main applications the tracer wire must be installed up the side of the sanitary structure, to inside the structure by joining the tracer wire between the ceiling and adjustment.

10. Personnel involved in the use of built-in fusion equipment shall perform the joining of polyethylene pipe by methods recommended for new pipe connections. Personnel directly involved with installing the new pipe shall have received training in the proper methods for handling and installing the HDPE pipe by a qualified representative and certification of this training shall be provided to the City.

11. Connections to HDPE pipe shall not be made immediately after the pipe has been installed. The fused pipe should be laid in the trench and be allowed to reach an equilibrium temperature overnight (24-hour period) in its surrounding environment.

12. The HDPE pipe must be properly aligned at all transitions to conventional or HDPE water main and appurtenances.

13. The polyethylene pipe shall be pressure tested after the line and all fittings and valves have been installed. Connections may be inspected for fluid leak inspection. Under no circumstances shall HDPE pipe be pressure tested when the temperature of the pipe is above 80°F.

14. Connection to an existing water main shall be made only after pressure and bacteriological test have been successfully completed. The City contractor must be present for the test and review the results. Testing and disinfection procedures shall meet the requirements of ANSI/AWWA-C600/C601. The water main shall pass a test of 150 PSI for a two (2) hour period. Water loss shall not exceed a rate of 11.85 U.S. gallons per inch diameter per mile of water main in twenty-four (24) hours. Bacteriological sample (24) hours back to back.

15. The method approved for rehabilitation of existing water mains by pipe bursting and installation of new HDPE pipe is I.L. Technology GRANDDIGGER SYSTEM, R100-SS3-2078) or approved equal. All contractors must be licensed to use the particular technology proposed for this work.

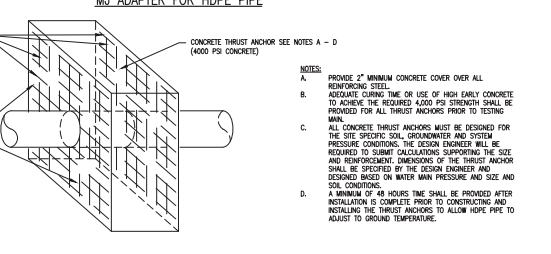
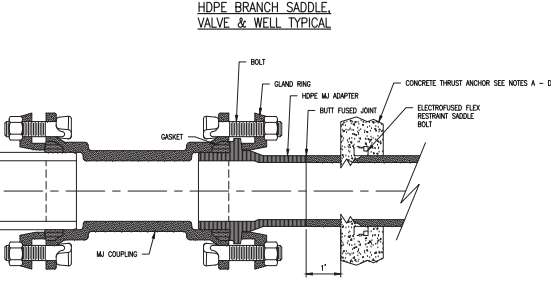
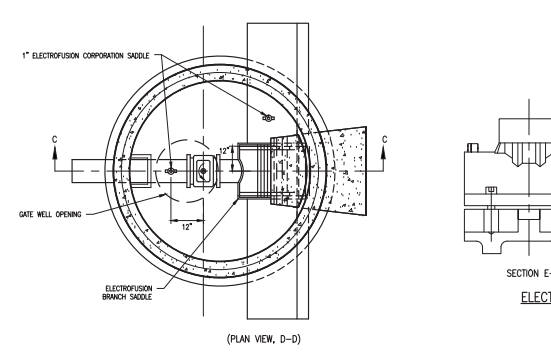
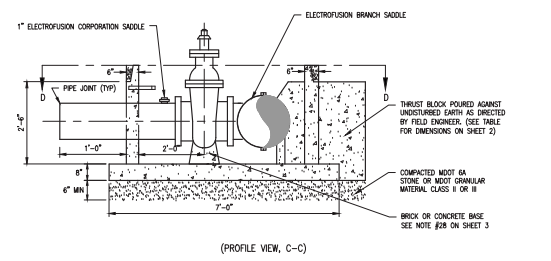
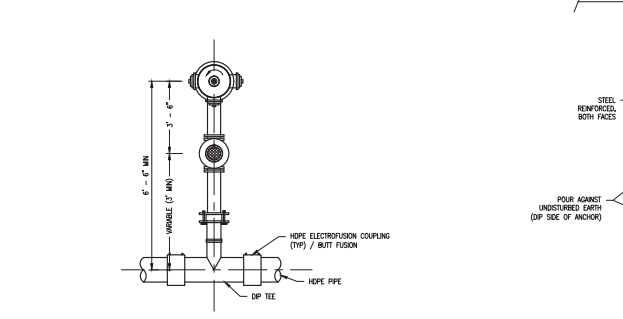
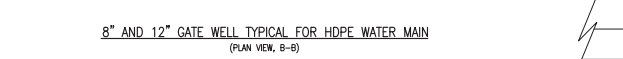
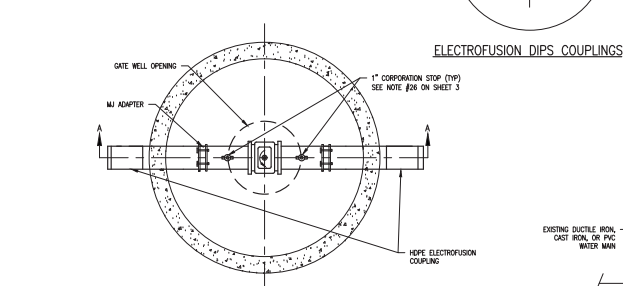
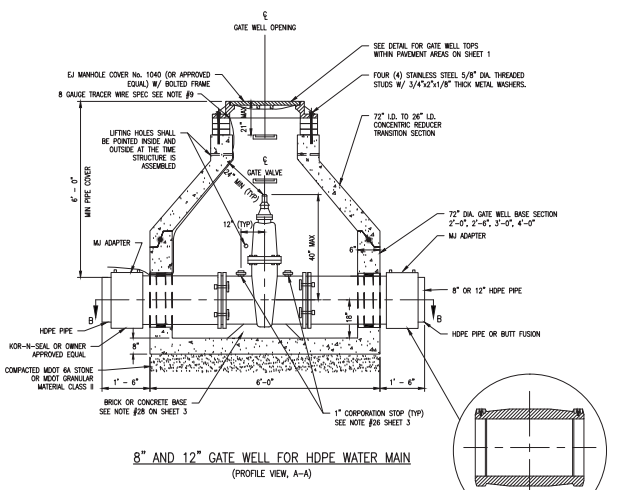
16. The pipe-bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate enough force to burst and compact the existing pipeline.

17. The Manufacturer's specifications shall dictate what size tool should be used in what diameter pipe, as well as parameters of what size tool for percentage of pipe altered.

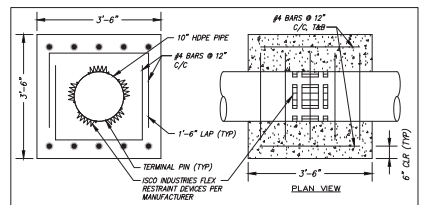
18. Prior to construction, the Contractor shall develop and provide to the City of Novi for review and approval a temporary water system plan to supply water services to area residents and businesses during pipe bursting operations. It is anticipated that the temporary system will be fed from existing fire hydrants. The temporary system and hydrants shall have passed bacteriological testing prior to use.

19. All service connections on the existing water main that is to be burst, or will be taken out of service, shall be connected to the temporary water system prior to machine bursting, disinfection, testing and service reconnection operations. Temporary service connections shall be made of the water service stop box by disconnecting the existing water service and connecting the temporary water line to the stop box.

EQUivalent DUCTILE IRON PIPE SIZES (DIPS)		
NOMINAL PIPE SIZE (DIPS)	O.D. SIZE (INCHES)	MIN WALL THICKNESS FOR 11 (140 PSI) (INCHES)
8"	8.90	0.627
10"	10.75	0.833
12"	13.50	1.200
16"	17.40	1.582
20"	21.90	1.964
24"	26.80	2.345



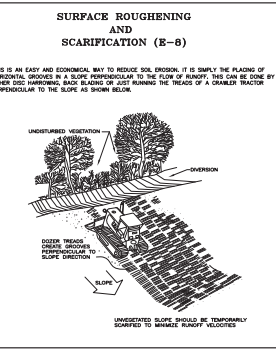
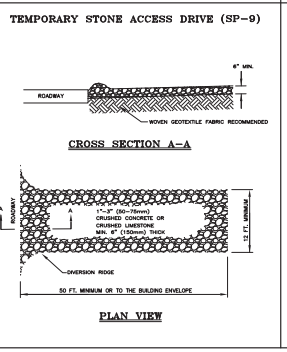
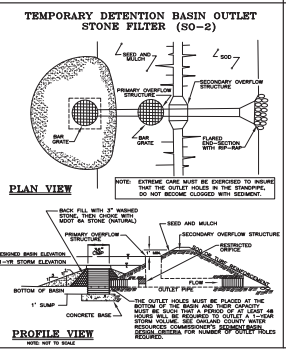
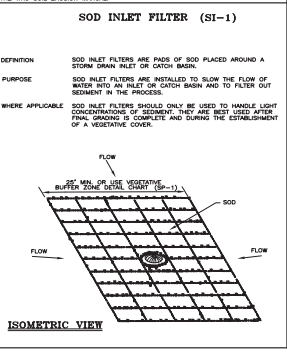
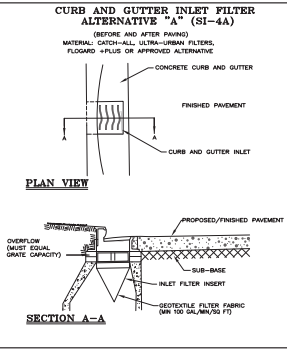
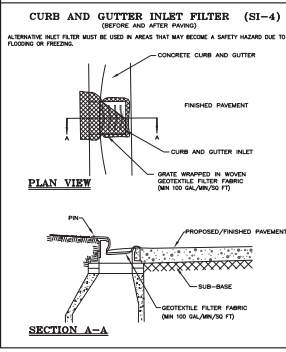
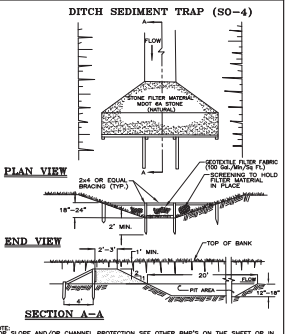
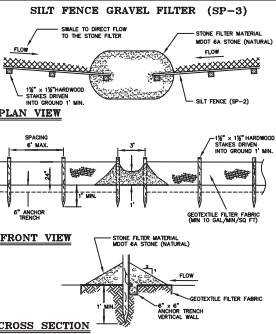
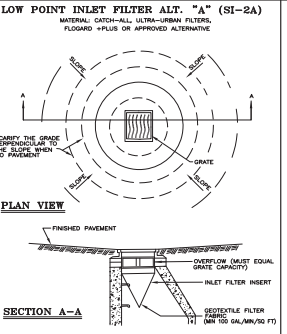
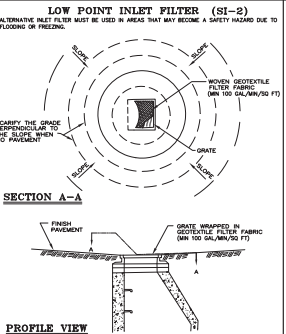
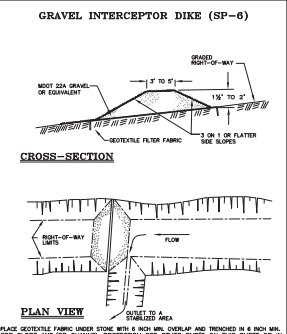
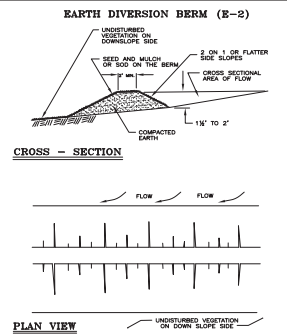
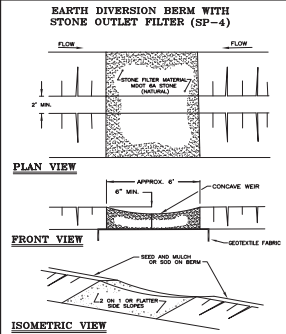
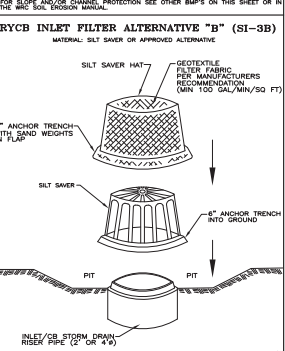
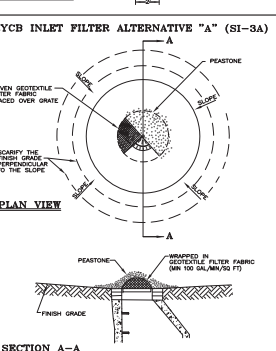
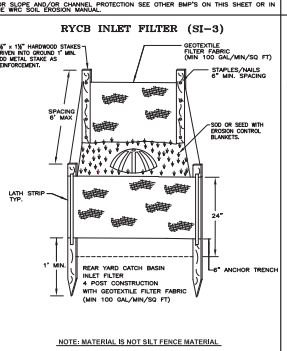
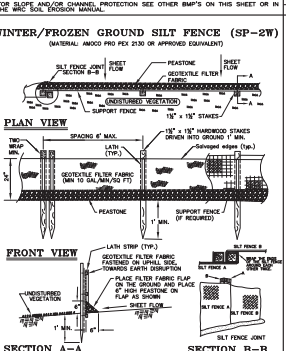
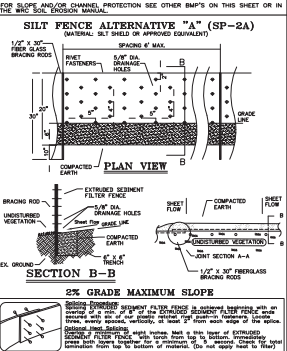
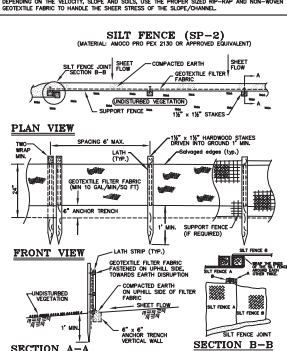
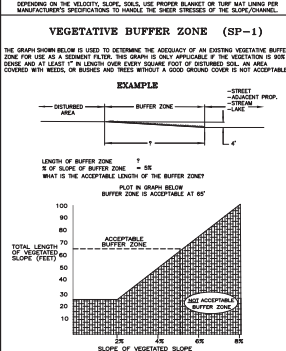
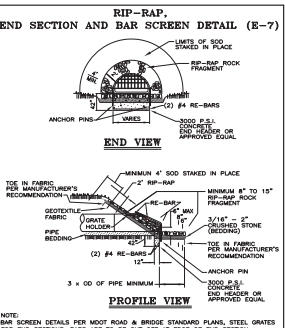
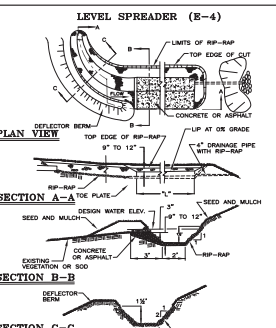
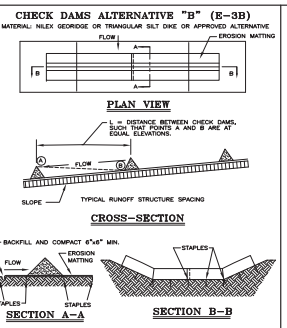
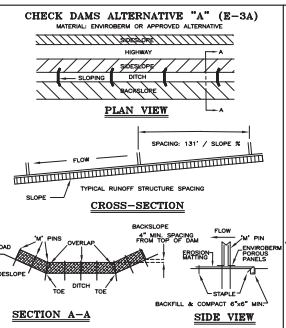
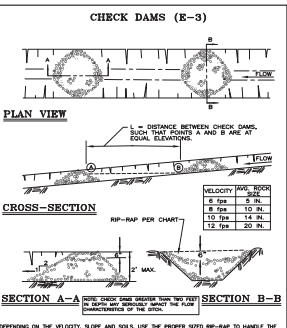
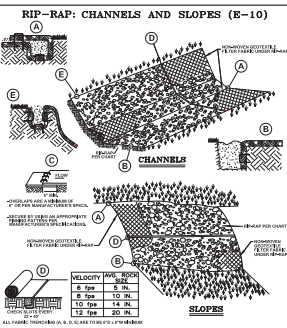
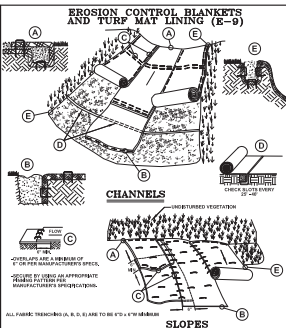
- NOTES:**
- PROVIDE 2" MINIMUM CONCRETE COVER OVER ALL REINFORCING STEEL.
 - ADEQUATE CURING TIME OR USE OF HIGH EARLY CONCRETE TO ACHIEVE THE REQUIRED 4000 PSI STRENGTH SHALL BE PROVIDED FOR ALL THRUST ANCHORS PRIOR TO TESTING MAIN.
 - ALL CONCRETE THRUST ANCHORS MUST BE DESIGNED FOR THE SITE SPECIFIC SOIL, GROUNDWATER AND SYSTEM PRESSURE CONDITIONS. THE DESIGN ENGINEER WILL BE REQUIRED TO SUBMIT CALCULATIONS SUPPORTING THE SIZE AND REINFORCEMENT. DIMENSIONS OF THE THRUST ANCHOR SHALL BE SPECIFIED BY THE DESIGN ENGINEER AND DESIGNED BASED ON WATER MAIN PRESSURE AND SIZE AND SOIL CONDITIONS.
 - A MINIMUM OF 48 HOURS TIME SHALL BE PROVIDED AFTER INSTALLATION TO COMPLETE PRIOR TO CONSTRUCTING AND INSTALLING THE THRUST ANCHORS TO ALLOW HDPE PIPE TO ADJUST TO GROUND TEMPERATURE.



- NOTES:**
- BEARING AREA SHALL BE AGAINST UNDISTURBED SOIL.
 - CONCRETE SHALL HAVE A MIN. 28 DAY COMP. STRENGTH OF 3,500 PSI.
 - ALL BARS SHALL BE EPOXY COATED.

CITY OF NOVI
 WATER MAIN
 STANDARD DETAILS

SHEET
5
 OF 5



NOTE:

WHILE PERFORMING WORK INVOLVING GROUNDS MAINTENANCE AND/OR THE CONSTRUCTION/MAINTENANCE OF ANY INFRASTRUCTURE, INCLUDING ROADS, WATER MAINS, SANITARY SEWERS, STORM DRAINS AND STORM WATER BEST MANAGEMENT PRACTICES (BMPs), CONTRACTORS SHALL MINIMIZE POLLUTION FROM STORM WATER RUNOFF THAT CAN AFFECT WATER QUALITY RELATED TO WORK ACTIVITIES. POLLUTANTS THAT COULD IMPAIR WATER QUALITY MAY INCLUDE FUEL, GREASE AND OIL, NUTRIENTS, BACTERIA AND PATHOGENS, LITTER AND DEBRIS, AND SOIL EROSION AND SEDIMENTATION. APPLICABLE BMPs SHALL BE IMPLEMENTED BY THE CONTRACTOR TO THE MAXIMUM EXTENT PRACTICABLE TO PROTECT WATER QUALITY AND WILDLIFE HABITAT.

SOIL EROSION AND SEDIMENTATION CONTROL DETAILS

DESIGNED BY: [Name]
 CHECKED BY: [Name]
 DATE: [Date]
 SCALE: [Scale]
 SHEET NO.: [Number] of [Total]

FAÇADE BOARD

FINAL PRODUCT MIGHT HAVE
SLIGHT VARIANCE AS PER ACCEPTABLE
INTERNATIONAL STANDARDS

0



NOISE IMPACT STATEMENT



2018-167
August 7, 2018

Mr. Mark Drane
Principal
Rogvoy Architects
32500 Telegraph Road, Suite 250
Bingham Farms, Michigan 48025

Subject: **Automobile Dealership Community Impact Study of Noise Levels**
re: Jaguar-Land Rover – SWC Grand River Ave. & Meadowbrook Rd.
Novi, MI

Dear Mr. Drane:

At your request and authorization, Kolano and Saha Engineers, Inc. (K&SE) has conducted an investigation to predict the property line sound levels expected from the operation of the proposed referenced dealership. This includes service operations, vehicle deliveries, and building mechanical equipment. These sound levels were evaluated against the limits established by the City of Novi Ordinance.

Proposed Site

The location of the proposed Jaguar-Land Rover dealership is at the southwest corner of Grand River Avenue and Meadowbrook Road. Most adjacent land uses the North, East and West are commercial. Property adjacent to the west of the southern half of the proposed site is zoned Gateway East (GE) and is currently undeveloped. The GE zoning has principal permitted uses that are commercial in function, though could include parks, mixed use or multi family. Property to the south is zoned residential. The City of Novi noise code limits for residential and commercial receiving land use apply at all respective property lines. **Exhibit 1** provides an aerial view of the site with the proposed building, drives and parking lot overlaid.

Sound level predictions were based on the location of property lines, mechanical equipment, location of service doors, and noise measurements conducted by K&SE for various elements that are expected to create noise at the proposed dealerships. The following documents were utilized for the predictions:

- Rogvoy Architects Drawings: Jaguar-Land Rover – Novi; Site Plan, Floor Plan, Elevations, Roof Plan, Rooftop Mechanical, and Site Grading.
- Sound power data provided for the proposed rooftop air makeup units as provided to us by Rogvoy Architects.

City of Novi Noise Code

The City of Novi Code, Zoning Ordinance, *Section 5.14 Performance Standards, Subsection 10 Noise*, restricts property line noise levels to 75dB(A) daytime and a 70dB(A) nighttime for business and commercial zones. Furthermore, it restricts property line noise levels to 60dB(A) daytime and 55dB(A) nighttime for residential zones. Daytime is defined as 7AM – 10PM with Nighttime occupying 10PM – 7AM.

Most of the dealership operations are expected to take place during the day though some early deliveries may occur before 7AM. It is expected that the roof top mechanical equipment may operate 24 hours a day to maintain building environmental conditions.

Furthermore, in the Novi Code of Ordinances helps to help reduce the impact of trucks and other motor vehicles in *Section 22-100*. This ordinance regulates idling, standing and loading/unloading of motor vehicles. The purpose of this section is to limit *'exhaust and noise from standing, idling, and loading/unloading of motor vehicles'* which can present an *'unreasonable risk to the general health safety and welfare of the community and otherwise presents a nuisance to residents living in close proximity.'* Under this ordinance, the period of time between 8PM and 7AM is protected for residents to enjoy the use of their property without undue impact from idling, standing, loading/unloading of motor vehicles. In particular:

(c)...(1) Between the hours of 8:00 p.m. and 7:00 a.m. (the following day), it shall be unlawful to permit, cause, or occupy any standing or idling motor vehicle or commercial vehicle within four hundred (400) feet of any residential structure, for more than fifteen (15) consecutive minutes or for a period or periods of time aggregating more than fifteen (15) minutes in any one (1) hour

...

(d)...(1) Between the hours of 8:00 p.m. and 7:00 a.m. (the following day), it shall be unlawful for any person to load/unload or permit the loading or unloading of any commercial vehicle within four hundred (400) feet of a residential structure, in any street, parking lot, or loading or unloading zone, dock, bay or area...

This ordinance is expected to limit early morning deliveries to locations on the site where truck loading/unloading operations would be more than 400 feet from nearby residents.

Advanced Computer Modeling Noise Prediction

Sound is a physical phenomenon that can be readily predicted with reasonable accuracy. In order to evaluate the sounds created from the proposed automobile dealership and determine what noise impact may occur at the site boundaries, we developed an advanced three dimensional acoustical model. This model allows accurate prediction of sound levels created by the operation of known building mechanical systems and related dealership operations. The computer program we use for this modeling relies on international standards (such as ISO 9613) to properly calculate and predict sound levels. The computer program relies on user inputs of terrain, structures, foliage, obstacles, sound reflective and absorptive surfaces, receiver positions, as well as the type of sound source, including point sources (small individual devices, such as small fans), line sources (numerous sources in a line, such as road traffic), and area sources (sources with large surface areas, such as transformers). By using this predictive tool we have constructed a virtual acoustic model of the proposed automobile dealership site and have developed sound level predictions for it.

Building Rooftop Mechanical Equipment

Building mechanical systems primarily consist of roof top air handling units and ventilation fans and are located at various points on the roof of the dealership building. Sound level data used for these mechanical systems comes from the unit manufacturers. Our modeling assumes a worst case scenario with all units operating simultaneously at nighttime on a continuous basis. The predicted sound level contour plots with this equipment operating are shown in **Exhibit 2**. The predicted sound level for the rooftop mechanical equipment is expected to be below all applicable ordinance noise limits.

Trash Compactor

A trash bin and compactor are planned to be located on the south side of the building. Sound level data used for the trash compactor comes from our measurement conducted at other commercial facilities that utilize similar equipment. The predicted sound level contour plots with the trash compactor operating are shown in **Exhibit 3**. This predicted sound is expected to be below all applicable ordinance noise limits.

Delivery Trucks Traveling on Site

The dealership is expected to receive deliveries at various times during the day and early mornings, potentially prior to 7AM. Cargo vans, box trucks as well as an occasional semi-truck are expected make these periodic deliveries of vehicle parts and business supplies. Trucks are expected to enter from Meadowbrook Road, travel along the south of the building, turn right to then travel along the west side of the building, and finally exit the site onto Grand River Ave. Cargo vans and box trucks are expected to make deliveries at two locations; the south side of the building near the west corner, and the west side of the building at the Parts Storage Room access door. The semi-trucks are expected to park along the north side of the drive such that the back of the trailer is positioned near the Parts Storage Room access door. **Exhibit 4, 5 & 6** provide the modeled configurations for semi-trucks and box trucks making deliveries on the site.

Semi-trucks driving along the west side of the building, as shown in **Exhibit 4**, are expected to be 2 dB higher than the nighttime commercial noise limit at distances within 10 feet of the property line on the commercial property to the west (O'Brien-Sullivan Funeral Homes). This same level is 3dB less than the daytime noise limit. This minor nighttime excursion is not expected to have any significant impact to the funeral home as the excursion does not occur in areas where people would normally reside. Additionally, though not taken into account in our model, there is vegetation along the property line on the side of the funeral home property that will help buffer some of the sound from the dealership.

Semi-truck and Box Truck delivery operations, as shown in **Exhibits 5 & 6**, are expected to comply with daytime and nighttime ordinance limits.

Car Carrier Loading/Unloading

The dealership is expected to receive vehicles to sell as well as to ship some vehicles off site. These deliveries are commonly made by car carrier trucks which produce similar sounds to other semi-trucks when being driven, though have a unique series of sounds while loading and unloading vehicles. We have conducted measurements of various sources of sound, including car carrier truck loading/unloading operations, from previous investigations and have compiled a database of sound sources. The car carrier operations contain multiple sound sources including the semi-truck idling, hydraulic pump operation, hydraulic actuators, shifting and setting of mechanical elements, and vehicles being driven onto and off the carrier. These operations have been compiled into a composite set of sound levels for the purpose of predictive modeling. The results of this model, as shown in **Exhibit 7**, are expected to comply with day and nighttime limits for adjacent commercial properties, though are expected to only comply with the daytime limits for adjacent residential properties.

Conclusions

Based on the findings of our study and under proper management, we expect the proposed Jaguar-Land Rover Dealership to be largely in compliance with the City of Novi ordinance noise criteria. The only exception that we anticipate will be for semi-trucks traveling along the west side of the dealership building. The result is expected to be a relatively small exceedance of 2dB above the commercial nighttime noise limit along the western property line adjacent to the funeral home. This small exceedance is not expected to create adverse impact, as stated in our evaluation of delivery trucks above.

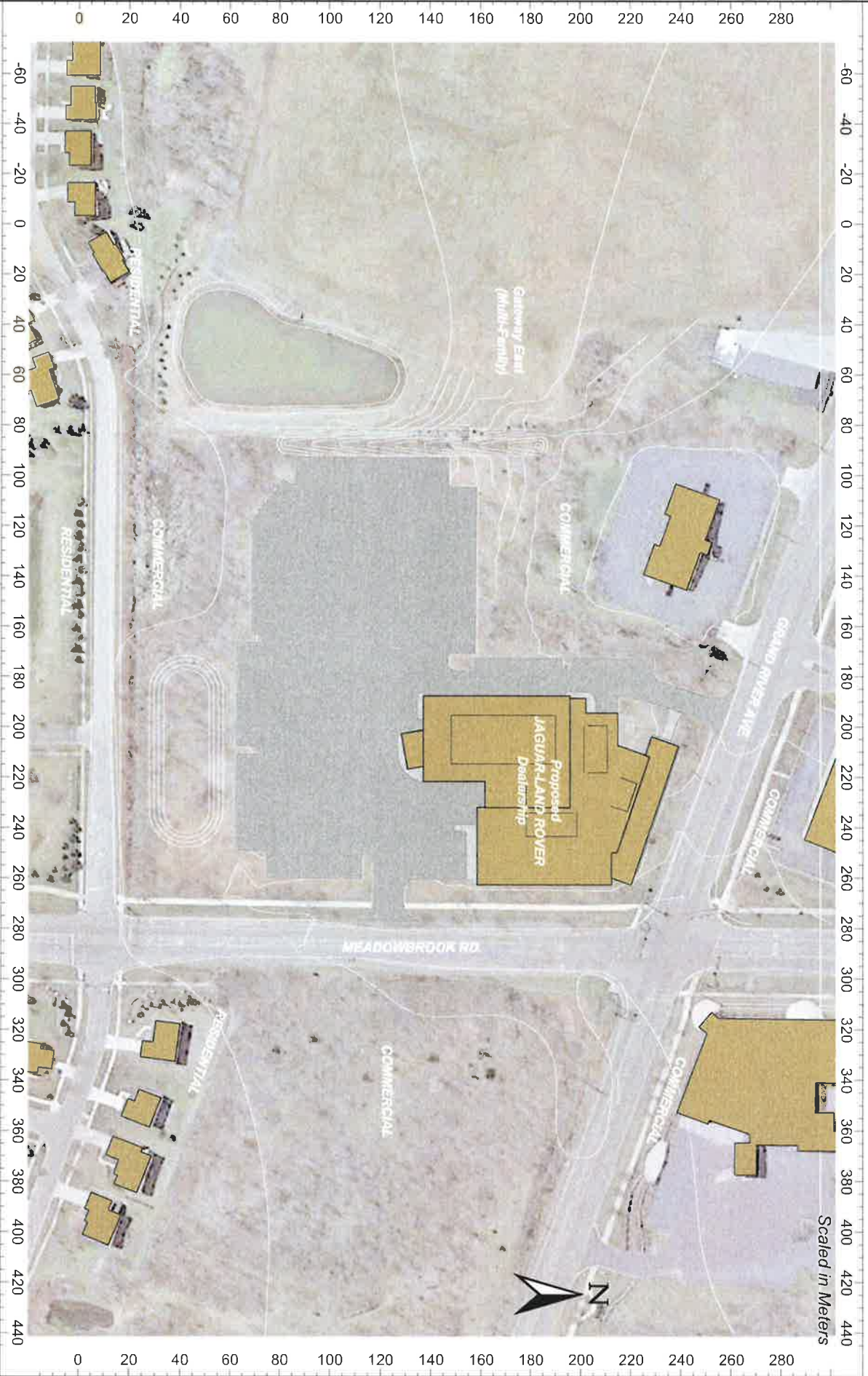
Mr. Drane, we hope this summary of our investigation is informative and helpful. Should you need additional information regarding this work or additional assistance, don't hesitate to ask.

Sincerely,
KOLANO AND SAHA ENGINEERS, INC.



Darren Brown, P.E.
INCE Board Certified
Consultant

**EXHIBIT 1
PROPOSED JAGUAR-LAND ROVER DEALERSHIP SITE PLAN MODEL WITH ADJACENT PROPERTIES**



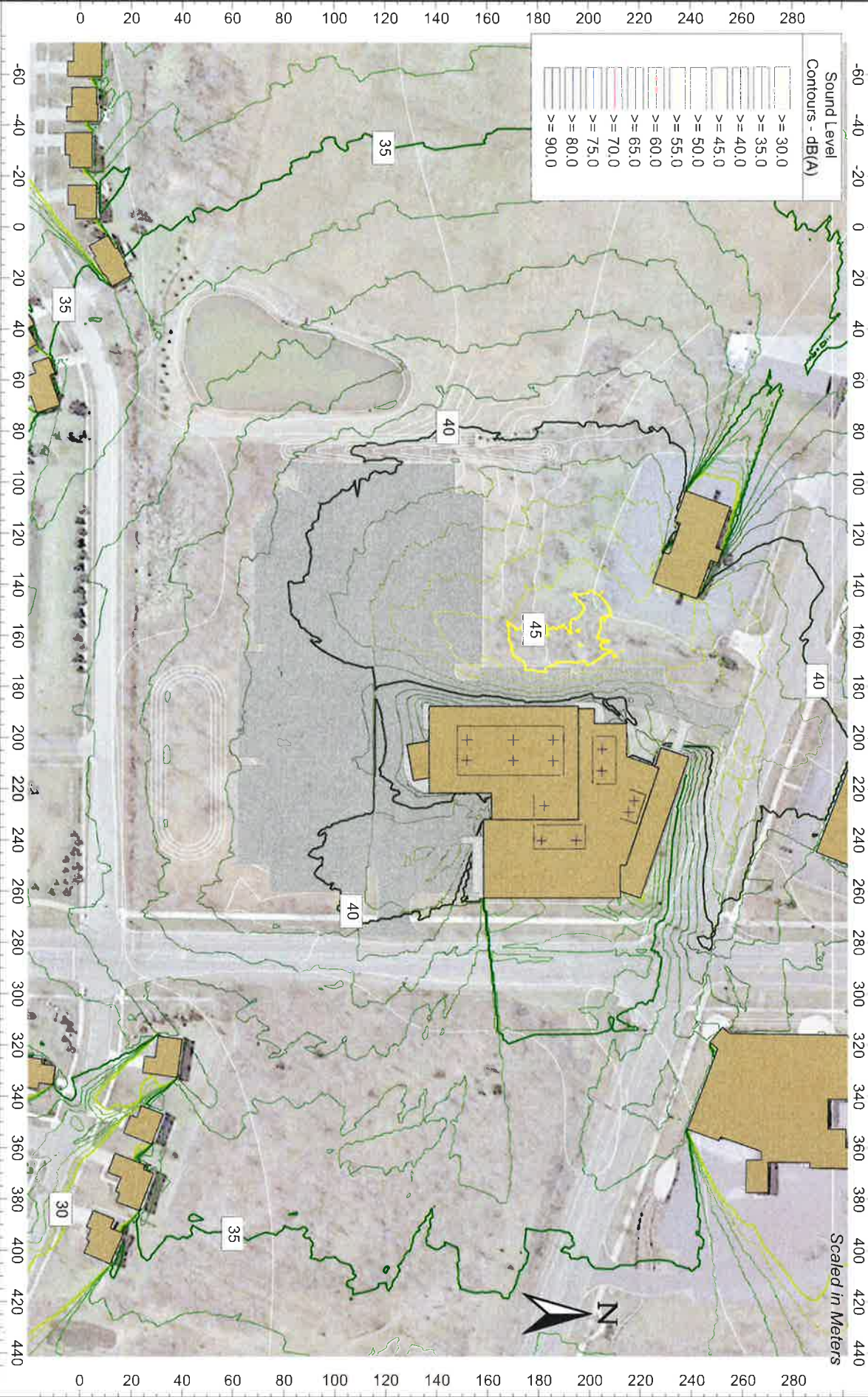
Kolano and Saha Engineers, Inc.
3559 Sashabaw Road - Waterford, MI 48329
248-674-4100 www.kandse.com

Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
Study Conducted for: **ROGVOY ARCHITECTS**
Project No. : 2018-167

Analysis Date (day.mo.yr): 07.08.18

EXHIBIT 2

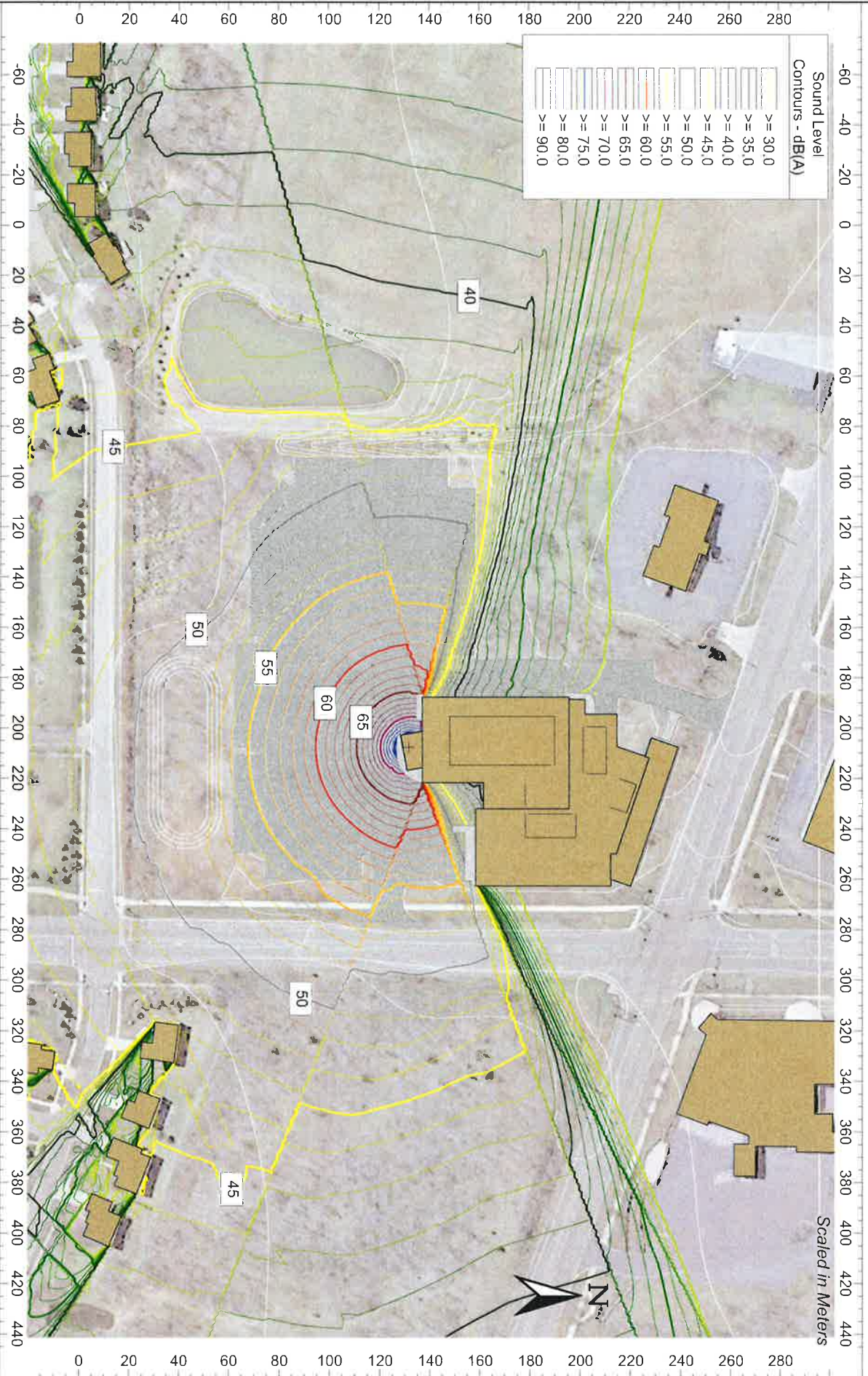
PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED ROOFTOP MECHANICAL EQUIPMENT SOUND LEVELS



K&S
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Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
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 Project No. : 2018-167
 Analysis Date (day.mo.yr): 07.08.18

EXHIBIT 3 PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED TRASH COMPACTOR SOUND LEVELS

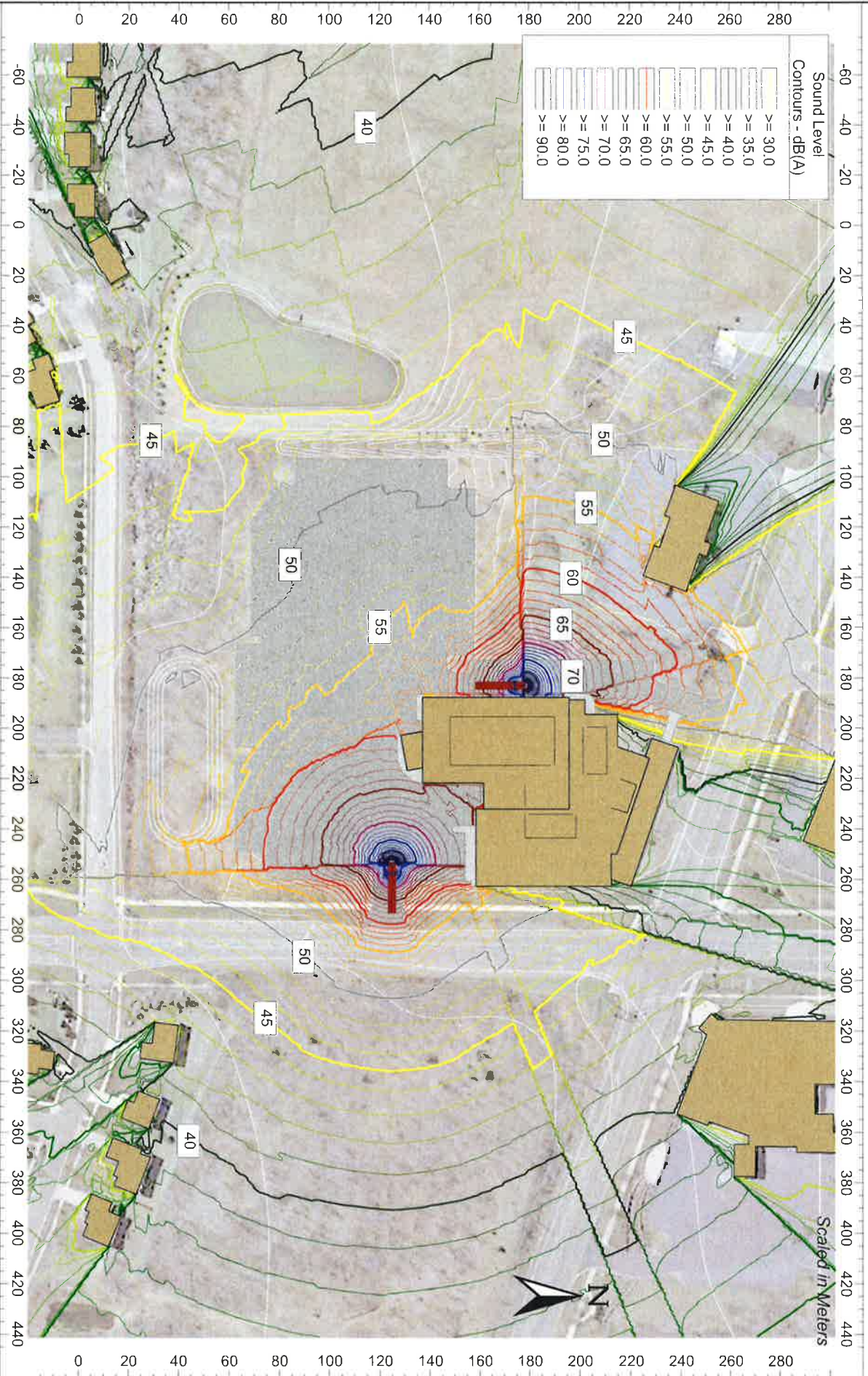


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Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
 Study Conducted for: **ROGVOY ARCHITECTS**
 Project No. : 2018-167

Analysis Date (day.mo.yr): 07.08.18

**EXHIBIT 4
PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED DELIVERY TRUCK DRIVING SOUND LEVELS**

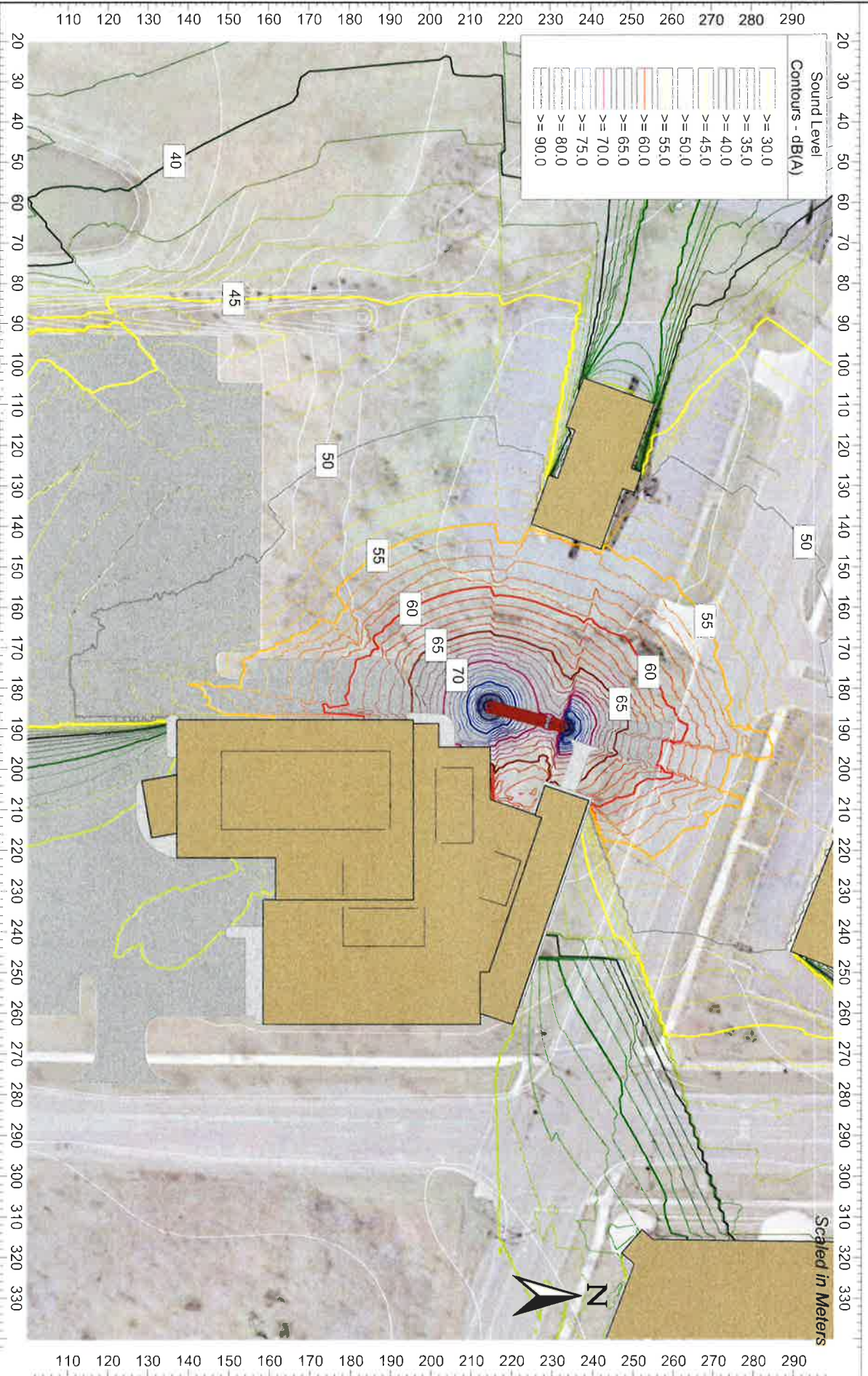


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Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
 Study Conducted for: ROGOVOY ARCHITECTS
 Project No. : 2018-167

Analysis Date (day.mo.yr): 07.08.18

**EXHIBIT 5
PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED DELIVERY TRUCK UNLOADING SOUND LEVELS**

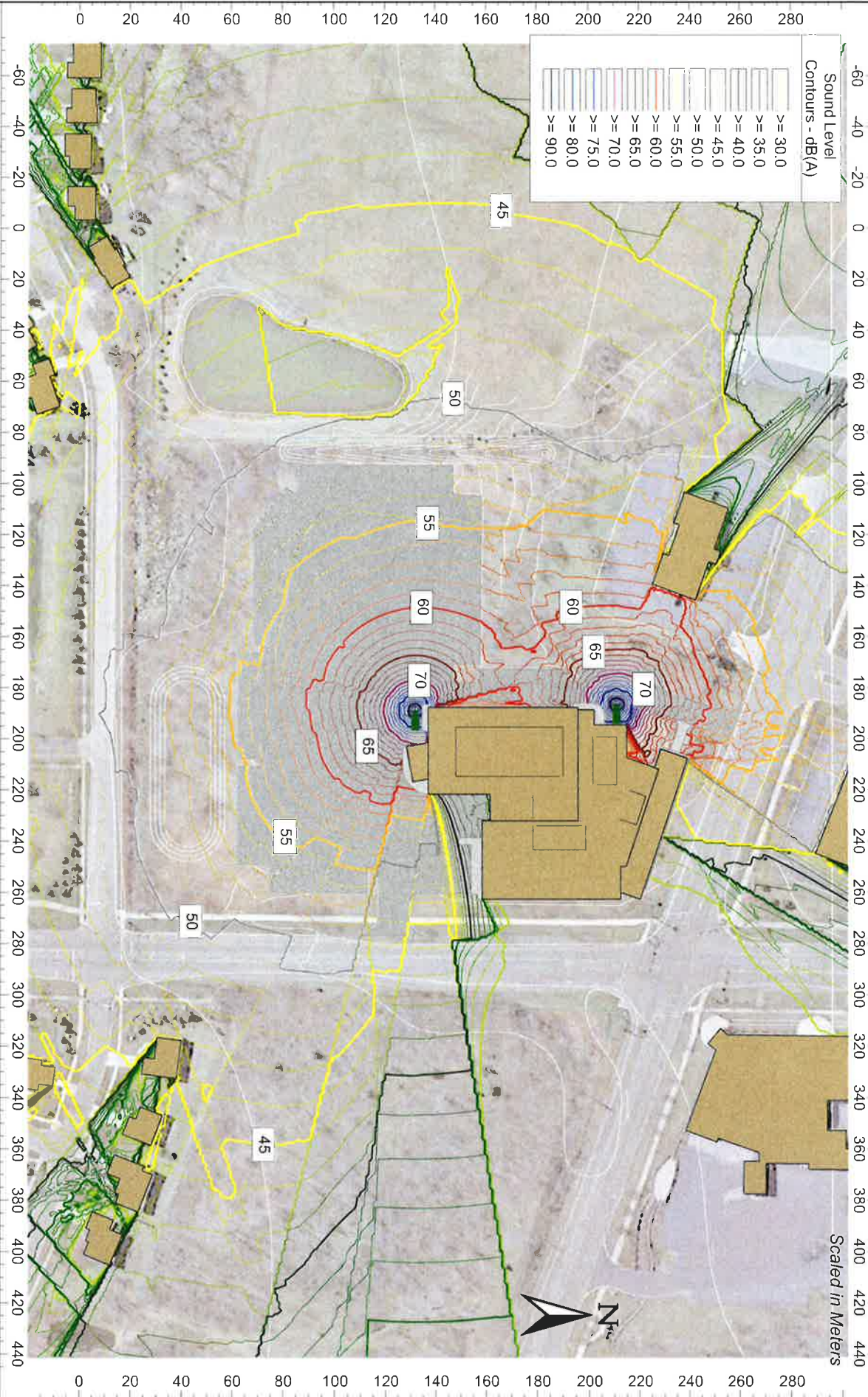


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Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
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 Project No. : 2018-167

Analysis Date (day.mo.yr): 07.08.18

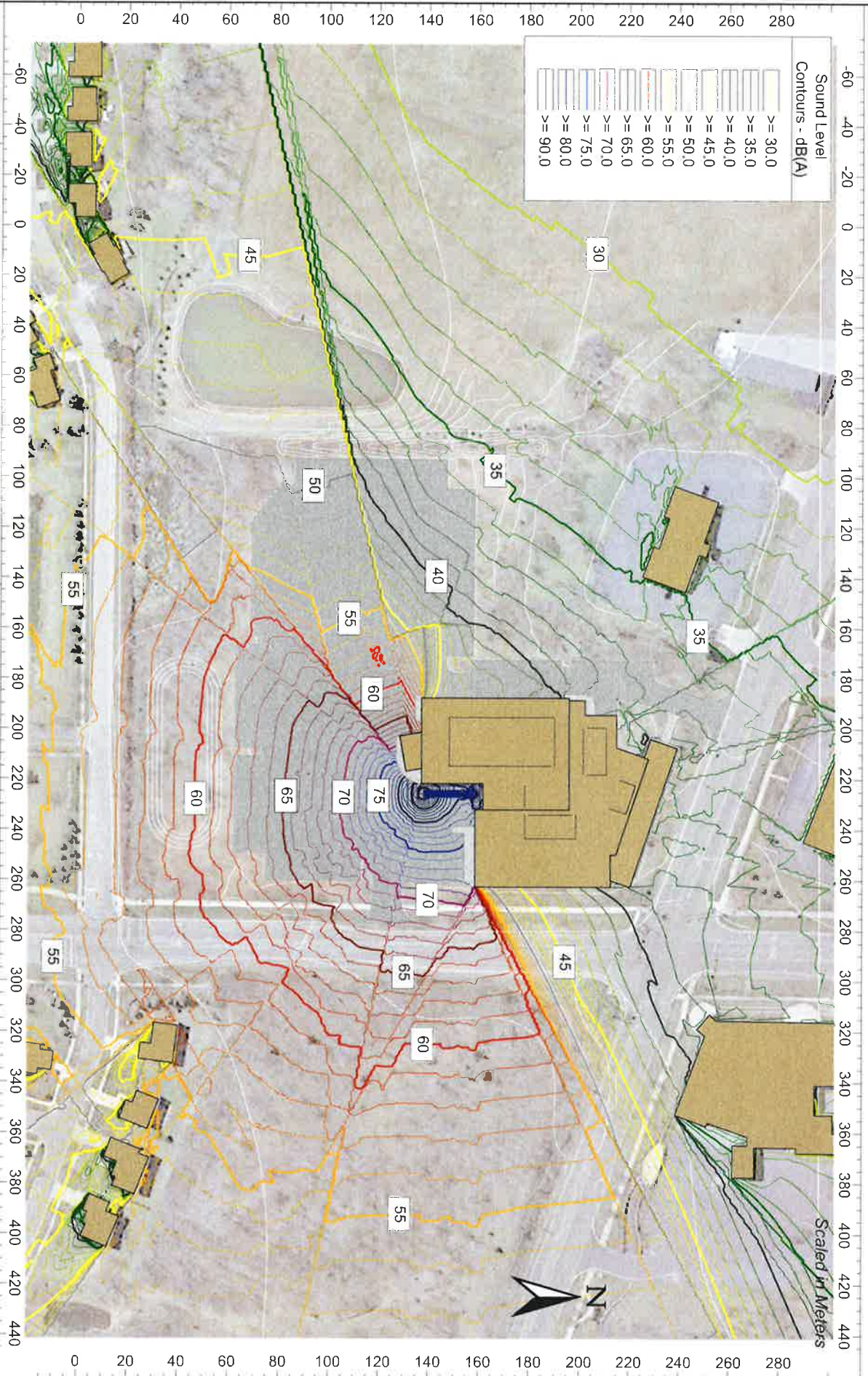
**EXHIBIT 6
PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED BOX TRUCK DELIVERY SOUND LEVELS**




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Project Name: PROPOSED JAGUAR-LAND ROVER NOVI
 Study Conducted for: ROGOVOY ARCHITECTS
 Project No. : 2018-167
 Analysis Date (day.mo.yr): 07.08.18

**EXHIBIT 7
PROPOSED JAGUAR-LAND ROVER DEALERSHIP - PREDICTED CAR CARRIER UNLOADING SOUND LEVELS**





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Project Name: **PROPOSED JAGUAR-LAND ROVER NOVI**
Study Conducted for: **ROGVOY ARCHITECTS**
Project No.: 2018-167
Analysis Date (day.mo.yr): 07.08.18

TRAFFIC STUDY

Memo

VIA EMAIL

To: Mr. Mark Drane, AIA, LEED AP
Rogvoy Architects

From: Julie M. Kroll, PE, PTOE
Steven J. Russo, PE
Fleis & VandenBrink

Date: December 12, 2017

Re: Erhard BMW
City of Novi, Michigan
Traffic Impact Study

Introduction

This memorandum presents the results of the Traffic Impact Study (TIS) for the proposed Erhard BMW dealership in the City of Novi, Michigan. The project site is located in the southwest quadrant of the Grand River Avenue & Meadowbrook Road intersection and is currently undeveloped. Site access is proposed via one site driveway to Meadowbrook Road and one a right-in right-out only driveway to Grand River Avenue.

Grand River Avenue is under the jurisdiction of the Road Commission for Oakland County (RCOC) and Meadowbrook Road is under the jurisdiction of the City of Novi. Per the City of Novi Community Development Department's *Site Plan and Development Manual (Section 1)*, a Traffic Impact Study (TIS) is required for site plan approval and permitting of site access. This TIS has been completed to identify the impacts (if any) of the proposed development on the following study intersections:

- Grand River Avenue & Meadowbrook Road,
- Meadowbrook Road & Cherry Hill Road / Clermont Avenue,
- Grand River Avenue & Grandview Lane / Funeral Home Drive, and
- The proposed site access locations.

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 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, September 12, 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 at all study intersections. This data was used as a baseline to establish existing traffic conditions 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. 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. Grand River Avenue & Meadowbrook Road	Signalized	EB	20.9	C	28.3	C
		WB	18.2	B	44.1	D
		NB	60.1	E	54.9	D
		SB	<u>50.4</u>	<u>D</u>	<u>75.4</u>	<u>E</u>
		Overall	31.4	C	48.6	D
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	56.4	E	55.7	E
		WB	55.3	E	56.2	E
		NB	2.4	A	2.3	A
		SB	<u>1.8</u>	<u>A</u>	<u>2.3</u>	<u>A</u>
		Overall	10.5	B	6.4	A
3. Grand River Avenue & Grandview Lane / Funeral Home Drive	STOP (Minor)	EB LT	9.2	A	11.2	B
		WB LT	0.0	A	0.0	A
		NB	0.0	A	0.0	A
		SB	14.7	B	45.7	E

The results of the existing conditions analysis indicate that all study intersection approaches and movements currently operate acceptably at a LOS D or better with the exception of the following:

- The NB and SB through movements at the signalized intersection of Grand River Avenue & Meadowbrook Road which, currently operates at a LOS E and F during the AM and PM peak hours, respectively.
- The EB and WB approaches at the signalized intersection of Meadowbrook Road & Cherry Hill Road / Clermont Avenue which currently operate at a LOS E during both peak hours.
- The STOP controlled SB left turn movement from Grandview Lane to Grand River Avenue which currently operates at a LOS F during the PM peak hour.

A review of SimTraffic network simulations indicates generally acceptable traffic operations during the AM peak hour with brief periods of long vehicle queues observed for the EB and NB approaches at the signalized intersection of Grand River Avenue & Meadowbrook Road; however, these queues typically clear during each signal cycle and limited cycle failures are observed. During the PM peak hour, long vehicle queues are observed for the WB and SB approaches at the Grand River Avenue & Meadowbrook Road intersection which last throughout the duration of the peak hour and do not dissipate.

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. It is noted that high delays and poor LOS experienced at the stop-controlled Grandview Lane approach are a result of high traffic volumes on Grand

River Avenue. However, the 95th percentile queue lengths for this approach are calculated to be 21 feet (one vehicle), which is not significant. Therefore, this unsignalized driveway was not included in the network improvements analysis.

Grand River Avenue & Meadowbrook Road

Signal timing adjustments were investigated at the Grand River Avenue & Meadowbrook Road intersection. However, it was determined that signal timing adjustments at this intersections alone would not address the existing operational deficiencies previously identified. Therefore, geometric improvements were evaluated.

The results of this analysis indicate that the existing exclusive WB right turn lane should be restriped as a shared through / right turn lane and an additional receiving lane should be constructed west of the intersection between Meadowbrook Road and Grandview Lane (approximately 275 feet). With this improvement, the signal timings were optimized to a 120 second cycle length and the existing right-turn overlap phase and dog house signal head for the WB approach should be removed.

Meadowbrook Road & Cherry Hill Road / Clermont Avenue

At the intersection of Meadowbrook Road & Cherry Hill Road / Clermont Avenue, signal cycle length and timing change adjustments are recommended to reduce the existing 120 second cycle length to run as a half-cycle of the Grand River Avenue & Meadowbrook Road intersection. The change in cycle length will have no impact on corridor progression along Meadowbrook Road as the signal will be able to double-cycle and stay in step-with upstream and downstream signals. The results of the existing conditions analysis with recommended improvements are summarized in Table 2.

Table 2: Existing Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Grand River Avenue & Meadowbrook Road	Signalized	EB	21.9	C	29.6	C
		WB	20.1	C	29.1	C
		NB	54.2	D	46.9	D
		SB	<u>41.0</u>	<u>D</u>	<u>47.6</u>	<u>D</u>
		Overall	30.2	C	36.3	D
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	25.1	C	26.1	C
		WB	24.7	C	26.2	C
		NB	4.1	A	3.5	A
		SB	<u>0.2</u>	<u>A</u>	<u>0.6</u>	<u>A</u>
		Overall	6.2	A	3.7	A

The results of the existing conditions analysis with improvements show that all signalized study intersection approaches will operate acceptably at a LOS D or better during both peak periods; however, the NB and SB through movements will continue to operate at a LOS E during the AM and PM peak hours, respectively. A review of network simulations with improvements indicates generally acceptable traffic operations during both peak periods with vehicle queues typically clearing during each signal cycle and limited cycle failures.

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 Grand River Avenue and Meadowbrook Road were referenced. The results of this analysis indicate that between 2011 and 2016, the Average Annual Daily Traffic (AADT) volumes at the intersection of Grand River Avenue & Meadowbrook Road intersection have decreased. 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, as a conservative approach a background traffic growth of 0.5% per year 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. Through conversations with the City of Novi Planning Department, a single background development was identified near the study area known as Brooktown Apartments. The site-generated vehicle trips from the background development were assigned to the study road network based on the TIS completed by F&V dated November 18, 2014 and existing peak hour traffic patterns.

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 3.

Table 3: Background Intersection Operations

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Grand River Avenue & Meadowbrook Road	Signalized	EB	21.6	C	29.5	C
		WB	18.9	B	51.7	D
		NB	60.1	E	56.0	E
		SB	<u>50.3</u>	<u>D</u>	<u>75.4</u>	<u>E</u>
		Overall	31.7	C	51.6	D
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	56.4	E	55.7	E
		WB	55.3	E	56.2	E
		NB	2.4	A	2.3	A
		SB	<u>1.9</u>	<u>A</u>	<u>2.3</u>	<u>A</u>
		Overall	10.4	B	6.4	A
3. Grand River Avenue & Grandview Lane / Funeral Home Drive	STOP (Minor)	EB LT	9.2	A	11.5	B
		WB LT	0.0	A	0.0	A
		NB	0.0	A	0.0	A
		SB	14.9	B	52.5	F

The results of the background conditions analysis 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 background 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 4.

The results of the background conditions analysis with improvements show that all signalized study intersection approaches will operate acceptably at a LOS D or better during both peak periods; however, the NB and SB through movements will continue to operate at a LOS E during the AM and PM peak hours, respectively. A review of network simulations with improvements indicates generally acceptable traffic operations during both peak periods with vehicle queues typically clearing during each signal cycle and limited cycle failures.

Table 4: Background Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Grand River Avenue & Meadowbrook Road	Signalized	EB	22.7	C	30.6	C
		WB	20.3	C	30.4	C
		NB	54.2	D	48.8	D
		SB	<u>40.9</u>	<u>D</u>	<u>47.1</u>	<u>D</u>
		Overall	30.4	C	37.2	D
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	25.1	C	26.1	C
		WB	24.7	C	26.2	C
		NB	4.1	A	3.5	A
		SB	<u>0.2</u>	<u>A</u>	<u>0.6</u>	<u>A</u>
		Overall	6.2	A	3.7	A

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 5.

Table 5: Site Trip Generation

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Automobile Sales	841	53,211	SF	1,719	77	25	102	50	75	125

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, local population densities, 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 6.

Table 6: Site Trip Distribution

To / From	via	AM/PM
North	Meadowbrook Road	17%
South	Meadowbrook Road	18%
East	Grand River Avenue	32%
West	Grand River Avenue	<u>33%</u>
		100%

The site-generated vehicle trips were assigned to the study road network based on this 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 7.

Table 7: Future Intersection Operations

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Grand River Avenue & Meadowbrook Road	Signalized	EB	22.4	C	30.7	C
		WB	19.1	B	52.3	D
		NB	60.1	E	69.6	E
		SB	<u>51.0</u>	<u>D</u>	<u>79.8</u>	<u>E</u>
		Overall	32.2	C	55.4	E
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	56.4	E	55.7	E
		WB	55.3	E	56.2	E
		NB	2.4	A	2.3	A
		SB	<u>1.9</u>	<u>A</u>	<u>2.5</u>	<u>A</u>
		Overall	10.3	B	6.4	A
3. Grand River Avenue & Grandview Lane / Funeral Home Drive	STOP (Minor)	EB LT	9.3	A	11.7	B
		WB LT	0.0	A	0.0	A
		NB	0.0	A	0.0	A
		SB	15.1	C	55.2	F
4. Meadowbrook Road & Site Drive	STOP (Minor)	EB	12.6	B	17.2	C
		NB LT	7.8	A	9.2	A
		SB	Free		Free	
5. Grand River Avenue & Site Drive	STOP (Minor)	EB	Free		Free	
		NB	12.2	B	11.9	B

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 hour, with minor increases in vehicle delay. At the intersection of Grand River Avenue & Meadowbrook Road overall vehicle delays will increase by less than four seconds during the peak periods which will not be discernable to existing network traffic. Additionally, the proposed development will increase traffic at this intersection by less than 3%, which is not significant.

At the proposed site driveway approaches to Grand River Avenue and Meadowbrook Road all approaches and movements will operate acceptably at a LOS C or better during both peak periods. A review of network simulations showed traffic operations which are similar to background conditions with generally acceptable traffic operations observed during the AM peak hour and long vehicle queues observed for the WB and SB approaches at Grand River Avenue & Meadowbrook Road during the PM peak hour. No significant vehicle queues are observed at the proposed site driveways.

Lastly, vehicle queues from the signalized intersections of Meadowbrook Road with Grand River Avenue and Cherry Hill Road / Clermont Avenue were evaluated with respect to the proposed site driveway locations. The queue length calculations based on SimTraffic simulations are shown in Table 8. The storage length is also indicated to be the distance between the painted stop bar and the respective driveway.

The results of this analysis indicate that vehicle queues from the adjacent signalized intersections will not have an adverse impact on the proposed site driveway to Meadowbrook Road. The proposed site driveway will be blocked for two minutes or less of the peak periods, which is not significant. On Grand River Avenue, EB vehicle queues from Grand River Avenue & Meadowbrook Road will block the proposed site driveway location for approximately 10 minutes of the peak periods. However, this driveway location is proposed to be a right-in / right-out only driveway and is located near the property boundary furthest from the signalized intersection consistent with best practices in access management.

Table 8: Vehicle Queue Lengths

Intersection	Approach / Lane	Available Storage	AM Peak			PM Peak		
			Avg. Queue (ft)	95th Queue (ft)	Blocked Time (min)	Avg. Queue (ft)	95th Queue (ft)	Blocked Time (min)
Grand River Avenue & Meadowbrook Road	NB Thru / Left	280	208	341	2	168	294	1
	EB	225	269	356	11	252	347	10
Meadowbrook Road & Cherry Hill Road	SB Thru / Left	315	22	64	0	47	125	0

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 9.

Table 9: Future Intersection Operations with Improvements

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Grand River Avenue & Meadowbrook Road	Signalized	EB	23.8	C	33.7	C
		WB	20.4	C	32.4	C
		NB	54.2	D	52.3	D
		SB	<u>41.1</u>	<u>D</u>	<u>47.3</u>	<u>D</u>
		Overall	30.9	C	39.4	D
2. Meadowbrook Road & Cherry Hill Road / Clermont Avenue	Signalized	EB	25.1	C	26.1	C
		WB	24.7	C	26.2	C
		NB	4.1	A	3.6	A
		SB	<u>0.3</u>	<u>A</u>	<u>0.8</u>	<u>A</u>
		Overall	6.1	A	3.8	A

The results of the future conditions analysis with improvements show that all signalized study intersection approaches will operate acceptably at a LOS D or better during both peak periods; however, the NB and SB through movements will continue to operate at a LOS E during the AM and PM peak hours, respectively. A review of network simulations with improvements indicates generally acceptable traffic operations during both peak periods with vehicle queues typically clearing during each signal cycle and limited cycle failures.

Access Management

The City of Novi standards for access management outlined in Section 11-216 of the City Ordinances were reviewed for the proposed site driveway to Grand River Avenue. The results of the analysis are summarized in Table 7.

Table 10: Driveway & Intersection Spacing

Location	Adjacent Driveway	Distance	City Requirement	Meets
Grand River Avenue	Funeral Home Drive	75 ft	275 ft	No
	Grandview Lane	75 ft	150 ft	No

The results of the analysis show that the proposed site driveway does not meet the City standards for driveway spacing. However, the site driveway to Grand River Avenue is proposed to be a right-in / right-out only driveway which will help to eliminate conflicts between turning vehicles from adjacent driveways. Additionally, the developer has explored shared access with the adjacent funeral home driveway to Grand River Avenue, which would eliminate the need for a new access point along Grand River Avenue; however,

they have not been able to reach an agreement. On Meadowbrook Road, the proposed site driveway is located half way between the signalized intersections of Meadowbrook Road with Grand River Avenue and Cherry Hill Road and will be blocked for less than two minutes of the peak period, which is not significant.

Lastly, the City of Novi warrants for right-turn lanes were evaluated at the site access point to Meadowbrook Road. The results of this analysis show that a right-turn deceleration taper is warranted at the proposed Site Drive. The right-turn deceleration taper should be designed in accordance with the City of Novi requirements.

Conclusions

The conclusions of this Traffic Impact Study are as follows:

1. The results of the existing conditions analysis indicate that all study intersection approaches and movements currently operate acceptably at a LOS D or better with the exception of the following:
 - a. The NB through movement and SB through movement at the signalized intersection of Grand River Avenue & Meadowbrook Road which currently operates at a LOS E and F during the AM and PM peak hours, respectively.
 - b. The EB and WB approaches at the signalized intersection of Meadowbrook Road & Cherry Hill Road / Clermont Avenue which currently operate at a LOS E during both peak hours.
 - c. The STOP controlled SB left turn movement from Grandview Lane to Grand River Avenue which currently operates at a LOS F during the PM peak hour.
2. The following mitigation measures are recommended under existing conditions in order to improve traffic operations under existing conditions:

Grand River Avenue & Meadowbrook Road

- a. Restripe the WB right turn lane at the signalized intersection of Grand River Avenue & Meadowbrook Road to provide a shared through / right turn lane.
- b. Construct an additional receiving lane west of the intersection between Meadowbrook Road and Grandview Lane (approximately 275 feet).
- c. Optimize signal phase splits and remove WB doghouse signal head and right turn overlap phasing.

Meadowbrook Road & Cherry Hill Road / Clermont Avenue

- d. Optimize signal cycle length to a half-cycle of the Grand River Avenue & Meadowbrook Road intersection.
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 with minor increases in vehicle delay.
 5. At the intersection of Grand River Avenue & Meadowbrook Road overall vehicle delays will increase by less than four seconds during the peak periods which will not be discernable to existing network traffic. Additionally, the proposed development will increase traffic at this intersection by less than 3%, which is not significant.
 6. At the proposed site driveway approaches to Grand River Avenue and Meadowbrook Road all approaches and movements will operate acceptably at a LOS C or better during both peak periods.
 7. A right turn deceleration taper is warranted at the site access point on Meadowbrook Road.
 8. The proposed site driveways should be designed in accordance with RCOC and City of Novi requirements.

Attached: Figures 1-5
Traffic Volume Data
SEMCOG Data
Synchro / SimTraffic Results

Novi Auxiliary Lane Warrants

SJR:jmk

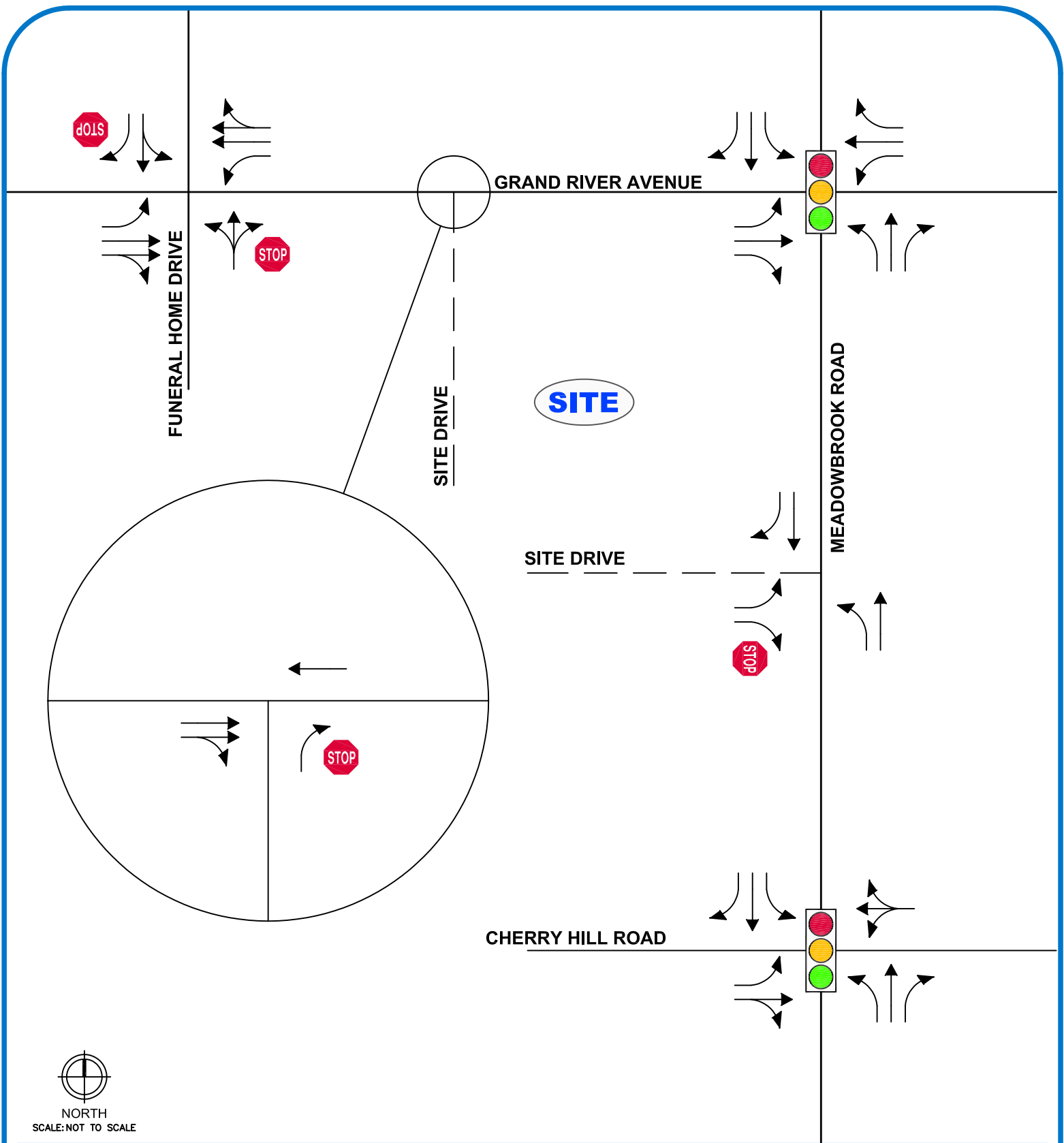




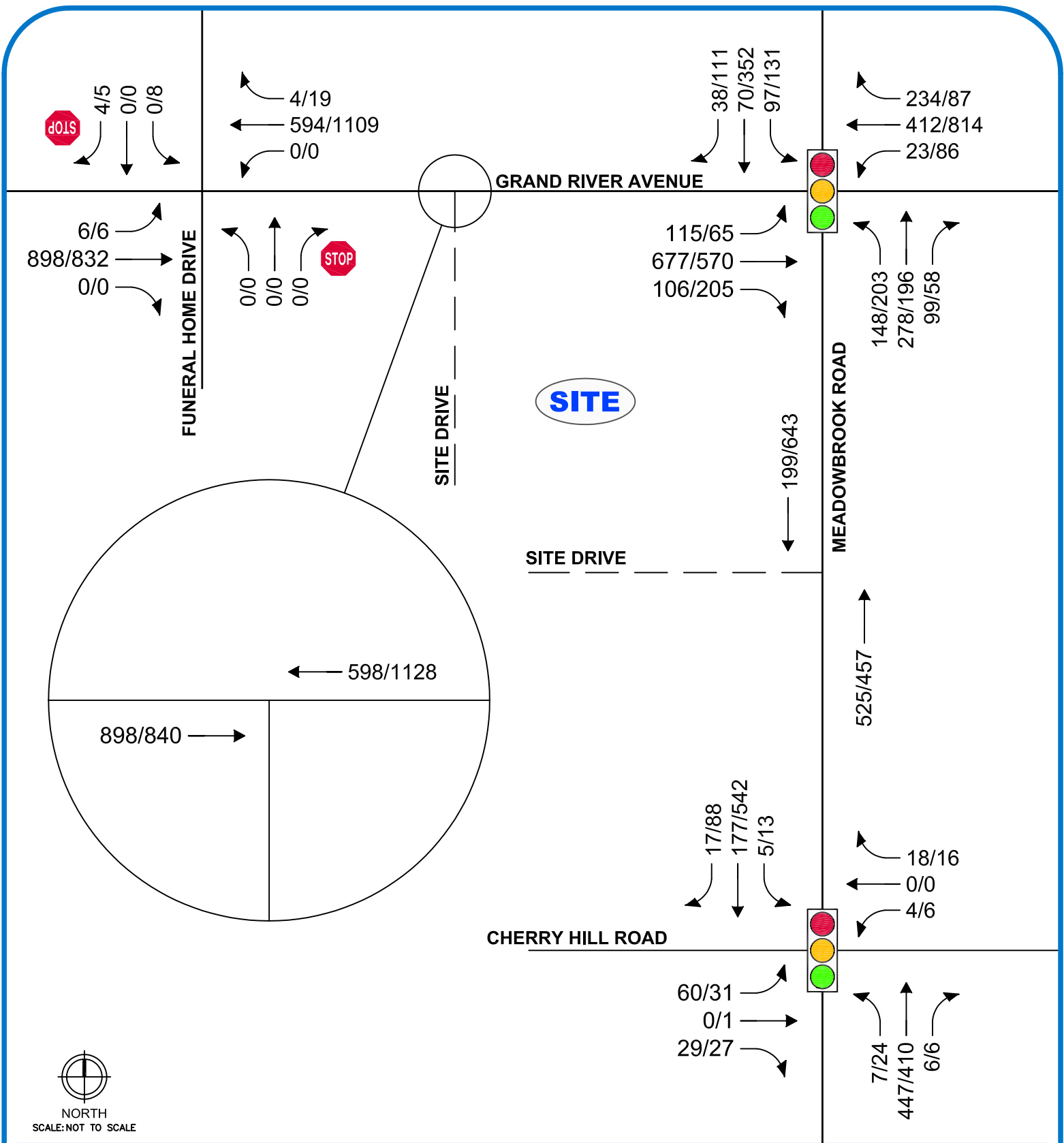


FIGURE 1 LANE USE AND TRAFFIC CONTROL

NOVI BMW TIS - CITY OF NOVI, MI

LEGEND

-  ROADS
-  LANE USE
-  SIGNALIZED INTERSECTION
-  UNSIGNALIZED INTERSECTION



NORTH
SCALE: NOT TO SCALE



FIGURE 2
EXISTING TRAFFIC VOLUMES
NOVI BMW TIS - CITY OF NOVI, MI

LEGEND

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

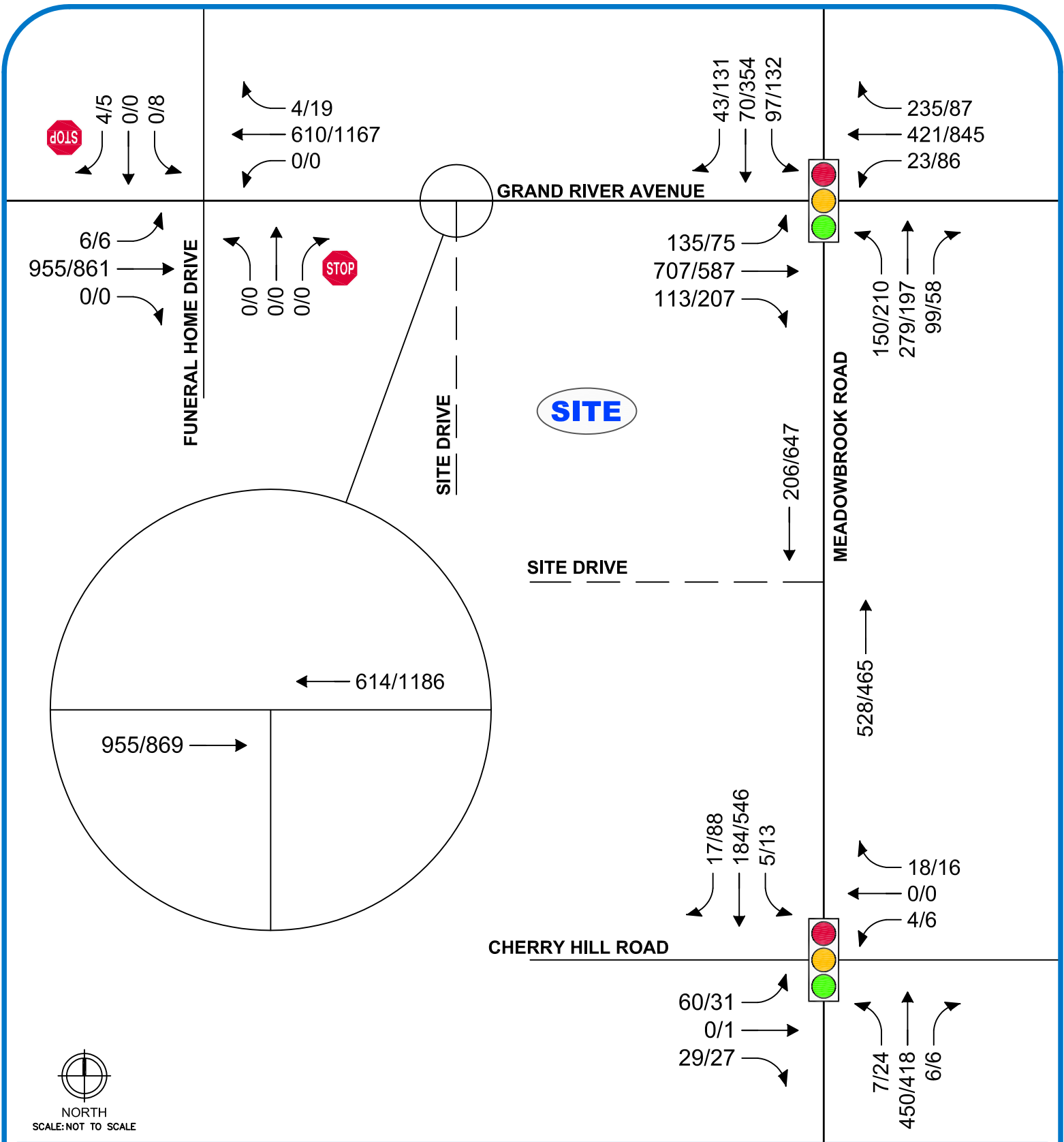


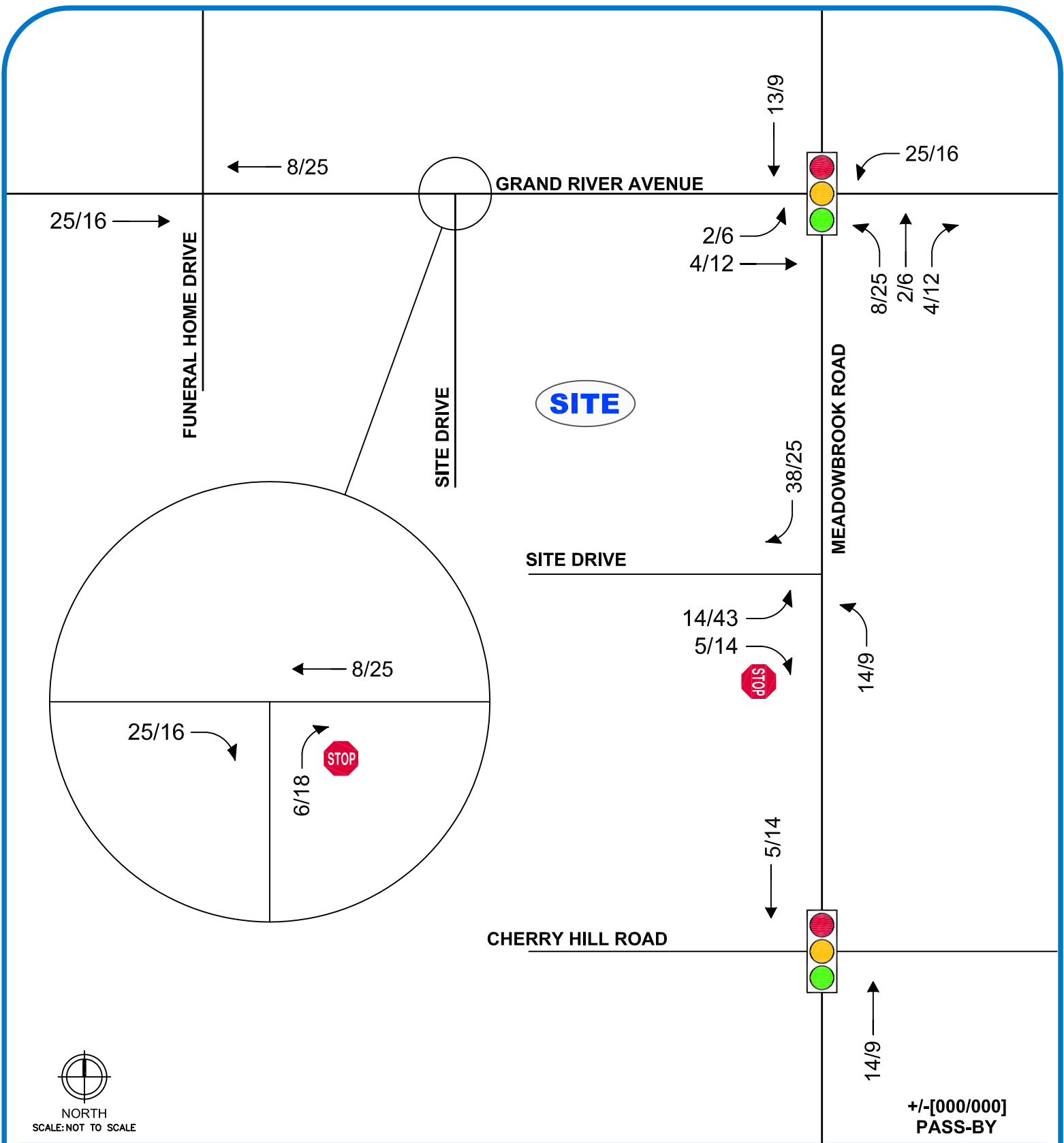
FIGURE 3
BACKGROUND TRAFFIC
VOLUMES

NOVI BMW TIS - CITY OF NOVI, MI



LEGEND

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



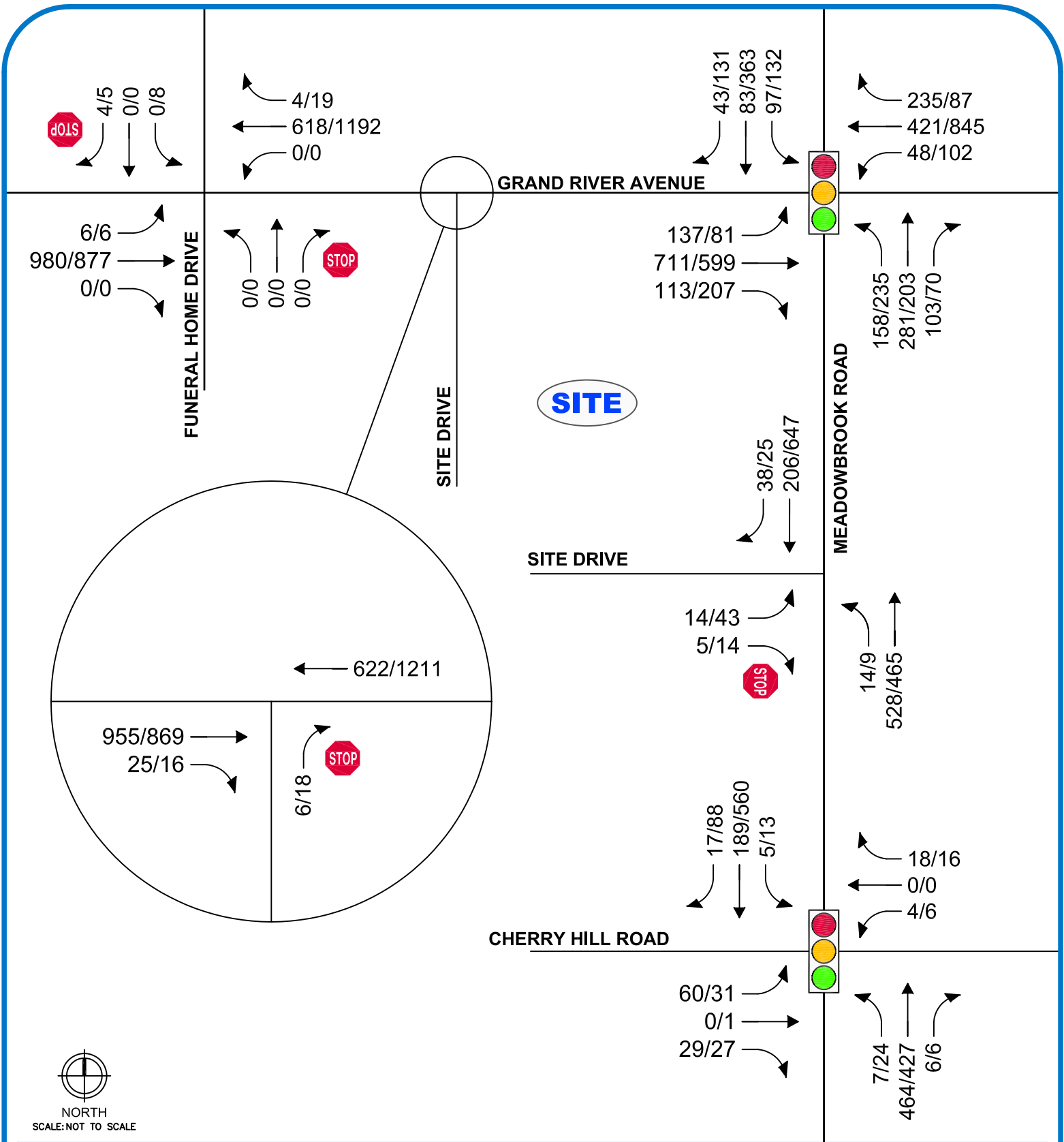
+/--[000/000]
PASS-BY



FIGURE 4
SITE-GENERATED
TRAFFIC VOLUMES
NOVI BMW TIS - CITY OF NOVI, MI

LEGEND

	ROADS
	TRAFFIC VOLUMES (AM/PM)
	SIGNALIZED INTERSECTION
	UNSIGNALED INTERSECTION



NORTH
SCALE: NOT TO SCALE



FIGURE 5
FUTURE TRAFFIC VOLUMES
NOVI BMW TIS - CITY OF NOVI, MI

LEGEND

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

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: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 5DW SE

File Name : TMC_1 GrandRiver & Grandview_9-12-14
Site Code : TMC_1
Start Date : 9/12/2017
Page No : 1

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds.

Start Time	Grandview Lane Southbound					Grand River Avenue Westbound					Funeral Home Drive Northbound					Grand River Avenue Eastbound					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	0	0	0	0	0	74	0	0	74	0	0	0	0	0	0	151	1	0	152	226
07:15 AM	1	0	0	0	1	1	85	0	0	86	0	0	0	0	0	0	185	2	0	187	274
07:30 AM	0	0	0	0	0	1	85	0	0	86	0	0	0	0	0	0	205	0	0	205	291
07:45 AM	1	0	0	1	2	0	130	0	0	130	0	0	0	0	0	0	258	3	0	261	393
Total	2	0	0	1	3	2	374	0	0	376	0	0	0	0	0	0	799	6	0	805	1184
08:00 AM	2	0	0	0	2	1	118	0	0	119	0	0	0	0	0	0	233	1	0	234	355
08:15 AM	1	0	0	0	1	1	146	0	0	147	0	0	0	0	0	0	235	2	0	237	385
08:30 AM	1	0	0	0	1	2	178	0	0	180	0	0	0	0	0	0	218	2	0	220	401
08:45 AM	0	0	0	2	2	0	152	0	0	152	0	0	0	0	0	0	212	1	0	213	367
Total	4	0	0	2	6	4	594	0	0	598	0	0	0	0	0	0	898	6	0	904	1508
**** BREAK ****																					
04:00 PM	3	0	2	0	5	1	265	0	0	266	0	0	0	0	0	0	187	2	0	189	460
04:15 PM	2	0	1	0	3	4	256	0	0	260	0	0	0	0	0	0	192	1	0	193	456
04:30 PM	3	0	1	0	4	4	276	0	0	280	0	0	0	0	0	0	176	0	0	176	460
04:45 PM	6	0	0	1	7	2	244	0	0	246	0	0	1	0	1	0	220	1	0	221	475
Total	14	0	4	1	19	11	1041	0	0	1052	0	0	1	0	1	0	775	4	0	779	1851
05:00 PM	1	0	3	0	4	4	281	0	0	285	0	0	0	0	0	0	207	2	0	209	498
05:15 PM	3	0	1	2	6	5	277	0	0	282	0	0	0	0	0	0	197	4	0	201	489
05:30 PM	0	0	0	0	0	7	290	0	0	297	0	0	0	0	0	0	219	0	0	219	516
05:45 PM	1	0	4	0	5	3	261	0	0	264	0	0	0	0	0	0	209	0	0	209	478
Total	5	0	8	2	15	19	1109	0	0	1128	0	0	0	0	0	0	832	6	0	838	1981
Grand Total	25	0	12	6	43	36	3118	0	0	3154	0	0	1	0	1	0	3304	22	0	3326	6524
Apprch %	58.1	0	27.9	14		1.1	98.9	0	0		0	0	100	0		0	99.3	0.7	0		
Total %	0.4	0	0.2	0.1	0.7	0.6	47.8	0	0	48.3	0	0	0	0	0	0	50.6	0.3	0	51	
Pass Cars	24	0	12	0	36	36	3047	0	0	3083	0	0	1	0	1	0	3225	20	0	3245	6365
% Pass Cars	96	0	100	0	83.7	100	97.7	0	0	97.7	0	0	100	0	100	0	97.6	90.9	0	97.6	97.6
Single Units	1	0	0	0	1	0	60	0	0	60	0	0	0	0	0	0	61	2	0	63	124
% Single Units	4	0	0	0	2.3	0	1.9	0	0	1.9	0	0	0	0	0	0	1.8	9.1	0	1.9	1.9
Heavy Trucks	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	18	0	0	18	29
% Heavy Trucks	0	0	0	0	0	0	0.4	0	0	0.3	0	0	0	0	0	0	0.5	0	0	0.5	0.4
Peds.	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
% Peds.	0	0	0	100	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1

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

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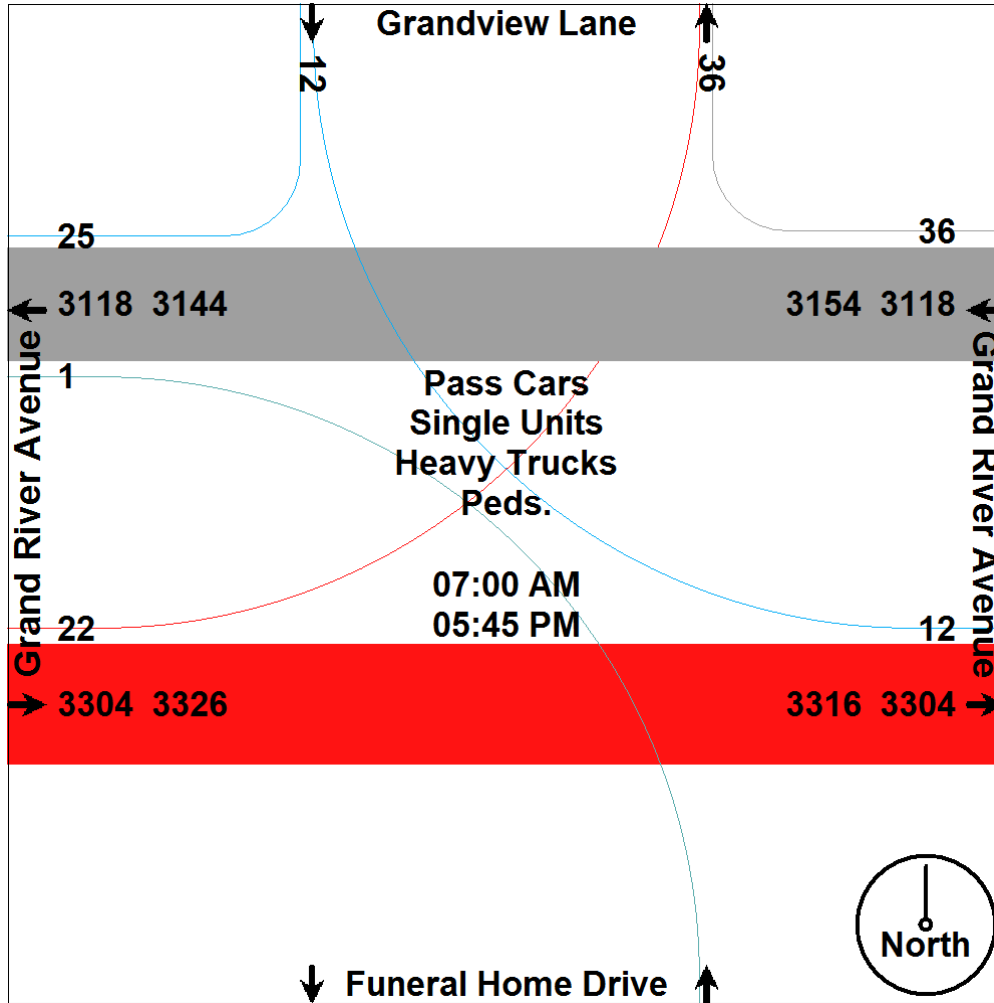
Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 5DW SE

File Name : TMC_1 GrandRiver & Grandview_9-12-14
Site Code : TMC_1
Start Date : 9/12/2017
Page No : 2



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Phone: (586) 786-5407

Traffic Study Performed For:

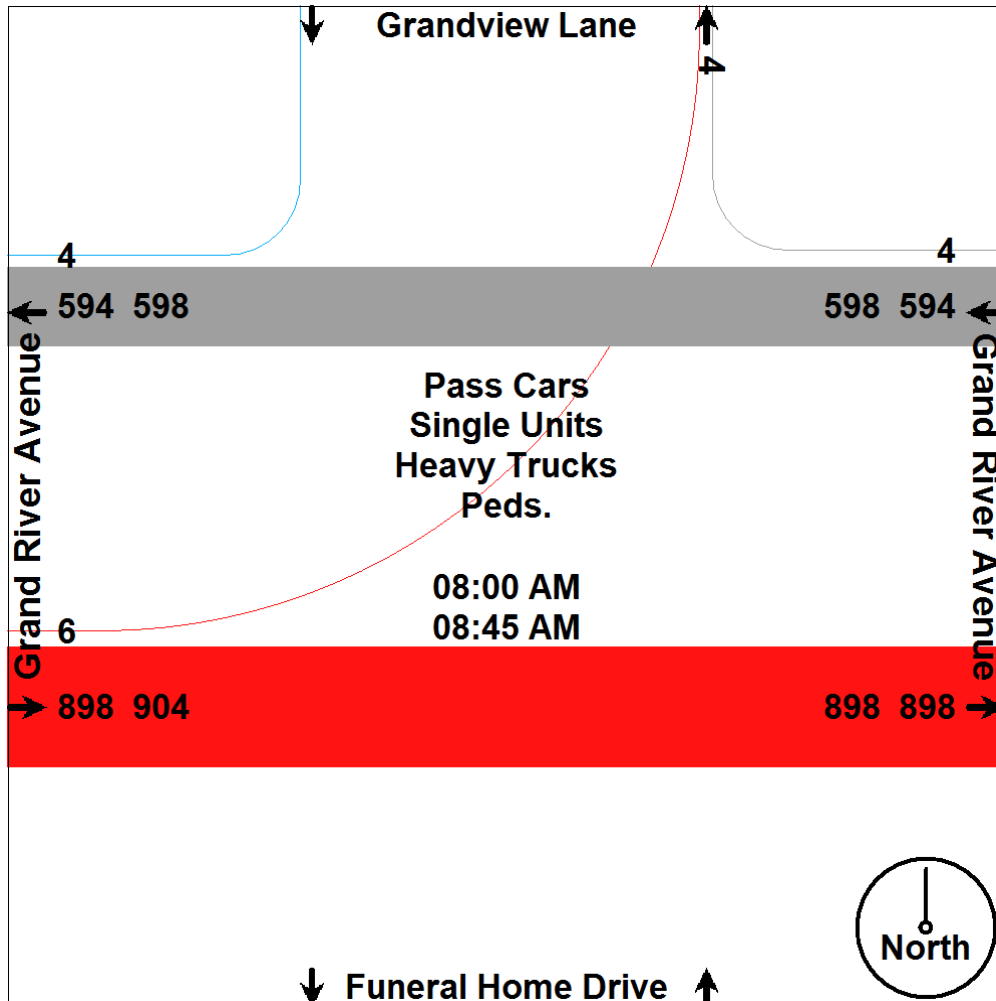
Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 5DW SE

File Name : TMC_1 GrandRiver & Grandview_9-12-14
Site Code : TMC_1
Start Date : 9/12/2017
Page No : 3

Start Time	Grandview Lane Southbound				Grand River Avenue Westbound				Funeral Home Drive Northbound				Grand River Avenue 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 08:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	2	0	0	2	1	118	0	119	0	0	0	0	0	233	1	234	355
08:15 AM	1	0	0	1	1	146	0	147	0	0	0	0	0	235	2	237	385
08:30 AM	1	0	0	1	2	178	0	180	0	0	0	0	0	218	2	220	401
08:45 AM	0	0	0	0	0	152	0	152	0	0	0	0	0	212	1	213	365
Total Volume	4	0	0	4	4	594	0	598	0	0	0	0	0	898	6	904	1506
% App. Total	100	0	0		0.7	99.3	0		0	0	0	0	0	99.3	0.7		
PHF	.500	.000	.000	.500	.500	.834	.000	.831	.000	.000	.000	.000	.000	.955	.750	.954	.939
Pass Cars	3	0	0	3	4	567	0	571	0	0	0	0	0	868	6	874	1448
% Pass Cars	75.0	0	0	75.0	100	95.5	0	95.5	0	0	0	0	0	96.7	100	96.7	96.1
Single Units	1	0	0	1	0	24	0	24	0	0	0	0	0	24	0	24	49
% Single Units	25.0	0	0	25.0	0	4.0	0	4.0	0	0	0	0	0	2.7	0	2.7	3.3
Heavy Trucks	0	0	0	0	0	3	0	3	0	0	0	0	0	6	0	6	9
% Heavy Trucks	0	0	0	0	0	0.5	0	0.5	0	0	0	0	0	0.7	0	0.7	0.6
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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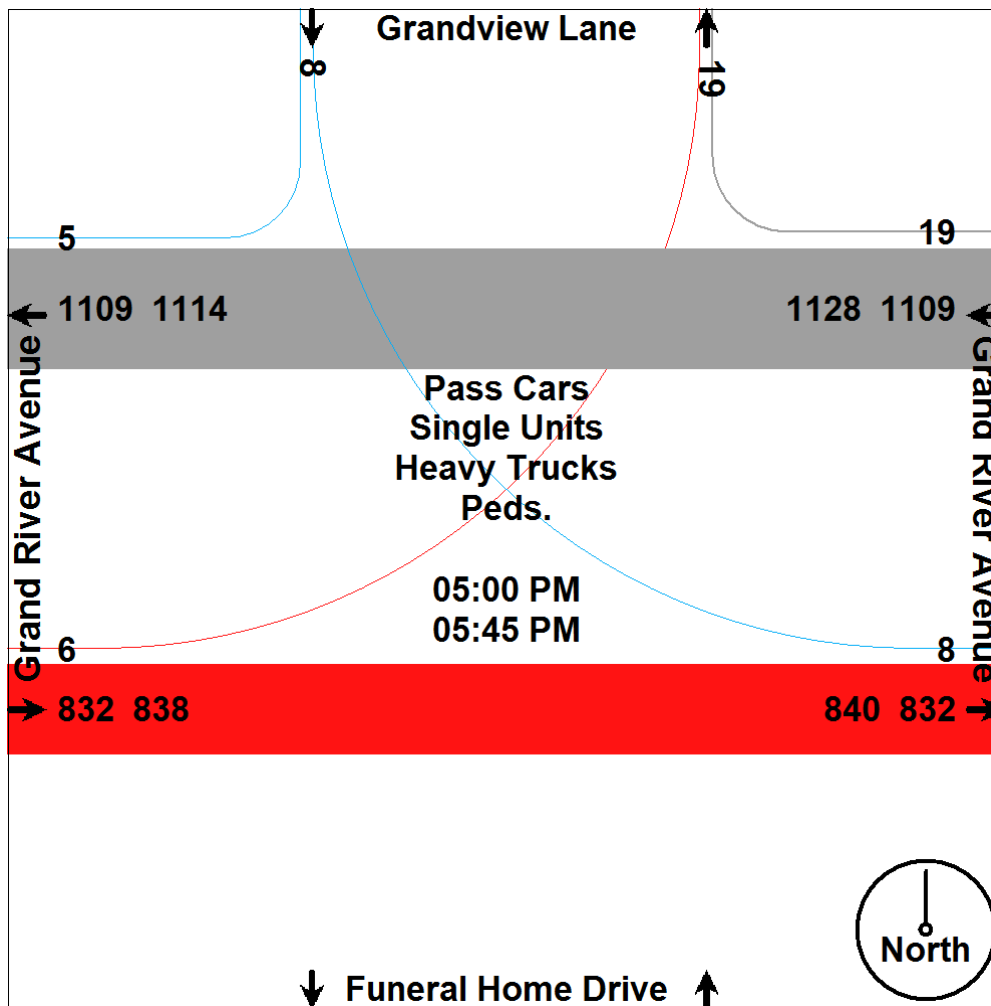
Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 5DW SE

File Name : TMC_1 GrandRiver & Grandview_9-12-14
Site Code : TMC_1
Start Date : 9/12/2017
Page No : 4

Start Time	Grandview Lane Southbound				Grand River Avenue Westbound				Funeral Home Drive Northbound				Grand River Avenue 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 05:00 PM																	
05:00 PM	1	0	3	4	4	281	0	285	0	0	0	0	0	207	2	209	498
05:15 PM	3	0	1	4	5	277	0	282	0	0	0	0	0	197	4	201	487
05:30 PM	0	0	0	0	7	290	0	297	0	0	0	0	0	219	0	219	516
05:45 PM	1	0	4	5	3	261	0	264	0	0	0	0	0	209	0	209	478
Total Volume	5	0	8	13	19	1109	0	1128	0	0	0	0	0	832	6	838	1979
% App. Total	38.5	0	61.5		1.7	98.3	0		0	0	0	0	0	99.3	0.7		
PHF	.417	.000	.500	.650	.679	.956	.000	.949	.000	.000	.000	.000	.000	.950	.375	.957	.959
Pass Cars	5	0	8	13	19	1100	0	1119	0	0	0	0	0	821	6	827	1959
% Pass Cars	100	0	100	100	100	99.2	0	99.2	0	0	0	0	0	98.7	100	98.7	99.0
Single Units	0	0	0	0	0	6	0	6	0	0	0	0	0	6	0	6	12
% Single Units	0	0	0	0	0	0.5	0	0.5	0	0	0	0	0	0.7	0	0.7	0.6
Heavy Trucks	0	0	0	0	0	3	0	3	0	0	0	0	0	5	0	5	8
% Heavy Trucks	0	0	0	0	0	0.3	0	0.3	0	0	0	0	0	0.6	0	0.6	0.4
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Phone: (586) 786-5407

Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 6H3 NW

File Name : TMC_2 GrandRiver & Meadowbrook_9-12-14
Site Code : TMC_2
Start Date : 9/12/2017
Page No : 1

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds.

Start Time	Meadowbrook Road Southbound					Grand River Avenue Westbound					Meadowbrook Road Northbound					Grand River Avenue Eastbound					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	7	7	7	0	21	22	52	8	0	82	20	37	13	0	70	11	124	16	0	151	324
07:15 AM	3	11	16	0	30	33	56	6	0	95	26	46	29	0	101	18	152	16	0	186	412
07:30 AM	5	9	20	1	35	31	63	5	0	99	25	47	21	0	93	15	188	16	0	219	446
07:45 AM	8	19	19	0	46	46	87	6	0	139	24	62	40	0	126	18	204	27	0	249	560
Total	23	46	62	1	132	132	258	25	0	415	95	192	103	0	390	62	668	75	0	805	1742
08:00 AM	4	11	31	0	46	60	83	8	0	151	26	74	28	0	128	24	181	28	0	233	558
08:15 AM	8	16	20	0	44	59	101	6	0	166	29	71	35	0	135	23	174	34	0	231	576
08:30 AM	12	20	27	0	59	66	124	5	0	195	22	62	45	0	129	29	158	28	0	215	598
08:45 AM	13	23	19	1	56	49	98	4	0	151	22	71	38	0	131	29	151	23	0	203	541
Total	37	70	97	1	205	234	406	23	0	663	99	278	146	0	523	105	664	113	0	882	2273
**** BREAK ****																					
04:00 PM	27	57	26	0	110	20	212	16	0	248	10	34	42	0	86	46	134	22	0	202	646
04:15 PM	16	62	25	0	103	22	212	7	0	241	15	35	35	0	85	37	128	24	0	189	618
04:30 PM	22	68	21	0	111	26	211	23	0	260	10	56	48	0	114	49	120	7	0	176	661
04:45 PM	18	61	22	1	102	22	185	14	0	221	18	49	35	0	102	62	141	15	0	218	643
Total	83	248	94	1	426	90	820	60	0	970	53	174	160	0	387	194	523	68	0	785	2568
05:00 PM	28	109	45	0	182	18	209	19	0	246	16	59	45	0	120	42	149	13	0	204	752
05:15 PM	28	98	31	0	157	21	186	27	0	234	15	44	64	0	123	57	141	9	0	207	721
05:30 PM	29	73	34	0	136	23	210	24	0	257	12	48	52	0	112	54	130	24	0	208	713
05:45 PM	25	72	21	0	118	25	203	16	1	245	14	43	41	1	99	50	145	18	3	216	678
Total	110	352	131	0	593	87	808	86	1	982	57	194	202	1	454	203	565	64	3	835	2864
Grand Total	253	716	384	3	1356	543	2292	194	1	3030	304	838	611	1	1754	564	2420	320	3	3307	9447
Apprch %	18.7	52.8	28.3	0.2		17.9	75.6	6.4	0		17.3	47.8	34.8	0.1		17.1	73.2	9.7	0.1		
Total %	2.7	7.6	4.1	0	14.4	5.7	24.3	2.1	0	32.1	3.2	8.9	6.5	0	18.6	6	25.6	3.4	0	35	
Pass Cars	244	715	378	0	1337	537	2240	188	0	2965	298	830	602	0	1730	551	2356	315	0	3222	9254
% Pass Cars	96.4	99.9	98.4	0	98.6	98.9	97.7	96.9	0	97.9	98	99	98.5	0	98.6	97.7	97.4	98.4	0	97.4	98
Single Units	6	1	5	0	12	4	43	5	0	52	5	6	8	0	19	12	50	5	0	67	150
% Single Units	2.4	0.1	1.3	0	0.9	0.7	1.9	2.6	0	1.7	1.6	0.7	1.3	0	1.1	2.1	2.1	1.6	0	2	1.6
Heavy Trucks	3	0	1	0	4	2	9	1	0	12	1	2	1	0	4	1	14	0	0	15	35
% Heavy Trucks	1.2	0	0.3	0	0.3	0.4	0.4	0.5	0	0.4	0.3	0.2	0.2	0	0.2	0.2	0.6	0	0	0.5	0.4
Peds.	0	0	0	3	3	0	0	0	1	1	0	0	0	1	1	0	0	0	3	3	8
% Peds.	0	0	0	100	0.2	0	0	0	100	0	0	0	0	100	0.1	0	0	0	100	0.1	0.1

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

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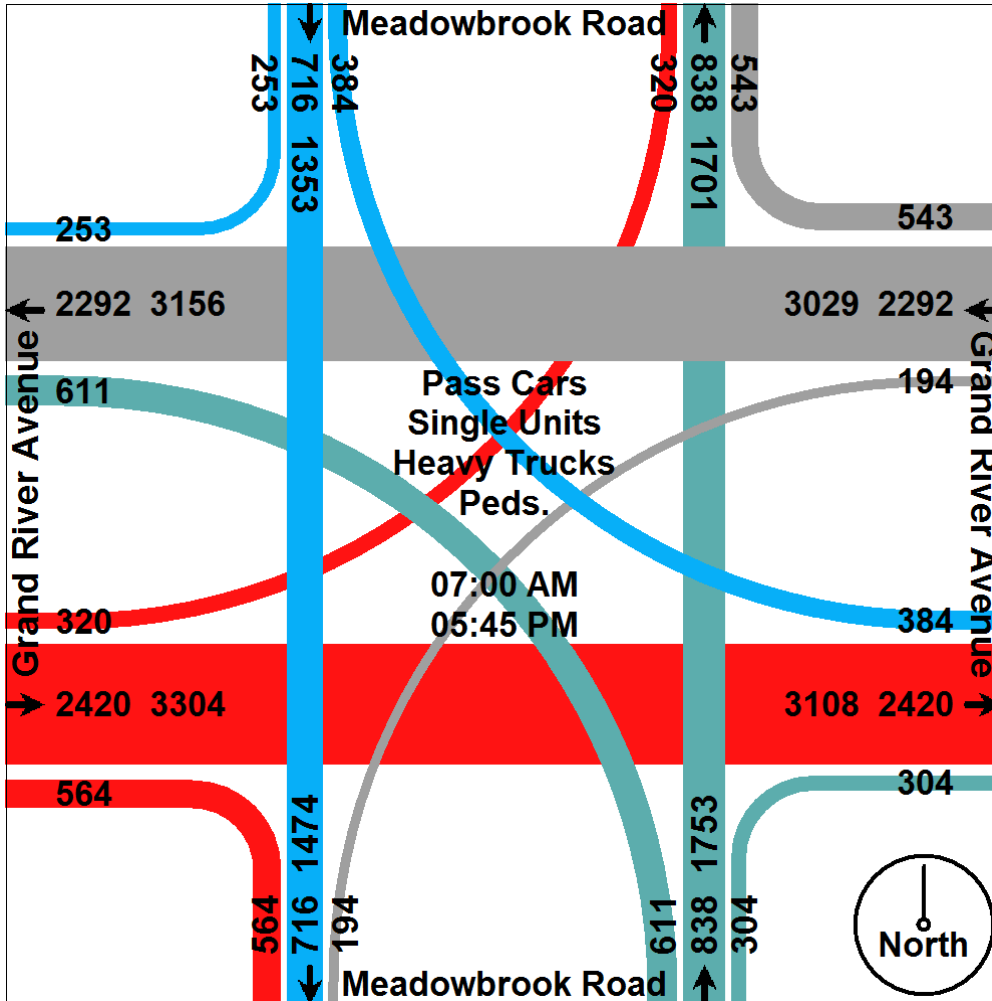
Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 6H3 NW

File Name : TMC_2 GrandRiver & Meadowbrook_9-12-14
Site Code : TMC_2
Start Date : 9/12/2017
Page No : 2



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Traffic Study Performed For:

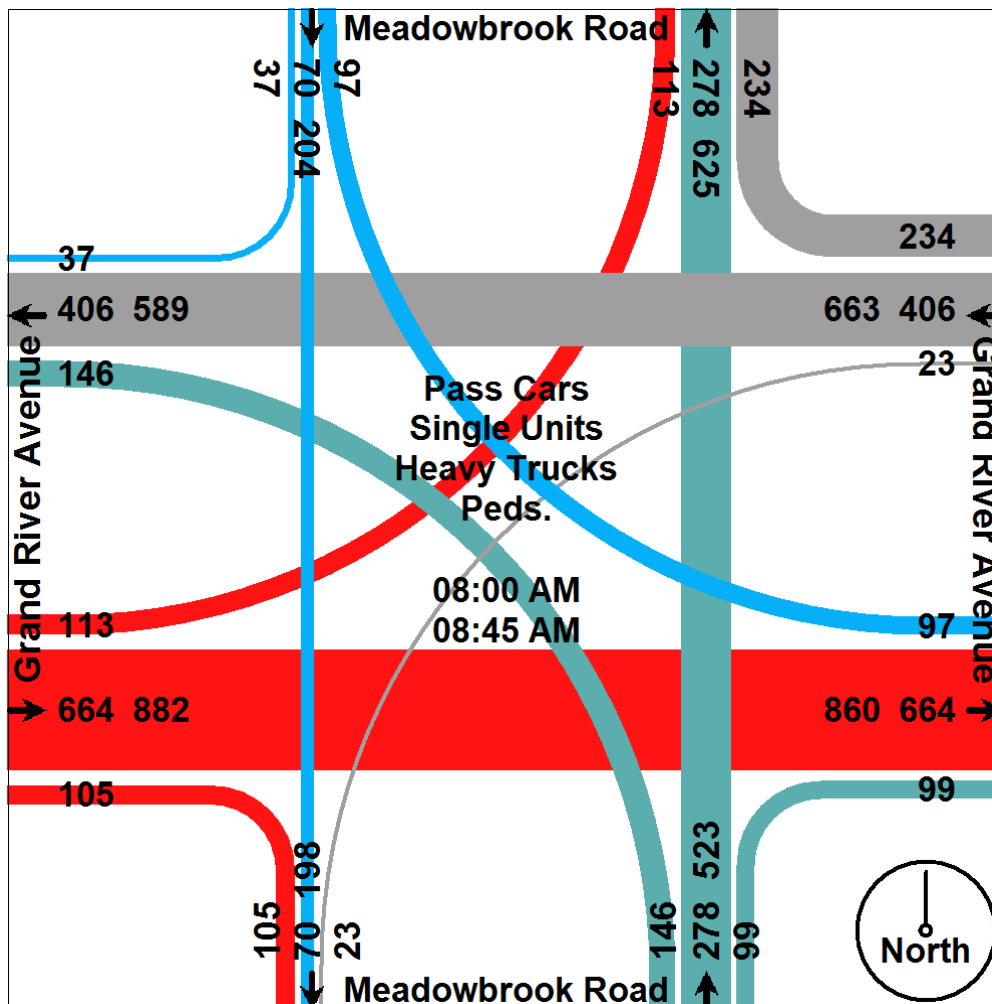
Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 6H3 NW

File Name : TMC_2 GrandRiver & Meadowbrook_9-12-14
Site Code : TMC_2
Start Date : 9/12/2017
Page No : 3

Start Time	Meadowbrook Road Southbound				Grand River Avenue Westbound				Meadowbrook Road Northbound				Grand River Avenue 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 08:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	4	11	31	46	60	83	8	151	26	74	28	128	24	181	28	233	558
08:15 AM	8	16	20	44	59	101	6	166	29	71	35	135	23	174	34	231	576
08:30 AM	12	20	27	59	66	124	5	195	22	62	45	129	29	158	28	215	598
08:45 AM	13	23	19	55	49	98	4	151	22	71	38	131	29	151	23	203	540
Total Volume	37	70	97	204	234	406	23	663	99	278	146	523	105	664	113	882	2272
% App. Total	18.1	34.3	47.5		35.3	61.2	3.5		18.9	53.2	27.9		11.9	75.3	12.8		
PHF	.712	.761	.782	.864	.886	.819	.719	.850	.853	.939	.811	.969	.905	.917	.831	.946	.950
Pass Cars	33	70	95	198	231	390	22	643	99	275	141	515	99	640	112	851	2207
% Pass Cars	89.2	100	97.9	97.1	98.7	96.1	95.7	97.0	100	98.9	96.6	98.5	94.3	96.4	99.1	96.5	97.1
Single Units	3	0	2	5	2	15	1	18	0	2	5	7	6	18	1	25	55
% Single Units	8.1	0	2.1	2.5	0.9	3.7	4.3	2.7	0	0.7	3.4	1.3	5.7	2.7	0.9	2.8	2.4
Heavy Trucks	1	0	0	1	1	1	0	2	0	1	0	1	0	6	0	6	10
% Heavy Trucks	2.7	0	0	0.5	0.4	0.2	0	0.3	0	0.4	0	0.2	0	0.9	0	0.7	0.4
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

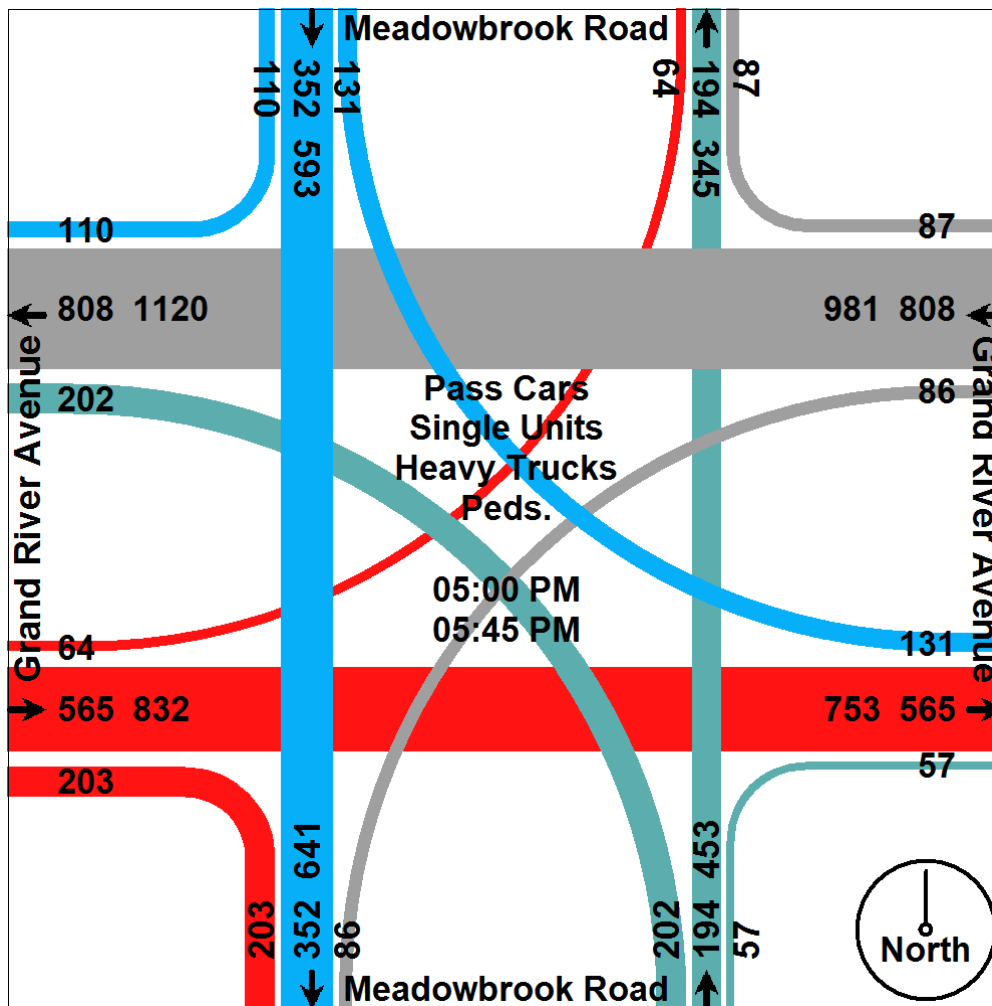
Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 6H3 NW

File Name : TMC_2 GrandRiver & Meadowbrook_9-12-14
Site Code : TMC_2
Start Date : 9/12/2017
Page No : 4

Start Time	Meadowbrook Road Southbound				Grand River Avenue Westbound				Meadowbrook Road Northbound				Grand River Avenue 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 05:00 PM																	
05:00 PM	28	109	45	182	18	209	19	246	16	59	45	120	42	149	13	204	752
05:15 PM	28	98	31	157	21	186	27	234	15	44	64	123	57	141	9	207	721
05:30 PM	29	73	34	136	23	210	24	257	12	48	52	112	54	130	24	208	713
05:45 PM	25	72	21	118	25	203	16	244	14	43	41	98	50	145	18	213	673
Total Volume	110	352	131	593	87	808	86	981	57	194	202	453	203	565	64	832	2859
% App. Total	18.5	59.4	22.1		8.9	82.4	8.8		12.6	42.8	44.6		24.4	67.9	7.7		
PHF	.948	.807	.728	.815	.870	.962	.796	.954	.891	.822	.789	.921	.890	.948	.667	.977	.950
Pass Cars	108	352	131	591	86	801	85	972	56	191	202	449	202	557	63	822	2834
% Pass Cars	98.2	100	100	99.7	98.9	99.1	98.8	99.1	98.2	98.5	100	99.1	99.5	98.6	98.4	98.8	99.1
Single Units	1	0	0	1	1	5	1	7	1	3	0	4	1	5	1	7	19
% Single Units	0.9	0	0	0.2	1.1	0.6	1.2	0.7	1.8	1.5	0	0.9	0.5	0.9	1.6	0.8	0.7
Heavy Trucks	1	0	0	1	0	2	0	2	0	0	0	0	0	3	0	3	6
% Heavy Trucks	0.9	0	0	0.2	0	0.2	0	0.2	0	0	0	0	0	0.5	0	0.4	0.2
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Data Collection, LLC

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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: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 340 SE

File Name : TMC_3 Meadowbrook & CherryHill_9-14-17
Site Code : TMC_3
Start Date : 9/12/2017
Page No : 1

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds.

Start Time	Meadowbrook Road Southbound					Clermont Avenue Westbound					Meadowbrook Road Northbound					Cherry Hill Road Eastbound					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	5	21	0	0	26	6	0	1	0	7	1	53	1	0	55	5	0	14	0	19	107
07:15 AM	5	28	1	0	34	7	0	1	0	8	0	76	0	0	76	7	0	14	0	21	139
07:30 AM	2	27	1	0	30	5	0	0	0	5	0	73	1	0	74	3	0	23	0	26	135
07:45 AM	3	38	1	0	42	8	0	2	0	10	0	92	0	0	92	4	0	20	0	24	168
Total	15	114	3	0	132	26	0	4	0	30	1	294	2	0	297	19	0	71	0	90	549
08:00 AM	3	35	3	0	41	2	0	1	0	3	1	114	2	0	117	7	0	12	0	19	180
08:15 AM	5	40	2	0	47	7	0	2	0	9	3	114	2	0	119	11	0	12	0	23	198
08:30 AM	4	46	0	0	50	8	0	1	0	9	1	100	3	0	104	5	0	18	0	23	186
08:45 AM	5	56	0	0	61	1	0	0	0	1	1	110	0	0	111	6	0	18	0	24	197
Total	17	177	5	0	199	18	0	4	0	22	6	438	7	0	451	29	0	60	0	89	761
**** BREAK ****																					
04:00 PM	13	109	3	0	125	2	0	0	0	2	1	84	5	0	90	2	0	15	2	19	236
04:15 PM	10	87	4	0	101	3	0	1	1	5	2	77	5	0	84	3	0	7	0	10	200
04:30 PM	15	123	5	0	143	3	0	0	0	3	1	93	5	0	99	3	0	4	0	7	252
04:45 PM	17	116	3	0	136	4	0	1	1	6	1	93	5	0	99	7	0	7	0	14	255
Total	55	435	15	0	505	12	0	2	2	16	5	347	20	0	372	15	0	33	2	50	943
05:00 PM	22	144	2	0	168	3	0	2	0	5	2	119	7	0	128	8	0	7	0	15	316
05:15 PM	30	146	1	0	177	8	0	2	0	10	1	105	6	0	112	7	0	8	0	15	314
05:30 PM	18	128	7	0	153	1	0	1	0	2	2	93	6	0	101	5	1	9	0	15	271
05:45 PM	14	114	6	0	134	2	0	3	0	5	1	90	6	1	98	5	0	10	2	17	254
Total	84	532	16	0	632	14	0	8	0	22	6	407	25	1	439	25	1	34	2	62	1155
Grand Total	171	1258	39	0	1468	70	0	18	2	90	18	1486	54	1	1559	88	1	198	4	291	3408
Apprch %	11.6	85.7	2.7	0		77.8	0	20	2.2		1.2	95.3	3.5	0.1		30.2	0.3	68	1.4		
Total %	5	36.9	1.1	0	43.1	2.1	0	0.5	0.1	2.6	0.5	43.6	1.6	0	45.7	2.6	0	5.8	0.1	8.5	
Pass Cars	166	1245	38	0	1449	70	0	18	0	88	17	1464	53	0	1534	88	1	197	0	286	3357
% Pass Cars	97.1	99	97.4	0	98.7	100	0	100	0	97.8	94.4	98.5	98.1	0	98.4	100	100	99.5	0	98.3	98.5
Single Units	4	11	1	0	16	0	0	0	0	0	0	20	1	0	21	0	0	1	0	1	38
% Single Units	2.3	0.9	2.6	0	1.1	0	0	0	0	0	0	1.3	1.9	0	1.3	0	0	0.5	0	0.3	1.1
Heavy Trucks	1	2	0	0	3	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	6
% Heavy Trucks	0.6	0.2	0	0	0.2	0	0	0	0	0	5.6	0.1	0	0	0.2	0	0	0	0	0	0.2
Peds.	0	0	0	0	0	0	0	0	2	2	0	0	0	1	1	0	0	0	4	4	7
% Peds.	0	0	0	0	0	0	0	0	100	2.2	0	0	0	100	0.1	0	0	0	100	1.4	0.2

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

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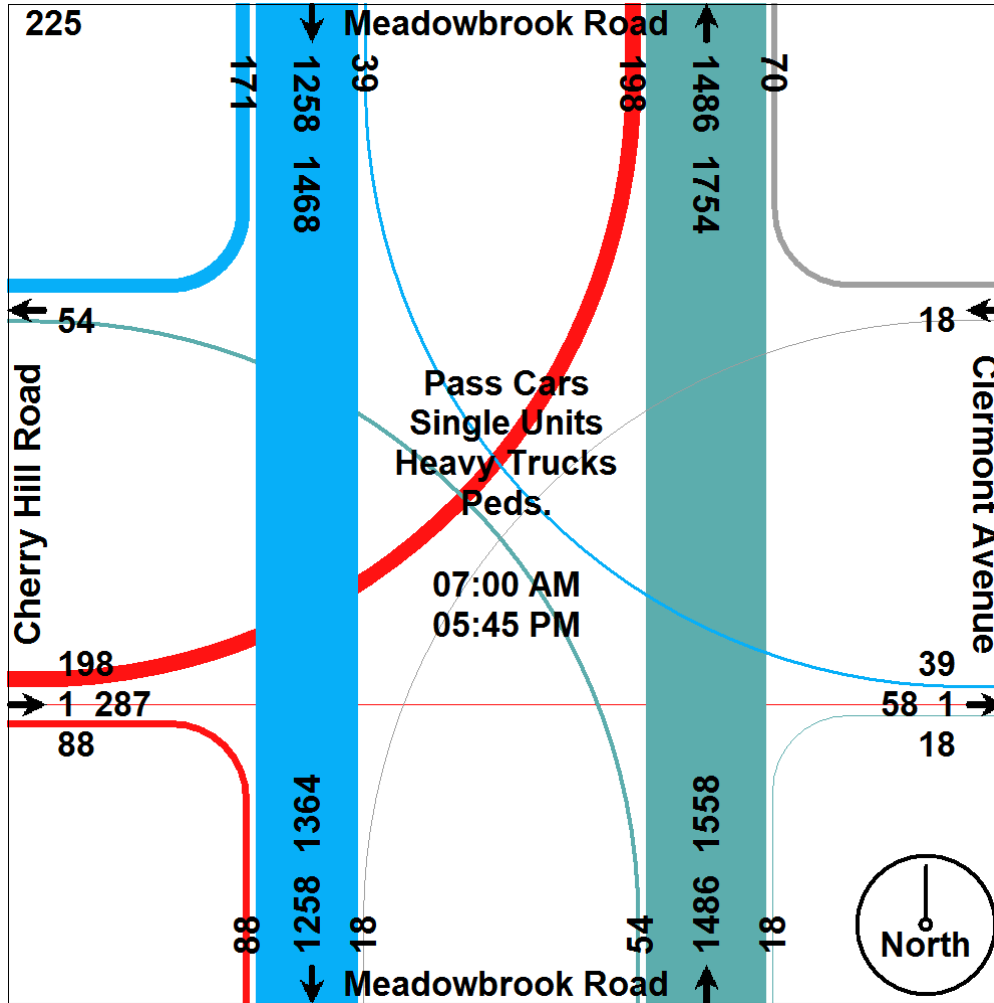
Traffic Study Performed For:

Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 340 SE

File Name : TMC_3 Meadowbrook & CherryHill_9-14-17
Site Code : TMC_3
Start Date : 9/12/2017
Page No : 2



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Traffic Study Performed For:

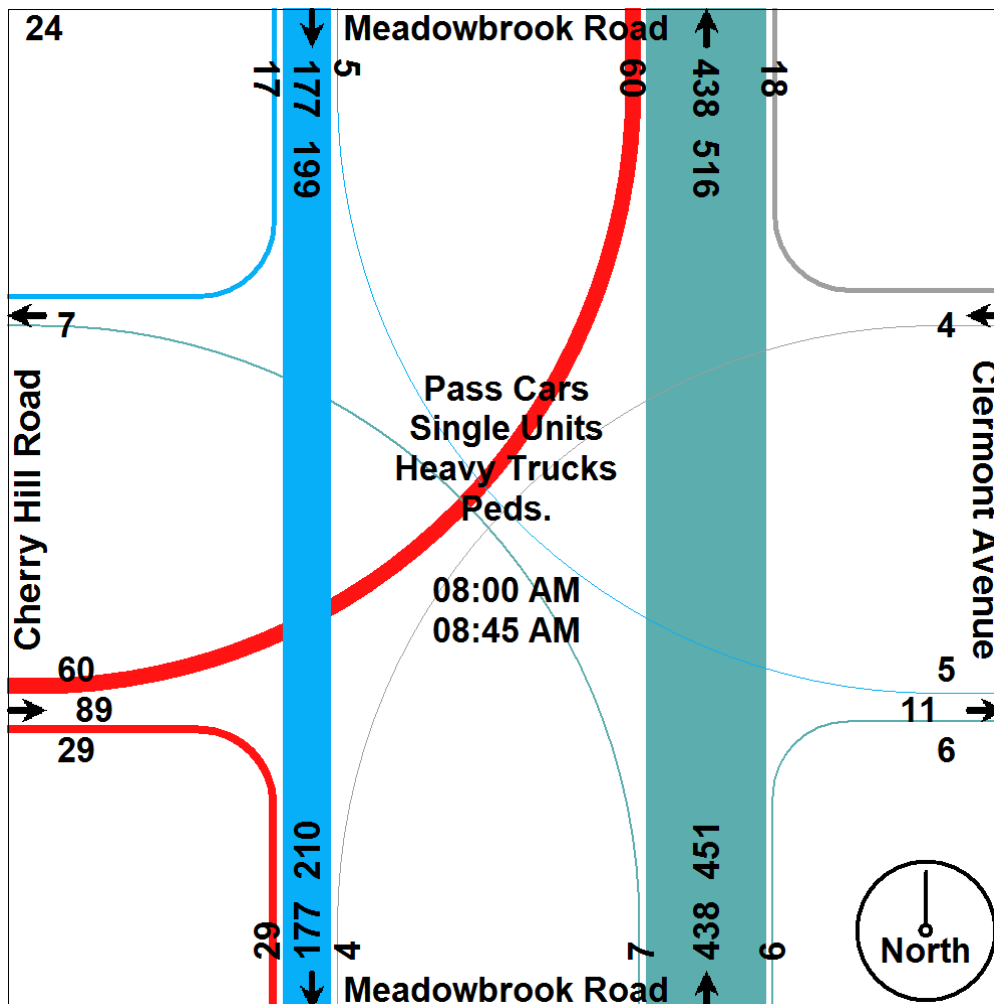
Fleis & VandenBrink



Project: Novi Traffic Impact Study
Type: 4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy, Dry Deg. 70's
Count By: Miovision Video SCU 340 SE

File Name : TMC_3 Meadowbrook & CherryHill_9-14-17
Site Code : TMC_3
Start Date : 9/12/2017
Page No : 3

Start Time	Meadowbrook Road Southbound				Clermont Avenue Westbound				Meadowbrook Road Northbound				Cherry Hill Road 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 08:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	3	35	3	41	2	0	1	3	1	114	2	117	7	0	12	19	180
08:15 AM	5	40	2	47	7	0	2	9	3	114	2	119	11	0	12	23	198
08:30 AM	4	46	0	50	8	0	1	9	1	100	3	104	5	0	18	23	186
08:45 AM	5	56	0	61	1	0	0	1	1	110	0	111	6	0	18	24	197
Total Volume	17	177	5	199	18	0	4	22	6	438	7	451	29	0	60	89	761
% App. Total	8.5	88.9	2.5		81.8	0	18.2		1.3	97.1	1.6		32.6	0	67.4		
PHF	.850	.790	.417	.816	.563	.000	.500	.611	.500	.961	.583	.947	.659	.000	.833	.927	.961
Pass Cars	15	171	5	191	18	0	4	22	5	431	6	442	29	0	59	88	743
% Pass Cars	88.2	96.6	100	96.0	100	0	100	100	83.3	98.4	85.7	98.0	100	0	98.3	98.9	97.6
Single Units	2	5	0	7	0	0	0	0	0	6	1	7	0	0	1	1	15
% Single Units	11.8	2.8	0	3.5	0	0	0	0	0	1.4	14.3	1.6	0	0	1.7	1.1	2.0
Heavy Trucks	0	1	0	1	0	0	0	0	1	1	0	2	0	0	0	0	3
% Heavy Trucks	0	0.6	0	0.5	0	0	0	0	16.7	0.2	0	0.4	0	0	0	0	0.4
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

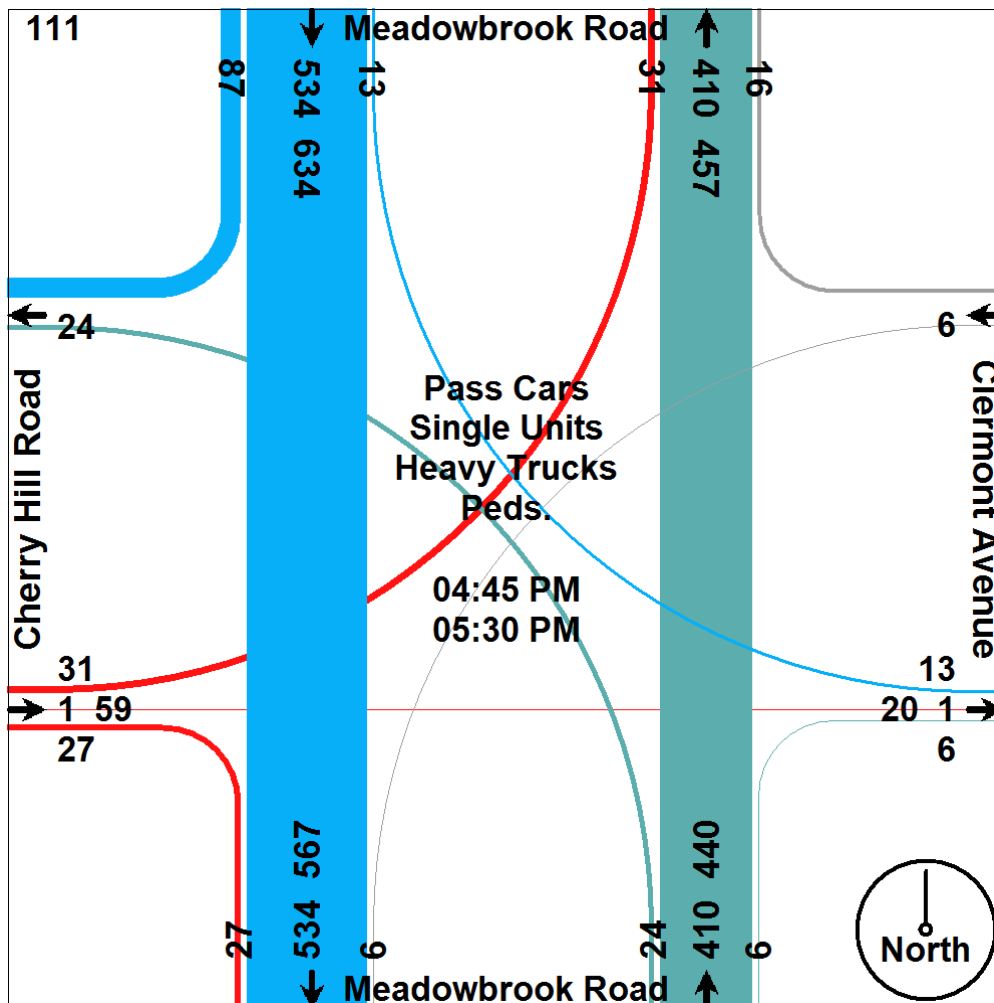
Fleis & VandenBrink



Project: Novi Traffic Impact Study
 Type: 4 Hr. Video Turning Movement Count
 Weather: Sunny/Cldy, Dry Deg. 70's
 Count By: Miovision Video SCU 340 SE

File Name : TMC_3 Meadowbrook & CherryHill_9-14-17
 Site Code : TMC_3
 Start Date : 9/12/2017
 Page No : 4

Start Time	Meadowbrook Road Southbound				Clermont Avenue Westbound				Meadowbrook Road Northbound				Cherry Hill Road 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 04:45 PM																	
04:45 PM	17	116	3	136	4	0	1	5	1	93	5	99	7	0	7	14	254
05:00 PM	22	144	2	168	3	0	2	5	2	119	7	128	8	0	7	15	316
05:15 PM	30	146	1	177	8	0	2	10	1	105	6	112	7	0	8	15	314
05:30 PM	18	128	7	153	1	0	1	2	2	93	6	101	5	1	9	15	271
Total Volume	87	534	13	634	16	0	6	22	6	410	24	440	27	1	31	59	1155
% App. Total	13.7	84.2	2.1		72.7	0	27.3		1.4	93.2	5.5		45.8	1.7	52.5		
PHF	.725	.914	.464	.895	.500	.000	.750	.550	.750	.861	.857	.859	.844	.250	.861	.983	.914
Pass Cars	87	532	13	632	16	0	6	22	6	404	24	434	27	1	31	59	1147
% Pass Cars	100	99.6	100	99.7	100	0	100	100	100	98.5	100	98.6	100	100	100	100	99.3
Single Units	0	2	0	2	0	0	0	0	0	6	0	6	0	0	0	0	8
% Single Units	0	0.4	0	0.3	0	0	0	0	0	1.5	0	1.4	0	0	0	0	0.7
Heavy Trucks	0	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	0
Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



List View

All DIRs

All Approaches

Record	<input type="button" value="⏪"/> <input type="button" value="⏴"/> <input type="text" value="1"/> <input type="button" value="⏵"/> <input type="button" value="⏩"/>	of 1	Goto Record	<input type="text"/>	<input type="button" value="go"/>
Location ID	481_SE	MPO ID			
Type	SPOT	HPMS ID			
On NHS		On HPMS			
LRS ID		LRS Loc Pt.			
SF Group	1	Route Type			
AF Group		Route			
GF Group		Active	Yes		
Class Dist Grp		Category	SCATS		
WIM Group					
QC Group	Default				
Funct'l Class	-	Milepost			
Located On	GRAND RIVER				
Loc On Alias					
	MEADOWBROOK				
	PR	MP	PT		
	0	481			
More Detail <input type="button" value="▶"/>					
STATION DATA					

Directions:

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2016	8,464						
2015	8,755						
2014	0 ⁷						
2013	1,338 ⁷						
2012	7,749						

1-5 of 11

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
<input type="button" value="👁"/>	Mon 9/18/2017	15	10,246
<input type="button" value="👁"/>	Sun 9/17/2017	15	6,615
<input type="button" value="👁"/>	Sat 9/16/2017	15	9,605
<input type="button" value="👁"/>	Fri 9/15/2017	15	12,045
<input type="button" value="👁"/>	Thu 9/14/2017	15	11,437
<input type="button" value="👁"/>	Wed 9/13/2017	15	11,111
<input type="button" value="👁"/>	Tue 9/12/2017	15	10,699
<input type="button" value="👁"/>	Mon 9/11/2017	15	10,442
<input type="button" value="👁"/>	Sun 9/10/2017	15	5,994
<input type="button" value="👁"/>	Sat 9/9/2017	15	8,448

VOLUME TREND <input type="button" value="?"/>	
Year	Annual Growth
2016	-3%
2015	0%
2014	-100%
2013	-83%
2012	-25%
2011	11%
2010	-18%
2009	14%
2008	-4%
2007	-4%

List View

All DIRs

All Approaches

Record 1 of 1 Goto Record

Location ID	481_NB	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	1	Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	SCATS
WIM Group			
QC Group	Default		
Funct'l Class	-	Milepost	
Located On	MEADOWBROOK		
Loc On Alias			
SOUTH OF	GRAND RIVER		
	PR	MP	PT
	0	481	

More Detail

STATION DATA

Directions:

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2016	4,663						
2015	5,005						
2012	5,567						
2011	7,556						
2010	16,610						

1-5 of 9

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
Mon 9/18/2017	15	5,141
Sun 9/17/2017	15	3,242
Sat 9/16/2017	15	4,221
Fri 9/15/2017	15	5,878
Thu 9/14/2017	15	5,406
Wed 9/13/2017	15	5,242
Tue 9/12/2017	15	5,317
Mon 9/11/2017	15	5,144
Sun 9/10/2017	15	3,026
Sat 9/9/2017	15	4,107

1-10 of 2958

VOLUME TREND

Year	Annual Growth
2016	-7%
2015	0%
2014	-100%
2012	-26%
2011	-55%
2010	202%
2009	-8%
2008	-5%
2007	-5%

List View

All DIRs

All Approaches

Record 1 of 1 Goto Record

Location ID	1244_SB	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	1	Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	SCATS
WIM Group			
QC Group	Default		
Funct'l Class	-	Milepost	
Located On	MEADOWBROOK		
Loc On Alias			
NORTH OF	CHERRY HILL		
	PR	MP	PT
	0	1244	

More Detail

STATION DATA

Directions:

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2016	4,735						
2015	5,109						
2014	3,265						
2013	4,964						
2012	4,976						

1-5 of 11

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
Mon 9/18/2017	15	4,708
Sun 9/17/2017	15	3,054
Sat 9/16/2017	15	3,891
Fri 9/15/2017	15	4,955
Thu 9/14/2017	15	4,975
Wed 9/13/2017	15	4,615
Tue 9/12/2017	15	4,631
Mon 9/11/2017	15	4,623
Sun 9/10/2017	15	3,032
Sat 9/9/2017	15	3,980

1-10 of 2072

VOLUME TREND

Year	Annual Growth
2016	-7%
2015	56%
2014	-34%
2013	0%
2012	-24%
2011	28%
2010	4%
2009	-1%
2008	6589%
2007	-97%

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

Record 1 of 1 Goto Record

Location ID	481_SB	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	1	Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	SCATS
WIM Group			
QC Group	Default		
Funct'l Class	-	Milepost	
Located On	MEADOWBROOK		
Loc On Alias			
NORTH OF	GRAND RIVER		
	PR	MP	PT
	0	481	

More Detail

STATION DATA

Directions: [SB](#) [1](#) [2](#) [3](#)

AADT

[Create 2-Way](#)

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2016	4,699						
2015	4,783						
2012	10,451						
2011	6,509						
2010	6,213						

1-5 of 9

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
Mon 9/18/2017	15	4,420
Sun 9/17/2017	15	1,819
Sat 9/16/2017	15	2,682
Fri 9/15/2017	15	4,645
Thu 9/14/2017	15	4,438
Wed 9/13/2017	15	4,525
Tue 9/12/2017	15	4,372
Mon 9/11/2017	15	4,254
Sun 9/10/2017	15	2,034
Sat 9/9/2017	15	3,069

1-10 of 2547

VOLUME TREND

Year	Annual Growth
2016	-2%
2015	0%
2014	-100%
2013	-58%
2012	61%
2011	5%
2010	3%
2009	-9%
2008	2%
2007	-2%

List View

All DIRs

All Approaches

Record 1 of 1 Goto Record

Location ID	481_NW	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group	1	Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	SCATS
WIM Group			
QC Group	Default		
Funct'l Class	-	Milepost	
Located On	GRAND RIVER		
Loc On Alias			
	MEADOWBROOK		
	PR	MP	PT
	0	481	

More Detail

STATION DATA

Directions:

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2016	8,547						
2015	8,542						
2012	8,486						
2011	8,388						
2010	13,412						

1-5 of 9

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
Mon 9/18/2017	15	9,611
Sun 9/17/2017	15	4,857
Sat 9/16/2017	15	7,462
Fri 9/15/2017	15	10,631
Thu 9/14/2017	15	10,613
Wed 9/13/2017	15	10,626
Tue 9/12/2017	15	10,250
Mon 9/11/2017	15	9,945
Sun 9/10/2017	15	5,050
Sat 9/9/2017	15	7,364

1-10 of 2883

VOLUME TREND

Year	Annual Growth
2016	0%
2015	0%
2014	-100%
2013	-1%
2012	1%
2011	-37%
2010	44%
2009	5%
2008	-5%
2007	-4%

Search...

YOU ARE VIEWING DATA FOR:

City of Novi

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

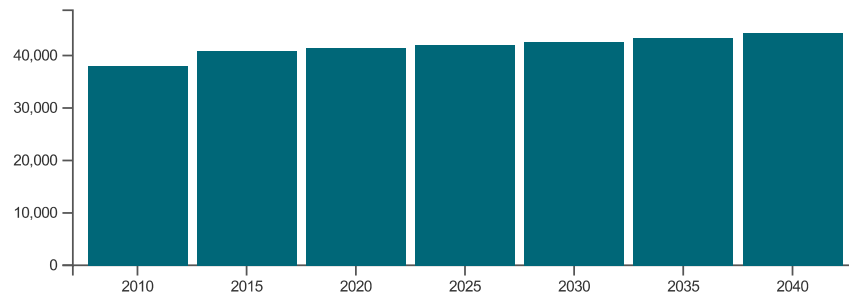


Census 2010 Population:
55,374
Area: 31.2 square miles

Economy & Jobs

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

Forecasted Jobs



Source: **SEMCOG 2040 Forecast** produced in 2012.

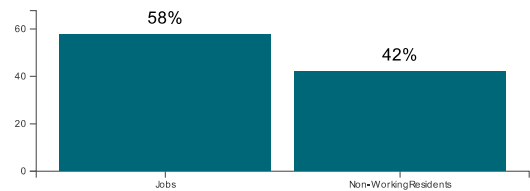
Forecasted Jobs by Industry	2010	2015	2020	2025	2030	2035	2040	Change 2010 - 2040
Forecasted Jobs By Industry	2010	2015	2020	2025	2030	2035	2040	Change 2010 - 2040
Natural Resources, Mining, & Construction	1,559	1,828	1,904	1,933	1,940	2,009	1,917	358
Manufacturing	1,719	1,807	1,764	1,670	1,639	1,547	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>

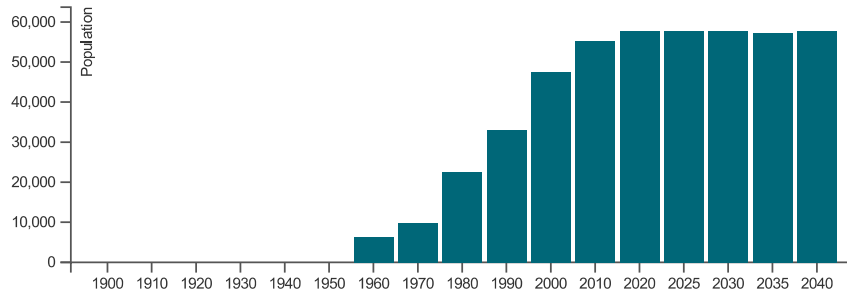


Census 2010 Population:
55,374
Area: 31.2 square miles

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	2000-2005 Avg.	Change 2006-2010 Avg.	2000-2010	Pct Change	2000-2010	SEMCOG Jul 2016	SEMCOG 2040
Population and Households	Census 2010	Change	2000-2010	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 Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Existing Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	677	106	23	412	234	148	278	99	97	70	38
Future Volume (veh/h)	115	677	106	23	412	234	148	278	99	97	70	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	121	713	112	27	485	275	156	293	104	113	81	44
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	404	1100	1070	294	1060	1005	354	335	315	197	295	322
Arrive On Green	0.04	0.57	0.57	0.02	0.54	0.54	0.08	0.17	0.17	0.06	0.15	0.15
Sat Flow, veh/h	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	121	713	112	27	485	275	156	293	104	113	81	44
Grp Sat Flow(s),veh/h/ln	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	4.1	35.2	3.6	0.9	21.1	11.0	9.7	20.3	7.6	7.1	5.1	3.1
Cycle Q Clear(g_c), s	4.1	35.2	3.6	0.9	21.1	11.0	9.7	20.3	7.6	7.1	5.1	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	404	1100	1070	294	1060	1005	354	335	315	197	295	322
V/C Ratio(X)	0.30	0.65	0.10	0.09	0.46	0.27	0.44	0.87	0.33	0.57	0.28	0.14
Avail Cap(c_a), veh/h	449	1100	1070	386	1060	1005	397	436	400	275	432	438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	20.7	9.1	17.4	19.5	12.9	44.8	56.6	49.1	47.1	52.7	46.7
Incr Delay (d2), s/veh	0.4	3.0	0.2	0.1	1.4	0.7	0.8	14.9	0.7	2.6	0.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	15.6	1.3	0.4	9.4	4.1	4.6	11.3	3.2	3.4	2.6	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.2	23.7	9.3	17.5	20.9	13.6	45.6	71.5	49.9	49.7	53.3	46.9
LnGrp LOS	B	C	A	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h		946			787			553			238	
Approach Delay, s/veh		20.9			18.2			60.1			50.4	
Approach LOS		C			B			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	86.0	17.8	27.1	12.6	82.5	15.1	29.8				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 60	15.0	31.0	* 9.5	* 60	15.0	31.0				
Max Q Clear Time (g_c+I1), s	2.9	37.2	11.7	7.1	6.1	23.1	9.1	22.3				
Green Ext Time (p_c), s	0.0	5.9	0.1	0.6	0.1	4.9	0.1	1.5				

Intersection Summary

HCM 6th Ctrl Delay	31.4
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary
 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Existing Conditions
 AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	447	6	5	177	17
Future Volume (veh/h)	60	0	29	4	0	18	7	447	6	5	177	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	471	6	6	216	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	149	0	108	42	9	66	1000	1658	1405	775	1631	1382
Arrive On Green	0.06	0.00	0.06	0.06	0.00	0.06	0.84	0.84	0.84	0.84	0.84	0.84
Sat Flow, veh/h	1395	0	1682	91	148	1025	1143	1969	1668	903	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	471	6	6	216	21
Grp Sat Flow(s),veh/h/ln	1395	0	1682	1264	0	0	1143	1969	1668	903	1938	1642
Q Serve(g_s), s	0.1	0.0	2.1	0.0	0.0	0.0	0.1	6.0	0.1	0.2	2.4	0.2
Cycle Q Clear(g_c), s	5.5	0.0	2.1	5.5	0.0	0.0	2.5	6.0	0.1	6.1	2.4	0.2
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	149	0	108	116	0	0	1000	1658	1405	775	1631	1382
V/C Ratio(X)	0.44	0.00	0.29	0.32	0.00	0.00	0.01	0.28	0.00	0.01	0.13	0.02
Avail Cap(c_a), veh/h	477	0	505	501	0	0	1000	1658	1405	775	1631	1382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.99	0.99	0.99
Uniform Delay (d), s/veh	55.1	0.0	53.6	53.7	0.0	0.0	1.9	2.0	1.5	2.6	1.7	1.5
Incr Delay (d2), s/veh	2.0	0.0	1.5	1.5	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.9	1.1	0.0	0.0	0.0	1.4	0.0	0.0	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.1	0.0	55.0	55.3	0.0	0.0	1.9	2.4	1.5	2.6	1.9	1.5
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			484			243	
Approach Delay, s/veh		56.4			55.3			2.4			1.8	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		106.3		13.7		106.3		13.7				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+11), s		8.0		7.5		8.1		7.5				
Green Ext Time (p_c), s		3.1		0.4		1.3		0.2				

Intersection Summary

HCM 6th Ctrl Delay	10.5
HCM 6th LOS	B

Notes

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

HCM 6th TWSC
 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Existing Conditions
 AM Peak Hour

Intersection												
Int Delay, s/veh	0.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	898	0	0	594	4	0	0	0	0	0	4
Future Vol, veh/h	6	898	0	0	594	4	0	0	0	0	0	4
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	83	83	83	92	92	92	50	50	50
Heavy Vehicles, %	3	3	3	5	5	5	0	0	0	0	0	25
Mvmt Flow	6	945	0	0	716	5	0	0	0	0	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	723	0	0	945	0	0	1680	1680	473	1203	1675	718
Stage 1	-	-	-	-	-	-	957	957	-	718	718	-
Stage 2	-	-	-	-	-	-	723	723	-	485	957	-
Critical Hdwy	4.145	-	-	4.175	-	-	7.3	6.5	6.9	7.3	6.5	6.575
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2285	-	-	2.2475	-	-	3.5	4	3.3	3.5	4	3.5375
Pot Cap-1 Maneuver	872	-	-	709	-	-	69	96	543	152	96	382
Stage 1	-	-	-	-	-	-	281	339	-	423	436	-
Stage 2	-	-	-	-	-	-	421	434	-	537	339	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	870	-	-	709	-	-	67	95	543	151	95	381
Mov Cap-2 Maneuver	-	-	-	-	-	-	67	95	-	151	95	-
Stage 1	-	-	-	-	-	-	279	337	-	419	435	-
Stage 2	-	-	-	-	-	-	412	433	-	533	337	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	14.7
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	870	-	-	709	-	-	-	381
HCM Lane V/C Ratio	-	0.007	-	-	-	-	-	-	0.021
HCM Control Delay (s)	0	9.2	-	-	0	-	-	0	14.7
HCM Lane LOS	A	A	-	-	A	-	-	A	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Existing Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	570	205	86	814	87	203	196	58	131	352	111
Future Volume (veh/h)	65	570	205	86	814	87	203	196	58	131	352	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	68	600	216	91	857	92	221	213	63	160	429	135
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	152	920	955	281	936	926	249	474	465	368	429	413
Arrive On Green	0.03	0.46	0.46	0.04	0.47	0.47	0.10	0.24	0.24	0.08	0.21	0.21
Sat Flow, veh/h	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Grp Volume(v), veh/h	68	600	216	91	857	92	221	213	63	160	429	135
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Q Serve(g_s), s	2.6	32.5	8.9	3.5	56.2	3.6	12.6	12.8	4.0	9.1	30.0	9.2
Cycle Q Clear(g_c), s	2.6	32.5	8.9	3.5	56.2	3.6	12.6	12.8	4.0	9.1	30.0	9.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	152	920	955	281	936	926	249	474	465	368	429	413
V/C Ratio(X)	0.45	0.65	0.23	0.32	0.92	0.10	0.89	0.45	0.14	0.43	1.00	0.33
Avail Cap(c_a), veh/h	221	920	955	336	936	926	254	474	465	420	429	413
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	28.8	15.0	22.6	34.4	14.9	40.0	45.4	37.9	38.4	55.0	43.3
Incr Delay (d2), s/veh	2.1	3.6	0.5	0.7	15.0	0.2	28.2	0.8	0.2	0.8	43.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	15.6	3.5	1.5	29.2	1.4	7.7	6.4	1.6	4.3	20.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.9	32.4	15.5	23.2	49.4	15.1	68.2	46.2	38.1	39.3	98.7	43.9
LnGrp LOS	C	C	B	C	D	B	E	D	D	D	F	D
Approach Vol, veh/h		884			1040			497			724	
Approach Delay, s/veh		28.3			44.1			54.9			75.4	
Approach LOS		C			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.9	71.4	20.6	36.0	10.8	72.5	17.2	39.5				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 61	15.0	30.0	* 9.5	* 61	15.0	30.0				
Max Q Clear Time (g_c+I1), s	5.5	34.5	14.6	32.0	4.6	58.2	11.1	14.8				
Green Ext Time (p_c), s	0.1	5.5	0.0	0.0	0.0	1.4	0.1	1.3				

Intersection Summary

HCM 6th Ctrl Delay	48.6
HCM 6th LOS	D

Notes

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

HCM 6th Signalized Intersection Summary
 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Existing Conditions
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	31	1	27	6	0	16	24	410	6	13	542	88
Future Volume (veh/h)	31	1	27	6	0	16	24	410	6	13	542	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	477	7	14	602	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	149	4	99	55	10	70	648	1682	1425	800	1695	1436
Arrive On Green	0.06	0.06	0.06	0.06	0.00	0.06	0.85	0.85	0.85	0.85	0.85	0.85
Sat Flow, veh/h	1538	64	1695	288	169	1204	752	1984	1681	926	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	477	7	14	602	98
Grp Sat Flow(s),veh/h/ln	1602	0	1695	1661	0	0	752	1984	1681	926	2000	1694
Q Serve(g_s), s	0.0	0.0	1.9	0.2	0.0	0.0	1.0	5.8	0.1	0.4	7.9	1.1
Cycle Q Clear(g_c), s	2.0	0.0	1.9	2.6	0.0	0.0	8.9	5.8	0.1	6.2	7.9	1.1
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	152	0	99	135	0	0	648	1682	1425	800	1695	1436
V/C Ratio(X)	0.22	0.00	0.28	0.30	0.00	0.00	0.04	0.28	0.00	0.02	0.36	0.07
Avail Cap(c_a), veh/h	495	0	508	523	0	0	648	1682	1425	800	1695	1436
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.67	0.67	0.67
Uniform Delay (d), s/veh	54.2	0.0	54.1	54.4	0.0	0.0	3.0	1.8	1.4	2.5	2.0	1.5
Incr Delay (d2), s/veh	1.0	0.0	2.2	1.7	0.0	0.0	0.1	0.4	0.0	0.0	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.9	1.2	0.0	0.0	0.1	1.3	0.0	0.1	1.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	0.0	56.3	56.2	0.0	0.0	3.1	2.3	1.4	2.5	2.4	1.5
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			512			714	
Approach Delay, s/veh		55.7			56.2			2.3			2.3	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		107.0		13.0		107.0		13.0				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+I1), s		10.9		4.0		9.9		4.6				
Green Ext Time (p_c), s		3.4		0.4		4.7		0.3				

Intersection Summary

HCM 6th Ctrl Delay	6.4
HCM 6th LOS	A

Notes

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

HCM 6th TWSC
 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Existing Conditions
 PM Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	832	0	0	1109	19	0	0	0	8	0	5
Future Vol, veh/h	6	832	0	0	1109	19	0	0	0	8	0	5
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	92	92	92	65	65	65
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	6	876	0	0	1167	20	0	0	0	12	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1189	0	0	876	0	0	2069	2077	438	1619	2057	1169
Stage 1	-	-	-	-	-	-	888	888	-	1169	1169	-
Stage 2	-	-	-	-	-	-	1181	1189	-	450	888	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.3	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	590	-	-	774	-	-	36	54	572	77	56	237
Stage 1	-	-	-	-	-	-	309	365	-	237	269	-
Stage 2	-	-	-	-	-	-	234	264	-	564	365	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	589	-	-	774	-	-	35	53	572	76	55	237
Mov Cap-2 Maneuver	-	-	-	-	-	-	35	53	-	76	55	-
Stage 1	-	-	-	-	-	-	306	361	-	234	268	-
Stage 2	-	-	-	-	-	-	226	263	-	558	361	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	45.7
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	589	-	-	774	-	-	76	237
HCM Lane V/C Ratio	-	0.011	-	-	-	-	-	0.162	0.032
HCM Control Delay (s)	0	11.2	-	-	0	-	-	61.3	20.7
HCM Lane LOS	A	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.5	0.1

1: Meadowbrook Road & Grand River Avenue (Push-Buttons) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	111	690	109	21	409	232	136	281	92	102	70	36
Hourly Exit Rate	111	690	109	21	409	232	136	281	92	102	70	36
Input Volume	115	687	106	23	412	234	148	282	99	97	70	38
% of Volume	97	100	103	90	99	99	92	100	93	105	100	95

1: Meadowbrook Road & Grand River Avenue (Push-Buttons) Performance by movement

Movement	All
Vehicles Exited	2289
Hourly Exit Rate	2289
Input Volume	2310
% of Volume	99

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons) Performance by movement

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Vehicles Exited	55	29	5	16	9	433	5	4	183	20	759
Hourly Exit Rate	55	29	5	16	9	433	5	4	183	20	759
Input Volume	60	29	4	18	7	447	6	5	183	17	776
% of Volume	92	101	125	89	129	97	83	76	100	116	98

3: Funeral Home Drive/Grandview Lane & Grand River Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Vehicles Exited	8	900	599	2	4	1513
Hourly Exit Rate	8	900	599	2	4	1513
Input Volume	6	898	612	4	4	1524
% of Volume	133	100	98	47	94	99

Total Network Performance

Vehicles Exited	2377
Hourly Exit Rate	2377
Input Volume	6963
% of Volume	34

1: Meadowbrook Road & Grand River Avenue (Push-Buttons) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicles Exited	64	562	212	81	828	80	196	202	61	128	357	110
Hourly Exit Rate	64	562	212	81	828	80	196	202	61	128	357	110
Input Volume	65	571	205	86	814	87	203	206	58	131	352	111
% of Volume	98	98	104	94	102	92	97	98	106	98	101	99

1: Meadowbrook Road & Grand River Avenue (Push-Buttons) Performance by movement

Movement	All
Vehicles Exited	2881
Hourly Exit Rate	2881
Input Volume	2888
% of Volume	100

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons) Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Vehicles Exited	29	1	28	4	18	24	400	9	14	560	84	1171
Hourly Exit Rate	29	1	28	4	18	24	400	9	14	560	84	1171
Input Volume	31	1	27	6	16	24	410	6	13	550	88	1173
% of Volume	94	100	103	70	111	99	98	144	106	102	95	100

3: Funeral Home Drive/Grandview Lane & Grand River Avenue Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Vehicles Exited	8	833	1120	22	5	6	1994
Hourly Exit Rate	8	833	1120	22	5	6	1994
Input Volume	6	832	1116	19	8	5	1986
% of Volume	133	100	100	114	61	120	100

Total Zone Performance

Vehicles Exited	22
Hourly Exit Rate	22
Input Volume	6047
% of Volume	0

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	274	433	31	102	359	134	259	427	274	145	154	65
Average Queue (ft)	72	257	6	14	162	34	91	202	56	69	51	18
95th Queue (ft)	192	431	17	62	296	89	187	333	157	125	112	46
Link Distance (ft)		335	335		1196			669			739	
Upstream Blk Time (%)		5										
Queuing Penalty (veh)		23										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		10			1			11				
Queuing Penalty (veh)		12			4			28				

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	88	30	38	27	128	12	30	83	36
Average Queue (ft)	33	13	11	4	40	1	2	22	3
95th Queue (ft)	69	31	30	18	98	6	15	63	20
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				5	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	65	196	55	45
Average Queue (ft)	4	18	2	3
95th Queue (ft)	36	101	39	18
Link Distance (ft)		641		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200		200	50
Storage Blk Time (%)		0		0
Queuing Penalty (veh)		2		0

Network Summary

Network wide Queuing Penalty: 70

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	274	406	125	325	1219	500	255	231	88	325	663	400
Average Queue (ft)	66	257	39	143	819	150	135	128	31	173	388	141
95th Queue (ft)	191	407	92	370	1353	518	229	212	71	370	709	386
Link Distance (ft)		335	335		1196			669			739	
Upstream Blk Time (%)		4			11						7	
Queuing Penalty (veh)		15			0						0	
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		10		0	41	0		2		0	24	
Queuing Penalty (veh)		6		0	71	0		5		0	59	

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	71	34	46	49	112	8	40	167	43
Average Queue (ft)	21	13	12	11	29	1	5	46	8
95th Queue (ft)	55	31	33	35	76	6	25	121	32
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				3	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	R	LT	R
Maximum Queue (ft)	24	52	8	33	31
Average Queue (ft)	5	3	0	5	4
95th Queue (ft)	19	28	4	21	18
Link Distance (ft)		641		209	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	200		15		50
Storage Blk Time (%)			0	0	0
Queuing Penalty (veh)			1	0	0

Zone Summary

Zone wide Queuing Penalty: 158

HCM 6th Signalized Intersection Summary

Existing Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	677	106	23	412	234	148	278	99	97	70	38
Future Volume (veh/h)	115	677	106	23	412	234	148	278	99	97	70	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	121	713	112	27	485	275	156	293	104	113	81	44
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	401	1026	978	265	1151	650	362	350	330	210	343	366
Arrive On Green	0.05	0.53	0.53	0.02	0.50	0.50	0.02	0.06	0.06	0.06	0.18	0.18
Sat Flow, veh/h	1845	1938	1640	1860	2285	1290	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	121	713	112	27	393	367	156	293	104	113	81	44
Grp Sat Flow(s),veh/h/ln	1845	1938	1640	1860	1856	1720	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	3.8	32.9	3.5	0.8	16.0	16.1	8.0	17.7	7.0	5.9	4.3	2.6
Cycle Q Clear(g_c), s	3.8	32.9	3.5	0.8	16.0	16.1	8.0	17.7	7.0	5.9	4.3	2.6
Prop In Lane	1.00		1.00	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	401	1026	978	265	935	866	362	350	330	210	343	366
V/C Ratio(X)	0.30	0.69	0.11	0.10	0.42	0.42	0.43	0.84	0.32	0.54	0.24	0.12
Avail Cap(c_a), veh/h	401	1026	978	314	935	866	362	492	450	214	488	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.3	21.0	10.5	17.7	18.8	18.8	39.5	54.8	47.4	38.3	42.6	37.4
Incr Delay (d2), s/veh	0.4	3.9	0.2	0.2	1.4	1.5	0.8	9.0	0.6	2.6	0.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	14.5	1.3	0.3	6.7	6.3	4.0	10.2	3.1	2.8	2.1	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	24.9	10.7	17.8	20.2	20.3	40.3	63.8	48.1	40.9	43.0	37.5
LnGrp LOS	B	C	B	B	C	C	D	E	D	D	D	D
Approach Vol, veh/h		946			787			553			238	
Approach Delay, s/veh		21.9			20.1			54.2			41.0	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	70.1	14.0	27.1	12.0	66.9	13.7	27.3				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 52	8.0	30.0	* 5.5	* 52	8.0	30.0				
Max Q Clear Time (g_c+I1), s	2.8	34.9	10.0	6.3	5.8	18.1	7.9	19.7				
Green Ext Time (p_c), s	0.0	5.3	0.0	0.6	0.0	5.8	0.0	1.7				

Intersection Summary

HCM 6th Ctrl Delay	30.2
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary

Existing Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↑	↖	↖	↑	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	447	6	5	177	17
Future Volume (veh/h)	60	0	29	4	0	18	7	447	6	5	177	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	471	6	6	216	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	278	0	179	88	17	145	926	1389	1177	673	1366	1158
Arrive On Green	0.11	0.00	0.11	0.11	0.00	0.11	0.71	0.71	0.71	1.00	1.00	1.00
Sat Flow, veh/h	1481	0	1682	158	161	1367	1143	1969	1668	903	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	471	6	6	216	21
Grp Sat Flow(s),veh/h/ln	1481	0	1682	1686	0	0	1143	1969	1668	903	1938	1642
Q Serve(g_s), s	1.0	0.0	1.0	0.0	0.0	0.0	0.1	5.6	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.2	0.0	1.0	1.2	0.0	0.0	0.1	5.6	0.1	5.6	0.0	0.0
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	179	251	0	0	926	1389	1177	673	1366	1158
V/C Ratio(X)	0.23	0.00	0.17	0.15	0.00	0.00	0.01	0.34	0.01	0.01	0.16	0.02
Avail Cap(c_a), veh/h	408	0	336	403	0	0	926	1389	1177	673	1366	1158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.99	0.99	0.99
Uniform Delay (d), s/veh	24.9	0.0	24.4	24.5	0.0	0.0	2.6	3.4	2.6	0.4	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.5	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.4	0.5	0.0	0.0	0.0	1.2	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.3	0.0	24.9	24.7	0.0	0.0	2.6	4.1	2.6	0.4	0.2	0.0
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			484			243	
Approach Delay, s/veh		25.1			24.7			4.1			0.2	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.6		12.4		47.6		12.4				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 37		12.0		* 37		12.0				
Max Q Clear Time (g_c+I1), s		7.6		4.2		7.6		3.2				
Green Ext Time (p_c), s		3.0		0.2		1.3		0.1				

Intersection Summary

HCM 6th Ctrl Delay	6.2
HCM 6th LOS	A

Notes

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

HCM 6th Signalized Intersection Summary

Existing Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	570	205	86	814	87	203	196	58	131	352	111
Future Volume (veh/h)	65	570	205	86	814	87	203	196	58	131	352	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	68	600	216	91	857	92	221	213	63	160	429	135
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	262	826	853	249	1458	157	263	505	496	388	484	465
Arrive On Green	0.03	0.42	0.42	0.04	0.42	0.42	0.06	0.17	0.17	0.08	0.24	0.24
Sat Flow, veh/h	1890	1984	1680	1890	3434	369	1890	1984	1672	1905	2000	1689
Grp Volume(v), veh/h	68	600	216	91	470	479	221	213	63	160	429	135
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1885	1918	1890	1984	1672	1905	2000	1689
Q Serve(g_s), s	2.5	30.4	8.7	3.3	23.0	23.0	10.5	11.5	3.6	7.5	24.8	7.6
Cycle Q Clear(g_c), s	2.5	30.4	8.7	3.3	23.0	23.0	10.5	11.5	3.6	7.5	24.8	7.6
Prop In Lane	1.00		1.00	1.00		0.19	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	826	853	249	800	814	263	505	496	388	484	465
V/C Ratio(X)	0.26	0.73	0.25	0.37	0.59	0.59	0.84	0.42	0.13	0.41	0.89	0.29
Avail Cap(c_a), veh/h	286	826	853	257	800	814	263	579	558	412	583	549
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	29.3	16.7	23.0	26.5	26.5	34.5	41.9	34.5	30.7	43.9	34.2
Incr Delay (d2), s/veh	0.5	5.6	0.7	0.9	3.2	3.1	20.2	0.6	0.1	0.7	13.9	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	14.7	3.4	1.4	10.3	10.5	6.4	5.9	1.5	3.4	13.8	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.6	34.9	17.4	23.9	29.6	29.6	54.7	42.5	34.6	31.4	57.8	34.6
LnGrp LOS	C	C	B	C	C	C	D	D	C	C	E	C
Approach Vol, veh/h		884			1040			497			724	
Approach Delay, s/veh		29.6			29.1			46.9			47.6	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.5	56.4	17.0	35.0	10.5	57.4	15.5	36.6				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 44	11.0	35.0	* 5.5	* 44	11.0	35.0				
Max Q Clear Time (g_c+I1), s	5.3	32.4	12.5	26.8	4.5	25.0	9.5	13.5				
Green Ext Time (p_c), s	0.0	3.8	0.0	2.2	0.0	6.2	0.1	1.5				

Intersection Summary

HCM 6th Ctrl Delay	36.3
HCM 6th LOS	D

Notes

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

HCM 6th Signalized Intersection Summary

Existing Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	31	1	27	6	0	16	24	410	6	13	542	88
Future Volume (veh/h)	31	1	27	6	0	16	24	410	6	13	542	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	477	7	14	602	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	244	6	146	101	15	104	666	1440	1220	712	1452	1229
Arrive On Green	0.09	0.09	0.09	0.09	0.00	0.09	0.73	0.73	0.73	1.00	1.00	1.00
Sat Flow, veh/h	1469	68	1695	284	173	1205	752	1984	1681	926	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	477	7	14	602	98
Grp Sat Flow(s),veh/h/ln1537	0	1695	1662	0	0	752	1984	1681	926	2000	1694	
Q Serve(g_s), s	0.0	0.0	0.9	0.0	0.0	0.0	0.6	5.2	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	0.9	1.3	0.0	0.0	0.6	5.2	0.1	5.3	0.0	0.0
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	250	0	146	219	0	0	666	1440	1220	712	1452	1229
V/C Ratio(X)	0.14	0.00	0.19	0.18	0.00	0.00	0.04	0.33	0.01	0.02	0.41	0.08
Avail Cap(c_a), veh/h	365	0	282	349	0	0	666	1440	1220	712	1452	1229
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.75	0.75	0.75
Uniform Delay (d), s/veh	25.5	0.0	25.5	25.6	0.0	0.0	2.3	3.0	2.3	0.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.9	0.6	0.0	0.0	0.1	0.6	0.0	0.0	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.5	0.0	0.0	0.4	0.5	0.0	0.0	0.1	1.0	0.0	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.9	0.0	26.4	26.2	0.0	0.0	2.5	3.6	2.3	0.4	0.7	0.1
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			512			714	
Approach Delay, s/veh		26.1			26.2			3.5			0.6	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		48.8		11.2		48.8		11.2				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 39		10.0		* 39		10.0				
Max Q Clear Time (g_c+I1), s		7.2		3.0		7.3		3.3				
Green Ext Time (p_c), s		3.2		0.1		4.5		0.1				

Intersection Summary

HCM 6th Ctrl Delay	3.7
HCM 6th LOS	A

Notes

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

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	274	415	43	36	239	196	276	334	144	154	124	44
Average Queue (ft)	86	228	6	11	120	80	90	169	47	57	43	15
95th Queue (ft)	233	390	24	31	208	171	180	273	102	119	97	38
Link Distance (ft)		331	331		1196			669			725	
Upstream Blk Time (%)		3										
Queuing Penalty (veh)		12										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)	0	7						7				
Queuing Penalty (veh)	0	8						17				

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	76	35	39	25	105	19	30	65	30
Average Queue (ft)	33	13	11	2	40	1	2	17	2
95th Queue (ft)	64	31	31	13	88	7	14	50	16
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				4	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	SB
Directions Served	L	T	R
Maximum Queue (ft)	24	102	62
Average Queue (ft)	2	6	8
95th Queue (ft)	13	50	39
Link Distance (ft)		613	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		50
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Zone Summary

Zone wide Queuing Penalty: 38

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	274	404	99	304	363	337	266	214	76	324	425	215
Average Queue (ft)	65	256	33	54	242	196	123	108	29	77	213	41
95th Queue (ft)	208	411	79	157	341	317	225	183	63	194	360	131
Link Distance (ft)		331	331		1196			669			725	
Upstream Blk Time (%)		4										
Queuing Penalty (veh)		16										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		10		0	2			1				3
Queuing Penalty (veh)		7		0	13			1				8

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	60	38	32	52	128	19	30	106	44
Average Queue (ft)	23	14	11	13	35	1	6	40	10
95th Queue (ft)	50	32	29	39	91	8	24	95	34
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				4	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	TR	LT	R
Maximum Queue (ft)	28	75	118	44	48	39
Average Queue (ft)	3	4	11	2	14	5
95th Queue (ft)	17	36	62	26	41	26
Link Distance (ft)		613	331	331	210	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200					50
Storage Blk Time (%)			0		5	0
Queuing Penalty (veh)			0		0	0

Zone Summary

Zone wide Queuing Penalty: 47

HCM 6th Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Background Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	707	113	23	421	235	150	279	99	97	70	43
Future Volume (veh/h)	135	707	113	23	421	235	150	279	99	97	70	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	142	744	119	27	495	276	158	294	104	113	81	50
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	403	1099	1071	275	1048	995	354	336	316	197	294	330
Arrive On Green	0.05	0.57	0.57	0.02	0.54	0.54	0.09	0.17	0.17	0.07	0.15	0.15
Sat Flow, veh/h	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	142	744	119	27	495	276	158	294	104	113	81	50
Grp Sat Flow(s),veh/h/ln	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	4.8	37.8	3.8	0.9	22.0	11.2	9.8	20.4	7.5	7.1	5.1	3.5
Cycle Q Clear(g_c), s	4.8	37.8	3.8	0.9	22.0	11.2	9.8	20.4	7.5	7.1	5.1	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	403	1099	1071	275	1048	995	354	336	316	197	294	330
V/C Ratio(X)	0.35	0.68	0.11	0.10	0.47	0.28	0.45	0.88	0.33	0.57	0.28	0.15
Avail Cap(c_a), veh/h	437	1099	1071	367	1048	995	395	436	400	275	432	448
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.2	21.3	9.1	18.2	20.1	13.3	44.8	56.6	49.1	47.1	52.7	46.2
Incr Delay (d2), s/veh	0.5	3.4	0.2	0.2	1.5	0.7	0.9	15.0	0.7	2.6	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	16.8	1.4	0.4	9.9	4.2	4.6	11.4	3.2	3.4	2.6	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	24.6	9.3	18.4	21.7	14.0	45.6	71.6	49.8	49.8	53.3	46.5
LnGrp LOS	B	C	A	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h		1005			798			556			244	
Approach Delay, s/veh		21.6			18.9			60.1			50.3	
Approach LOS		C			B			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	85.9	17.9	27.1	13.4	81.6	15.1	29.9				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 60	15.0	31.0	* 9.5	* 60	15.0	31.0				
Max Q Clear Time (g_c+I1), s	2.9	39.8	11.8	7.1	6.8	24.0	9.1	22.4				
Green Ext Time (p_c), s	0.0	6.0	0.1	0.6	0.1	5.0	0.1	1.5				

Intersection Summary

HCM 6th Ctrl Delay	31.7
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary

Background Conditions

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↑	↖	↖	↑	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	450	6	5	184	17
Future Volume (veh/h)	60	0	29	4	0	18	7	450	6	5	184	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	474	6	6	224	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	149	0	108	42	9	66	992	1658	1405	773	1631	1382
Arrive On Green	0.06	0.00	0.06	0.06	0.00	0.06	0.84	0.84	0.84	0.84	0.84	0.84
Sat Flow, veh/h	1395	0	1682	91	148	1025	1135	1969	1668	900	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	474	6	6	224	21
Grp Sat Flow(s),veh/h/ln	1395	0	1682	1264	0	0	1135	1969	1668	900	1938	1642
Q Serve(g_s), s	0.1	0.0	2.1	0.0	0.0	0.0	0.1	6.0	0.1	0.2	2.5	0.2
Cycle Q Clear(g_c), s	5.5	0.0	2.1	5.5	0.0	0.0	2.6	6.0	0.1	6.2	2.5	0.2
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	149	0	108	116	0	0	992	1658	1405	773	1631	1382
V/C Ratio(X)	0.44	0.00	0.29	0.32	0.00	0.00	0.01	0.29	0.00	0.01	0.14	0.02
Avail Cap(c_a), veh/h	477	0	505	501	0	0	992	1658	1405	773	1631	1382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.99	0.99	0.99
Uniform Delay (d), s/veh	55.1	0.0	53.6	53.7	0.0	0.0	1.9	2.0	1.5	2.6	1.7	1.5
Incr Delay (d2), s/veh	2.0	0.0	1.5	1.5	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.9	1.1	0.0	0.0	0.0	1.4	0.0	0.0	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.1	0.0	55.0	55.3	0.0	0.0	1.9	2.4	1.5	2.6	1.9	1.5
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			487			251	
Approach Delay, s/veh		56.4			55.3			2.4			1.9	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		106.3		13.7		106.3		13.7				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+1), s		8.0		7.5		8.2		7.5				
Green Ext Time (p_c), s		3.1		0.4		1.4		0.2				

Intersection Summary

HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Notes

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

HCM 6th TWSC
 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Background Conditions
 AM Peak Hour

Intersection												
Int Delay, s/veh	0.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	955	0	0	610	4	0	0	0	0	0	4
Future Vol, veh/h	6	955	0	0	610	4	0	0	0	0	0	4
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	83	83	83	92	92	92	50	50	50
Heavy Vehicles, %	3	3	3	5	5	5	0	0	0	0	0	25
Mvmt Flow	6	1005	0	0	735	5	0	0	0	0	0	8

























Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	742	0	0	1005	0	0	1759	1759	503	1252	1754	737
Stage 1	-	-	-	-	-	-	1017	1017	-	737	737	-
Stage 2	-	-	-	-	-	-	742	742	-	515	1017	-
Critical Hdwy	4.145	-	-	4.175	-	-	7.3	6.5	6.9	7.3	6.5	6.575
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2285	-	-	2.2475	-	-	3.5	4	3.3	3.5	4	3.5375
Pot Cap-1 Maneuver	857	-	-	672	-	-	61	86	519	140	86	372
Stage 1	-	-	-	-	-	-	258	318	-	413	428	-
Stage 2	-	-	-	-	-	-	411	425	-	516	318	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	855	-	-	672	-	-	59	85	519	139	85	371
Mov Cap-2 Maneuver	-	-	-	-	-	-	59	85	-	139	85	-
Stage 1	-	-	-	-	-	-	256	316	-	409	427	-
Stage 2	-	-	-	-	-	-	402	424	-	512	316	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	14.9
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	855	-	-	672	-	-	-	371
HCM Lane V/C Ratio	-	0.007	-	-	-	-	-	-	0.022
HCM Control Delay (s)	0	9.2	-	-	0	-	-	0	14.9
HCM Lane LOS	A	A	-	-	A	-	-	A	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Background Conditions
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	587	207	86	845	87	210	197	58	132	354	131
Future Volume (veh/h)	75	587	207	86	845	87	210	197	58	132	354	131
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	79	618	218	91	889	92	228	214	63	161	432	160
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	135	915	955	269	923	916	254	479	468	371	429	420
Arrive On Green	0.03	0.46	0.46	0.04	0.47	0.47	0.11	0.24	0.24	0.08	0.21	0.21
Sat Flow, veh/h	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Grp Volume(v), veh/h	79	618	218	91	889	92	228	214	63	161	432	160
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Q Serve(g_s), s	3.1	34.1	9.0	3.5	60.8	3.7	13.0	12.8	3.9	9.1	30.0	11.0
Cycle Q Clear(g_c), s	3.1	34.1	9.0	3.5	60.8	3.7	13.0	12.8	3.9	9.1	30.0	11.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	135	915	955	269	923	916	254	479	468	371	429	420
V/C Ratio(X)	0.58	0.68	0.23	0.34	0.96	0.10	0.90	0.45	0.13	0.43	1.01	0.38
Avail Cap(c_a), veh/h	198	915	955	324	923	916	254	479	468	422	429	420
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.9	29.5	15.0	23.2	36.3	15.3	39.9	45.2	37.7	38.4	55.0	43.6
Incr Delay (d2), s/veh	3.9	4.0	0.6	0.7	22.0	0.2	30.5	0.8	0.2	0.8	45.5	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	16.4	3.5	1.5	33.0	1.4	8.1	6.4	1.6	4.3	20.2	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.9	33.5	15.5	23.9	58.2	15.5	70.4	45.9	37.9	39.2	100.5	44.3
LnGrp LOS	D	C	B	C	E	B	E	D	D	D	F	D
Approach Vol, veh/h		915			1072			505			753	
Approach Delay, s/veh		29.5			51.7			56.0			75.4	
Approach LOS		C			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.9	71.1	21.0	36.0	11.4	71.6	17.2	39.8				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 61	15.0	30.0	* 9.5	* 61	15.0	30.0				
Max Q Clear Time (g_c+I1), s	5.5	36.1	15.0	32.0	5.1	62.8	11.1	14.8				
Green Ext Time (p_c), s	0.1	5.6	0.0	0.0	0.0	0.0	0.1	1.3				

Intersection Summary

HCM 6th Ctrl Delay	51.6
HCM 6th LOS	D

Notes

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

HCM 6th Signalized Intersection Summary
 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Background Conditions
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	31	1	27	6	0	16	24	418	6	13	546	88
Future Volume (veh/h)	31	1	27	6	0	16	24	418	6	13	546	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	486	7	14	607	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	149	4	99	55	10	70	645	1682	1425	793	1695	1436
Arrive On Green	0.06	0.06	0.06	0.06	0.00	0.06	0.85	0.85	0.85	0.85	0.85	0.85
Sat Flow, veh/h	1538	64	1695	288	169	1204	749	1984	1681	918	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	486	7	14	607	98
Grp Sat Flow(s),veh/h/ln1602	0	1695	1661	0	0	749	1984	1681	918	2000	1694	
Q Serve(g_s), s	0.0	0.0	1.9	0.2	0.0	0.0	1.0	5.9	0.1	0.4	8.0	1.1
Cycle Q Clear(g_c), s	2.0	0.0	1.9	2.6	0.0	0.0	9.0	5.9	0.1	6.3	8.0	1.1
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	152	0	99	135	0	0	645	1682	1425	793	1695	1436
V/C Ratio(X)	0.22	0.00	0.28	0.30	0.00	0.00	0.04	0.29	0.00	0.02	0.36	0.07
Avail Cap(c_a), veh/h	495	0	508	523	0	0	645	1682	1425	793	1695	1436
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.66	0.66	0.66
Uniform Delay (d), s/veh	54.2	0.0	54.1	54.4	0.0	0.0	3.0	1.8	1.4	2.5	2.0	1.5
Incr Delay (d2), s/veh	1.0	0.0	2.2	1.7	0.0	0.0	0.1	0.4	0.0	0.0	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln1.0	0.0	0.0	0.9	1.2	0.0	0.0	0.1	1.3	0.0	0.1	1.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	0.0	56.3	56.2	0.0	0.0	3.1	2.3	1.4	2.5	2.4	1.5
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			521			719	
Approach Delay, s/veh		55.7			56.2			2.3			2.3	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		107.0		13.0		107.0		13.0				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+I1), s		11.0		4.0		10.0		4.6				
Green Ext Time (p_c), s		3.5		0.4		4.7		0.3				

Intersection Summary

HCM 6th Ctrl Delay	6.4
HCM 6th LOS	A

Notes

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

HCM 6th TWSC
 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Background Conditions
 PM Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	861	0	0	1167	19	0	0	0	8	0	5
Future Vol, veh/h	6	861	0	0	1167	19	0	0	0	8	0	5
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	92	92	92	65	65	65
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	6	906	0	0	1228	20	0	0	0	12	0	8
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1250	0	0	906	0	0	2160	2168	453	1695	2148	1230
Stage 1	-	-	-	-	-	-	918	918	-	1230	1230	-
Stage 2	-	-	-	-	-	-	1242	1250	-	465	918	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.3	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	559	-	-	754	-	-	31	48	559	67	49	219
Stage 1	-	-	-	-	-	-	296	353	-	219	252	-
Stage 2	-	-	-	-	-	-	216	247	-	552	353	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	558	-	-	754	-	-	30	47	559	66	48	219
Mov Cap-2 Maneuver	-	-	-	-	-	-	30	47	-	66	48	-
Stage 1	-	-	-	-	-	-	293	349	-	216	251	-
Stage 2	-	-	-	-	-	-	208	247	-	546	349	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			0			52.5		
HCM LOS							A			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	-	558	-	-	754	-	-	66	219			
HCM Lane V/C Ratio	-	0.011	-	-	-	-	-	0.186	0.035			
HCM Control Delay (s)	0	11.5	-	-	0	-	-	71.6	22			
HCM Lane LOS	A	B	-	-	A	-	-	F	C			
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.6	0.1			

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	275	432	32	108	335	130	249	404	322	180	149	59
Average Queue (ft)	100	287	6	16	176	38	95	211	69	70	54	18
95th Queue (ft)	244	465	17	66	296	93	192	350	197	138	117	45
Link Distance (ft)		335	335		1196			669			739	
Upstream Blk Time (%)		7										
Queuing Penalty (veh)		35										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)	0	13			1			14	0			
Queuing Penalty (veh)	0	17			2			36	0			

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	94	30	39	31	141	12	30	90	42
Average Queue (ft)	34	13	13	3	46	1	5	24	4
95th Queue (ft)	72	31	32	17	106	6	22	67	21
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				5	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	70	271	55	35
Average Queue (ft)	4	31	2	2
95th Queue (ft)	38	149	39	16
Link Distance (ft)		641		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200		200	50
Storage Blk Time (%)		1		0
Queuing Penalty (veh)		5		0

Zone Summary

Zone wide Queuing Penalty: 96

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	274	413	136	325	1224	500	298	318	89	325	844	400
Average Queue (ft)	79	284	41	145	951	178	149	132	33	184	536	197
95th Queue (ft)	224	436	100	372	1468	563	265	234	71	384	976	465
Link Distance (ft)		335	335		1196			669			829	
Upstream Blk Time (%)		6			24							17
Queuing Penalty (veh)		28			0							0
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		14			47		1	2		0	39	0
Queuing Penalty (veh)		11			81		2	6		0	106	0

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	68	39	46	40	113	16	35	178	48
Average Queue (ft)	23	14	11	12	28	1	7	49	10
95th Queue (ft)	56	34	31	36	73	7	28	130	33
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				3	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	R	LT	R
Maximum Queue (ft)	25	159	12	33	33
Average Queue (ft)	5	11	0	6	4
95th Queue (ft)	20	71	5	23	20
Link Distance (ft)		641		209	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	200		15		50
Storage Blk Time (%)		0	0	0	0
Queuing Penalty (veh)		1	0	0	0

Zone Summary

Zone wide Queuing Penalty: 235

HCM 6th Signalized Intersection Summary

Background Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	707	113	23	421	235	150	279	99	97	70	43
Future Volume (veh/h)	135	707	113	23	421	235	150	279	99	97	70	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	142	744	119	27	495	276	158	294	104	113	81	50
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	396	1025	978	247	1157	643	362	351	331	209	344	367
Arrive On Green	0.05	0.53	0.53	0.02	0.50	0.50	0.02	0.06	0.06	0.06	0.18	0.18
Sat Flow, veh/h	1845	1938	1640	1860	2300	1277	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	142	744	119	27	399	372	158	294	104	113	81	50
Grp Sat Flow(s),veh/h/ln	1845	1938	1640	1860	1856	1722	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	4.5	35.2	3.8	0.8	16.3	16.4	8.0	17.7	7.0	5.9	4.3	2.9
Cycle Q Clear(g_c), s	4.5	35.2	3.8	0.8	16.3	16.4	8.0	17.7	7.0	5.9	4.3	2.9
Prop In Lane	1.00		1.00	1.00		0.74	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	396	1025	978	247	934	866	362	351	331	209	344	367
V/C Ratio(X)	0.36	0.73	0.12	0.11	0.43	0.43	0.44	0.84	0.31	0.54	0.24	0.14
Avail Cap(c_a), veh/h	396	1025	978	295	934	866	362	492	450	214	488	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.6	21.6	10.6	18.3	18.9	18.9	39.5	54.7	47.4	38.3	42.5	37.5
Incr Delay (d2), s/veh	0.5	4.5	0.3	0.2	1.4	1.6	0.8	9.1	0.6	2.6	0.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	15.6	1.4	0.3	6.9	6.4	4.0	10.2	3.1	2.8	2.1	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.2	26.1	10.8	18.5	20.3	20.4	40.3	63.9	48.0	40.9	42.9	37.7
LnGrp LOS	B	C	B	B	C	C	D	E	D	D	D	D
Approach Vol, veh/h		1005			798			556			244	
Approach Delay, s/veh		22.7			20.3			54.2			40.9	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	70.0	14.0	27.1	12.0	66.9	13.7	27.4				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 52	8.0	30.0	* 5.5	* 52	8.0	30.0				
Max Q Clear Time (g_c+I1), s	2.8	37.2	10.0	6.3	6.5	18.4	7.9	19.7				
Green Ext Time (p_c), s	0.0	5.2	0.0	0.6	0.0	5.9	0.0	1.7				

Intersection Summary

HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary

Background Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↑	↖	↖	↑	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	450	6	5	184	17
Future Volume (veh/h)	60	0	29	4	0	18	7	450	6	5	184	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	474	6	6	224	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	278	0	179	88	17	145	920	1389	1177	671	1366	1158
Arrive On Green	0.11	0.00	0.11	0.11	0.00	0.11	0.71	0.71	0.71	1.00	1.00	1.00
Sat Flow, veh/h	1481	0	1682	158	161	1367	1135	1969	1668	900	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	474	6	6	224	21
Grp Sat Flow(s),veh/h/ln	1481	0	1682	1686	0	0	1135	1969	1668	900	1938	1642
Q Serve(g_s), s	1.0	0.0	1.0	0.0	0.0	0.0	0.1	5.6	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.2	0.0	1.0	1.2	0.0	0.0	0.1	5.6	0.1	5.7	0.0	0.0
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	179	251	0	0	920	1389	1177	671	1366	1158
V/C Ratio(X)	0.23	0.00	0.17	0.15	0.00	0.00	0.01	0.34	0.01	0.01	0.16	0.02
Avail Cap(c_a), veh/h	408	0	336	403	0	0	920	1389	1177	671	1366	1158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.99	0.99	0.99
Uniform Delay (d), s/veh	24.9	0.0	24.4	24.5	0.0	0.0	2.6	3.4	2.6	0.4	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.5	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.4	0.5	0.0	0.0	0.0	1.2	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.3	0.0	24.9	24.7	0.0	0.0	2.6	4.1	2.6	0.4	0.3	0.0
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			487			251	
Approach Delay, s/veh		25.1			24.7			4.1			0.2	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.6		12.4		47.6		12.4				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 37		12.0		* 37		12.0				
Max Q Clear Time (g_c+1), s		7.6		4.2		7.7		3.2				
Green Ext Time (p_c), s		3.0		0.2		1.3		0.1				

Intersection Summary

HCM 6th Ctrl Delay	6.2
HCM 6th LOS	A

Notes

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

HCM 6th Signalized Intersection Summary

Background Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	587	207	86	845	87	210	197	58	132	354	131
Future Volume (veh/h)	75	587	207	86	845	87	210	197	58	132	354	131
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	79	618	218	91	889	92	228	214	63	161	432	160
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	256	822	850	238	1443	149	263	509	499	389	488	476
Arrive On Green	0.04	0.41	0.41	0.04	0.42	0.42	0.06	0.17	0.17	0.08	0.24	0.24
Sat Flow, veh/h	1890	1984	1680	1890	3448	357	1890	1984	1672	1905	2000	1689
Grp Volume(v), veh/h	79	618	218	91	486	495	228	214	63	161	432	160
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1885	1920	1890	1984	1672	1905	2000	1689
Q Serve(g_s), s	2.9	31.8	8.8	3.3	24.2	24.2	10.8	11.6	3.6	7.5	25.0	9.0
Cycle Q Clear(g_c), s	2.9	31.8	8.8	3.3	24.2	24.2	10.8	11.6	3.6	7.5	25.0	9.0
Prop In Lane	1.00		1.00	1.00		0.19	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	256	822	850	238	789	803	263	509	499	389	488	476
V/C Ratio(X)	0.31	0.75	0.26	0.38	0.62	0.62	0.87	0.42	0.13	0.41	0.89	0.34
Avail Cap(c_a), veh/h	272	822	850	245	789	803	263	579	558	413	583	556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	29.9	16.8	23.5	27.3	27.3	34.5	41.7	34.3	30.5	43.8	34.2
Incr Delay (d2), s/veh	0.7	6.3	0.7	1.0	3.6	3.5	24.3	0.6	0.1	0.7	13.9	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	15.6	3.5	1.4	11.0	11.2	6.8	5.9	1.5	3.4	13.9	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	36.2	17.6	24.5	30.9	30.9	58.8	42.4	34.4	31.2	57.6	34.7
LnGrp LOS	C	D	B	C	C	C	E	D	C	C	E	C
Approach Vol, veh/h		915			1072			505			753	
Approach Delay, s/veh		30.6			30.4			48.8			47.1	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.5	56.2	17.0	35.3	11.0	56.7	15.5	36.8				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 44	11.0	35.0	* 5.5	* 44	11.0	35.0				
Max Q Clear Time (g_c+I1), s	5.3	33.8	12.8	27.0	4.9	26.2	9.5	13.6				
Green Ext Time (p_c), s	0.0	3.6	0.0	2.3	0.0	6.3	0.1	1.5				

Intersection Summary

HCM 6th Ctrl Delay	37.2
HCM 6th LOS	D

Notes

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

HCM 6th Signalized Intersection Summary

Background Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↑	↔	↔	↑	↔
Traffic Volume (veh/h)	31	1	27	6	0	16	24	418	6	13	546	88
Future Volume (veh/h)	31	1	27	6	0	16	24	418	6	13	546	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	486	7	14	607	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	244	6	146	101	15	104	663	1440	1220	705	1452	1229
Arrive On Green	0.09	0.09	0.09	0.09	0.00	0.09	0.73	0.73	0.73	1.00	1.00	1.00
Sat Flow, veh/h	1469	68	1695	284	173	1205	748	1984	1681	918	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	486	7	14	607	98
Grp Sat Flow(s),veh/h/ln1537	0	1695	1662	0	0	748	1984	1681	918	2000	1694	
Q Serve(g_s), s	0.0	0.0	0.9	0.0	0.0	0.0	0.6	5.3	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	0.9	1.3	0.0	0.0	0.6	5.3	0.1	5.5	0.0	0.0
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	250	0	146	219	0	0	663	1440	1220	705	1452	1229
V/C Ratio(X)	0.14	0.00	0.19	0.18	0.00	0.00	0.04	0.34	0.01	0.02	0.42	0.08
Avail Cap(c_a), veh/h	365	0	282	349	0	0	663	1440	1220	705	1452	1229
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.74	0.74	0.74
Uniform Delay (d), s/veh	25.5	0.0	25.5	25.6	0.0	0.0	2.3	3.0	2.3	0.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.9	0.6	0.0	0.0	0.1	0.6	0.0	0.0	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.5	0.0	0.0	0.4	0.5	0.0	0.0	0.1	1.1	0.0	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.9	0.0	26.4	26.2	0.0	0.0	2.5	3.6	2.3	0.4	0.7	0.1
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			521			719	
Approach Delay, s/veh		26.1			26.2			3.5			0.6	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		48.8		11.2		48.8		11.2				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 39		10.0		* 39		10.0				
Max Q Clear Time (g_c+1), s		7.3		3.0		7.5		3.3				
Green Ext Time (p_c), s		3.3		0.1		4.5		0.1				

Intersection Summary

HCM 6th Ctrl Delay	3.7
HCM 6th LOS	A

Notes

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

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	274	408	46	52	240	202	191	320	244	132	126	41
Average Queue (ft)	86	257	7	14	132	101	95	177	56	55	35	17
95th Queue (ft)	222	427	27	38	218	188	170	284	137	106	89	40
Link Distance (ft)		331	331		1196			669				725
Upstream Blk Time (%)		6										
Queuing Penalty (veh)		28										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		9						9	0			
Queuing Penalty (veh)		12						24	0			

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	79	35	36	25	134	15	28	89	35
Average Queue (ft)	32	14	11	2	43	1	2	22	2
95th Queue (ft)	64	32	30	13	99	9	15	63	15
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)	0				5	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	17	196	55	60
Average Queue (ft)	1	20	4	6
95th Queue (ft)	9	132	56	31
Link Distance (ft)		613		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200		200	50
Storage Blk Time (%)		1		0
Queuing Penalty (veh)		4		0

Zone Summary

Zone wide Queuing Penalty: 68

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	274	408	113	234	425	368	242	234	82	289	374	91
Average Queue (ft)	64	274	34	61	258	213	120	117	30	65	208	36
95th Queue (ft)	203	421	88	186	381	337	209	198	64	164	329	69
Link Distance (ft)		331	331		1196			669			725	
Upstream Blk Time (%)		4										
Queuing Penalty (veh)		19										
Storage Bay Dist (ft)	250			300		450	350		200	300		325
Storage Blk Time (%)		12			4			1				2
Queuing Penalty (veh)		9			24			3				5

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	64	34	42	35	113	4	30	135	36
Average Queue (ft)	20	13	11	11	32	0	6	43	9
95th Queue (ft)	51	31	33	32	83	3	25	106	31
Link Distance (ft)	396		509		469			669	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	300		250
Storage Blk Time (%)					3	0			
Queuing Penalty (veh)					1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

























Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	TR	LT	R
Maximum Queue (ft)	28	54	118	76	43	39
Average Queue (ft)	3	4	12	3	12	6
95th Queue (ft)	17	28	57	40	38	27
Link Distance (ft)		613	331	331	210	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200					50
Storage Blk Time (%)			0		3	0
Queuing Penalty (veh)			0		0	0

Zone Summary

Zone wide Queuing Penalty: 61

HCM 6th Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Future Conditions
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	711	113	48	421	235	158	281	103	97	83	43
Future Volume (veh/h)	137	711	113	48	421	235	158	281	103	97	83	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	144	748	119	56	495	276	166	296	108	113	97	50
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	402	1084	1064	277	1045	992	346	338	329	197	289	327
Arrive On Green	0.05	0.56	0.56	0.03	0.53	0.53	0.09	0.17	0.17	0.07	0.15	0.15
Sat Flow, veh/h	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	144	748	119	56	495	276	166	296	108	113	97	50
Grp Sat Flow(s),veh/h/ln	1845	1938	1641	1860	1953	1654	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	4.9	38.8	3.9	1.9	22.1	11.2	10.4	20.5	7.8	7.1	6.2	3.5
Cycle Q Clear(g_c), s	4.9	38.8	3.9	1.9	22.1	11.2	10.4	20.5	7.8	7.1	6.2	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	402	1084	1064	277	1045	992	346	338	329	197	289	327
V/C Ratio(X)	0.36	0.69	0.11	0.20	0.47	0.28	0.48	0.88	0.33	0.57	0.34	0.15
Avail Cap(c_a), veh/h	436	1084	1064	356	1045	992	380	436	412	275	432	449
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.3	22.1	9.3	18.9	20.3	13.4	44.9	56.5	48.3	47.4	53.5	46.5
Incr Delay (d2), s/veh	0.5	3.6	0.2	0.4	1.5	0.7	1.0	15.5	0.7	2.6	0.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	17.4	1.4	0.8	9.9	4.2	4.9	11.5	3.3	3.4	3.1	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	25.7	9.5	19.2	21.8	14.1	45.9	72.0	49.0	50.0	54.3	46.7
LnGrp LOS	B	C	A	B	C	B	D	E	D	D	D	D
Approach Vol, veh/h		1011			827			570			260	
Approach Delay, s/veh		22.4			19.1			60.1			51.0	
Approach LOS		C			B			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	84.8	18.5	26.7	13.5	81.4	15.1	30.0				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 60	15.0	31.0	* 9.5	* 60	15.0	31.0				
Max Q Clear Time (g_c+I1), s	3.9	40.8	12.4	8.2	6.9	24.1	9.1	22.5				
Green Ext Time (p_c), s	0.0	5.9	0.1	0.7	0.1	5.0	0.1	1.5				

Intersection Summary

HCM 6th Ctrl Delay	32.2
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Future Conditions
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↑	↖	↖	↑	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	464	6	5	189	17
Future Volume (veh/h)	60	0	29	4	0	18	7	464	6	5	189	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	488	6	6	230	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	149	0	108	42	9	66	986	1658	1405	762	1631	1382
Arrive On Green	0.06	0.00	0.06	0.06	0.00	0.06	0.84	0.84	0.84	0.84	0.84	0.84
Sat Flow, veh/h	1395	0	1682	91	148	1025	1129	1969	1668	889	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	488	6	6	230	21
Grp Sat Flow(s),veh/h/ln	1395	0	1682	1264	0	0	1129	1969	1668	889	1938	1642
Q Serve(g_s), s	0.1	0.0	2.1	0.0	0.0	0.0	0.1	6.3	0.1	0.2	2.6	0.2
Cycle Q Clear(g_c), s	5.5	0.0	2.1	5.5	0.0	0.0	2.7	6.3	0.1	6.4	2.6	0.2
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	149	0	108	116	0	0	986	1658	1405	762	1631	1382
V/C Ratio(X)	0.44	0.00	0.29	0.32	0.00	0.00	0.01	0.29	0.00	0.01	0.14	0.02
Avail Cap(c_a), veh/h	477	0	505	501	0	0	986	1658	1405	762	1631	1382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.1	0.0	53.6	53.7	0.0	0.0	1.9	2.0	1.5	2.7	1.7	1.5
Incr Delay (d2), s/veh	2.0	0.0	1.5	1.5	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.9	1.1	0.0	0.0	0.0	1.5	0.0	0.0	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.1	0.0	55.0	55.3	0.0	0.0	2.0	2.4	1.5	2.7	1.9	1.5
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			501			257	
Approach Delay, s/veh		56.4			55.3			2.4			1.9	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		106.3		13.7		106.3		13.7				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+1), s		8.3		7.5		8.4		7.5				
Green Ext Time (p_c), s		3.3		0.4		1.4		0.2				

Intersection Summary

HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

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

HCM 6th TWSC
 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Future Conditions
 AM Peak Hour

Intersection												
Int Delay, s/veh	0.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	980	0	0	618	4	0	0	0	0	0	4
Future Vol, veh/h	6	980	0	0	618	4	0	0	0	0	0	4
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	83	83	83	92	92	92	50	50	50
Heavy Vehicles, %	3	3	3	5	5	5	0	0	0	0	0	25
Mvmt Flow	6	1032	0	0	745	5	0	0	0	0	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	752	0	0	1032	0	0	1796	1796	516	1275	1791	747
Stage 1	-	-	-	-	-	-	1044	1044	-	747	747	-
Stage 2	-	-	-	-	-	-	752	752	-	528	1044	-
Critical Hdwy	4.145	-	-	4.175	-	-	7.3	6.5	6.9	7.3	6.5	6.575
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2285	-	-	2.2475	-	-	3.5	4	3.3	3.5	4	3.5375
Pot Cap-1 Maneuver	850	-	-	657	-	-	57	81	509	135	82	367
Stage 1	-	-	-	-	-	-	249	309	-	408	423	-
Stage 2	-	-	-	-	-	-	405	421	-	507	309	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	848	-	-	657	-	-	55	80	509	134	81	366
Mov Cap-2 Maneuver	-	-	-	-	-	-	55	80	-	134	81	-
Stage 1	-	-	-	-	-	-	247	307	-	404	422	-
Stage 2	-	-	-	-	-	-	396	420	-	503	307	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	15.1
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	848	-	-	657	-	-	-	366
HCM Lane V/C Ratio	-	0.007	-	-	-	-	-	-	0.022
HCM Control Delay (s)	0	9.3	-	-	0	-	-	0	15.1
HCM Lane LOS	A	A	-	-	A	-	-	A	C
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-	0.1

HCM 6th TWSC
4: Meadowbrook Road & Site Drive

Future Conditions
AM Peak Hour

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	14	5	14	528	206	38
Future Vol, veh/h	14	5	14	528	206	38
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	50	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	95	95	86	86
Heavy Vehicles, %	2	2	0	2	4	0
Mvmt Flow	15	5	15	556	240	44

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	848	262	284 0
Stage 1	262	-	- -
Stage 2	586	-	- -
Critical Hdwy	6.42	6.22	4.1 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.2 -
Pot Cap-1 Maneuver	332	777	1290 -
Stage 1	782	-	- -
Stage 2	556	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	328	777	1290 -
Mov Cap-2 Maneuver	431	-	- -
Stage 1	773	-	- -
Stage 2	556	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1290	-	431	777	-	-
HCM Lane V/C Ratio	0.011	-	0.035	0.007	-	-
HCM Control Delay (s)	7.8	-	13.7	9.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0	-	-

HCM 6th TWSC
 5: Site Drive & Grand River Avenue (Push-Buttons)

Future Conditions
 AM Peak Hour

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↑
Traffic Vol, veh/h	955	25	0	622	0	6
Future Vol, veh/h	955	25	0	622	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	85	85	92	92
Heavy Vehicles, %	3	0	0	4	2	2
Mvmt Flow	1005	26	0	732	0	7

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	516
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	6.93
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3.319
Pot Cap-1 Maneuver	-	0	505
Stage 1	-	0	-
Stage 2	-	0	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	505
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	505	-	-	-
HCM Lane V/C Ratio	0.013	-	-	-
HCM Control Delay (s)	12.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

HCM 6th Signalized Intersection Summary
 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Future Conditions
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	599	207	102	845	87	235	203	70	132	363	131
Future Volume (veh/h)	81	599	207	102	845	87	235	203	70	132	363	131
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	85	631	218	107	889	92	255	221	76	161	443	160
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	137	905	946	267	919	913	254	479	477	364	429	424
Arrive On Green	0.04	0.46	0.46	0.04	0.46	0.46	0.11	0.24	0.24	0.08	0.21	0.21
Sat Flow, veh/h	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Grp Volume(v), veh/h	85	631	218	107	889	92	255	221	76	161	443	160
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1984	1680	1890	1984	1671	1905	2000	1683
Q Serve(g_s), s	3.3	35.5	9.1	4.2	61.0	3.7	15.0	13.3	4.8	9.1	30.0	11.0
Cycle Q Clear(g_c), s	3.3	35.5	9.1	4.2	61.0	3.7	15.0	13.3	4.8	9.1	30.0	11.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	137	905	946	267	919	913	254	479	477	364	429	424
V/C Ratio(X)	0.62	0.70	0.23	0.40	0.97	0.10	1.00	0.46	0.16	0.44	1.03	0.38
Avail Cap(c_a), veh/h	195	905	946	312	919	913	254	479	477	416	429	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.0	30.4	15.4	23.9	36.6	15.5	41.7	45.4	37.5	38.4	55.0	43.3
Incr Delay (d2), s/veh	4.5	4.4	0.6	1.0	22.9	0.2	57.6	0.8	0.2	0.8	52.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	17.2	3.6	1.8	33.4	1.5	11.0	6.6	2.0	4.3	21.1	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.5	34.8	15.9	24.9	59.4	15.7	99.3	46.2	37.7	39.3	107.4	44.0
LnGrp LOS	D	C	B	C	E	B	F	D	D	D	F	D
Approach Vol, veh/h		934			1088			552			764	
Approach Delay, s/veh		30.7			52.3			69.6			79.8	
Approach LOS		C			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.7	70.3	21.0	36.0	11.7	71.3	17.2	39.8				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 9.5	* 61	15.0	30.0	* 9.5	* 61	15.0	30.0				
Max Q Clear Time (g_c+I1), s	6.2	37.5	17.0	32.0	5.3	63.0	11.1	15.3				
Green Ext Time (p_c), s	0.1	5.6	0.0	0.0	0.1	0.0	0.1	1.4				

Intersection Summary

HCM 6th Ctrl Delay	55.4
HCM 6th LOS	E

Notes

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

HCM 6th Signalized Intersection Summary
 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Future Conditions
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↕	↗	↖	↕	↗
Traffic Volume (veh/h)	31	1	27	6	0	16	24	427	6	13	560	88
Future Volume (veh/h)	31	1	27	6	0	16	24	427	6	13	560	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	497	7	14	622	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	149	4	99	55	10	70	635	1682	1425	784	1695	1436
Arrive On Green	0.06	0.06	0.06	0.06	0.00	0.06	0.85	0.85	0.85	0.85	0.85	0.85
Sat Flow, veh/h	1538	64	1695	288	169	1204	738	1984	1681	909	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	497	7	14	622	98
Grp Sat Flow(s),veh/h/ln1602	0	1695	1661	0	0	738	1984	1681	909	2000	1694	
Q Serve(g_s), s	0.0	0.0	1.9	0.2	0.0	0.0	1.0	6.1	0.1	0.4	8.3	1.1
Cycle Q Clear(g_c), s	2.0	0.0	1.9	2.6	0.0	0.0	9.3	6.1	0.1	6.5	8.3	1.1
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	152	0	99	135	0	0	635	1682	1425	784	1695	1436
V/C Ratio(X)	0.22	0.00	0.28	0.30	0.00	0.00	0.04	0.30	0.00	0.02	0.37	0.07
Avail Cap(c_a), veh/h	495	0	508	523	0	0	635	1682	1425	784	1695	1436
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	54.1	54.4	0.0	0.0	3.1	1.9	1.4	2.5	2.0	1.5
Incr Delay (d2), s/veh	1.0	0.0	2.2	1.7	0.0	0.0	0.1	0.4	0.0	0.0	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln1.0	0.0	0.0	0.9	1.2	0.0	0.0	0.1	1.4	0.0	0.1	1.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	0.0	56.3	56.2	0.0	0.0	3.2	2.3	1.4	2.6	2.6	1.6
LnGrp LOS	E	A	E	E	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			532			734	
Approach Delay, s/veh		55.7			56.2			2.3			2.5	
Approach LOS		E			E			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		107.0		13.0		107.0		13.0				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 73		36.0		* 73		36.0				
Max Q Clear Time (g_c+11), s		11.3		4.0		10.3		4.6				
Green Ext Time (p_c), s		3.6		0.4		4.9		0.3				

Intersection Summary

HCM 6th Ctrl Delay	6.4
HCM 6th LOS	A

Notes

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

HCM 6th TWSC
3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Future Conditions
PM Peak Hour

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕	↔		↕			↕	↔
Traffic Vol, veh/h	6	877	0	0	1192	19	0	0	0	8	0	5
Future Vol, veh/h	6	877	0	0	1192	19	0	0	0	8	0	5
Conflicting Peds, #/hr	2	0	0	0	0	2	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	200	-	200	50	-	15	-	-	-	-	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	92	92	92	65	65	65
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	6	923	0	0	1255	20	0	0	0	12	0	8
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1277	0	0	923	0	0	2204	2212	462	1731	2192	1257
Stage 1	-	-	-	-	-	-	935	935	-	1257	1257	-
Stage 2	-	-	-	-	-	-	1269	1277	-	474	935	-
Critical Hdwy	4.115	-	-	4.115	-	-	7.3	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	546	-	-	743	-	-	29	45	552	64	46	211
Stage 1	-	-	-	-	-	-	289	347	-	212	245	-
Stage 2	-	-	-	-	-	-	208	239	-	545	347	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	545	-	-	743	-	-	28	44	552	63	45	211
Mov Cap-2 Maneuver	-	-	-	-	-	-	28	44	-	63	45	-
Stage 1	-	-	-	-	-	-	286	343	-	209	245	-
Stage 2	-	-	-	-	-	-	200	239	-	539	343	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			0			55.2		
HCM LOS							A			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	-	545	-	-	743	-	-	63	211			
HCM Lane V/C Ratio	-	0.012	-	-	-	-	-	0.195	0.036			
HCM Control Delay (s)	0	11.7	-	-	0	-	-	75.5	22.7			
HCM Lane LOS	A	B	-	-	A	-	-	F	C			
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.7	0.1			

HCM 6th TWSC
4: Meadowbrook Road & Site Drive

Future Conditions
PM Peak Hour

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	14	9	465	647	25
Future Vol, veh/h	43	14	9	465	647	25
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	50	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	89	89	90	90
Heavy Vehicles, %	2	2	0	1	0	0
Mvmt Flow	47	15	10	522	719	28

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1275	733	747 0
Stage 1	733	-	- -
Stage 2	542	-	- -
Critical Hdwy	6.42	6.22	4.1 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.2 -
Pot Cap-1 Maneuver	184	421	870 -
Stage 1	475	-	- -
Stage 2	583	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	182	421	870 -
Mov Cap-2 Maneuver	318	-	- -
Stage 1	470	-	- -
Stage 2	583	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	17.2	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	870	-	318	421	-	-
HCM Lane V/C Ratio	0.012	-	0.147	0.036	-	-
HCM Control Delay (s)	9.2	-	18.3	13.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	0.1	-	-

HCM 6th TWSC
5: Site Drive & Grand River Avenue (Push-Buttons)

Future Conditions
PM Peak Hour

Intersection

Int Delay, s/veh 0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↑
Traffic Vol, veh/h	869	16	0	1211	0	18
Future Vol, veh/h	869	16	0	1211	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	92	92
Heavy Vehicles, %	1	0	0	1	2	2
Mvmt Flow	915	17	0	1275	0	20

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	466
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	6.93
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3.319
Pot Cap-1 Maneuver	-	0	544
Stage 1	-	0	-
Stage 2	-	0	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	544
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	544	-	-	-
HCM Lane V/C Ratio	0.036	-	-	-
HCM Control Delay (s)	11.9	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	225	322	43	186	316	175	300	389	296	169	137	67
Average Queue (ft)	112	269	8	34	169	39	118	208	69	67	63	20
95th Queue (ft)	245	356	27	113	301	104	242	341	177	131	119	48
Link Distance (ft)		225	225		1196			300			829	
Upstream Blk Time (%)	0	19					0	3	0			
Queuing Penalty (veh)	0	90					0	17	0			
Storage Bay Dist (ft)	250			300		450	275		200	300		325
Storage Blk Time (%)	0	19			1		0	14				
Queuing Penalty (veh)	1	26			2		0	37				

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	95	35	38	26	114	12	25	83	28
Average Queue (ft)	36	12	11	2	44	0	3	22	2
95th Queue (ft)	75	30	30	14	96	5	17	64	15
Link Distance (ft)	396		509		469			300	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	150		250
Storage Blk Time (%)	0				5	0			
Queuing Penalty (veh)	0				1	0			

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	TR	T	R	R
Maximum Queue (ft)	64	356	164	16	18	48
Average Queue (ft)	3	43	6	1	1	4
95th Queue (ft)	34	187	70	9	9	27
Link Distance (ft)		641		55		
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (ft)	200		200		15	50
Storage Blk Time (%)		1		0	0	0
Queuing Penalty (veh)		7		0	0	0

Intersection: 4: Meadowbrook Road & Site Drive

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	43	31	24	133
Average Queue (ft)	10	6	2	7
95th Queue (ft)	36	26	15	61
Link Distance (ft)	307			300
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)		50	100	
Storage Blk Time (%)	1	0		0
Queuing Penalty (veh)	0	0		0

Intersection: 5: Site Drive & Grand River Avenue (Push-Buttons)

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	154	40
Average Queue (ft)	62	9
95th Queue (ft)	162	33
Link Distance (ft)	55	211
Upstream Blk Time (%)	11	
Queuing Penalty (veh)	52	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 234

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T	R
Maximum Queue (ft)	225	304	134	325	1148	500	274	303	182	324	688	352
Average Queue (ft)	80	252	40	146	848	136	168	157	40	189	461	145
95th Queue (ft)	201	347	93	365	1466	487	276	294	114	387	882	379
Link Distance (ft)		225	225		1196			300			829	
Upstream Blk Time (%)	0	17			24		1	2	0		14	
Queuing Penalty (veh)	0	76			0		0	9	0		0	
Storage Bay Dist (ft)	250			300		450	275		200	300		325
Storage Blk Time (%)	0	17			39		2	3		0	29	
Queuing Penalty (veh)	0	14			74		7	9		0	79	

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	59	35	37	40	116	12	62	180	44
Average Queue (ft)	21	13	11	11	30	0	7	47	11
95th Queue (ft)	54	34	30	32	85	5	36	125	37
Link Distance (ft)	396		509		469			300	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	150		250
Storage Blk Time (%)					3	0		0	
Queuing Penalty (veh)					1	0		0	

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	TR	R	LT	R
Maximum Queue (ft)	30	202	108	31	33	29
Average Queue (ft)	4	21	6	3	8	3
95th Queue (ft)	18	133	69	16	28	16
Link Distance (ft)		641			209	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200		200	15		50
Storage Blk Time (%)		1		0	3	0
Queuing Penalty (veh)		4		0	0	0

Intersection: 4: Meadowbrook Road & Site Drive

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	92	64	35	61	4
Average Queue (ft)	33	16	6	6	0
95th Queue (ft)	68	47	25	63	3
Link Distance (ft)	307			300	300
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)		50	100		
Storage Blk Time (%)	6	0		0	
Queuing Penalty (veh)	1	0		0	

Intersection: 5: Site Drive & Grand River Avenue (Push-Buttons)

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	136	53
Average Queue (ft)	43	16
95th Queue (ft)	126	45
Link Distance (ft)	55	211
Upstream Blk Time (%)	8	
Queuing Penalty (veh)	33	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 308

HCM 6th Signalized Intersection Summary

Future Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	711	113	48	421	235	158	281	103	97	83	43
Future Volume (veh/h)	137	711	113	48	421	235	158	281	103	97	83	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1938	1938	1938	1953	1953	1953	1969	1969	1969	1953	1953	1953
Adj Flow Rate, veh/h	144	748	119	56	495	276	166	296	108	113	97	50
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.95	0.95	0.95	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	4	3	3	3	2	2	2	3	3	3
Cap, veh/h	395	1007	962	250	1155	641	351	353	346	209	346	369
Arrive On Green	0.05	0.52	0.52	0.03	0.50	0.50	0.02	0.06	0.06	0.06	0.18	0.18
Sat Flow, veh/h	1845	1938	1640	1860	2300	1277	1875	1969	1668	1860	1953	1655
Grp Volume(v), veh/h	144	748	119	56	399	372	166	296	108	113	97	50
Grp Sat Flow(s),veh/h/ln	1845	1938	1640	1860	1856	1722	1875	1969	1668	1860	1953	1655
Q Serve(g_s), s	4.6	36.2	3.9	1.7	16.4	16.5	8.0	17.9	7.2	5.9	5.2	2.9
Cycle Q Clear(g_c), s	4.6	36.2	3.9	1.7	16.4	16.5	8.0	17.9	7.2	5.9	5.2	2.9
Prop In Lane	1.00		1.00	1.00		0.74	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	395	1007	962	250	932	865	351	353	346	209	346	369
V/C Ratio(X)	0.36	0.74	0.12	0.22	0.43	0.43	0.47	0.84	0.31	0.54	0.28	0.14
Avail Cap(c_a), veh/h	395	1007	962	283	932	865	351	492	464	214	488	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.7	22.5	11.1	19.0	18.9	19.0	39.9	54.7	46.5	38.2	42.8	37.4
Incr Delay (d2), s/veh	0.6	4.9	0.3	0.4	1.4	1.6	1.0	9.5	0.6	2.6	0.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	16.3	1.4	0.7	6.9	6.5	4.5	10.4	3.1	2.8	2.5	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.3	27.5	11.3	19.4	20.4	20.5	40.9	64.3	47.1	40.8	43.3	37.6
LnGrp LOS	B	C	B	B	C	C	D	E	D	D	D	D
Approach Vol, veh/h		1011			827			570			260	
Approach Delay, s/veh		23.8			20.4			54.2			41.1	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.9	68.9	14.0	27.2	12.0	66.8	13.7	27.5				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 52	8.0	30.0	* 5.5	* 52	8.0	30.0				
Max Q Clear Time (g_c+I1), s	3.7	38.2	10.0	7.2	6.6	18.5	7.9	19.9				
Green Ext Time (p_c), s	0.0	5.0	0.0	0.7	0.0	5.9	0.0	1.7				

Intersection Summary

HCM 6th Ctrl Delay	30.9
HCM 6th LOS	C

Notes

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

HCM 6th Signalized Intersection Summary

Future Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↑	↖	↖	↑	↗
Traffic Volume (veh/h)	60	0	29	4	0	18	7	464	6	5	189	17
Future Volume (veh/h)	60	0	29	4	0	18	7	464	6	5	189	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	2000	2000	2000	1969	1969	1969	1938	1938	1938
Adj Flow Rate, veh/h	65	0	31	7	0	30	7	488	6	6	230	21
Peak Hour Factor	0.93	0.93	0.93	0.61	0.61	0.61	0.95	0.95	0.95	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	0	0	0	2	2	2	4	4	4
Cap, veh/h	278	0	179	88	17	145	916	1389	1177	660	1366	1158
Arrive On Green	0.11	0.00	0.11	0.11	0.00	0.11	0.71	0.71	0.71	1.00	1.00	1.00
Sat Flow, veh/h	1481	0	1682	158	161	1367	1129	1969	1668	889	1938	1642
Grp Volume(v), veh/h	65	0	31	37	0	0	7	488	6	6	230	21
Grp Sat Flow(s),veh/h/ln	1481	0	1682	1686	0	0	1129	1969	1668	889	1938	1642
Q Serve(g_s), s	1.0	0.0	1.0	0.0	0.0	0.0	0.1	5.8	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.2	0.0	1.0	1.2	0.0	0.0	0.1	5.8	0.1	5.9	0.0	0.0
Prop In Lane	1.00		1.00	0.19		0.81	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	179	251	0	0	916	1389	1177	660	1366	1158
V/C Ratio(X)	0.23	0.00	0.17	0.15	0.00	0.00	0.01	0.35	0.01	0.01	0.17	0.02
Avail Cap(c_a), veh/h	408	0	336	403	0	0	916	1389	1177	660	1366	1158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	24.4	24.5	0.0	0.0	2.6	3.5	2.6	0.4	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.5	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.4	0.5	0.0	0.0	0.0	1.3	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.3	0.0	24.9	24.7	0.0	0.0	2.6	4.2	2.6	0.4	0.3	0.0
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		96			37			501			257	
Approach Delay, s/veh		25.1			24.7			4.1			0.3	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.6		12.4		47.6		12.4				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 37		12.0		* 37		12.0				
Max Q Clear Time (g_c+I1), s		7.8		4.2		7.9		3.2				
Green Ext Time (p_c), s		3.1		0.2		1.3		0.1				

Intersection Summary

HCM 6th Ctrl Delay	6.1
HCM 6th LOS	A

Notes

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

HCM 6th Signalized Intersection Summary

Future Conditions W / Improvements

1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	599	207	102	845	87	235	203	70	132	363	131
Future Volume (veh/h)	81	599	207	102	845	87	235	203	70	132	363	131
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	85	631	218	107	889	92	255	221	76	161	443	160
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.82	0.82	0.82
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	249	788	835	223	1387	144	278	535	528	398	497	489
Arrive On Green	0.04	0.40	0.40	0.05	0.40	0.40	0.07	0.18	0.18	0.08	0.25	0.25
Sat Flow, veh/h	1890	1984	1680	1890	3448	357	1890	1984	1672	1905	2000	1689
Grp Volume(v), veh/h	85	631	218	107	486	495	255	221	76	161	443	160
Grp Sat Flow(s),veh/h/ln	1890	1984	1680	1890	1885	1920	1890	1984	1672	1905	2000	1689
Q Serve(g_s), s	3.2	33.7	9.0	4.0	24.9	24.9	12.0	11.8	4.3	7.4	25.7	8.9
Cycle Q Clear(g_c), s	3.2	33.7	9.0	4.0	24.9	24.9	12.0	11.8	4.3	7.4	25.7	8.9
Prop In Lane	1.00		1.00	1.00		0.19	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	788	835	223	758	772	278	535	528	398	497	489
V/C Ratio(X)	0.34	0.80	0.26	0.48	0.64	0.64	0.92	0.41	0.14	0.40	0.89	0.33
Avail Cap(c_a), veh/h	259	788	835	223	758	772	278	579	565	438	583	561
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	32.0	17.4	25.4	28.9	28.9	34.1	40.8	33.2	30.0	43.5	33.5
Incr Delay (d2), s/veh	0.8	8.4	0.8	1.6	4.1	4.1	33.3	0.6	0.1	0.7	14.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	16.9	3.5	1.8	11.4	11.6	8.2	6.0	1.8	3.4	14.4	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.5	40.4	18.2	27.0	33.0	32.9	67.4	41.4	33.4	30.7	58.2	33.9
LnGrp LOS	C	D	B	C	C	C	E	D	C	C	E	C
Approach Vol, veh/h		934			1088			552			764	
Approach Delay, s/veh		33.7			32.4			52.3			47.3	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	54.2	18.0	35.8	11.4	54.8	15.5	38.3				
Change Period (Y+Rc), s	* 6.5	* 6.5	6.0	6.0	* 6.5	* 6.5	6.0	6.0				
Max Green Setting (Gmax), s	* 5.5	* 43	12.0	35.0	* 5.5	* 43	12.0	35.0				
Max Q Clear Time (g_c+I1), s	6.0	35.7	14.0	27.7	5.2	26.9	9.4	13.8				
Green Ext Time (p_c), s	0.0	2.9	0.0	2.2	0.0	6.0	0.1	1.6				

Intersection Summary

HCM 6th Ctrl Delay	39.4
HCM 6th LOS	D

Notes

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

HCM 6th Signalized Intersection Summary

Future Conditions W / Improvements

2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↑	↔	↔	↑	↔
Traffic Volume (veh/h)	31	1	27	6	0	16	24	427	6	13	560	88
Future Volume (veh/h)	31	1	27	6	0	16	24	427	6	13	560	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	2000	2000	2000	2000	2000	2000	1984	1984	1984	2000	2000	2000
Adj Flow Rate, veh/h	33	1	28	11	0	29	28	497	7	14	622	98
Peak Hour Factor	0.95	0.95	0.95	0.55	0.55	0.55	0.86	0.86	0.86	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	0	0	0
Cap, veh/h	244	6	146	101	15	104	656	1440	1220	696	1452	1229
Arrive On Green	0.09	0.09	0.09	0.09	0.00	0.09	0.73	0.73	0.73	1.00	1.00	1.00
Sat Flow, veh/h	1469	68	1695	284	173	1205	738	1984	1681	909	2000	1694
Grp Volume(v), veh/h	34	0	28	40	0	0	28	497	7	14	622	98
Grp Sat Flow(s),veh/h/ln1537	0	1695	1662	0	0	738	1984	1681	909	2000	1694	
Q Serve(g_s), s	0.0	0.0	0.9	0.0	0.0	0.0	0.6	5.5	0.1	0.1	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	0.9	1.3	0.0	0.0	0.6	5.5	0.1	5.6	0.0	0.0
Prop In Lane	0.97		1.00	0.27		0.72	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	250	0	146	219	0	0	656	1440	1220	696	1452	1229
V/C Ratio(X)	0.14	0.00	0.19	0.18	0.00	0.00	0.04	0.35	0.01	0.02	0.43	0.08
Avail Cap(c_a), veh/h	365	0	282	349	0	0	656	1440	1220	696	1452	1229
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.5	0.0	25.5	25.6	0.0	0.0	2.3	3.0	2.3	0.4	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.0	0.9	0.6	0.0	0.0	0.1	0.7	0.0	0.1	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.5	0.0	0.0	0.4	0.5	0.0	0.0	0.1	1.1	0.0	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.9	0.0	26.4	26.2	0.0	0.0	2.5	3.7	2.3	0.4	0.9	0.1
LnGrp LOS	C	A	C	C	A	A	A	A	A	A	A	A
Approach Vol, veh/h		62			40			532			734	
Approach Delay, s/veh		26.1			26.2			3.6			0.8	
Approach LOS		C			C			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		48.8		11.2		48.8		11.2				
Change Period (Y+Rc), s		* 5.3		6.0		* 5.3		6.0				
Max Green Setting (Gmax), s		* 39		10.0		* 39		10.0				
Max Q Clear Time (g_c+I1), s		7.5		3.0		7.6		3.3				
Green Ext Time (p_c), s		3.4		0.1		4.7		0.1				

Intersection Summary

HCM 6th Ctrl Delay	3.8
HCM 6th LOS	A

Notes

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

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	221	311	50	81	229	200	297	350	222	119	105	51
Average Queue (ft)	101	259	8	28	130	93	97	174	58	54	47	17
95th Queue (ft)	234	356	28	61	220	183	195	288	145	107	98	42
Link Distance (ft)		221	221		1196			300			815	
Upstream Blk Time (%)	0	19					0	2	0			
Queuing Penalty (veh)	0	90					0	9	0			
Storage Bay Dist (ft)	250			300		450	275		200	300		325
Storage Blk Time (%)	0	19						7				
Queuing Penalty (veh)	1	26						19				

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	81	34	39	26	125	19	31	87	30
Average Queue (ft)	30	12	10	2	43	1	3	23	3
95th Queue (ft)	62	30	30	14	94	7	18	67	20
Link Distance (ft)	396		509		469			300	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	150		250
Storage Blk Time (%)	0				5	0		0	
Queuing Penalty (veh)	0				1	0		0	

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	TR	T	LT	R
Maximum Queue (ft)	24	294	55	10	32	55
Average Queue (ft)	2	40	2	0	1	6
95th Queue (ft)	12	168	39	5	16	33
Link Distance (ft)		642		55	210	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200		200		50	
Storage Blk Time (%)		1			0	
Queuing Penalty (veh)		6			0	

Intersection: 4: Meadowbrook Road & Site Drive

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	43	31	31	62
Average Queue (ft)	12	4	4	3
95th Queue (ft)	37	20	20	33
Link Distance (ft)	307		300	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	50		100	
Storage Blk Time (%)	0	0		0
Queuing Penalty (veh)	0	0		0

Intersection: 5: Site Drive & Grand River Avenue (Push-Buttons)

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	140	35
Average Queue (ft)	64	9
95th Queue (ft)	161	31
Link Distance (ft)	55	211
Upstream Blk Time (%)	11	
Queuing Penalty (veh)	54	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 205

Intersection: 1: Meadowbrook Road & Grand River Avenue (Push-Buttons)

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	T	TR	L	T	R	L	T	R
Maximum Queue (ft)	221	314	130	297	461	405	262	291	168	289	485	338
Average Queue (ft)	83	269	36	67	284	234	153	133	36	84	234	61
95th Queue (ft)	222	347	93	183	413	358	255	246	99	216	439	215
Link Distance (ft)		221	221		1196			300			815	
Upstream Blk Time (%)	0	27	0				0	0	0		0	
Queuing Penalty (veh)	0	120	0				0	2	0		0	
Storage Bay Dist (ft)	250			300		450	275		200	300		325
Storage Blk Time (%)	0	27			5	0	0	2				5
Queuing Penalty (veh)	1	22			34	0	1	6				16

Intersection: 2: Meadowbrook Road & Cherry Hill Road/Clermont Avenue (Push-Buttons)

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	R	L	T	R
Maximum Queue (ft)	55	43	50	35	126	15	39	206	40
Average Queue (ft)	17	14	13	10	32	1	5	55	11
95th Queue (ft)	44	35	35	32	85	7	24	145	37
Link Distance (ft)	396		509		469			300	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		100		300		35	150		250
Storage Blk Time (%)	0				3	0		1	
Queuing Penalty (veh)	0				1	0		1	

Intersection: 3: Funeral Home Drive/Grandview Lane & Grand River Avenue

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	TR	T	LT	R
Maximum Queue (ft)	62	240	55	66	56	30
Average Queue (ft)	4	43	9	7	17	4
95th Queue (ft)	36	189	90	35	56	20
Link Distance (ft)		639		55	210	
Upstream Blk Time (%)				0		
Queuing Penalty (veh)				0		
Storage Bay Dist (ft)	200		200			50
Storage Blk Time (%)		2		0	14	0
Queuing Penalty (veh)		10		0	1	0

Intersection: 4: Meadowbrook Road & Site Drive

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	73	47	30	4
Average Queue (ft)	30	12	5	0
95th Queue (ft)	62	39	22	3
Link Distance (ft)	307			300
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50	100	
Storage Blk Time (%)	6	0		
Queuing Penalty (veh)	1	0		

Intersection: 5: Site Drive & Grand River Avenue (Push-Buttons)

Movement	EB	WB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	136	125	31	116
Average Queue (ft)	67	12	1	36
95th Queue (ft)	163	69	13	118
Link Distance (ft)	55	221	221	211
Upstream Blk Time (%)	16	0		1
Queuing Penalty (veh)	70	0		0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

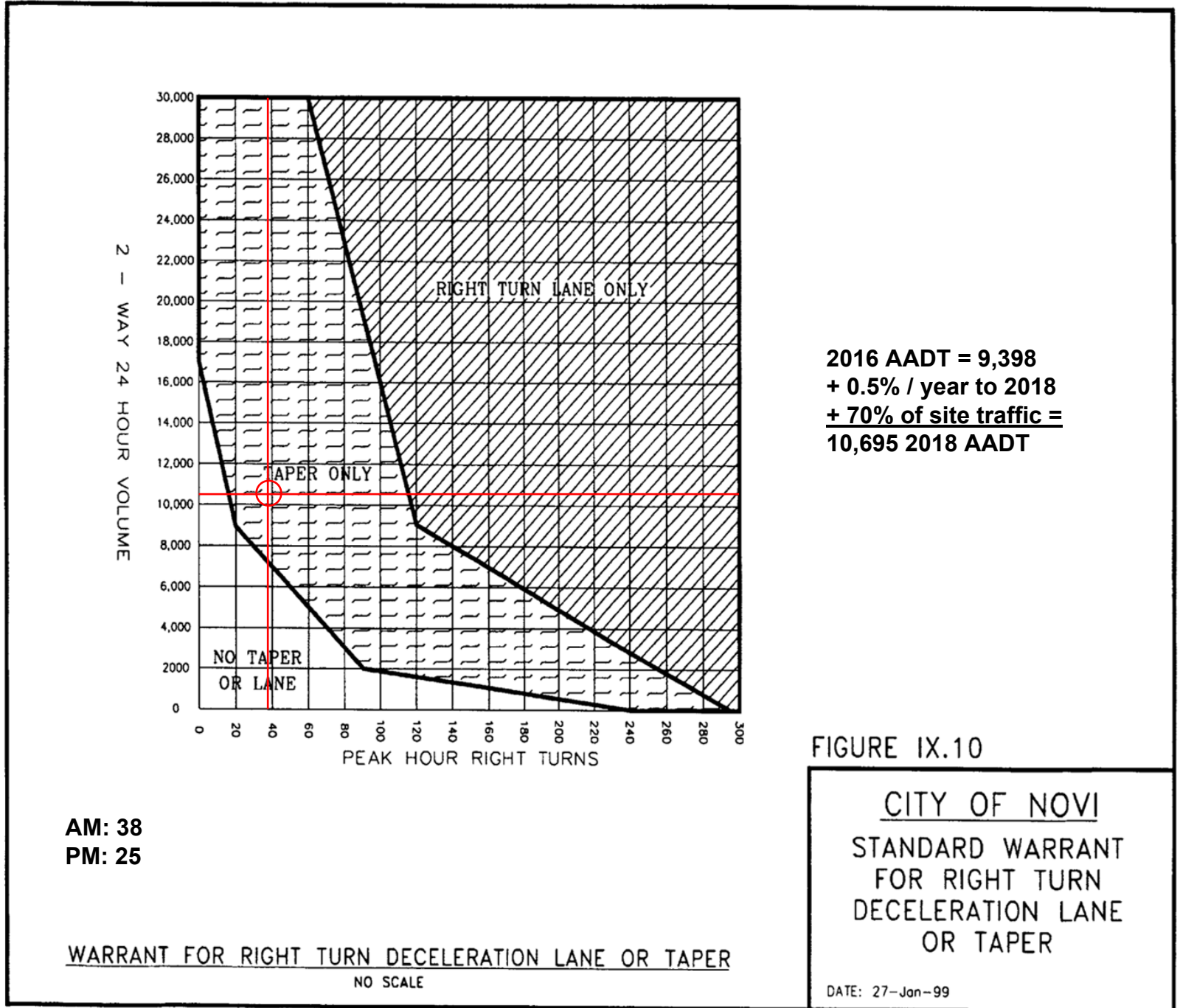
Zone Summary

Zone wide Queuing Penalty: 285

MEADOWBROOK ROAD & SITE DRIVE RIGHT TURN LANE WARRANT

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

Figure IX.10



GEO-TECHNICAL STUDY

Geotechnical Investigation

Proposed BMW of Novi

SWC of Grand Rive Ave and Meadowbrook Road
Novi, MI

Erhard BMW

Kenneth Widerstedt

4065 West Maple Road

Bloomfield Hills, MI 48301

June 23, 2017

PEA Project No. 2017-176



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June 23, 2017
PEA Job No: 2017-176

Mr. Kenneth Widerstedt, Facility Manager
Erhard BMW
4065 West Maple Road
Bloomfield Hills, Michigan 48301

**RE: Geotechnical Investigation
Proposed BMW of Novi
SWC of Grand River Avenue and Meadowbrook Road
City of Novi, Oakland County, Michigan**

Dear Mr. Widerstedt:

PEA, Inc. (PEA) has performed a geotechnical investigation for the proposed new dealership of the BMW of Novi in Novi, Michigan. The purpose of our investigation was to determine the general subsurface conditions at planned location for the new building and parking areas in order to provide foundation and related site preparation recommendations.

Based on our investigation, the site soils over the whole site generally consist of black silty sand topsoil which overlies a medium stiff to hard silty clay, which is native to the site.

Groundwater was encountered in boring TB-7 during drilling at 7 feet below existing ground surface and is not expected to impact construction or operation of the building construction.

A minimal amount of earthwork will be needed to achieve final design grades. We anticipate cuts and fills of 1 to 2 feet. Following successful completion of earthwork operations, we recommend that the proposed building be supported by shallow foundations bearing on engineered fill or on the native soils. We caution that if site conditioning and earthwork operations are during wet or cold weather (i.e. any time other than late spring to early fall) significant difficulty should be anticipated.

The data obtained during this investigation along with our evaluations, analysis and recommendations are presented in the subsequent portions of this report.

Site Conditions and Proposed Construction

The proposed BMW of Novi is located at the southwest corner of Grand River Avenue and Meadowbrook Road. The site is bordered by Grand River Avenue to the north, Meadowbrook Road to the east, Cherry Hill Road to the south, and O'Brein-Sullivan Funeral Home and trees to the west. The proposal calls for a new dealership building along with associated parking, drives and site work.

The site is irregularly shaped as shown on the Test Boring Location Plan with a frontage on Grand River Avenue of about 400 feet and on Meadowbrook Road of about 634 feet. The perimeter of the site is generally tree lined with a wetland located in the southwest corner of the site. The ground surface near the west side of the site at Grand River Avenue is about Elevation 898. The ground surface along Meadowbrook Road varies from about Elevation 889 to 883. In general, the site slopes to a swale flowing from the northeast corner to the wetland at about Elevation 886 to 879. Within the proposed building area, the ground surface varies from about 888 to 892.

In addition, most of the proposed building area appears to have been graded as part of an earlier site development that installed both water mains and hydrants on the site as well as sanitary sewer leads. Vegetation within this area is sparse.

Although no specific loading information was available for the proposed building, we anticipate slab-on-grade construction and loads will not exceed 150 kips for interior columns and 3,000 pounds per linear foot for walls. We anticipate a finish floor elevation of about 888 to 890. These elevations result in cuts and fills of 1 to 2 feet at the proposed building location. We also understand that any existing underground utilities would be reused, if applicable.

Regional Geology and Seismic Activity

Based on Michigan Department of Environmental Quality Quaternary Geology Map of Michigan and the Oakland County Surficial Geology Map, the site soils were generally deposited as a moraine adjacent to glacial outwash sand and gravel and postglacial alluvium. Based on the Oakland County Bedrock Topography Map, bedrock is about elevation 600 or 290 feet below the surface.

Southern Michigan and Novi are considered to have a relatively low seismic risk. The appropriate geotechnical design considerations for seismic conditions should be applied based on the Michigan Building Code. Based on our interpretation of the test borings and understanding of the soil conditions below the depth of exploration, we recommend the site be classified as a Class D Site.

Field Investigation

We investigated subsurface conditions at the existing facility site by drilling nine test borings designated TB-1 to TB-9, and are presented as Figures 1-9. Stock Drilling Company drilled the test borings on June 8 and 9, 2017. The boring locations are shown on the Test Boring Location Plan. Ground surface elevations were surveyed by PEA.

Test borings extended to depths of 20 feet and were advanced by 3 inch inside-diameter hollow-stem casings. Soil samples were taken at intervals of generally 2.5 feet within the upper 10 feet and at 5 foot intervals below 10 feet. These test boring samples were taken by the Standard Penetration Test method (ASTM D-1586). Geotechnical engineers generally accept that auto hammers are more efficient than the traditional manual hammer. Therefore, the "N" value obtained in the field by using the auto hammer will generally be lower than those found using the manual hammer. We consider the blows from the automatic hammer will be about 2/3 to 3/4 of the blows using a cathead and rope. The actual blows from the auto hammer and the "N" value are presented. However, the relative density description is based on both the actual auto hammer and an expected equivalent N from a manual hammer. Most published soil parameters utilizing the N value are based on the manual hammer.

The soil samples obtained with the split-barrel sampler were sealed in containers and transported to our laboratory for further classification and testing. We will retain these soil samples for 60 days after the date of this report. At that time, we will dispose of the samples unless otherwise instructed.

Presentation of Data

We evaluated the soil and groundwater conditions encountered in the test borings and have presented these conditions in the form of individual Logs of Test Borings on Figure 1 through 9. The nomenclature used on the boring logs and elsewhere are presented on the Soil Terminology sheet, Figure 10. The stratification shown on the test boring logs represents the soil conditions at the actual boring locations. Variations may occur between the borings. The stratigraphic lines represent the approximate boundary

between the soil types, however, the transition may be more gradual than what is shown. We have prepared the logs included with this report on the basis of field classification supplemented by laboratory classification and testing.

Laboratory Testing

The soil samples obtained from the test borings were also classified in our laboratory. Selected samples were tested to determine natural moisture contents. Testing was performed in general accordance with current ASTM standards. The results of these tests are presented on the individual Logs of Test Borings.

Soil Conditions and Evaluations

From the information developed during this investigation, subsoil conditions are generally similar throughout the site. A topsoil overlies native soils consisting of medium stiff to hard brown or grey silty clay with varying amounts of sand and gravel. The stiffness of the clay generally increased from medium stiff to very stiff or hard. Small layers of medium stiff clay were encountered near the end of the boring in TB-5 and TB-8. Occasional sand seams were observed in borings TB-2, TB-3, TB-6 and TB-7. Cobbles were encountered in TB-2, TB-6 and TB-8. The moisture content of the top soil sample ranged from 11 to 19 percent and generally decreased with depth. The soil profile was generally consistent across the site.

Site Preparation

On the basis of available data, we anticipate a minimal amount of earthwork will be required to achieve final design grades. We recommend that all earthwork operations be performed under adequate specifications and be properly monitored in the field. We expect the earthwork to consist of minimal cuts and fills to bring the site to grade; preparing for floor slabs and pavement. We recommend the following earthwork operations be performed.

- Any surface vegetation should be cleared. Topsoil or any other organic soils, if encountered, should be removed in their entirety from the building and parking areas.
- Abandoned utilities inside the proposed building should be removed in their entirety. Outside the building, the abandoned utilities should either be removed or plugged.
- Following removal of the topsoil the exposed surface should be thoroughly examined for the presence of unsuitable fill. Any unsuitable fill should be removed.
- Where cohesive soils are present prior to fill placement in fill areas, and after rough grade has been achieved in cut areas, the cohesive subgrade should be thoroughly proof-rolled. A heavy rubber-tired vehicle such as a loaded dump truck should be used for proof-rolling.
- We expect that some areas of the site will not proof-roll satisfactorily. Any areas that exhibit excessive pumping and yielding during proof-rolling and compaction should be stabilized by aeration, drying, and compaction if weather conditions are favorable or removal and replacement with engineered fill (undercutting).
- Undercutting also can include the use of geotextiles and geogrids.
- Following proof-rolling and repair of unsuitable areas, the upper foot of the subgrade should be compacted to 90 percent of the maximum dry density as determined by the Modified Proctor Compaction Test, (ASTM D-1557) prior to placement of fill.

We recommend materials meeting the following criteria be used for backfill or engineered fill to achieve design grades:

- The material should be non-organic and free of debris.
- The on-site soils may be used for engineered fill provided that they are approximately at the optimum moisture content. The silty clay soils may require aeration and drying before they can be properly compacted.
- Free-draining granular soils should be used for trench backfill and in confined spaces.
- Common Fill: The on-site soils may be used for common fill material. Common fill should be used in large areas that can be compacted by large earth moving equipment.
- Granular Fill: Granular fill should be used in confined areas such as trenches and backfill around foundations. Granular fill should meet the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
6 inch	100
3 inch	95-100
Loss by Wash	0-15

MDOT Class III meets the requirements for Granular Fill.

Alternately the following also can be used:

<u>Sieve Size</u>	<u>Percent Passing</u>
3 inch	100
1 inch	60-100
No. 30	0-30
Loss by Wash	0-10

MDOT Class II meets the requirements for Granular Fill. Some restrictions apply to some applications

- Sand-Gravel Fill: Sand-gravel fill should be used where free-draining material is required. Free-draining material is recommended for underfloor fill and retaining wall backfill. Sand and gravel fill should meet the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch	100
1/2 inch	45-85
No. 4	20-85
No. 30	5-30
Loss by Wash	0-5

MDOT Class I material meets the requirements for sand and gravel.

- Crushed Stone Fill: Crushed stone fill should be used for aggregate base and for any over-excavated foundations. Crushed stone should meet the following gradations:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2 inch	100
1 inch	85-100
1/2 inch	50-75
No. 8	20-45
Loss by Wash	0-10

MDOT 21AA meets the gradation.

We recommend placing fill in accordance with the following:

The fill should be placed in uniform horizontal layers. The thickness of each layer should be in accordance with the following:

<u>Compaction Method</u>	<u>Maximum Loose Lift Thickness</u>
Hand-operated vibratory plate or light roller In confined areas	4 inches
Hand-operated vibratory roller weighing at Least 1,000 pounds	6 inches
Vibratory roller drum roller, minimum dynamic Force, 2,000 pounds	9 inches
Vibratory drum roller, minimum dynamic force, 30,000 pounds	12 inches
Sheep's-foot roller	8 inches

The vibrating roller thicknesses are for compacting granular soils. If vibrating drum rollers are used for cohesive soils, the recommended lift thickness is one-third the tabulated value. The lift thicknesses may be increased if field compaction testing demonstrate the specified compaction is achieved throughout the lift.

The fill should be compacted to achieve the specified maximum dry density as determined by the Modified Proctor compaction test (ASTM D-1557). The specified compaction for fill placed in various area should be as follows:

<u>Area</u>	<u>Percent Compaction</u>
Within building	95
Below foundations	95
Pavement base	95
Within one foot of pavement subgrade	95
Below one foot of pavement subgrade	92
Landscaped area	88

- Trench backfill shall be compacted to above standards. The building is considered to extend 10 feet beyond the foundations of the structure. Pavement is considered to extend 5 feet beyond the edge plus a one-on-one slope to the original grade.
- Frozen material should not be used as fill nor should fill be placed on a frozen subgrade.

The site conditioning procedures discussed above are expected to result in fairly stable subgrade conditions throughout most of the site. However, the on-site silty cohesive soils are sensitive to softening when wet or disturbed by construction traffic, depending on weather conditions and the type of equipment and construction procedures used, surface instability may develop in parts of the site. If this occurs, additional corrective procedures may be required as in-place stabilization or undercutting. Surface instability for pavement preparation commonly results from poor surface water management as the building is constructed and underground utilities installed. Also, sensitive subgrades are not protected from excessive construction traffic. Corrective procedures can be limited by careful attention to water management and construction traffic.

Foundation Recommendations

Based on an evaluation of the subsurface data developed and successful completion of the earthwork procedures previously outlined, we recommend that the proposed building addition be supported on shallow spread and/or strip footings.

Exterior footings should be founded at a depth of at least 3.5 feet below the exposed finished grade for protection against frost penetration. Additionally exterior footings should be finished "neat", vertical side walls having equal width-throughout the footing depth and length, to aid in preventing frost heave. Interior footings not exposed to frost penetration during or after construction can be installed at shallower depths provided that suitable bearing soils are present.

We recommend a uniform net allowable soil bearing pressure of 3,000 pounds per square foot (psf) be used for the design of footings founded on native cohesive deposits below any existing fill or on engineered fill known to extend to the native granular soils. In addition, the bearing capacity can be increased by one third for transient loads, i.e. wind and earthquake.

In using a net allowable soil pressure, the weight of the footing, backfill over the footing, or floor slabs need not be included in the structural loads for sizing footings. However, strip footings should be at least 12 inches in width, and isolated spread footings should be at least 18 inches in their dimension, regardless of the resulting bearing pressure. We recommend that all strip footings be suitably reinforced to minimize the effects of differential settlements associated with local variations in subsoil conditions. All foundation excavations should be observed and tested to verify that adequate in-situ bearing pressures, compatible with the design value, are achieved.

Groundwater Conditions and Control

Water level observations were made at each of the test borings during and following the completion of drilling operations. During drilling, groundwater was observed at 7 feet bgs in boring TB-3. At completion, groundwater was not observed in any of the borings. The results of the individual water level measurements are shown on the respective Logs of Test Borings. Fluctuations in groundwater levels should be anticipated due to seasonal variations, and following periods of prolonged precipitation or drought.

Groundwater observations during drilling operations in predominantly cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow. Considering the predominantly cohesive character of the subsoils and groundwater levels observed in one boring at 7 feet below the ground surface, no significant groundwater accumulations are anticipated in construction excavations. We expect that accumulations of groundwater or surface runoff water in such excavations should be controllable with normal pumping from properly constructed sumps.

Floor Slabs

The subgrade resulting from the satisfactory completion of site preparation operations can be used for the support of concrete floor slabs. Based on the anticipated finish floor grades, the slab may be supported by engineered fill and native soils. A modulus of subgrade reaction, k , of 125 pounds per cubic inch may be used for design. We recommend that all concrete floor slabs be suitably reinforced and separated from the foundation system to allow for independent movement. If floor settlement is to be virtually eliminated, the existing fill deposits would have to be removed in their entirety and replaced with engineered backfill.

We recommend a porous granular blanket consisting of MDOT Class I sand at least 4 inches thick under the floor slab. We also recommend a vapor barrier for floor covering materials affected by moisture from the subgrade.

Pavement Considerations

The subgrade resulting from the satisfactory completion of site preparation operations can also be used for the support of pavements. The cohesive subgrade soils consist of low plasticity silty/sandy clays which can be classified as CL or CL-ML, according to the Unified Soil Classification System (USCS). Soils of these types tend to have poor drainage characteristics, are frost susceptible, and are generally unstable under repeated loading. Based on the results of our investigation and the anticipated frost and moisture conditions, these soils may be assigned an estimated California Bearing Ratio (CBR) value of 4 for the design of pavements.

Criteria for an engineered design has not been furnished. In addition to traffic loads, criteria also includes the design life, reliability and defining the condition at the end of the design period. We anticipate that both a light and heavy duty conventional pavement of asphalt with aggregate base will be used. In addition, a concrete pavement may be used for parking and truck traffic areas.

Typical pavements for similar projects have included:

Conventional Asphalt on Aggregate Base

Parking:	3 ½ inches of Asphalt Surface Course 8 inches of Aggregate Base
Heavy Duty Drive Areas:	4 inches of Asphalt Surface Course 12 inches of Aggregate Base

We recommend that the asphalt meet Michigan Department of Transportation (MDOT) specifications for MDOT 13A or a commercial mix similar to the 1990 MDOT 1100. The aggregate base should meet criteria for MDOT 21AA.

For pavements, we recommend that “stub” or “finger” drains be provided around catch basins and other low parts of the site to minimize the accumulation of water above and within the frost susceptible subgrade soils. We also recommend edge drains along parking perimeters where upgrade surface water can flow onto or under pavement. Consideration should also be given to providing subdrains around the perimeter of any proposed landscaped islands within the parking area since they can become a source of water infiltration into the pavement. Such subdrains could be connected to nearby catch basins. The pavement should be properly sloped to promote effective surface drainage and prevent water ponding.

The pavement recommendations provided in this report are intended to provide serviceable pavement for about 20 years. However, all pavements require regular maintenance and occasional repairs. The need for such maintenance is not necessarily indicative of premature pavement failure. If such activities are not performed in a timely manner, the service life of the pavement can be substantially reduced. Most pavements require preservation treatments about 15 years into their life from environmental causes.

In truck loading zones, truck trailer parking areas, and trash dumpster pick-up areas within the asphalt pavement areas, heavy concentrated wheel loads will be subjected upon the pavement. This type of activity frequently results in rutting of asphalt pavement and ultimately can lead to premature failure. Therefore, we recommend that suitably reinforced concrete pavement at least 8 inches in thickness be given consideration in these areas.

Field Monitoring

Soil conditions at the site could vary from those generalized on the basis of test borings made at specific locations. We recommend that a qualified geotechnical engineer be retained to provide soil engineering services during the site preparation, excavation, and foundation phases of the proposed project. This is to observe compliance with the design concepts, specifications, and recommendations. Also, this allows modifications to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.

General Comments

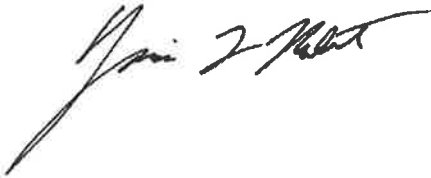
We have formulated the evaluations and recommendations presented in this report, relative to site preparation and building foundations, on the basis of data provided to us relating to the location of the proposed buildings. Any significant change in this data should be brought to our attention for review and evaluation with respect to the prevailing subsurface conditions.

The scope of the present investigation was limited to evaluation of subsurface conditions for the support of building foundations, and other related aspects of development. No chemical, environmental, or hydrogeological testing or analysis was included in the scope of this investigation.

If you have any questions regarding this report, or if we may be of further assistance to you in any respect, please feel free to contact us. We appreciate the opportunity to have been of service to you.

Sincerely,

PEA, INC.



Jessica Nibert, EIT
Staff Engineer



Jack Sattelmeier, PE
Senior Project Manager

Attachments: Log of Test Boring
 Soil Terminology
 Location Plan



LOG OF TEST BORING NO. TB-1

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION	888.4	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	0.5	0	TOPSOIL: Dark Brown CLAYEY SILT						
			1-S	3 2 3	5	19.3			
		4	Medium to Stiff Brown SILTY CLAY, Some Sand with Silty Sand and Trace Clay Seams						
884			2-S	2 3 6	9	11.6		*3000	
		8	Hard Brown SILTY CLAY, Trace to Little Sand and Gravel, Occasional Silt Partings						
880			3-S	6 14 23	37	13.9		*8000	
876		12	Hard Gray SILTY CLAY, Trace to Little Sand and Gravel						
872			4-S	11 19 26	45	8.4		*8000	
		16	Hard Gray SILTY CLAY, Trace to Little Sand and Gravel						
868		20	5-S	7 8 13	21			*9000	
		24	End Of Boring						
864			6-S	7 9 13	22			*9000	
Total Depth: 20 Drilling Date: 6/9/17 Inspector: JMS Contractor: Stock Drilling Company			Drilling Method: 3-1/4 In. Dia. Hollow-stem Auger Autohammer Plugging procedure: Excavated Soil			Water Level Observation: Dry At Completion Notes: * Penetrometer			



LOG OF TEST BORING NO. TB-2

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA								
GROUND SURFACE ELEVATION 889.5	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)		
888	0									
		1-S	2 3 5	8	11.5		*3000			
		Medium to Stiff Brown SILTY CLAY, Some Sand, Trace Gravel, Occasional Cobble, Occasional Sand Seam								
884	4									
		2-S	2 3 5	8	11.4		*3000			
		Hard Brown SILTY CLAY, Trace Sand and Gravel								
880	8									
		3-S	6 11 18	29	9.1		*9000			
		Hard Gray SILTY CLAY Trace Sand and Gravel, Occasional Silty Sand Seams and Occasional Cobble								
876	12									
		4-S	5 8 10	18			*9000			
872	16									
		Very Stiff Gray SILTY CLAY, Trace Sand								
868	20									
		5-S	4 8 10	18	9.2		*9000			
864	24									
		6-S	3 5 10	15			*6000			
		End Of Boring								
Total Depth: 20 Drilling Date: 6/9/17 Inspector: JMS Contractor: Stock Drilling Company					Drilling Method: 3-1/4 In. Dia. Hollow-stem Auger Autohammer Plugging procedure: Excavated Soil				Water Level Observation: Dry At Completion Notes: * Penetrometer	



LOG OF TEST BORING NO. TB-3

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 888.3	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	0							
Medium to Stiff Brown SILTY CLAY, Some Sand. Occasional Sand Seam	1	1-S	2 3 4	7	16.2		*4000	
	4	2-S	3 3 6	9	12.1		*4000	
Hard Brown SILTY CLAY Little Sand, Occasional Sand Seam	8	3-S	8 9 25	36	10.3		*8000	
	12	4-S	15 12 13	25			*8000	
Hard Gray SILTY CLAY, Trace to Little Sand, Occasional Sand Seam, Occasional Fine Sandy Silt Layer	16	5-S	8 12 16	28				
	20	6-S	6 10 17	27	11.5		*8000	
868	20	End Of Boring						
864	24							
Total Depth: 20 Drilling Date: 6/9/17 Inspector: JMS Contractor: Stock Drilling Company		Drilling Method: 3-1/4 In. Dia. Hollow-stem Auger Autohammer Plugging procedure: Excavated Soil		Water Level Observation: 7 Ft. During Drilling Dry At Completion Notes: * Penetrometer				



LOG OF TEST BORING NO. TB-4

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION 888.4		DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	Hard to Very Stiff Brown SILTY CLAY, Trace to Little Sand, Trace Gravel	0		5 5 3	8			*8000	
		1-S							
884	Hard Brown SILTY CLAY, Trace to Little Sand, Trace Gravel	4		2 4 7	11	10.8		*5000	
		2-S							
880	Hard Brown SILTY CLAY, Trace to Little Sand, Trace Gravel	8		9 17 19	36			*8000	
		3-S							
876	Hard to Very Stiff Gray SILTY CLAY, Trace to Little Sand, Trace Gravel, Occasional Sandy Silt Layer	12		12 17 17	34	9.1		*8000	
		4-S							
872	Hard to Very Stiff Gray SILTY CLAY, Trace to Little Sand, Trace Gravel, Occasional Sandy Silt Layer	16		4 5 5	10			*7000	
		5-S							
868	End Of Boring	20		28 18 17	35			*8000	
864		24							
Total Depth: 20 Drilling Method: 3 In. Driven Closed End Casing Autohammer Drilling Date: 6/8/17 Inspector: JMS Plugging procedure: Excavated Soil Contractor: Stock Drilling Company		Water Level Observation: <i>Dry At Completion</i> Notes: * Penetrometer							



LOG OF TEST BORING NO. TB-5

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION 889.9		DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	Hard Brown SILTY CLAY, Trace to Little Sand, Trace Gravel	0							
		1-S	4 6 9	15				*8000	
		4							
		2-S	3 8 25	33				*8000	
884									
		3-S	3 4 5	9	7.9			*6000	
	Very Stiff to Hard Gray SILTY CLAY Little Sand, Trace Gravel	8							
		4-S	3 5 7	12				*8000	
880									
		5-S	2 3 6	9	11.4			*5400	
	Medium Gray SILTY CLAY, Trace Sand Hard Gray SILTY CLAY, Trace Sand End Of Boring	12							
876									
		6-S	2 2 13	15	14.2			*2000	
872		16							
868		20							
864		24							
Total Depth: 20 Drilling Method: <i>3-1/4 In. Dia. Hollow-stem Auger</i> Drilling Date: <i>6/9/17</i> <i>Autohammer</i> Inspector: <i>JMS</i> Plugging procedure: <i>Excavated Soil</i> Contractor: <i>Stock Drilling Company</i>		Water Level Observation: <i>Dry At Completion</i> Notes: * Penetrometer							



LOG OF TEST BORING NO. TB-6

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION	889.0	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	<div style="display: flex; align-items: center;"> <div style="margin-left: 10px;"> <p>Hard Mottled Gray Brown SILTY CLAY, Trace to Little Sand and Gravel</p> <p>Stiff Brown SILTY CLAY, Little Sand and Gravel</p> <p>Very Stiff to Hard Gray SILTY CLAY, with Little Sand and Gravel Occasional Sand Seam, Occasional Cobble</p> <p style="text-align: center;">End Of Boring</p> </div> </div>	0							
		15 9	1-S	4	13			*8000	
884		4							
		3 5	2-S	9	14	10.1		*4000	
		1 6	3-S	7	13			*5000	
880		8							
	2 5	4-S	6	11	8.9		*6000		
876	12								
	3 7	5-S	10	17			*8000		
872	16								
	3 5	6-S	20/3				*6000		
868	20								
864	24								
Total Depth: <i>19.7</i> Drilling Method: <i>3 In Driven Casing to 13.5 Ft. Hollow-stem Auger Below Autohammer</i> Drilling Date: <i>6/8/17</i> Inspector: <i>JMS</i> Plugging procedure: <i>Excavated Soil</i> Contractor: <i>Stock Drilling Company</i>		Water Level Observation: <i>Dry At Completion</i> Notes: <i>* Penetrometer</i>							



LOG OF TEST BORING NO. TB-7

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION 891.8	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)	
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="margin: 0;">888</p> <p style="margin: 0;">884</p> <p style="margin: 0;">880</p> <p style="margin: 0;">876</p> <p style="margin: 0;">872</p> <p style="margin: 0;">868</p> </div> <div style="flex: 2; border-left: 1px dashed black; border-right: 1px dashed black; padding: 0 5px;"> <p style="margin: 0;">Hard to Very Stiff Brown SILTY CLAY, Trace Sand and Gravel, Occasional Sand Seam</p> <p style="margin: 0;">Medium To Stiff Gray SILTY CLAY, Trace Sand and Gravel</p> <p style="margin: 0;">Very Stiff Gray SILTY CLAY, Little Sand, Trace Gravel</p> <p style="margin: 0;">End Of Boring</p> </div> <div style="flex: 1; text-align: right;"> <p style="margin: 0;">0</p> <p style="margin: 0;">4</p> <p style="margin: 0;">8</p> <p style="margin: 0;">12</p> <p style="margin: 0;">16</p> <p style="margin: 0;">20</p> <p style="margin: 0;">24</p> </div> </div>									
		1-S	3 6 9	15				*9000	
		2-S	3 7 10	17	9.8			*6000	
		3-S	1 2 3	5	9.9			*1400	
		4-S	2 3 7	10	9.6			*3000	
		5-S	5 6 9	15	9.9			*7000	
		6-S	4 6 7	13				*6000	
	Total Depth: 20		Drilling Method: 3-1/4 In. Dia. Hollow-stem Auger Autohammer			Water Level Observation: Dry At Completion			
	Drilling Date: 6/9/17		Plugging procedure: Excavated Soil			Notes: * Penetrometer			
	Inspector: JMS		Contractor: Stock Drilling Company						



LOG OF TEST BORING NO. TB-8

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION 891.1		DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	<div style="border-left: 1px dashed black; border-right: 1px dashed black; padding: 5px;"> <p style="text-align: center;">Hard Brown SILTY CLAY Trace to Little Sand , Trace to Some Gravel, Occasional Gravel Seam, Occasional Cobble</p> </div>	0							
		1-S	3 6 6	12				*8000	
		4							
		2-S	15 21 28	49	3.1				
884		8							
	<div style="border-left: 1px dashed black; border-right: 1px dashed black; padding: 5px;"> <p style="text-align: center;">Very Stiff Gray SILTY CLAY, Trace to Little Sand, Trace Gravel</p> </div>	3-S	3 4 7	11			*7000		
880		12							
		4-S	2 4 5	9			*5000		
876	<div style="border-left: 1px dashed black; border-right: 1px dashed black; padding: 5px;"> <p style="text-align: center;">Medium To Stiff Gray SILTY CLAY, Trace Sand and Gravel</p> </div>	16							
		5-S	1 2 4	6	14.2		*2000		
872	20	End Of Boring							
868	24								
<p>Total Depth: <i>20</i></p> <p>Drilling Method: <i>3-1/4 In. Dia. Hollow-stem Auger Autohammer</i></p> <p>Drilling Date: <i>6/9/17</i></p> <p>Inspector: <i>JMS</i></p> <p>Contractor: <i>Stock Drilling Company</i></p>		<p>Water Level Observation: <i>Dry At Completion</i></p> <p>Notes: <i>* Penetrometer</i></p>							



LOG OF TEST BORING NO. TB-9

PROJECT NAME: *Proposed BMW Dealership*
LOCATION: *Grand River and Meadowbrook Roads*
Novi, Michigan

PEA Job No.: *2017-176*
Reviewed by: *DJS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 889.2	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
888	0							
		1-S	4 9 5	14				
884	4	2-S	3 5 8	13	10.7		*6000	
		3-S	7 10 12	22			*8000	
880	8	4-S	3 4 5	9			*7000	
876	12	5-S	3 4 6	10	10.1		*7000	
872	16							
868	19	6-S	5 26 28	54				
864	20							
	24							
Total Depth: 20 Drilling Method: 3-1/4 In. Dia. Hollow-stem Auger Autohammer Drilling Date: 6/9/17 Inspector: JMS Contractor: Stock Drilling Company Plugging procedure: Excavated Soil		Water Level Observation: <i>Dry At Completion</i> Notes: * Penetrometer						

SOIL TERMINOLOGY

Unless otherwise noted, all terms utilized herein refer to the Standard Definitions presented in ASTM D-653.

PARTICLE SIZES

Boulders - Greater than 12 inches (305 mm)

Cobbles - 3 inches (76.2 mm) to 12 inches (305 mm)

Gravel:

< Coarse - 3/4 inches (9.05 mm) to 3 inches (76.2 mm)

< Fine - No. 4 (4.75 mm) to 3/4 inches (19.05 mm)

Sand:

< Coarse - No. 10 (2.00 mm) to No. 4 (4.74 mm)

< Medium - No. 40 (0.425 mm) to No. 10 (2.00 mm)

< Fine - No. 200 (0.074 mm) to No. 40 (0.425 mm)

Silt - 0.005 mm to 0.074 mm

Clay - Less than 0.005 mm

CLASSIFICATION

The major soil constituent is the principal noun (i.e., clay, silt, sand, gravel). The minor constituents are reported as follows:

Modifiers to Main Constituent (Percent by Weight)

Trace	-	01 to 10%
Little	-	10 to 20%
Some	-	20 to 30%
Adjective	-	Over 30%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier (i.e., silty clay). Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils (i.e., silty clay, trace of sand, little gravel).

<u>Consistency</u>	<u>Unconfined Compressive Strength (PSF)</u>	<u>Approximate Range of N</u>
Very Soft	Below 500	0 to 2
Soft	500 to 1,000	3 to 4
Medium	1,000 to 2,000	5 to 8
Stiff	2,000 to 4,000	9 to 15
Very Stiff	4,000 to 8,000	16 to 30
Hard	8,000 to 16,000	31 to 50
Very Hard	Over 16,000	Over 50

Consistency of cohesive soils is based upon as elevation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

COHESIONLESS SOILS

<u>Density Classification</u>	<u>Relative Density %</u>	<u>Approximate Range of N</u>
Very Loose	0 to 15	0 to 4
Loose	16 to 35	5 to 10
Medium Compact	36 to 65	11 to 30
Compact	66 to 85	31 to 50
Very Compact	86 to 100	Over 50

Relative Density of Cohesionless Soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

C	-	Core
D	-	Directly from Auger Flight or Miscellaneous Sample
S	-	Split Spoon Sample - ASTM D-1586
LS	-	S - Sample with liner insert
ST	-	Shelby Tube Sample - 3 inch diameter unless otherwise noted
PS	-	Piston Sample - 3 inch diameter unless otherwise noted
RC	-	Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D-1586) - a 2.0-inch outside diameter, 1-3/8-inch inside diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely.

PLANNING REVIEW



PLAN REVIEW CENTER REPORT

March 18, 2019

Planning Review

JAGUAR

JSP 17-65

PETITIONER

Erhard Motor Sales, Inc

REVIEW TYPE

Preliminary Site Plan with a SDO Option and Final Site Plan

PROPERTY CHARACTERISTICS

Section	23	
Site Location	southwest corner of Grand River Avenue and Meadowbrook Road 50-22-23-251-018 (5.62 acres) and 22-23-251-019(3.86 acres)	
Site School	Novi Community School District	
Site Zoning	Gateway East (GE)	
Adjoining Zoning	North	GE with a consent judgment
	East	OS-1 Office Service
	West	NCC: Non-Commercial Center
	South	RM-2: High-Density Multiple-Family
Current Site	Vacant	
Adjoining Uses	North	Gateway Village
	East	Vacant
	West	O'Brien-Sullivan Funeral Home
	South	Meadowbrook Commons: Novi Senior Center
Site Size	9.48 Acres	
Plan Date	February 11, 2019	

PROJECT SUMMARY

The subject property is comprised of two parcels totaling 9.48 acres. It is located on the southwest corner of Grand River Avenue and Meadowbrook Road (Section 23). The applicant is proposing to build a 58,663 square foot car sales facility for Jaguar Land Rover. The proposed facility includes sales and service area. The concept plan proposes 138 parking spaces for employee and visitors and 287 parking spaces for storing cars for sale. A storm water pond is proposed on the south side that also acts a buffer from the residential use on south side of Cherry Hill Road. It has access from both Meadowbrook Road and Grand River Avenue.

RECOMMENDATION

Approval of the **Preliminary Site Plan and Final 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. **City Council approval of the Preliminary Site Plan with a SDO Option, a Wetland Permit, a Woodland Permit and Storm Water Management Plan is required.**

PROJECT HISTORY

City Council approved a rezoning request for the subject property from NCC (Non-Center Commercial) and OS-1 (Office Service) to GE (Gateway East) at their December 4, 2017 meeting.

A public hearing for the request was held by the Planning Commission on September 26, 2018. At that meeting, the Planning Commission recommended approval of the Jaguar Land Rover Special Development Option Concept Plan JSP 17-65.

The City Council held a public hearing on the proposed Concept Plan at the November 13, 2018 City Council meeting. Tentative approval of the plan was granted at that time, subject to a number of conditions, and direction was provided for the City Attorney to prepare an SDO Agreement to be brought back before the City Council for final approval.

The City Council approved the SDO Concept Plan and the agreement at their January 7, 2019 meeting.

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. **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. Deviations approved as part of SDO Agreement:
 - a. Planning deviation from Section 3.11.8 for absence of required sidewalk along Cherry Hill Road due to existing wetlands;
 - b. Deviations from Section 5.15. Exterior Building Wall Façade Materials for the following:
 - i. Underage of brick (30% minimum required, 25% on north façade and 28% on east façade proposed);
 - ii. Overage of flat metal panels (50% maximum allowed, 58% on north façade and 56% on east façade proposed);
 - iii. Overage of horizontal rib metal panels for roof top screening (0% allowed, 17% on north, 16% on east, 12% on south and 18% on west proposed);
 - c. Defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City;
 - d. Traffic deviation for variance from Design and Construction Standards Section 11-216(d) for not meeting the minimum distance required for same-side commercial driveways along Grand River Avenue;
 - e. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Grand River Road frontage due to lack of space (8 trees required);
 - f. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Cherry Hill Road frontage due to lack of space (8 trees required);
 - g. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings in area of wetland in order to preserve wetland along Cherry Hill Road frontage;
 - h. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings between Cherry Hill and the parking lot area not behind the wetland;
2. Conditions of the SDO Agreement:

The following conditions from the SDO agreement should be met prior to final site plan approval.

 - a. All loading and unloading from car carriers shall occur at non-peak traffic hours.
 - b. Remaining woodlands and wetlands areas on the southerly portion of the property are to be placed in a conservation easement, in a form and manner to be approved by the City attorney, in accordance with applicable ordinances and regulations. **Please provide draft easements for review.**
 - c. Dedication of the right-of-way, to the proposed future right-of-way line, along Meadowbrook Road, as shown on the approved Site Plan. **Please provide the drafts and related ROW exhibits for review.**

3. Traffic Impact Study: As part of the SDO Concept plan approval, the applicant received approval to defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City. The applicant has shared a Full Impact Study recently. It is currently under review.
4. Bicycle Parking (Sec. 4.16): When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations. All six spaces are provided in one location. **This deviation was not included in the SDO agreement. Please revise to conform.**
5. 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. **Spillover exceeds 1 along Grand River and Meadowbrook frontage near the entry drive. Please revise.**
6. Conservation Easements: Draft conservation easements are required along with electronic site plan submittal.
7. Plan Review Chart: Planning review chart provides additional comments and requests clarification for certain items. **Please address them in addition to the comments provided in this letter.**
8. Exterior 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 submitted, reviewed, and approved as part of a site plan application. In that case, the 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 after Site plan approval. 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.

OTHER REVIEWS

- a. Engineering Review: Engineering recommends approval of the Preliminary site plan. Final site plan is not recommended. Additional comments to be addressed with revised final site plan.
- b. Landscape Review: Landscape recommends approval of the Preliminary and Final site plan. Additional comments to be addressed with electronic stamping sets.
- c. Woodland Review: A City of Novi Woodland permit is required for proposed impacts. Woodland review. Additional comments to be addressed with electronic stamping sets.
- d. Wetlands Review: A City of Novi Wetland permit and letter of authorization is required. Wetlands review recommends approval of Preliminary Site plan provided additional information is provided prior to City Council meeting. Final site plan is not recommended. Additional comments to be addressed with revised final site plan.
- e. Traffic Review: Traffic recommends approval of the Preliminary site plan. Final site plan is not recommended. Additional comments to be addressed with revised final site plan.
- f. Facade Review: Façade recommends approval.
- g. Fire Review: Fire recommends approval.

NEXT STEP: CITY COUNCIL MEETING

The plan is scheduled for the City Council public hearing on April 1, 2019. Please provide the following by March 22, 2019

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.
3. Revised wetland plan with missing information noted in the review letter.

REVISED FINAL SITE PLAN SUBMITTAL

Wetlands, Traffic and Engineering are not recommending final site plan approval. After receiving the City Council approval, please submit the following for reconsideration

1. Site plan revision form
2. Four copies of revised site plan. Please do not include standard detail sheets.
3. A response letter addressing ALL the comments from ALL the review letters.
4. Draft legal documents for conservation easements and Right-of-Way dedication.

ELECTRONIC STAMPING SET SUBMITTAL AND RESPONSE LETTER

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

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

STAMPING SET APPROVAL

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

SITE ADDRESSING

The building would require a new address. 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 on the Internet at www.cityofnovi.org under the forms page of the Community Development Department.

Please contact Brian Riley [248.347.0438] in the Community Development Department with any specific questions regarding addressing of sites.

STREET AND PROJECT NAME

Not Applicable

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. **No work on the site may be commenced before a pre-construction meeting is held.** 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 248.735.5607 or skomaragiri@cityofnovi.org.



PREVIOUS CITY COUNCIL ACTIONS

The City Council approved the SDO Concept Plan and the agreement at their **January 7, 2019 meeting**.

To approve of the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for a Special Development Option (SDO) Agreement for the Jaguar Land Rover development JSPI 7-65, Regular Meeting of the Council of the City of Novi Monday, January 7, 2019 Page 4 consisting of a 58,663 square foot car sales facility, subject to execution of the Consent to Agreement by the Owners of the property and also subject to final review and approval of the Agreement as to form, including any required minor and nonsubstantive changes, by the City Manager and City Attorney's office. This motion is made because the Agreement meets the spirit and intent of the tentative approval granted by the City Council at the meeting of November 13, 2018.

The City Council held a public hearing on the proposed Concept Plan at the **November 13, 2018** City Council meeting. Tentative approval of the plan was granted at that time, subject to a number of conditions, and direction was provided for the City Attorney to prepare an SDO Agreement to be brought back before the City Council for final approval.

In the matter of Jaguar JSP17-65 motion to approve the Special Development Option Concept Plan, and direction to the City Attorney to prepare a Special Development Option (SDO) Agreement to return to the City Council for consideration and approval.

1. *This motion is based on following conditions and deviations:*
 - i. *The applicant shall work with staff to provide acceptable amount of Open Space as defined in Section 3.11.7 GE District required conditions, prior to City Council's consideration of SDO Concept Plan;*
 - j. *The applicant shall work with City's Façade consultant to provide alternate design elements to meet the intent of Section 3.11.8;*
 - k. *Planning deviation from Section 3.11.8 for absence of required sidewalk along Cherry Hill Road due to existing wetlands;*
 - l. *Deviations from Section 5.15. Exterior Building Wall Façade Materials for the following:*
 - iv. *Underage of brick (30% minimum required, 25% on north façade and 28% on east façade proposed);*
 - v. *Overage of flat metal panels (50% maximum allowed, 58% on north façade and 56% on east façade proposed);*
 - vi. *Overage of horizontal rib metal panels for roof top screening (0% allowed, 17% on north, 16% on east, 12% on south and 18% on west proposed);*
 - m. *Defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City;*
 - n. *Traffic deviation for variance from Design and Construction Standards Section 11-216(d) for not meeting the minimum distance required for same-side commercial driveways along Grand River Avenue;*
 - o. *Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Grand River Road frontage due to lack of space (8 trees required);*
 - p. *Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Cherry Hill Road frontage due to lack of space (8 trees required);*
 - q. *Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings in area of wetland in order to preserve wetland along Cherry Hill Road frontage;*
 - r. *Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings between Cherry Hill and the parking lot area not behind the wetland;*
 - s. *The Applicant shall comply with the conditions and items listed in the staff and consultant review letters as a requirement noted in the Special Development Option Agreement.*

2. *The applicant's compliance with the conditions and items listed in the staff and consultant review letters shall be noted in the Special Development Option Agreement.*
3. *The City Council authorizes the approval of the SDO Concept Plan which consists of a non-residential use permitted elsewhere in this Zoning Ordinance but not otherwise permitted in the GE district, on the condition that such use meets all of the following criteria, as determined by the City Council:*
 - a. *The proposed use exemplifies the intent of the GE district as stated in Section 3.1.16.A, and the intent of the SDO as stated in Section 3.1.16. (since the proposed plan provides for a high-quality and distinctive development that will complement and support the City's Main Street/Town Center area.)*
 - b. *The proposed use incorporates as a predominant physical component of the development that provides a unique entry feature along Grand River Avenue for the GE district, characterized by a distinct, high-profile appearance (since, in the opinion of the City's Façade consultant and Landscape Architect, the rendering provided by the applicant after the preparation of the review letters, provides a unique entry feature including a small park and attractive landscaping).*
 - c. *The proposed use is compatible with, and will promote, the uses permitted with the GE district and SDO.*
 - d. *The proposed use will not create an inconsistency with the City's Master Plan for Land Use in terms of the general activities on the site and the impacts upon the surrounding area (since the area is developed with commercial and multiple family uses, and landscape buffering is being provided to the extent possible).*
 - e. *The proposed use is designed in a manner that will result in traffic and pedestrian safety, consistent with the adjoining pedestrian and vehicular thoroughfares (as noted in the Traffic Engineer's Review letter).*
 - f. *The proposed use is designed with exceptional aesthetic quality, including building design, building materials and landscaping design, not likely to be achieved except based upon this authorization (since, in the opinion of the City's Façade consultant and Landscape Architect, the rendering provided by the applicant after the preparation of the review letters, provides a unique entry feature including a small park and attractive landscaping).*
4. *This motion is made based on the following findings:*
 - a. *The project results in a recognizable and substantial benefit to the ultimate users of the project and to the community, where such benefit would otherwise be unfeasible or unlikely to be achieved by a traditional development;*
 - b. *In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B the proposed type and density of development does not result in an unreasonable increase in the use of public services, facilities and utilities, and does not place an unreasonable burden upon the subject and/or surrounding land and/or property owners and occupants and/or the natural environment (as noted in the Community Impact Statement);*
 - c. *Based upon proposed uses, layout and design of the overall project, the proposed building facade treatment, the proposed landscaping treatment and the proposed signage, the Special Development Option project will result in a material enhancement to the area of the City in which it is situated (as the proposed corner park and building facade are designed to enhance the gateway to Town Center);*
 - d. *The proposed development does not have a materially adverse impact upon the Master Plan for Land Use of the City, and is consistent with the intent and spirit of the Zoning Ordinance (as the development is consistent with the standards provided for the Special Development Option, particularly related to the four corners of the intersection of Grand River and Meadowbrook Road);*
 - e. *In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B, the proposed development does not result in an unreasonable negative economic impact upon surrounding properties (as the proposed use is comparable to the vehicle dealership on the opposite corner, and the proposed placement of the building near Grand*

- River Avenue and Meadowbrook Road Right of Way, along with the proposed landscaping provide buffers to the nearby residential uses);*
- f. The proposed development contains at least as much usable open space as would be required in this Ordinance in relation to the most dominant use in the development (as the applicant has provided two usable open space areas for public use as part of the development);*
 - g. Each particular proposed use in the development, as well as the size and location of such use, results in and contributes to a reasonable and mutually supportive mix of uses on the site, and a compatibility of uses in harmony with the surrounding area and other downtown areas of the City (as the use is compatible with an existing car dealership use on the northeast corner of Grand River Avenue and Meadowbrook Road, and other commercial uses along Grand River;*
 - h. The proposed development is under single ownership and/or control such that there is a single person or entity having responsibility for completing the project in conformity with this Ordinance (as the proposed development is owned and operated by Erhard Motor Sales, Inc.);*
 - i. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service (as noted in Traffic Engineering review letter);*
 - j. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area (as noted in the Community Impact Statement);*
 - k. Relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats (as the plan does not propose any impacts to wetlands and acceptable impacts to woodlands and wetlands buffers);*
 - l. Relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood (as noted in the Community Impact Statement);*
 - m. Relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use (as the development fosters economic growth);*
 - n. Relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner; and*
 - o. Relative to other feasible uses of the site, the proposed use is (1) listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and (2) is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.*



PLANNING REVIEW CHART: GE Gateway East

Review Date: March 14, 2019
Review Type: Preliminary and Final Site Plan
Project Name: Jaguar Land Rover
Plan Date: February 11, 2019
Prepared by: Sri Ravali Komaragiri, Planner
Contact: E-mail: skomaragiri@cityofnovi.org Phone: 248.735.5607

Items in **Bold** need to be addressed by the applicant with next submittal

Item	Required Code	Proposed	Meets Code	Comments
Zoning and Use Requirements				
Master Plan <i>(Adopted July 26, 2017)</i>	Town Center Gateway (Gateway East)	Gateway East (SDO)	Yes	City
Density <i>(Adopted July 26, 2017)</i>	13.6 DUA	Not applicable	NA	
Area Study	Grand River Corridor Study as part of the 2017 Master plan update		NA	
Zoning <i>(Eff. Dec. 25, 2013)</i>	Gateway East (SDO)	GE: Gateway East with SDO	Yes	
Uses Permitted <i>(Sec 3.1.16.B & C)</i>	Sec 3.1.16.B Principal Uses Permitted. Sec 3.1.16.C Special Land Uses 3.12 Special Development Option (SDO) for the GE district	Jaguar Land Rover Car dealership (See note below)	Yes	
Phasing	Indicate how many phases Show phase lines on the plans Tentative timeline for completion of all phases	Phasing is not proposed	NA	
<p>Note: The subject property is located at the "entry" area of the Gateway East District, since it is located on one of the four properties at the intersection of Grand River and Meadowbrook. Following a recommendation of the Planning Commission, Council may approve an SDO project which consists of a non-residential use permitted elsewhere in the ordinance, but not otherwise permitted in the GE district for these properties, subject to conditions listed in Section 3.12.2.A.ii</p>				
Development Standards <i>(Sec 3.1.16.D)</i>				
Lot Size	Minimum Area: 2 acres Minimum Lot Width: 200 ft.	9.48 acres 407 ft.	Yes	
Lot Coverage	See Section 3.11			
Setbacks	See Section 3.11			

Item	Required Code	Proposed	Meets Code	Comments
Building Height	35 ft. or 2 stories, whichever is less	25 ft.	Yes	
Parking Setbacks	See Section 3.11			
Building Setbacks (Sec 3.11.5)				
<i>Major Thoroughfare (Grand River Avenue)</i>				
Front (Grand River)	Min: 70 ft. from centerline Max: 90 ft. from centerline	90 ft. (Grand River Avenue)	Yes	
Exterior Side (Meadowbrook)		90 ft. (Meadowbrook Road)		
Side (west)	0 ft.	59.76 ft.	Yes	
Rear (south)	30 ft. Minimum	326.74 ft.	Yes	
Parking Setback (Sec 3.11.6.A)				
Front (Grand River)	No front yard parking allowed	None proposed	Yes	
Exterior Side (Meadowbrook)				
Side	10 ft. with 5 ft. from building facade	35.34 ft.	Yes	
Rear (south)	10 ft.	124.15 ft.	Yes	
Notes To District Standards for GE/SDO Option (Sec 3.6.2)				
Maximum number of stories for SDO (Sec 3.6.2.G)	3 stories max See Sec. 3.12.5.E.vi	2 stories proposed	Yes	
Minimum lot size for SDO (Sec 3.6.2.I)	Min: 5 acres Minimum lot width: 300 ft.	9.48 acres 407 ft.	Yes	
Maximum building height for SDO (Sec 3.6.2.J)	May be increased to 50 ft. Any structure within 300 ft. of one-family residential is 35 ft.	25 ft.	Yes	
Parking setback screening (Sec 3.6.2.P)	Required parking setback area shall be landscaped per Sec. 5.5.3. Abutting residential requires a berm.	Meets the minimum requirements	Yes	Refer to Landscape review for additional comments
Modification of Parking Setback Requirements (Sec. 3.6.2.Q)	Planning Commission may modify if determined modification will improve the use of the site and landscaping	None requested	NA	
District Required Conditions for GE (Sec. 3.11)				
Maximum FAR	Maximum floor area ratio shall	0.158	Yes	

Item	Required Code	Proposed	Meets Code	Comments
<i>(Sec. 3.11.2.A)</i>	be 0.275.			
Max. Stories <i>(Sec. 3.11.2.B)</i>	Maximum number of stories is limited to two.	NA See SDO Requirements	NA	
Off-street Parking <i>(Sec. 3.11.3)</i>	Off-street parking shall be provided within the building, parking structure, or designed parking area within 300 ft. Still parking is not allowed. All parking in a structure must be screened.	Parking lot within 300 feet.	Yes	
Outdoor storage <i>(Sec. 3.11.4)</i>	The outdoor storage of goods or material shall be prohibited.	Car for sale will be stored outside	Yes	
Building Setbacks <i>(Sec. 3.11.5)</i>	See Chart 3.11.5. See above.			
Parking Lot Screening <i>(Sec. 3.11.6.B)</i>	Parking lots shall be screened from all major thoroughfares by a 2.5 foot brick or stone wall or 3 foot planting screen or existing vegetation to achieve 80% winter opacity and 90% summer opacity.	Meets the minimum requirements	Yes	Refer to Landscape review for additional comments
Open Space <i>(Sec. 3.11.7)</i>	25% of gross area of each development site shall be comprised of open space. Areas less than 20 ft. wide shall not be considered. Additional conditions apply per Sec. 3.11.7 Substantially all of the total open space area must be designed as useable space.	2.37 acres required 2.63 acres provided per site data	Yes	
Building Façade and Scale	Street corner buildings should have greater massing and height. Additional height upto 40 ft. may be approved by Council to provide additional massing.	Current elevations do meet the massing requirement.	Yes	
Sidewalks and Bicycle Paths <i>(Sec. 3.11.9)</i>	8 ft. pathway along Grand River. 6 ft. sidewalk along Meadowbrook Road Bicycle Paths are required per the Master Plan.	Sidewalk on Meadowbrook existing 8 feet pathway on Grand River proposed	Yes	
Streetscape Amenities	Decorative pedestrian-scale parking lot lighting, public	A corner pedestrian plaza is proposed	Yes?	

Item	Required Code	Proposed	Meets Code	Comments
(Sec. 3.11.10)	pathways, bicycle racks, etc. Grand River lighting, landscape plantings, etc.			
Loading (Sec. 3.11.12)	Located in rear yard or interior side yard, if fronting on more than one road	Loading proposed in rear yard	Yes	
Adjacency (Sec. 3.11.14)	City Council may impose additional conditions in order to ensure compatibility with and between adjacent properties	City Council did not include additional conditions at the time of SDO Concept plan approval	Yes?	This plan City Council approval for Preliminary site plan
Special Development Option (SDO) for the GE District (Sec. 3.12)				
Intent (Sec. 3.12.1)	<ul style="list-style-type: none"> - Mixed use developments - Quality residential development - Conserving natural resources - Compatibility between neighboring properties and downtown district - Unique "entry" developments at the intersection of Grand River and Meadowbrook 	Car dealership, compatible with existing car dealership use nearby	Yes?	
Eligibility Criteria (Sec. 3.12.3.A)	SDO uses can be proposed only for properties located in GE district, subject to City Council approval	It is zoned for SDO uses	Yes	
Eligibility Criteria (Sec. 3.12.3.B)	The proposed development should comply with the criteria listed in Section 3.12.3.B	Complies	Yes	
Project Design Standards: Non-Residential (Sec. 3.12.4.B)	The design standards listed in Section 3.12.4.B shall apply	A pedestrian plaza area is indicated	Yes	
General Design Standards (Sec. 3.12.4.C)	Perimeter setback as determined by City Council	No setback provided near Grand River and Meadowbrook intersection		
	underground installation of utilities	None proposed??	NA	
	Safe pedestrian connectivity	Pathway along Grand River Avenue and sidewalk along Meadowbrook Road is existing	Yes?	

Item	Required Code	Proposed	Meets Code	Comments
	The City's Grand River Corridor Plan and reasonably shall be incorporated in terms of design features and concepts applicable to the subject property.	More information on street lights, streetscape etc.	Yes	
	noise reduction and visual screening provisions when abutting residential uses	Abuts residential use to the south. The applicant provided a very detailed noise impact statement that address all kinds of noise that would be generated within the proposed site and all noise levels are under the maximum allowed	Yes	
	Reduce driveways and curb cuts along Grand River Avenue. Additional conditions apply	A new curb cut is proposed	No?	The applicant indicated in the response letter that discussion with the neighbor to have shared access weren't successful.
	On retail buildings, windows within areas of the premises to which the public is invited shall be made of materials which do not materially obstruct transparency	Glazed windows	Yes	
	The City Council shall resolve ambiguities in the interpretation of applicable regulations using the Zoning Ordinance, Master Plan, the intent of this Article and other City standards or policies as a guide.	Will be determined at the time of Council meeting		
Plan Information (Sec. 3.12.7.C.i.u)	Community impact statement is required.	Abbreviated community impact statement is provided which address Traffic and Noise.	Yes	
Site Standards: Parking and Circulation				
Number of Parking Spaces (Sec.5.2.12.C)	1 space for each 200 square feet of usable floor area and 1 for each auto service stall in service room	Total parking for facility proposed: 104 spaces)@ 1 space for each 200 square feet		

Item	Required Code	Proposed	Meets Code	Comments
Motor vehicle sales and service establishments		of 20, 798 sf of usable floor area) Service bay: 34 spaces (1 space for each of 34 service bays) Vehicle Storage: 287 spaces Total: 426 spaces		
Parking Space Dimensions and Maneuvering Lanes <i>(Sec. 5.3.2)</i>	<ul style="list-style-type: none"> - 90° Parking: 9 ft. x 19 ft. - 24 ft. two way drives - 9 ft. x 17 ft. parking spaces allowed along 7 ft. wide interior sidewalks as long as detail indicates a 4" curb at these locations and along landscaping. 	9 x 19 ft. proposed 24 ft. proposed 9 ft. x 17 ft. parking spaces along landscape islands Some of the display spaces are double-stacked.	Yes	
Parking stall located adjacent to a parking lot entrance (public or private) <i>(Sec. 5.3.13)</i>	Shall not be located closer than twenty-five (25) feet from the street right-of-way (ROW) line, street easement or sidewalk, whichever is closer	None proposed	Yes	
End Islands <i>(Sec. 5.3.12)</i>	<ul style="list-style-type: none"> - End Islands with landscaping and raised curbs are required at the end of all parking bays that abut traffic circulation aisles. - The end islands shall generally be at least 8 feet wide, have an outside radius of 15 feet, and be constructed 3' shorter than the adjacent parking stall as illustrated in the Zoning Ordinance 	End islands are proposed.	Yes?	Refer to Traffic for more comments
Site Standards: Barrier Free (ADA)				
Barrier Free Spaces <i>Michigan Building Code 2012 / Barrier Free Code</i>	5 barrier free parking spaces (for total 101-200); at least 1 van barrier free parking space	5 proposed including 1 van	Yes?	

Item	Required Code	Proposed	Meets Code	Comments
Barrier Free Space Dimensions <i>Michigan Building Code 2012 / Barrier Free Code</i>	<ul style="list-style-type: none"> - 8' wide with an 8' wide access aisle for van accessible spaces. - 5' wide with a 5' wide access aisle for regular accessible spaces. 	1 - 8' wide van accessible spaces provided.	Yes	
Barrier Free Signs <i>MMUTCD / Barrier Free Code</i>	One sign for each accessible parking space.	Provided	Yes	
Site Standards: Bicycle Parking				
Minimum number of Bicycle Parking <i>(Sec. 5.16.1)</i>	Minimum two spaces	6 spaces	Yes	
Bicycle Parking General requirements <i>(Sec. 5.16)</i>	<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. 	All 6 spaces provided in one location	No?	<p><u>This is considered a deviation for having more than 4 spaces in one location.</u></p> <p>This deviation was not included in the SDO agreement. Please revise to conform</p>
Covered Bicycle Parking <i>(Sec. 5.16.4)</i>	When 20 or more bicycle parking spaces are required, 25% shall be covered spaces.	Not applicable	NA	
Bicycle Parking Lot layout <i>(Sec 5.16.6)</i>	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	Meets the standard	Yes	
Site Standards: Loading and Dumpsters				
Loading Spaces <i>(Sec. 5.4.2)</i>	<ul style="list-style-type: none"> - Loading, unloading space shall be provided in the rear yard at a ratio of 10 sq. ft. for each front foot of building. - Except in the case of a double frontage lot, loading-unloading, as well as trash receptacles may be located in an interior side yard beyond the minimum side yard setback requirement of 	Loading space proposed in side yard 2460 square feet space is provided. It appears to meet the requirement	Yes?	Provide the required and proposed loading area calculation

Item	Required Code	Proposed	Meets Code	Comments
	the district.			
Dumpster (Sec 4.19.2.F)	<ul style="list-style-type: none"> - Located in rear yard or interior side yard in case of double frontage - 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 	Appears to be located in interior side yard Attached to the building	Yes?	
Dumpster Enclosure (Sec. 21-145. (c))	<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 	It appears to be brick as indicated on south building elevation	Yes?	
Site Standards: Lighting and Rooftop				
Exterior lighting (Sec. 5.7)	<ul style="list-style-type: none"> - All residential developments shall provide lighting at each entrance intersecting with a major thoroughfare sufficient to illuminate the entrance of the development. - Minimum illumination shall be 0.2 fc - Fixtures shall not exceed 25 ft. - Lighting shall be subject to the requirements of this Section of the Zoning Ordinance. 	Lighting plan is provided.	Yes?	<u>Provide the missing information with the next submittal</u>
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.	Unknown	No	Provide location of utility equipment.
Roof top appurtenances	Roof top appurtenances shall be screened in accordance	Unknown	No	<u>Will be reviewed for conformance at the</u>

Item	Required Code	Proposed	Meets Code	Comments
screening	with applicable facade regulations, and shall not be visible from any street, road or adjacent property.			<u>time of site plan review.</u>
Accessory Structures	Additional regulations apply per Section 4.19	None proposed		
Site Standards: Streets & Sidewalks				
Frontage on a Public Street <i>(Sec. 5.12)</i>	Frontage on a Public Street is required	Frontage on Grand River	Yes	
Access to a Major Thoroughfare <i>(Sec. 5.13)</i>	Vehicular access provided to an existing or planned major thoroughfare	Access to Grand River	Yes	
Off-Road Non-Motorized Facilities <i>City Ordinance Ch. 11, Sec. 11-256</i>	<ul style="list-style-type: none"> - New streets shall have a sidewalk on both sides of the proposed street. - Sidewalks identified by the master plan as arterials and collectors shall be 6 ft. or 8 ft. wide designated by the Bike/Ped Plan. - Local streets and private roads shall be 5 ft. 	Sidewalk existing on Meadowbrook Road. 8 feet wide asphalt path along Grand River Avenue None proposed along Cherry Hill Road	No	<i>Absence of sidewalk along Cherry Hill Road is approved as part of the SDO.</i>
Pedestrian Connectivity	Whether the traffic circulation features within the site and location of automobile parking areas are designed to assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	Connection to sidewalk along Meadowbrook is proposed Connection to sidewalk along Grand River Avenue is proposed along Meadowbrook	Yes	
Building Code and other design standard Requirements				
Building Exits <i>Michigan Building Code 2012</i>	Building exits must be connected to sidewalk system or parking lot.	Some of the exits are not connected to a sidewalk system or parking lot.	No	
Design and Construction Standards Manual	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).	Provided	Yes	

Item	Required Code	Proposed	Meets Code	Comments
General layout and dimension of proposed physical improvements	Location of all existing and proposed buildings, proposed building heights, building layouts, (floor area in square feet), location of proposed parking and parking layout, streets and drives, and indicate square footage of pavement area (indicate public or private).	Mostly provided	Yes?	Refer to all review letters for additional dimensions requested
Economic Impact	- Total cost of the proposed building & site improvements - Number of anticipated jobs created (during construction & after building is occupied, if known)	None provided	No	
Development/ Business Sign	- Signage if proposed requires a permit. - Exterior Signage is not regulated by the Planning Division or Planning Commission.	One is not proposed at this time	NA	<u>For sign permit information contact Ordinance at 248-735-5678</u>
Project and Street Naming	Project and Street Names are to be approved for public safety concerns	Not applicable	NA	
Legal Documents	- Conservation Easement	Draft easements are required at the time of electronic stamping sets	No	
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	One is provided	Yes?	Some information is missing
Lighting Plan (Sec. 5.7.A.i)	Site plan showing location of all existing & proposed buildings, landscaping, streets, drives, parking areas & exterior lighting fixtures	Indicated as required	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.	Not provided	No	<u>Will be reviewed for conformance at the time of site plan review.</u>

Item	Required Code	Proposed	Meets Code	Comments
Lighting Plan (Sec. 5.7.2.A.ii)	Specifications for all proposed & existing lighting fixtures	Provided	Yes	
	Photometric data	Provided	Yes?	
	Fixture height	25 feet	Yes	
	Mounting & design	Text provided	Yes?	
	Glare control devices (Also see Sec. 5.7.3.D)	LED		
	Type & color rendition of lamps	LED	Yes	
	Hours of operation	Not included		
	Photometric plan illustrating all light sources that impact the subject site, including spill-over information from neighboring properties			
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)	25 ft. maximum proposed	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 	Notes added to plan	Yes	
Security Lighting (Sec. 5.7.3.H)	<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 	Automatic lighting control to reduce load by 50% during non peak business hours.	Yes	
Lighting for security purposes shall be directed only onto the area to be secured.				
Lighting Ratio (Sec. 5.7.3.E)	Average light level of the surface being lit to the lowest light of the surface being lit shall not exceed 4:1	3.6:1	Yes	
Type of Lighting (Sec. 5.7.3.F)	Use of true color rendering lamps such as metal halide is preferred over high & low pressure sodium lamps	LED	Yes	
Min. Illumination (Sec. 5.7.3.k)	Parking areas: 0.2 min	0.2 min	Yes	
	Loading & unloading areas: 0.4 min	0.4 min	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	Walkways: 0.2 min	0.2 min	Yes	
	Building entrances, frequent use: 1.0 min	1.0 min	Yes	
	Building entrances, infrequent use: 0.2 min	0.2 mins	Yes	
Max. Illumination adjacent to Non-Residential <i>(Sec. 5.7.3.K)</i>	When site abuts a non-residential district, maximum illumination at the property line shall not exceed 1 foot candle	Abuts non-residential on the south North West	Yes	Spillover exceeds 1 along Grand River and Meadowbrook frontage near the entry drive. Please revise. Spillover should be calculated at the future ROW line
Cut off Angles <i>(Sec. 5.7.3.L)</i>	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	Does not exceed 0.5 along southwest boundary where it abuts residential	Yes	

NOTES:

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

ENGINEERING REVIEW



PLAN REVIEW CENTER REPORT

March 15, 2019

Engineering Review

Jaguar Land Rover
JSP17-0065

Applicant

Erhard Motors Sales, Inc.

Review Type

Preliminary/Final Site Plan

Property Characteristics

- Site Location: South of Grand River Avenue, West of Meadowbrook Road
- Site Size: 9.48 acres
- Plan Date: 02/11/2019
- Design Engineer: PEA, Inc.

Project Summary

- Construction of an approximately 53,211 square-foot dealership and associated parking. Site access would be provided via an entrance on Grand River Avenue and Meadowbrook Road.
- Water service would be provided by an 8-inch extension from the existing 16-inch water main along Grand River Avenue. A 2-inch domestic lead and a 6-inch fire lead would be provided to serve the building, along with three additional hydrants.
- Sanitary sewer service would be provided by a 6-inch extension from the existing 8-inch sanitary sewer that crosses Grand River Avenue.
- Storm water would be collected by a single storm sewer collection system and discharged to an on-site detention basin and off-site regional detention basin.

Recommendation

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

Approval of the Final Site Plan and Final Storm Water Management Plan is not recommended.

Comments:

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

General

1. Revise the plan set to tie in at least one city established benchmark. An interactive map of the City's established survey benchmarks can be found under the 'Map Gallery' tab on www.cityofnovi.org. City benchmark number 2411 is located southeast of the Grand River and Meadowbrook intersection.
2. Provide a note along with the traffic control sign table stating all traffic signage will comply with the current MMUTCD standards.
3. Provide a note stating if dewatering is anticipated or encountered during construction a dewatering plan must be submitted to the Engineering Division for review.
4. Generally, all proposed trees shall remain outside utility easements. Where proposed trees are required within a utility easement, the trees shall maintain a minimum 5-foot horizontal separation distance from any existing or proposed utility. All utilities shall be shown on the landscape plan, or other appropriate sheet, to confirm the separation distance.
5. Provide the City's standard detail sheets for water main (5 sheets-rev. 02/16/2018), sanitary sewer (3 sheets- rev. 02/16/2018), storm sewer (2 sheets-rev. 02/16/2018), paving (2 sheets-rev. 03/05/2018) and Pathways (1 sheet-rev. 04/12/2018) at the time of the Stamping Set submittal. These details can be found on the City's website at this location: <http://cityofnovi.org/Government/City-Services/Public-Services/Engineering-Division/Engineering-Standards-and-Construction-Details.aspx>

Water Main

6. A tapping sleeve, valve and well is required at the connection to the existing water main.
7. Add shut-off valves to the two leads to the building.
8. Three (3) sealed sets of revised utility plans along with the MDEQ permit application (06/12 rev.) for water main construction and 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

1. Provide a sanitary sewer monitoring manhole, unique to this site, within a dedicated access easement or within the road right-of-way. If not in the right-of-way, provide a **20-foot wide access easement to the monitoring**

- manhole from the right-of-way** (rather than a public sanitary sewer easement).
2. Revise the sanitary sewer basis of design using the City's Standard Sewer Unit Factor Chart (attached). A value of 3.2 people per REU should be used instead of 3.5 people per REU.
 3. Note on the construction materials table that 6-inch sanitary leads shall be a minimum SDR 23.5, and **mains shall be SDR 26**.
 4. Provide a note on the Utility Plan and sanitary profile stating the sanitary leads will be buried at least 5 feet deep where under the influence of pavement.

Storm Sewer

5. A minimum cover depth of 3 feet shall be maintained over all proposed storm sewer. Grades shall be elevated and minimum pipe slopes shall be used to maximize the cover depth. In situations where the minimum cover cannot be achieved, Class V pipe must be used with an absolute minimum cover depth of 2 feet. An explanation shall be provided where the cover depth cannot be provided.
6. Label the four-foot deep sump and an oil/gas separator in the last storm structure prior to discharge to the storm water basin.
7. An easement is required over any storm sewers accepting and conveying off-site drainage.
8. Provide a schedule listing the casting type and other relevant information for each proposed storm structure on the utility plan. Round castings shall be provided on all catch basins except curb inlet structures.
9. Show and label all roof conductors, and show where they tie into the storm sewer.

Storm Water Management Plan

10. 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.
11. Provide calculations verifying the post-development runoff rate directed to the proposed receiving drainage course does not exceed the pre-development runoff rate for the site.
12. Provide release rate calculations for the three design storm events (first flush, bank full, 100-year).
13. Label the 5-foot wide stone bridge/access route allowing direct access to the standpipe from the bank of the basin during high-water conditions (i.e. stone 6-inches above high water elevation). Provide a detail and/or note as necessary.
14. Provide an access easement for maintenance over the pretreatment structure.

15. Provide a soil boring in the vicinity of the storm water basin to determine soil conditions and to establish the high water elevation of the groundwater table.
16. A 4-foot wide safety shelf is required one-foot below the permanent water surface elevation within the basin.

Paving and Grading

17. Provide a minimum of 6 spot elevations where the pathway crosses each driveway (one at each corner and two in the center of the driveway on each side of the pathway). Spot elevations shall be provided to demonstrate a level landing adjacent to each side of the pathway crossing.
18. Detectable warning plates are required at all barrier free ramps, hazardous vehicular crossings and other areas where the sidewalk is flush with the adjacent drive or parking pavement. The barrier-free ramps shall comply with current MDOT specifications for ADA Sidewalk Ramps. Provide the latest version of the MDOT standard detail for detectable surfaces.
19. The grade of the drive approach shall not exceed 2-percent within the first 25 feet of the intersection. Provide spot grades as necessary to establish this grade.
20. If the materials for the sidewalk within the right-of-way are used for the drive, the sidewalk shall be striped through the approach. Provide additional spot grades as necessary to verify the maximum 2-percent cross-slope is being maintained along the walk.
21. The end islands shall conform to the City standard island design, or variations of the standard design, while still conforming to the standards as outlined in Section 2506 of Appendix A of the Zoning ordinance (i.e. 2' minor radius, 15' major radius, minimum 8' wide, 3' shorter than adjacent 19' stall).
22. Provide top of curb/walk and pavement/gutter grades to indicate height of curb adjacent to parking stalls and drive areas.
23. Provide a line designation representing the effective 19-foot stall length for 17-foot perimeter stalls.
24. Provide dimensions for all parking spaces.
25. Provide the standard MDOT detail 'M' approach at the Grand River Avenue and Meadowbrook Road driveway entrances.
26. Per Section 26.5-35(c), a statement is required on any plan containing a private street with the following language: "City of Novi has no responsibility to improve or maintain the private streets contained within or private streets providing access to the property described in this plan".

Soil Erosion and Sediment Control

27. A SESC permit is required. A full review has not been completed at this time. The review checklist detailing all SESC requirements is attached to this letter. Please address the comments below and submit a SESC permit application

under separate cover. The application can be found on the City's website at <http://cityofnovi.org/Reference/Forms-and-Permits.aspx>.

Off-Site Easements

28. Any off-site utility easements anticipated must be executed **prior to final approval of the plans**. If you have not already done so, drafts of the easements and a recent title search shall be submitted to the Community Development Department as soon as possible for review, and shall be approved by the Engineering Division and the City Attorney prior to executing the easements.

The following must be submitted with the Revised Final Site Plan:

29. A letter from either the applicant or the applicant's engineer must be submitted with the Stamping Set highlighting the changes made to the plans addressing each of the comments listed above and indicating the revised sheets involved. **Additionally, a statement must be provided stating that all changes to the plan have been discussed in the applicant's response letter.**
30. An itemized construction cost estimate must be submitted to the Community Development Department for the determination of plan review and construction inspection fees. This estimate should only include the civil site work and not any costs associated with construction of the building or any demolition work. **The estimate must be itemized** for each utility (water, sanitary, storm sewer), on-site paving (square yardage), right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pre-treatment structure and restoration).

The following must be submitted with the Stamping Set:

(Please note that all documents must be submitted together as a package with the Stamping Set submittal with a legal review transmittal form that can be found on the City's website. Partial submittals will not be accepted.)

31. A draft copy of the Storm Drainage Facility Maintenance Easement Agreement (SDFMEA), as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department. Once the agreement is approved by the City's Legal Counsel, this agreement will then be sent to City Council for approval/acceptance. The SDFMEA will then be recorded at the office of the Oakland County Register of Deeds. This document is available on our website.
32. A draft copy of the 20-foot wide easement for the water main to be constructed onsite must be submitted to the Community Development Department. This document is available on our website.
33. A draft copy of the 20-foot wide easement for the sanitary sewer and monitoring manhole to be constructed onsite must be submitted to the Community Development Department. This document is available on our website.

34. 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.


The following must be addressed prior to construction:

35. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development Department to setup a meeting (248-347-0430).
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 (no application required). No fee is required for this permit.
37. Material certifications must be submitted to Spalding DeDecker for review prior to the construction of any onsite utilities. Contact Ted Meadows at 248-844-5400 for more information.
38. Construction inspection fees an amount that is to be determined must be paid to the Community Development Department.
39. Legal escrow fees in an amount that is to be determined must be deposited with the Community Development Department. All unused escrow will be returned to the payee at the end of the project. This amount includes engineering legal fees only. There may be additional legal fees for planning legal documents.
40. A storm water performance guarantee in an amount equal to 120% of the cost required to complete the storm water management facilities as specified in the Storm Water Management Ordinance must be posted at the Community Development Department.
41. Water and Sanitary Sewer Fees must be paid prior to the pre-construction meeting. Contact the Water & Sewer Division at 248-347-0498 to determine the amount of these fees.
42. A street sign financial guarantee in the amount of \$6,000 (\$400 per traffic control sign proposed) must be posted at the Community Development Department. Signs must be installed in accordance with MMUTCD standards.
43. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department, Building Division (248-347-0430) for forms and information. The financial guarantee and inspection fees will be determined during the SESC review.
44. A permit for all proposed work activities within the road right-of-way must be obtained from the City of Novi. This application is available from the City Engineering Division or on the City website and can be filed once the Final Site Plan has been submitted. Please contact the Engineering Division at 248-347-0454 for further information. Please submit the cover sheet, standard details and plan sheets applicable to the permit only.

45. A permit for work within the road right-of-way of Grand River Avenue must be obtained from the Road Commission for Oakland County (RCOC). Please contact the RCOC (248-858-4835) directly with any questions. The applicant must forward a copy of this permit to the City. Provide a note on the plans indicating all work within the road right-of-way will be constructed in accordance with the RCOC standards.
46. A permit for water main construction must be obtained from the MDEQ. This permit application must be submitted through the Engineering Division after the water main plans have been approved. Please submit the cover sheet, overall utility sheet, standard details and plan/profile sheets applicable to the permit.
47. An NPDES permit must be obtained from the MDEQ since the site is over 5 acres in size. The MDEQ may require an approved SESC plan to be submitted with the Notice of Coverage.
48. An inspection permit for the sanitary sewer tap must be obtained from the Oakland County Water Resource Commissioner (OCWRC).
49. Permits for the construction of each retaining wall exceeding 48 inches in height (measured from bottom of the footing to top of the 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 Kate Richardson at (248) 347-0586 with any questions.



Kate Richardson, EIT
Plan Review Engineer

cc: Sri Komaragiri, Community Development
Angela Sosnowski, Community Development
Tina Glenn, Treasurers
Kristin Pace, Treasurers
Ben Croy, PE, Water and Sewer
George Melistas, Engineering
Darcy Rechten, PE, Engineering
T. Meadows, T. Reynolds,; Spalding DeDecker

LANDSCAPE REVIEW



PLAN REVIEW CENTER REPORT
March 20, 2019
Combined Preliminary/Final Site Plan -
Landscaping
Jaguar/Land Rover

Review Type

Preliminary/Final Site Plan Landscape Review

Job #

JSP17-0065

Property Characteristics

- Site Location: Southwest Corner of Grand River and Meadowbrook
- Site Acreage: 8.2 acres
- Site Zoning: GE
- Adjacent Zoning: North: Grand River/NCC, East: Meadowbrook/OS-1, South: Cherry Hill/RM-2, West: GE(Multifamily) and NCC
- Plan Date: 2/11/2019

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. Underlined items must be addressed in revised Final Site Plans. Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review and the accompanying Landscape Chart are summaries and are not intended to substitute for any Ordinance.

Recommendation

This project is recommended for approval of Preliminary Site Plans but not Final Site Plans. The corrections noted below should be addressed in revised Final Site Plans.

LANDSCAPE DEVIATIONS GRANTED BY THE CITY COUNCIL ON JANUARY 7, 2019:

1. Deviation to not provide street trees along Grand River (8 trees)
2. Deviation to not provide street trees along Cherry Hill (11 trees)
3. Deviation to not provide greenbelt berm or plantings in area of wetland in order to preserve wetland
4. Deviation to not provide greenbelt berm in greenbelt between Cherry Hill and the parking lot area not behind the wetland

Please copy the above deviations, including the meeting date, to Sheet L-1.0 of the Landscape Plans.

Ordinance Considerations

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

Please provided somewhere in the set.

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

1. Provided.
2. The overhead utility lines in the vicinity of the project are clearly noted.

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

Provided.

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

1. While the property is not adjacent to residentially zoned property, the property to the west is a multi-family project under construction.
2. The 5 foot tall berm provided meets the requirement for parking adjacent to residential and the west property line is heavily landscaped with a mix of woodland replacement deciduous canopy trees.

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

1. The required greenbelt width is provided along both frontages.
2. There are some minor shortages in landscaping provided along the frontages that are outlined on the landscape chart, and **should be corrected on the revised Final Site Plans.**
3. **Please increase the height of the berm along Meadowbrook, especially south of the entry to at least 3 feet, to block lights from the residence across Meadowbrook.**
4. The applicant is not providing a berm or landscaping in the Cherry Hill Road greenbelt in order to preserve existing trees and the wetland. *This waiver was granted by the Planning Commission.*
5. *Please change at least the southern three Crimean lindens east of the parking lot to large evergreens to help block lights from impacting the single family residence across Meadowbrook.*

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

1. Street trees are provided along Meadowbrook as required.
2. Street trees are not provided along either Grand River or Cherry Hill. *These deviations are supported by staff because a drainage ditch and utility lines do not provide room for the trees along Grand River, and a deep ditch along Cherry Hill does not allow room for street trees there.*

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

1. Based on the vehicular use areas, 4,751 sf of islands and 24 trees are required. 12,620 sf of islands and 24 trees are provided.
2. Each interior island and endcap island must have 200sf of green space and have at least one tree planted in it.
 - a. **The corner island on the south side of the Meadowbrook entry without a tree should have a tree in it. It can be one of the 3 perimeter trees east of the pathway.**
 - b. **Please shift the detention basin access aisle to the east 5 feet and plant endcap tree(s) in the space between the aisle and the parking lot.**
 - c. **Please increase the width of the endcap closest to the loading zone to at least 10 feet.**
3. Woodland replacement trees should not be planted in parking lot islands. **Please remove them from all interior islands and access way perimeters (they should all be able to be included in a conservation easement).**
4. There must be at least 200sf of green space per tree planted in interior islands. **Please remove trees from islands as necessary to meet that requirement.**

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

1. Based on the 2,072lf of perimeter, 59 trees are required. 44 new canopy trees, 7 greenbelt canopy trees within 15 feet of the parking lot being double-counted as perimeter trees, and 7 existing trees being preserved that are within 15 feet of the parking lot are provided.
2. **To increase the screening of lights from the residence across Meadowbrook Drive, please replace at least the southern 3 of the Crimean lindens being double counted as**

perimeter and greenbelt trees with a large evergreen such as white spruce or Norway spruce.

Loading Zone screening (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)

Provided

Building Foundation Landscape (Zoning Sec 5.5.3.D.)

1. Based on the building perimeter, less doors and other paved entry points, 6,712sf of foundation landscape area is required, and 6,902sf are provided adjacent to the building.
2. Greater than 60% of the building along both frontages has foundation landscaping.

Woodland Replacement Trees (Section 37)

1. **Please do not locate woodland replacement trees in areas where they cannot be protected, such as in the greenbelt where utilities are nearby, in parking lot islands, etc.**
2. **Please show the boundaries of the protective conservation easement for the replacement trees on the landscape plan.**

Plant List, Notations and Details (LDM 2.h. and t., LDM 4)

1. Provided.
2. The diversity requirements apply to non-replacement trees. **Please see the Landscape Chart and attached spreadsheet regarding *Ostrya virginiana* and the diversity requirements.**
3. 25 of 36 species (69%) non-replacement species are native to Michigan.
4. **Please note that straight species (not Grow Low) *Rhus aromatica* should be used around the detention basin.**

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

Provided

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

1. The proposed landscaping must be provided with sufficient water to become established and survive over the long term.
2. Please note how this will be accomplished if an irrigation plan is not provided.

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

Provided

Proposed trees to be saved (Sec 37 Woodland Protection 37-9, LDM 2.e.(1))

Provided

Corner Clearance (Zoning Sec 5.9)

1. Provided
2. The 25 foot clearance zone lines can be removed from the Grand River entry.

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



LANDSCAPE REVIEW SUMMARY CHART – Combined Preliminary & Final Site Plans

Review Date: February 25, 2019
Project Name: JSP17 – 0065: Jaguar/Land Rover
Plan Date: February 11, 2019
Prepared by: Rick Meader, Landscape Architect E-mail: rmeader@cityofnovi.org;
 Phone: (248) 735-5621

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

LANDSCAPE DEVIATIONS APPROVED BY CITY COUNCIL ON JANUARY 1, 2019

1. Deviation to not provide street trees along Grand River (8 trees)
2. Deviation to not provide street trees along Cherry Hill (11 trees)
3. Deviation to not provide greenbelt berm or plantings in area of wetland in order to preserve wetland
4. Deviation to not provide greenbelt berm in greenbelt between Cherry Hill and the parking lot area not behind the wetland

Please copy the above to Sheet L-1.0 of the Landscape Plans.

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 	<ul style="list-style-type: none"> ▪ Overall Scale 1" =50' ▪ Foundation plans scale 1" =20' 	Yes	
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 original signature on Stamping Sets</u>
Miss Dig Note (800) 482-7171	Show on all plan sheets	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
(LDM.3.a.(8))				
Zoning (LDM 2.f.)	Include all adjacent zoning	<u>Parcel:</u> GE <u>North:</u> Grand River <u>East:</u> Meadowbrook Rd <u>South:</u> Cherry Hill Rd <u>West:</u> GE & NCC	Yes	Please show zoning of all adjacent parcels on landscape plan.
Survey information (LDM 2.c.)	<ul style="list-style-type: none"> ▪ Legal description or boundary line survey ▪ Existing topography 	Topo, description on C-1.0	Yes	
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. 	<ul style="list-style-type: none"> ▪ Existing trees shown on T-1.0, T1.1 ▪ Proposed removals, calculations on T-1.0 ▪ Tree Chart on T-1.1 	Yes	<ol style="list-style-type: none"> 1. See ECT review for full analysis of Wetlands & Woodlands. 2. Please provide all replacement trees in areas that can be protected with a conservation easement. 3. Please show tree protection fencing on Demolition Plan.
Soil types (LDM.2.r.)	<ul style="list-style-type: none"> ▪ As determined by Soils survey of Oakland county ▪ Show types, boundaries 	Not provided.	No	Please provide somewhere in plan set.
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))	<ul style="list-style-type: none"> ▪ Overhead and underground utilities, including hydrants ▪ Show light posts 	Yes	Yes	
Proposed grading. 2' contour minimum (LDM 2.e.(1))	Provide proposed contours at 2' interval	Berms shown on Sheet C-3.0	TBD	<ol style="list-style-type: none"> 1. Please increase height of berm along Meadowbrook Road to at least 3 feet, with undulations above that if possible. This is especially important in the frontage south of the Meadowbrook entry. 2. Slopes should be no steeper than 1:3.
Snow deposit (LDM.2.q.)	Show snow deposit areas on plan	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
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 	No evergreen trees are proposed in islands	Yes	
Name, type and number of ground cover (LDM 1.c.(5))	As proposed on planting islands	Seed and/or sod are indicated on islands	Yes	
General (Zoning Sec 5.5.3.C.ii)				
Parking lot Islands (a, b. i)	<ul style="list-style-type: none"> A minimum of 200 SF to qualify A minimum of 200sf unpaved area per tree planted in an island 6" curbs Islands minimum width 10' BOC to BOC 	Yes	Yes	
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)	<ul style="list-style-type: none"> Maximum of 15 contiguous spaces. Maximum of 25 contiguous spaces in vehicular storage area 	<ul style="list-style-type: none"> 15 is maximum bay length Most endcaps and interior islands have trees as required. 	Yes	
Plantings around Fire Hydrant (d)	No plantings with matured height greater than 12' within 10 ft. of fire hydrants	None are too close	Yes	
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	<ul style="list-style-type: none"> 25' clear vision zone shown for both Grand River and Meadowbrook Rd. The RCOC sight clear vision zone is provided 	Yes	<ol style="list-style-type: none"> The city clear vision zone can be removed from the Grand River entry. Please revise the clear zone at the Meadowbrook Road entry per the drawing at the bottom of this chart and remove any shrubs taller than 30" or trees from the zone.

Item	Required	Proposed	Meets Code	Comments
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 vehicular use areas up to 50,000sf x 7.5%	<ul style="list-style-type: none"> A = x sf * 7.5 % = A sf 50,000 * 7.5% = 3750 sf 		Yes	
B = Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF) x 1 %	<ul style="list-style-type: none"> B = x sf * 1% = B sf (150,110- 50000) * 1% = 1,001 sf 		Yes	
Category 2: For: I-1 and I-2 (Zoning Sec 5.5.3.C.iii)				
A. = Total square footage of vehicular use area up to 50,000 sf x 5%	A = x sf * 5% = A sf	NA		
B = Total square footage of additional paved vehicular use areas over 50,000 SF x 0.5%	B = 0.5% x 0 sf = B SF	NA		
All Categories				
C = A+B Total square footage of landscaped islands	3750 + 1001 = 4751 SF	12,620 sf	Yes	
D = C/200 Number of canopy trees required	4751/200 = 24 Trees	24 trees	Yes	<ol style="list-style-type: none"> 1. Please increase the size of the inset showing the island areas and perimeter line by at least 25% to make it more legible. 2. Please move woodland replacement trees from areas where they can't be placed in a conservation easement. 3. If they cannot fit on the site in acceptable locations, a deposit for the trees that can't be planted can be made to the city's tree fund. 4. Please move one of the OVs from the

Item	Required	Proposed	Meets Code	Comments
				<p>interior island with less than 400sf to another location.</p> <p>5. Please add an interior tree to the interior corner island of the Meadowbrook entry without a tree. That area should be at least 10 feet wide with a greenspace of at least 200sf.</p> <p>6. Please increase the width of the green space between the detention basin access drive and the edge of the curb to 10 feet and plant at least one tree in that area, which is an endcap.</p> <p>7. Please increase the width of the narrow endcap closest to the southern loading zone to at least 10 feet.</p>
<p>Perimeter Green space</p>	<ul style="list-style-type: none"> ▪ 1 Canopy tree per 35 lf ▪ 2072/35 = 59 trees 	<p>44 new trees + 8 perimeter trees + 7 existing trees within 15 feet of the curb to remain.</p>	<p>Yes</p>	<p>1. Please make the perimeter line more visible for verification.</p> <p>2. Please make sure all perimeter trees are within 15 feet of the curb. One of the double-counted greenbelt trees appears to be more than 15 feet from the nearest curb.</p> <p>3. If any of the existing trees to remain are damaged in the course of construction, they need to be replaced with new perimeter canopy trees.</p>
<p>Access way perimeter</p>	<p>1 canopy tree per 35 lf on each side of road,</p>	<p>Included in above</p>		

Item	Required	Proposed	Meets Code	Comments
	less widths of access drives.			
Parking land banked	NA	None		
Berms, Walls and ROW Planting Requirements				
Berms				
<ul style="list-style-type: none"> ▪ All berms shall have a maximum slope of 33%. Gradual slopes are encouraged. Show 1ft. contours ▪ Berm should be located on lot line except in conflict with utilities. ▪ Berms should be constructed with 6" of top soil. 				
Residential Adjacent to Non-residential (Sec 5.5.3.A) & (LDM 1.a)				
Berm requirements (Zoning Sec 5.5.A)	Landscaped berm 4.5-6 feet high required abutting multi-family project west of site.	5-6 foot tall landscaped berm is provided along west property line	Yes	
Planting requirements (LDM 1.a.)	LDM Novi Street Tree List	Berm is heavily landscaped with deciduous canopy trees	Yes	
Adjacent to Public Rights-of-Way (Sec 5.5.B) and (LDM 1.b)				
Berm requirements (Zoning Sec 5.5.3.A.(5))	An undulating berm a minimum of 3 feet high with a 3 foot wide crest is required between parking and right-of-way	<ul style="list-style-type: none"> ▪ Berms are provided between Grand River and Meadowbrook and parking areas. ▪ No berm is provided along Cherry Hill Road. 	Yes Yes No	<ol style="list-style-type: none"> 1. Please ensure the proposed berms along Grand River and Meadowbrook have a maximum slope of 1:3. 2. Please increase the height of the Meadowbrook Road berm south of the entry to at least 3 feet. 3. Due to the preservation of the wetland, a landscape deviation to not provide the required berm in that area of the Cherry Hill greenbelt was granted by the Planning Commission. 4. A landscape deviation was also granted to not provide the greenbelt berm between the detention pond and Cherry Hill Road to

Item	Required	Proposed	Meets Code	Comments
				<i>preserve the existing trees.</i>
Cross-Section of Berms (LDM 2.j)				
Slope, height and width	<ul style="list-style-type: none"> ▪ Label contour lines ▪ Maximum 33% ▪ Min. 3 feet flat horizontal area ▪ Minimum 3 feet high ▪ Constructed of loam with 6' top layer of topsoil. 	No		Please provide berm cross sections that includes maximum slopes, loam construction and 6" layer of topsoil callouts
Type of Ground Cover		Seed		
Setbacks from Utilities	Overhead utility lines and 15 ft. setback from edge of utility or 20 ft. setback from closest pole	NA		
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	No walls are proposed except in the building foundation.		
Walls greater than 3 ½ ft. should be designed and sealed by an Engineer		No details provided		
ROW Landscape Screening Requirements(Sec 5.5.3.B. ii)				
Greenbelt width (2)(3) (5)	Parking: 20 ft. No Pkg: 25 ft	35 ft to parking 27 ft to building	Yes	
Min. berm crest width	None	<ol style="list-style-type: none"> 1. Berms are proposed between the parking and roads along both Grand River and Meadowbrook Road 2. No berm is provided along entire Cherry Hill Road frontage 	No	<i>The deviations for the Cherry Hill Road frontage were granted by the Planning Commission.</i>
Minimum berm height (9)	None	Some of the berms are sufficient in height, others aren't.	TBD	<ol style="list-style-type: none"> 1. Please increase the minimum height for the Meadowbrook Road berms to 3 feet. 2. Please make sure the slopes are no steeper than 1:3.

Item	Required	Proposed	Meets Code	Comments
<p>3' wall</p> <p>Canopy deciduous or large evergreen trees Notes (1) (10)</p>	<p>(4)(7)</p> <p>Parking: 1 tree per 35 lf</p> <ul style="list-style-type: none"> ▪ Meadowbrook: $(288-30)/35 = 7$ trees ▪ Grand River: $(90-40)/35 = 1$ tree <p>No Pkg: 1 per 60 ft</p> <ul style="list-style-type: none"> ▪ Meadowbrook: $348/60 = 6$ trees ▪ Grand River: $253/60 = 4$ trees ▪ Cherry Hill: $370/60 = 6$ trees <p>Total Requirement</p> <ul style="list-style-type: none"> ▪ Meadowbrook: 13 ▪ Grand River: 5 ▪ Cherry Hill: 6 	<p>No</p> <p><u>Meadowbrook:</u> 12 new trees (7 double-counted perimeter trees) + 8 subcanopy (=5 canopy at 1.5/tree under utility lines) 1 existing tree</p> <p><u>Grand River:</u> 1 deciduous canopy 4 large evergreens</p> <p><u>Cherry Hill:</u> 6 existing trees (total of 19 existing trees saved in greenbelt)</p>	<p></p> <p>Yes Yes Yes</p>	<ol style="list-style-type: none"> 1. Please use more evergreen woodland replacement trees between Cherry Hill Road and the detention pond to increase the screening of the parking lot. Up to 10% of the total number of woodland replacements planted on the site can be evergreen. 2. Please show the location of the building address number and keep it unscreened from road(s). 3. Please place the 4 white pines further apart. Large canopy trees are defined as reaching a minimum mature width of at least 15 feet so they should be allowed to meet that width. 4. Please change at least the southern 3 Crimean lindens east of the parking lot to large evergreens to help block lights from impacting the residence across Meadowbrook.
<p>Sub-canopy deciduous trees Notes (2)(10)</p>	<p>Parking: 1 tree per 20 lf</p> <ul style="list-style-type: none"> ▪ Meadowbrook: $(288-30)/20 = 13$ trees ▪ Grand River: $(90-40)/20 = 3$ trees <p>No Pkg: 1 per 40 ft</p> <ul style="list-style-type: none"> ▪ Meadowbrook: $348/40 = 9$ trees ▪ Grand River: $253/40 = 6$ trees ▪ Cherry Hill: $370/40 = 9$ trees <p>Total Requirement</p>	<p><u>Meadowbrook:</u> 20 new trees</p> <p><u>Grand River:</u> 8 new trees</p> <p><u>Cherry Hill:</u> 9 existing trees</p>	<p>No No Yes</p>	<ol style="list-style-type: none"> 1. Please provide 1 more subcanopy tree along Grand River 2. Please locate at least 3 subcanopy trees along the Grand River building frontage, evenly spaced, to soften the view from the road since no street trees

Item	Required	Proposed	Meets Code	Comments
	<ul style="list-style-type: none"> Meadowbrook: 22 Grand River: 9 Cherry Hill: 9 			<p>can be planted.</p> <p>3. Please provide 2 more subcanopy trees in the Meadowbrook greenbelt.</p>
<p>Canopy deciduous trees in area between sidewalk and curb <i>(Novi Street Tree List)</i></p>	<p>Parking: 1 tree per 35 lf</p> <ul style="list-style-type: none"> Meadowbrook: (288-62)/35 = 6 trees Grand River: (90-40)/35 = 1 tree <p>No Pkg: 1 per 35 ft</p> <ul style="list-style-type: none"> Meadowbrook: 348/35 = 6 trees Grand River: 253/35 = 4 Cherry Hill: 370/35 = 6 <p>Total Requirement</p> <ul style="list-style-type: none"> Meadowbrook: 12 Grand River: 5 Cherry Hill: 6 	<p><u>Meadowbrook:</u> 4 existing trees 13 new trees</p> <p><u>Grand River:</u> 0 trees</p> <p><u>Cherry Hill:</u> 0 trees</p>	<p>Yes No No</p>	<p>1. A landscape deviation was granted by the Planning Commission for the lack of street trees along Grand River</p> <p>2. A landscape deviation was granted by the Planning Commission for the lack of street trees along Cherry Hill Road.</p>
<p>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</p>				
<p>Interior Street to Industrial subdivision <i>(LDM 1.d.(2))</i></p>	<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 	<p>NA</p>		
<p>Screening of outdoor storage, loading/unloading <i>(Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)</i></p>		<ul style="list-style-type: none"> Loading zone on the south side of the building faces Meadowbrook. A heavily landscaped berm is proposed in the greenbelt which will screen that loading zone. 	<p>Yes</p>	<p>Please limit the berm's slope to 1:3.</p>
<p>Transformers/Utility boxes <i>(LDM 1.e from 1 through 5)</i></p>	<ul style="list-style-type: none"> A minimum of 2ft. separation between box and the plants Ground cover below 4" is allowed up to pad. No plant materials 	<ul style="list-style-type: none"> A transformer is shown near the western loading zone Arborvitae are shown as screening for it. 	<p>Yes</p>	<p>Please add a note stating that the screening shrubs are to be maintained at a height at least as tall as the electrical box.</p>

Item	Required	Proposed	Meets Code	Comments
	within 8 ft. from the doors			
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. ▪ A= 839 lf x 8ft = 6712 SF 	A= 6902 sf	Yes	
<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	<ul style="list-style-type: none"> ▪ 100% of the building facing Grand River is landscaped. ▪ 70% of the building facing Meadowbrook is 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 shall cover 70-75% of the basin rim area ▪ 10" to 14" tall grass along sides of basin ▪ Refer to wetland for basin mix 	It appears that at least 70% of the basin rims will be landscaped with large native shrubs.	Yes	Please add a note stating that straight species <i>Rhus aromatica</i> should be used.
Phragmites Control (Sec 5.5.6.C)	<ul style="list-style-type: none"> ▪ Any and all populations of <i>Phragmites australis</i> on site shall be included on tree survey. ▪ Treat populations per MDEQ guidelines and requirements to eradicate the weed from the site. 	Sheet L-1.4 shows <i>Phragmites</i> locations and a plan for its removal.	Yes	
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 June, July and August for the 2-year warranty period. 	Yes	Yes	
Plant source	Shall be northern nursery	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
(LDM 2.n & LDM 3.a.(2))	grown, No.1 grade.			
Irrigation plan (LDM 2.s.)	A fully automatic irrigation system or a method of providing sufficient water for plant establishment and survival is required on Final Site Plans.	No	No	<ol style="list-style-type: none"> 1. <u>Please add an irrigation plan or information as to how plants will be watered sufficiently for establishment and long- term survival.</u> 2. <u>If xeriscaping is used, please provide information about plantings included.</u> 3. <u>Irrigation plans/information need to be provided in electronic stamping sets at the latest. When they are provided, the system should be set up to not over-water species along the north side of the building, which don't need as much water for maximum performance.</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., LDM 4) – Include all cost estimates				
Quantities and sizes	Refer to LDM suggested plant list	Yes	Yes	
Root type		Yes	Yes	
Botanical and common names		Yes	Yes	<ol style="list-style-type: none"> 1. Please reduce the number of OV's used in the general site tree plantings (ie not woodland replacements) to 19 per the attached diversity table to meet the standards of the Landscape Design Manual.

Item	Required	Proposed	Meets Code	Comments
				There is no limit to how many Ironwoods may be used as woodland replacements. 2. 26 of 37 species used (70%) are native to Michigan.
Type and amount of lawn		Yes	Yes	
Cost estimate (LDM 2.t)	For all new plantings, mulch and sod as listed on the plan	Yes	Yes	
Planting Details/Info (LDM 2.i) – Utilize City of Novi Standard Details				
Canopy Deciduous Tree	Refer to LDM for detail drawings	Yes	Yes	
Evergreen Tree		Yes	Yes	
Shrub		Yes	Yes	
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	Please show the tree fencing line on the Demolition Plan.
Other Plant Material Requirements (LDM 3)				
General Conditions (LDM 3.a)	Plant materials shall not be planted within 4 ft. of property line	Yes	Yes	
Plant Materials & Existing Plant Material (LDM 3.b)	Clearly show trees to be removed and trees to be saved.	Yes	Yes	
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	None taken		
Plant Sizes for ROW, Woodland replacement and others (LDM 3.c)	2.5" canopy trees 6' evergreen trees		Yes	
Plant size credit (LDM3.c.(2))	NA	No		
Prohibited Plants	No plants on City	None		

Item	Required	Proposed	Meets Code	Comments
<i>(LDM 3.d)</i>	Invasive Species List			
Recommended trees for planting under overhead utilities <i>(LDM 3.e)</i>	Label the distance from the overhead utilities	Overhead lines are clearly marked.	Yes	
Collected or Transplanted trees <i>(LDM 3.f)</i>		None		
Nonliving Durable Material: Mulch <i>(LDM 4)</i>	<ul style="list-style-type: none"> ▪ Trees shall be mulched to 3" depth and shrubs, groundcovers to 2" depth ▪ Specify natural color, finely shredded hardwood bark mulch. Include in cost estimate. ▪ Refer to section for additional information 	Yes	Yes	
<p>NOTES:</p> <ol style="list-style-type: none"> 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



March 19, 2019
ECT No. 190160-0100

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

Re: Jaguar/Land Rover (JSP17-0065)
Wetland Review of the Preliminary & Final Site Plan (PSP19-0032)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the SDO Concept Plan for the proposed Jaguar/Land Rover project prepared by PEA, Inc. dated February 11, 2019 and stamped "Received" by the City of Novi Community Development Department on February 12, 2019 (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. In addition, ECT conducted an on-site wetland boundary verification inspection at this site on November 23, 2016. In general, wetland boundary delineations and verifications are valid for a period of three (3) years.

ECT currently recommends approval of the Preliminary Site Plan for Wetlands contingent on the applicant satisfactorily addressing the items noted in the *Wetland/Watercourse Comments* Section of this letter prior to the City Council meeting. ECT recommends Final Site Plan denial for Wetlands with the condition that the items noted in the *Wetland/Watercourse Comments* Section of this letter are addressed with a Revised Final Site Plan Submittal.

The following wetland related items are required for this project:

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

The proposed development is located west of Meadowbrook Road between Cherry Hill and Grand River Avenue in Section 23. The overall project site area is approximately 9.5 acres and is currently vacant (Parcels 22-23-251-018 and 22-23-251-019). Based on historic aerial photos, the majority of this site has been previously disturbed (cleared/graded) in the past. The project includes the construction of a 53,211 square foot automotive facility, associated parking areas and driveways, utilities as well as a storm water detention basin that appears to outlet to the City of Novi storm sewer system along Meadowbrook Road. Based on our review of the Plan, Novi aerial photos, Novi GIS, and the City of Novi Official Wetlands and

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Woodlands Maps (see Figure 1); it appears as if this proposed project site contains both City-Regulated Wetlands and Regulated Woodlands.

Wetland Evaluation

ECT conducted a wetland evaluation for the proposed site on November 23, 2016. The focus of the site inspection was to review site conditions in order to determine whether any on-site wetlands are regulated by the City of Novi including whether wetlands meet the City of Novi's Wetland Essentiality Criteria. One (1) area of wetland (i.e., Wetland A) is indicated on the Wetland Location Map (i.e., Figure 2, provided by Niswander Environmental). This wetland area was marked in the field with survey tape flags at the time of our inspection. The Wetland Location Map (Figure 2) indicate the approximate location of Wetland A but does not indicate the 25-foot wetland buffer/setback boundary.

On August 11, 2016 Niswander Environmental conducted a wetland delineation on the property. In general, wetland boundary delineations and verifications are valid for a period of three (3) years (this is a requirement of the Michigan Department of Environmental Quality, MDEQ). It is Niswander's opinion that Wetland A is likely not regulated by MDEQ due to the fact that it is less than 5 acres in size and is not hydrologically connected to any nearby bodies of water. They state that the City of Novi would regulate Wetland A under the "essential to the preservation of the natural resources of the City" clause in the wetland protection ordinance.

Wetland A is a small emergent/scrub-shrub wetland located in the southern portion of the Property, along a drainage ditch that extends east/west along Cherry Hill Road (Figure 2). Northern portions of this 0.48-acre wetland extend into a section of wooded area that contains common buckthorn (*Rhamnus cathartica*), multiflora rose (*Rosa multiflora*), grapevine (*Vitis riparia*), and honeysuckle (*Lonicera tatarica*). The wetland is dominated primarily by invasive reed canary grass (*Phalaris arundinacea*), although other species such as sandbar willow (*Salix exigua*), cattail (*Typha angustifolia*), glossy buckthorn (*Frangula alnus*), swamp milkweed (*Asclepias incarnata*), joe pye weed (*Eupatorium maculatum*), and sapling ash (*Fraxinus pennsylvanica*) and elm (*Ulmus americana*) are also present.

The southern portion of Wetland A (i.e., ditch along north side of Cherry Hill Road) is a shallow, narrow roadside ditch. Much of the vegetation within this ditch consists of reed canary grass, buckthorn, grapevine, and rice cutgrass.

The adjacent upland area consists of what appears to be area that has been previously disturbed. Areas of fairly sparse trees and shrubs exist throughout this upland area.

ECT previously verified that the Wetland A boundaries appeared to be accurately flagged in the field and depicted on the Wetland Location Map. It can be noted that the City of Novi's Regulated Wetland Map (Figure 1) is not accurate in indicating the location of wetland on the subject property. The Wetland Location Map provided by Niswander Environmental (Figure 2) does appear to accurately portray the existing wetland location and this appears to be accurately portrayed on the Plan.

Proposed Wetland/Watercourse Impacts

As noted above, the Plan indicates one (1) area of wetland on this site located along the southern boundary. Portions of this wetland area appear to be included on the City of Novi *Regulated Wetlands and Watercourse Map* (see Figure 1, attached). The Plan appears to propose one (1) area of wetland/watercourse impact for the removal of existing culvert end sections, the installation of a storm water outlet pipe from the proposed detention basin to the drain, and associated grading. **The current Plan does not appear to label or**

quantify the proposed impacts to the wetland/watercourse or the 25-foot natural features setback. This information shall be added to the Plan. The Applicant shall indicate and quantify (square feet or acres) all areas of direct impact (cut or fill) within the wetland/watercourse boundaries on subsequent plan submittals.

With regard to the 25-foot wetland setbacks, the Plan appears to propose encroachment into the 25-foot wetland buffer south of the proposed detention basin for the purpose of constructing the stormwater outlet pipe (30" diameter concrete pipe). These impacts have not been indicated or quantified on the current Plan. The Applicant shall indicate, quantify (square feet or acres of fill or excavation within the wetland buffer limits, if applicable) on subsequent plan submittals. The City of Novi regulates a 25-foot buffer surrounding all wetland and watercourses.

Regulatory Status - MDEQ

ECT has evaluated the on-site wetlands and believes that they are considered to be essential/regulated by the City of Novi as they meet one or more of the essentiality criteria (i.e., functions and values) outlined in the City of Novi Wetland and Watercourse Protection Ordinance. As noted, the wetlands appear to accurately be flagged in the field and appear to be indicated accurately on the Plan.

The Michigan Department of Environmental Quality (MDEQ) generally regulates wetlands that are within 500 feet of an inland lake, pond, or stream, or within 1,000 feet of a Great Lake, Lake St. Clair, the St. Clair River, or the Detroit River. Isolated wetlands five (5) acres in size or greater are also regulated. The MDEQ may also exert regulatory control over isolated wetlands less than five acres in size "...if the department determines that protection of the area is essential to the preservation of the natural resources of the state from pollution, impairment, or destruction and the department has notified the owner".

Should the applicant propose impacts to the on-site wetlands (or watercourse), it will be their responsibility to contact MDEQ to determine the regulatory status of these features. If wetland impacts are proposed, the applicant shall provide correspondence with the MDEQ such as a wetland permit application, wetland permit, wetland assessment, or Letter of No Jurisdiction. It appears as if the on-site wetlands could be MDEQ-regulated. Subject to MDEQ concurrence, a MDEQ Wetland Use Permit will need to be on file prior to the issuance of a City Wetland Use Permit. A City of Novi Wetland Permit cannot be issued prior to receiving this information.

Regulatory Status – City of Novi

The City of Novi Wetland and Watercourse Protection Ordinance (City of Novi Code of Ordinances, Part II, Chapter 12, Article V.; Division 2.) describes the regulatory criteria for wetlands and review standards for wetland permit applications. The City of Novi regulates 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). Wetlands deemed regulated by the City of Novi require the approval of a use permit for any proposed impacts to the wetland.

ECT has evaluated the areas of on-site wetland and believes the wetlands are regulated by the City's Wetland and Watercourse Protection Ordinance because they meet one or more of the essentiality criteria in the Ordinance (i.e., stormwater storage and wildlife habitat).

It should be noted that in those cases where an activity results in the impact to wetland areas of 0.25-acre or greater that are deemed essential under City of Novi Ordinance subsection 12-174(b) mitigation shall be

required. The applicant shall submit a mitigation plan which provides for the establishment of replacement wetlands at a ratio of 1:1 through 2:1 times the area of the natural wetland impaired or destroyed, if impacts meet or exceed the 0.25-acre threshold. In general, the MDEQ's threshold for the requirement of wetland mitigation is 0.3-acre of wetland impacts. The current Plan does not appear to propose impacts requiring wetland mitigation.

As noted above, any proposed use of the wetlands will 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 applicant is urged to minimize impacts to on-site wetlands and wetland setbacks to the greatest extent practicable. The City regulates wetland buffers/setbacks. Article 24, Schedule of Regulations, of the Zoning Ordinance states that:

“There shall be maintained in all districts a wetland and watercourse setback, as provided herein, unless and to the extent, it is determined to be in the public interest not to maintain such a setback. The intent of this provision is to require a minimum setback from wetlands and watercourses”.

Wetland/Watercourse Comments

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

1. ECT encourages the Applicant to minimize impacts to on-site wetlands and 25-foot wetland setbacks to the greatest extent practicable. The Applicant should consider modification of the proposed site design to preserve all wetland and wetland buffer areas. Specifically, the applicant shall work to avoid any proposed encroachment into the 25-foot wetland buffer for the purpose constructing the proposed stormwater detention basin. The City regulates wetland buffers/setbacks. Article 24, Schedule of Regulations, of the Zoning Ordinance states that:

“There shall be maintained in all districts a wetland and watercourse setback, as provided herein, unless and to the extent, it is determined to be in the public interest not to maintain such a setback. The intent of this provision is to require a minimum setback from wetlands and watercourses”.

The *SESC Plan* (Sheet C-5.0) appears to indicate that the majority, if not all, of the existing 25-foot natural features setback will receive temporary seed and mulch. The *Grading Plan* (Sheet C-4.0) does not appear to indicate grading within the 25-foot setback, except for within the area of the stormwater detention basin outfall pipe. The applicant shall clarify the intent of the temporary seed and mulch that is proposed within the 25-foot setback. Twenty-five-foot buffers are intended to contain native plant types, and sod or common grass seed is not desirable in these areas. Please clarify the intent and type of the proposed seed mix and mulch within this area.

2. The current Plan appears to propose direct impact to wetland/watercourse for the removal of some existing storm water pipe and the installation of a stormwater outfall pipe from the proposed detention basin. The applicant shall provide information on subsequent plans that clearly indicates the existing areas of onsite wetlands as well as the area of the 25-foot wetland buffers (i.e., square feet or acres of existing natural features). In addition, the Plan shall clearly indicate the area (square feet or acres) of all wetland and wetland buffer impacts (both permanent and temporary, if applicable) and the volume (cubic yards) of all wetland impacts.

3. It appears as though a City of Novi *Minor Use Wetland* and likely a MDEQ Wetland Permit would be required for the proposed wetland impacts. A City of Novi *Authorization to Encroach the 25-Foot Natural Features Setback* would be required for any proposed impacts to on-site 25-foot wetland buffers.
4. It should be noted that it is the Applicant's responsibility to confirm the need for a Permit from the MDEQ for any proposed wetland impacts. Final determination as to the regulatory status of any on-site wetlands shall be made by MDEQ. The Applicant should provide a copy of the MDEQ Wetland Use Permit application to the City (and our office) for review and a copy of the approved permit upon issuance. A City of Novi Wetland Permit cannot be issued prior to receiving this information.
5. The Plan should address how any temporary impacts to wetland buffers shall be restored, if applicable. A proposed seed mix should be provided on the Plan for restoration of these wetland buffer areas. Sod or common grass seed will not be authorized in these areas.
6. The Applicant is encouraged to provide wetland conservation easements for any areas of remaining wetland and 25-foot wetland buffer. 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 as shown on the approved plans. 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 Wetland and Watercourse permit. An easement that includes the existing wetland/watercourse and the 25-foot wetland buffer appears to be shown on the *Easement Plan* (Sheet C-6.1).
7. As noted above, should impacts to the wetland area be proposed, the applicant shall provide correspondence from the MDEQ clarifying the regulatory status of Wetland A. A City of Novi Wetland Permit cannot be issued prior to receiving this information.

Recommendation

ECT currently recommends approval of the Preliminary Site Plan for Wetlands contingent on the applicant satisfactorily addressing the items noted in the *Wetland/Watercourse Comments* Section of this letter prior to the City Council meeting. ECT recommends Final Site Plan denial for Wetlands with the condition that the items noted in the *Wetland/Watercourse Comments* Section of this letter are addressed with a Revised Final Site Plan Submittal.

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

Jaguar/Land Rover (JSP17-0065)
Wetland Review of the Preliminary & Final Site Plan (PSP19-0032)
March 19, 2019 (Revision 1)
Page 6 of 9

cc: Lindsay Bell, City of Novi Planner
Sri Komaragiri, City of Novi Planner
Rick Meader, City of Novi Landscape Architect
Hannah Smith, City of Novi Planning Assistant

Attachments: Figure 1. City of Novi Regulated Wetland & Woodland Map
Figure 2. Wetland Locations Map
Site Photos

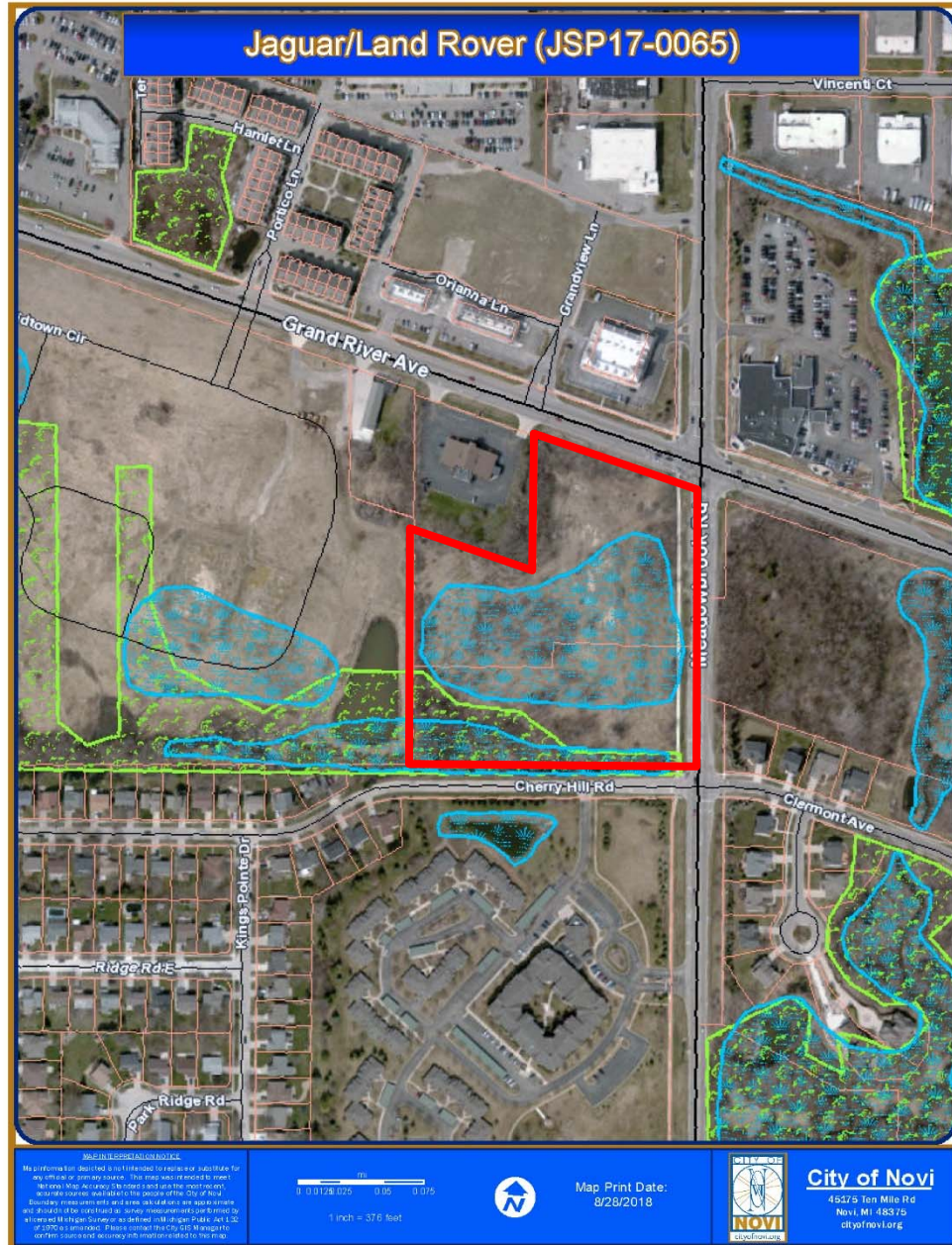


Figure 1. City of Novi Regulated Wetland & Woodland Map (approximate project boundary shown in red). Regulated Woodland areas are shown in green and Regulated Wetland areas are shown in blue.



Figure 2. Wetland Location Map (figure provided by Niswander Environmental).

Site Photos



Photo 1. Looking northeast towards Meadowbrook Road and Wetland Flags A-19 and A-20 (ECT, November 23, 2016).



Photo 2. Looking north at Wetland A near the southwest corner of the site (ECT, November 23, 2016).

WOODLANDS REVIEW



March 19, 2019
ECT No. 190160-0200

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

Re: Jaguar/Land Rover (JSP17-0065)
Woodland Review of the Preliminary & Final Site Plan (PSP19-0032)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the Preliminary & Final Site Plan for the proposed Jaguar/Land Rover project prepared by PEA, Inc. dated February 11, 2019 and stamped "Received" by the City of Novi Community Development Department on February 12, 2019 (Plan). The Plan was reviewed for conformance with the City of Novi Woodland Protection Ordinance Chapter 37.

ECT currently recommends approval of the Preliminary Site Plan for Woodlands contingent on the applicant satisfactorily addressing the items noted in the *Woodland Comments* Section of this letter prior to the City Council meeting. ECT recommends Final Site Plan denial for Woodlands with the condition that the items noted in the *Woodland Comments* Section of this letter are addressed with a Revised Final Site Plan Submittal.

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 west of Meadowbrook Road between Cherry Hill and Grand River Avenue in Section 23. The overall project site area is approximately 9.5 acres and is currently vacant (Parcels 22-23-251-018 and 22-23-251-019). Based on historic aerial photos, the majority of this site has been previously disturbed (cleared/graded) in the past. The project includes the construction of a 53,211 square foot automotive facility, associated parking areas and driveways, utilities as well as a storm water detention basin that appears to outlet to the City of Novi storm sewer system along Meadowbrook Road. Based on our review of the Plan, Novi aerial photos, Novi GIS, and the City of Novi Official Wetlands and Woodlands Maps (see Figure 1); it appears as if this proposed project site contains both City-Regulated Wetlands and Regulated Woodlands.

The purpose of the Woodlands Protection Ordinance is to:

2200 Commonwealth
Blvd., Suite 300
Ann Arbor, MI
48105

(734)
769-3004

FAX (734)
769-3164

- 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;*
- 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.*

As noted in the City's Woodlands Ordinance (Section 37-4, Applicability):

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 assessment that the existing woodland areas located on the subject site should all be considered regulated.

It should be noted that the purpose of the City of Novi Woodland Protection Ordinance (Chapter 37) 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;*
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 review of the woodland information provided on the Plan.

On-Site Woodland Evaluation

ECT has reviewed the City of Novi Official Woodlands Map and previously completed an on-site Woodland Evaluation on November 23, 2016. 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). The areas designated as City Regulated Woodlands are located in the southwest section of the site.

An existing tree survey has been completed for the site and a *Tree Preservation List* is included as Sheet T-1.1. This sheet identifies tree tag numbers, diameter-at-breast-height (DBH), common/botanical name, condition, and removal status. The applicant should include a column for woodland replacements required for the proposed tree removals in this list. In general, the on-site trees consist of eastern cottonwood (*Populus deltoides*), black locust (*Robinia pseudoacacia*), box elder (*Acer negundo*), black walnut (*Juglans nigra*), white willow (*Salix alba*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and silver maple (*Acer saccharinum*).

In terms of habitat quality and diversity of tree species, the overall subject site consists of trees in good condition. In terms of a scenic asset, wildlife habitat, windblock, noise buffer or other environmental asset, the forested areas located on the subject site appear to be considered to be of fair to good quality. There are a significant number of trees to be removed for the proposed development.

Proposed Woodland Impacts and Replacements

A review of the Plan (*Tree Preservation Plan & Tree Preservation List*) indicates the following:

- Total Trees Surveyed: 310
- Total Trees Removed: 150 (48% of total trees surveyed)

The *Tree Preservation Plan* (Sheet T-1.0) notes that **173** Woodland Replacement Tree credits are required and that a total of **173** on-site Woodland Replacement Tree credits are proposed with a mix of canopy (deciduous) trees and evergreen trees.

The Plan includes a *Tree Plant List* on the *Landscape Plan* (Sheet L-1.0), that lists the species of the proposed Woodland Replacement Trees; however it does not currently appear to specify the quantity of each species that will be used as Woodland Replacement tree credits in the table. The applicant should, for example, specify how many of the 25 hophornbeam listed in the list are Woodland Replacement Trees as opposed to Perimeter Parking Lot or Landscape trees, etc. ECT requests that the applicant provide the quantity of each species of tree being used as Woodland Replacement Credit in the 'Replacement Tree' column of the table.

All of the tree species proposed as Woodland Replacement Tree material appears to be acceptable per the City's Woodland Tree Replacement Chart, however, the applicant shall specify the thornless honeylocust (*Gleditsia triacanthos inermis*) on the Plan. It should also be noted that all deciduous replacement trees shall be two and one-half (2 ½) inches caliper or greater and count at a 1-to-1 replacement ratio. All coniferous replacement trees shall be 6-feet in height (minimum) and provide 1.5 trees-to-1 replacement credit

replacement ratio (i.e., each coniferous tree planted provides for 0.67 credits). The “upsizing” of Woodland Replacement trees for additional Woodland Replacement credit is not supported by the City of Novi. Finally, all proposed Woodland Replacement tree material shall meet the species requirements in the *Woodland Tree Replacement Chart* (attached).

The Woodland Replacement trees are proposed around the stormwater detention basin, along the west edge of the property. Previously, Woodland Replacement Trees were proposed near the loading zone, and within several parking lot islands. The location of those replacement trees in the parking lot islands and perhaps near the loading zone were not consistent with the intent of the Woodland Ordinance in mitigating for the loss of woodland tree canopy. In addition, it is not clear how those replacement trees would be protected in perpetuity through a landscape or woodland easement. The applicant has satisfactorily relocated those proposed Woodland Replacement Trees to other areas of the site that can more easily be placed into such an easement. The Ordinance states that the location of replacement trees shall be such as to provide the optimum enhancement, preservation and protection of woodland areas. Where woodland densities permit, tree relocation or replacement shall be within the same woodland areas as the removed trees. Such woodland replanting shall not be used for the landscaping requirements of the subdivision ordinance or the zoning landscaping, Section 2509. Where replacements are installed in a currently non-regulated woodland area on the project property, appropriate provision shall be made to guarantee that the replacement trees shall be preserved as planted, such as through a conservation or landscape easement to be granted to the city. Such easement or other provision shall be in a form acceptable to the city attorney and provide for the perpetual preservation of the replacement trees and related vegetation. The applicant is now demonstrating on the Plan that all proposed Woodland Replacement Trees will be guaranteed to be preserved as planted within a conservation easement or landscape easement to be granted to the City.

City of Novi Woodland Review Standards and Woodland Permit Requirements

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”.

A Woodland Permit from the City of Novi would be required for proposed impacts to any trees 8-inch diameter-at-breast-height (DBH) or greater located within those areas designated as Regulated Woodland Areas or impacts to any tree 36” DBH or greater regardless of location. Such trees shall be relocated or replaced by the permit grantee.

Woodland Comments

The following are repeat comments from our Woodland Review of the SDO Concept Plan (PSP18-0125) dated August 29, 2018. The current status of each comment follows in ***bold italics***. Please consider the following comments when preparing subsequent site plan submittals:

1. ECT encourages the Applicant to minimize impacts to on-site woodlands to the greatest extent practicable. Currently, the Plan proposes to remove **149** of the **310** surveyed trees (48% of the on-site regulated trees). The current required Woodland Replacement Credit quantity is **172** Woodland Replacement Credits.

This comment still applies. The Plan indicates the removal of 150 Regulated Trees requiring a total of 173 Woodland Replacement Credits. The current Plan does however propose to replace all required Woodland Replacement Credits through on-site planting of deciduous and coniferous tree plantings.

2. The Plan includes a *Tree Plant List* on Sheet T-1.0, that lists the species of the proposed Woodland Replacement Trees; however it does not currently appear to specify the quantity of each species that will be used as Woodland Replacement tree credits. The applicant should, for example, specify how many of the 28 hophornbeam listed in the list are Woodland Replacement Trees as opposed to Perimeter Parking Lot or Landscape trees, etc.

This comment still applies. The Tree List is included on Sheet L-1.0 (Landscape Plan). The applicant should, for example, specify how many of the 25 hophornbeam listed in the list are Woodland Replacement Trees as opposed to Perimeter Parking Lot or Landscape trees, etc. ECT requests that the applicant provide the quantity of each species of tree being used as Woodland Replacement Credit in the 'Replacement Tree' column of the table.

3. For trees proposed for removal, the Tree Plant List should include a column indicating the number of Woodland Replacement Credits Required.

This comment still applies. See Comment #2, above.

4. All of the tree species proposed as Woodland Replacement Tree material appears to be acceptable per the City's Woodland Tree Replacement Chart, however, the applicant shall specify the thornless honeylocust (*Gleditsia triacanthos inermis*) on the Plan.

This comment still applies.

5. A Woodland Permit from the City of Novi would be required for proposed impacts to any trees 8-inch diameter-at-breast-height (DBH) or greater and located within an area designated as City Regulated Woodland, or any tree 36-inches DBH regardless of location on the site. Such trees shall be relocated or replaced by the permit grantee. All deciduous replacement trees shall be two and one-half (2 ½) inches caliper or greater and count at a 1-to-1 replacement ratio and all coniferous replacement trees shall be six (6) feet in height (minimum) and count at a 1.5-to-1 replacement ratio. All Woodland Replacement trees shall be species that are listed on the City's Woodland Tree Replacement Chart (attached).

This comment still applies.

6. 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. Currently, the Woodland Replacement Performance Guarantee would be \$68,800 (172 Woodland Replacement Credits Required x \$400/Credit). Based on a successful inspection of the installed on-site Woodland Replacement trees, the original Woodland Financial Guarantee shall be returned to the Applicant. Twenty-five percent (25%) of the value of the Woodland Replacement material shall be kept for a period of 2-years after the successful inspection of the tree replacement installation as a *Woodland Maintenance and Guarantee Bond*. This *Woodland Maintenance and Guarantee Bond* value is to be \$17,200.

This comment still applies, however, currently the Woodland Replacement Performance Guarantee would be \$69,200 (173 Woodland Replacement Credits Required x \$400/Credit). The Woodland Maintenance and Guarantee Bond value will be \$17,300.

7. If applicable, Woodland 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*.

This comments still applies.

8. If applicable, 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 are proposed on-site that cannot be placed on-site at the time of landscaping.

This comment still applies.

9. The applicant currently proposes to provide 172 Woodland Replacement Credits on site. The Applicant shall provide preservation/conservation easements as directed by the City of Novi Community Development Department for any areas of woodland replacement trees. The applicant shall demonstrate that the all proposed woodland replacement trees 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. The applicant shall clearly indicate the proposed conservation easement boundaries on the Plan.

This comment still applies; however the applicant currently proposes to provide 173 Woodland Replacement Credits on-site. The applicant is now demonstrating on the Plan (Sheet C-6.1) that all proposed Woodland Replacement Trees will be guaranteed to be preserved as planted within a conservation easement or landscape easement to be granted to the City.

10. As noted, some of the proposed Woodland Replacement trees are within the parking lot or close to the proposed loading zone. The location of these trees is not consistent with the intent of the Woodland Ordinance in mitigating for the loss of woodland tree canopy. ECT suggests that these proposed Woodland Replacement Trees be relocated to another area of the site that can more easily be placed into a conservation easement.

This comment has been satisfactorily addressed.

Woodland Recommendation

ECT currently recommends approval of the Preliminary Site Plan for Woodlands contingent on the applicant satisfactorily addressing the items noted in the *Woodland Comments* Section of this letter prior to the City Council meeting. ECT recommends Final Site Plan denial for Woodlands with the condition that the items noted in the *Woodland Comments* Section of this letter are addressed with a Revised Final Site Plan Submittal.

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: Lindsay Bell, City of Novi Planner
Sri Komaragiri, City of Novi Planner
Rick Meader, City of Novi Landscape Architect
Hannah Smith, City of Novi Planning Assistant

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

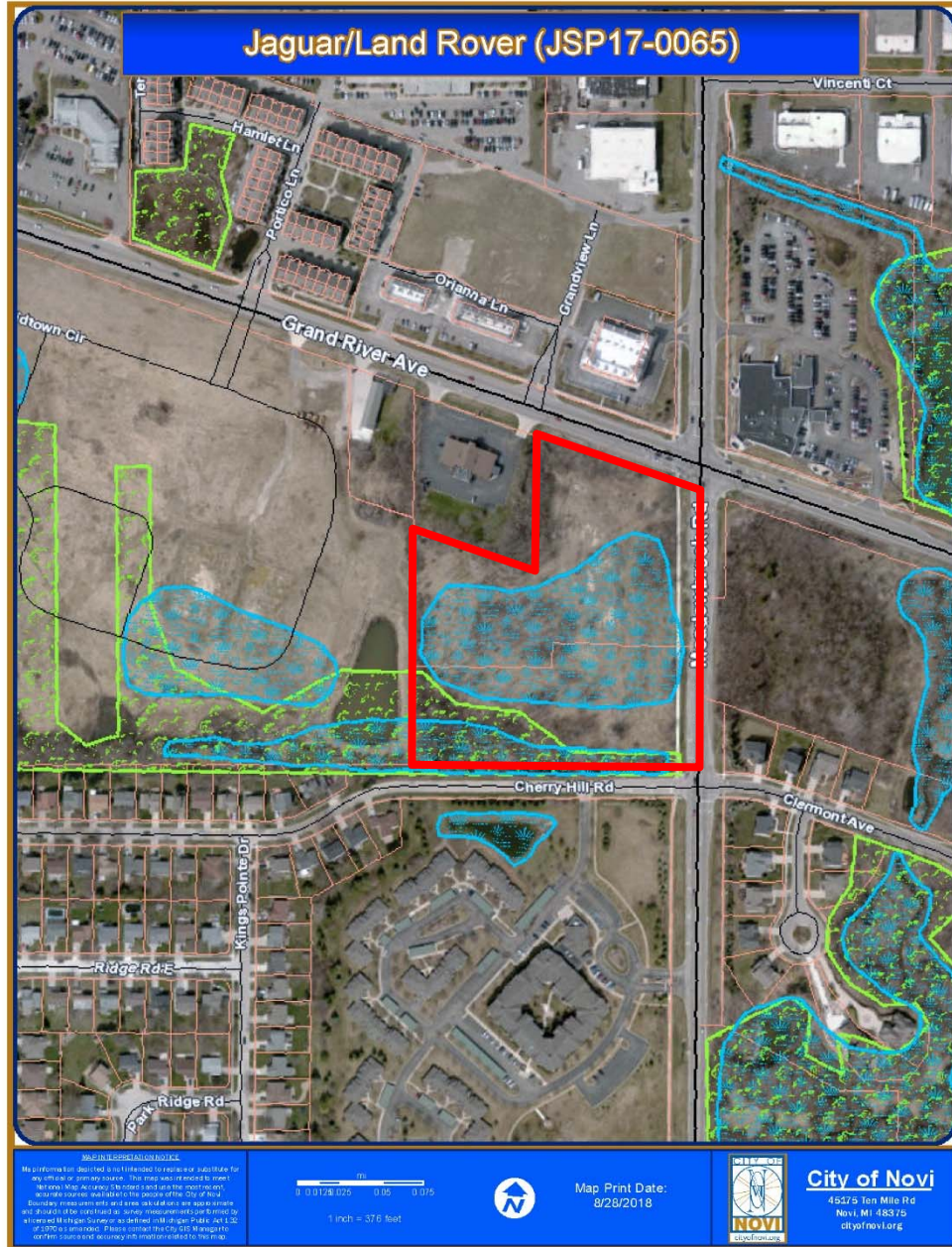


Figure 1. City of Novi Regulated Wetland & Woodland Map (approximate project boundary shown in red). Regulated Woodland areas are shown in green and Regulated Wetland areas are shown in blue.

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
Smooth Shadbush	Amelanchier laevis
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
Pagoda Dogwood	Cornus alternifolia
Flowering Dogwood	Cornus florida
American Beech	Fagus grandifolia
Thornless Honeylocust	Gleditsia triacanthos inermis
Kentucky Coffeetree	Gymnocladus dioica
Walnut	Juglans nigra or Juglans cinerea
Eastern Larch	Larix laricina
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_(1.5:1 ratio) (6' ht.)	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 Basswood	Tilia americana

Site Photos



Photo 1. Looking south at project site. Area of mapped Regulated Woodland is located along the southwest portion of the site (ECT, November 23, 2016).



Photo 2. Looking north at area of un-mapped woodland along the western portion of the project site (ECT, November 23, 2016).

TRAFFIC REVIEW



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

Project name:
 JSP17-0065 Jaguar/Land Rover Preliminary and
 Final Site Plan Traffic Review

From:
 AECOM

Date:
 March 22, 2019

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

CC:
 Sri Komaragiri, Lindsay Bell, George Melistas,
 Darcy Rechten, Hannah Smith, Kate Richardson

Memo

Subject: JSP17-0065 Jaguar/Land Rover Preliminary/Final Traffic Review

The preliminary and final site plan was reviewed to the level of detail provided and AECOM **recommends preliminary site plan approval** and **final site plan denial** 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, Erhard Motor Sales Inc., is proposing a Jaguar/Land Rover motor sales facility on the southwest corner of Meadowbrook Road and Grand River Avenue. The applicant is proposing a 53,211 square foot building that will include both sales and service areas.
 - a. The applicant should update site plans to be consistent with the building size. Both 53,211 and 58,663 are listed as building size on the plans.
2. Meadowbrook Road is under the jurisdiction of the City of Novi and Grand River Avenue is under the jurisdiction of the Road Commission for Oakland County.
3. The parcel is currently under NCC (Non-Center Commercial) and OS-1 (Office Service) Zoning. The applicant is proposing to re-zone the parcel to GE (Gateway East) zoning via a special development overlay (SDO).

TRAFFIC IMPACTS

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

ITE Code: 840 (Automobile Sales)
 Development-specific Quantity: 53,211 square feet gross floor area
 Zoning Change: NCC/OS-1 to GE

Trip Generation Summary				
	Estimated Trips	Estimated Peak-Direction Trips	City of Novi Threshold	Above Threshold?

AM Peak-Hour Trips	117	70	100	Yes
PM Peak-Hour Trips	100	73	100	No
Daily (One-Directional) Trips	1,495	N/A	750	Yes

1. Based on the City thresholds and the expected trips to be generated, the estimated trips do trigger the needs for a traffic impact study. The applicant has provided a TIS that was reviewed.
2. The applicant should refer to the TIS Review Letter for more specific comments regarding traffic.

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 one entrance from Grand River Avenue and one entrance from Meadowbrook Road.
2. The Grand River Avenue driveway is a right-in/one-way-out driveway proposed to be within the existing right turn lane along eastbound Grand River Avenue.
 - a. The driveway dimensions for width are in compliance with the City standards for this particular type of driveway and meet fire department requirements.
 - b. The entering and exiting radii are within the allowable range per Figure IX.2 from the City’s Code of Ordinances but could consider reducing to 20’ to meet the standard. Alternatively, because of the right-in/right-out design, the entering and exiting radii may need to deviate from the standard dimensions.
 - c. The applicant should dimension the right-in/right-out island on Grand River Avenue.**
3. The proposed Meadowbrook Road driveway is a two-way driveway. The width of 30 feet meets City standards and although the turning radii dimensions are within the allowable range, the applicant should consider increasing to 20 feet.
4. The Meadowbrook Road driveway is proposed at the current location of a right turn lane taper. The applicant is extending the right turn lane north of the site driveway so that it also acts as a right turn lane for the development. The applicant provided dimensions for the taper and turn lane that are within range of Figure IX.11 in the City’s Code of Ordinances. There is not an exiting taper due to the existing right turn lane for Cherry Hill Road.
5. The applicant provided sight distance at both driveways that are in accordance with Figure VIII-E in the City’s Code of Ordinances.

INTERNAL SITE OPERATIONS

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

1. General Traffic Flow
 - a. The applicant has provided large vehicle turning paths entering from Meadowbrook Road and exiting at Grand River Avenue. **The applicant should also include large vehicle delivery truck patterns into and out of the proposed loading zone.**
 - b. The City requires a loading zone totaling 10 square feet for each front foot of building. Reference section 5.4 of the City’s Zoning Ordinance for more information.
 - i. The applicant has provided a 2,465 S.F. loading zone located adjacent to the 10 visitor and ADA accessible parking at the main entrance to the building. There is a note stating that no long term delivery truck parking is allowed on site but **the applicant should consider revising that to not allow deliveries during normal business hours so that the trucks do not block those 10**

parking spaces. Per Section 5.4.2 the loading zone should “not have a disruptive effect on the safe and efficient flow of pedestrian and vehicular traffic within the site”. Alternatively, the parking space access and/or loading zone access may be revised.

- c. The proposed trash enclosure area is not expected to interfere with parking operations.
- d. The applicant has indicated that the intent of the proposed 13 foot wide access pathway near the Grand River Avenue driveway is to facilitate the movement of vehicles in and out of the showroom.

2. Parking Facilities

- a. As per the City’s Zoning Ordinance, the applicant is required to provide one parking space for each 200 square feet of usable floor area of sales room and one for every one auto service stall in the service room. The building information listed on sheet C-2.0 (and in the revised RTIS) is 58,663 S.F. where the label on the building plan on sheet C-2.0 is 53,211 S.F. The applicant should update the facility size to be consistent across all records.
 - i. **The applicant should review the parking calculations table and the parking space labels on the plans to ensure they are consistent.** For example the parking calculations table indicates 287 storage spaces, the plan label is 291 and the total counted is 290.
- b. The applicant has provided a total of 426 parking spaces.
 - i. It should be noted that the Novi City Council is currently reviewing an amendment to the Zoning Ordinance that limits the number of on-site parking spaces to 125 percent of the required parking. The amendment is expected to be approved prior to the Jaguar/Land Rover development being reviewed by the Planning Commission. Therefore, the applicant should accommodate for this amendment within their site plan or seek a special land use subject to Planning Commission approval.
 - ii. **Of the total 426 spaces provided, 138 of those are required for visitor, employee and service bay parking and there are only 136 shown. The applicant should designate (2) more spaces or a waiver may be required.**
 - iii. Five (5) barrier free parking spaces are required and five (5) are proposed with one (1) of those spaces being van accessible. The dimensions of these spaces are in compliance with ADA Standards for Accessible Design.
- c. The applicant has provided parking space lengths for parking spaces throughout the development. The applicant has proposed four inch curbs around the perimeter of the development, which require a parking space length of 17 feet. Please reference Section 5.3.2 of the City’s Zoning Ordinance for further clarification.
 - i. **It should also be noted that the note on sheet C-3.0 indicates four inch curbs while the detail on sheet C-8.0 indicates 6” curbs.**
 - ii. **The applicant should indicate that 6” curbs are required at the parking end islands.**
- d. **The applicant should provide the width of all aisles on the site to ensure compliance.**
- e. **The applicant should provide width dimensions for the proposed landscape islands, or indicate that the dimensions provided are typical throughout the site unless otherwise noted. The applicant has indicated that the landscape islands are 4.25’ shorter than the adjacent parking space, which does not meet the 3’ requirement. Also the 1.5’ radii does not meet the 2’ requirement. In some locations, the exterior radii is less than 15’ and should be increased to 15’. Please reference Section 5.3.12 for more information and update the plans to meet City standards.**
- f. The applicant is required to provide two (2) bicycle parking spaces for the service center section of the development and six (6) have been provided. A bicycle parking layout is shown on sheet C-3.0 but a **dimension for the width of the sidewalk should also be included.**
 - i. **The detail shown is for four (4) bicycle parking spaces and not the six (6) that the data table on sheet C3.0 states are provided.**
 - ii. The bike loop detail on sheet C-8.0 is in compliance with City standards.

3. Sidewalk Requirements

- a. The applicant has proposed an 8' sidewalk adjacent to Grand River Avenue in order to be in compliance with the City's Non-Motorized Master Plan.
- b. The proposed sidewalks throughout the site are generally in compliance with City standards; however, **additional dimensions are required for the sidewalks on the southeast side of the building.**
- c. The applicant has provided sidewalk connections from the site to the required sidewalks along Grand River Avenue and Meadowbrook Road.
- d. The applicant has provided sidewalk ramp and detectable warning surface locations and details.
- e. **The applicant should indicate the need for and intent of the proposed gray paver walkway on the site. The placement of such walkway is not ideal in that it is placed between the parking spaces and the end islands. The end islands should be relocated to be adjacent to the parking spaces.**

SIGNING AND STRIPING

1. All on-site signing and pavement markings shall be in compliance with the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). The following is a discussion of the proposed signing and striping.
 - a. The applicant has provided a signing layout, quantities table, and details.
 - b. The proposed stop sign (R1-1) should be 30" in size.
 - c. The applicant could consider adding a Keep Right (R4-7) and a No Left Turn (R3-2) sign in the island of the Grand River Avenue entrance. These signs are listed in the quantity table but are not labeled on the plans.
2. The applicant has provided pavement marking details for the ADA accessible parking but **should also indicate pavement marking details including color, dimensions and location throughout the site and entrances in future submittals.**
 - a. **The applicant could consider pavement markings for the pedestrian crossing at the Meadowbrook entrance.**

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

Sincerely,

AECOM



Patricia A. Thompson, EIT
Traffic Engineer



Josh A. Bocks, AICP, MBA
Senior Transportation Planner/Project Manager

TRAFFIC STUDY REVIEW



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

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

Project name:
JSP17-0065 Jaguar Traffic Impact Study Review
Letter
From:
AECOM

Date:
March 22, 2019

CC:
Sri Komaragiri, Lindsay Bell, George Melistas, Darcy
Rechtien, Hannah Smith, Kate Richardson

Memo

Subject: JSP17-0065 Jaguar Traffic Impact Study Review Letter

The traffic impact study (TIS) for the proposed Jaguar Land Rover Dealership was reviewed to the level of detail provided and AECOM **recommends approval** of the TIS as long as comments provided below are adequately addressed to the satisfaction of the City at the time of the Final Site Plan.

GENERAL COMMENTS

1. The remainder of the memo will provide comments on a section-by-section basis following the format of the submitted report.

PROJECT SETTING

1. The applicant identified two (2) signalized and one (1) unsignalized intersections as being within the area of study and of interest to the project.
2. Existing traffic volumes were collected by Traffic Data Collection, LLC, on Tuesday, September 12th, 2017. All three intersections of interest were counted for volume and turning movements.
3. AM peak period was determined to be 7:00 AM to 9:00 AM. PM peak was determined to be 4:00 PM to 6:00 PM.

PROPOSED ACTION

1. The proposed development is a 58,663 SF Jaguar Land Rover Dealership. The study, however, was conducted for a 53,211 BMW Dealership which has since changed to the Jaguar Land Rover Dealership.

TRIP GENERATION

1. The applicant conducted the analysis using the ITE Trip Generation Manual, 9th Edition. This should be updated to utilize the 10th Edition.

TRAFFIC VOLUMES

1. Existing traffic volumes for the 2018 'No-Build' condition were taken from the data collected on September 12th, 2017 and grown based on SEMCOG growth estimates from analysis based on data from 2011 to 2016.
2. The applicant used the vehicle trips that would be generated by the proposed development and assigned them to the study road network based on existing peak hour traffic patterns, local population densities, the proposed site plan, and the methodologies published by ITE.
3. The applicant included figures for both the No-Build 2018 traffic volumes and the Build 2028 traffic volumes in the appendix.
4. The applicant also included a single background development identified near the study area known as Brooktown Apartments. Data for this development was entered into the network. This data was based on a study completed in 2014.

TRAFFIC ANALYSIS

1. The applicant conducted an HCM analysis on each intersection for the No-Build and Build scenarios in Synchro.
2. At the intersection of Grand River and Meadowbrook most turning movements/approaches operate at acceptable LOS for both AM and PM peaks, with the exception of the northbound left turn and northbound approach, which operates at LOS E in both peak periods for both the No-Build and Build conditions as does the southbound approach for the PM peak. The applicant notes that the movement likely does not operate as poorly as shown, due to the adaptive operations at the signal.
3. At the intersection of Meadowbrook and Cherry Hill the eastbound and westbound movements in both peak periods operate at a LOS E
4. The applicant notes that on Grand River Avenue, EB vehicle queues from Grand River Avenue & Meadowbrook Road will block the proposed site driveway location for approximately 10 minutes of the peak periods which justifies the need for it to be a right-in / right-out only driveway.
5. The applicant notes that a deceleration lane will be needed as part of the mitigation process.

SUMMARY AND RECOMMENDATIONS

1. The applicant should update the study with newer traffic counts and work with the City's traffic consultant, AECOM, to include more background development assumptions and to develop an agreed upon methodology and scope.
2. The applicant should update the size of the development in their analysis.
3. The applicant should update the version of the ITE Trip Generation Manual used in their calculations.

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

Sincerely,

AECOM



Patricia A. Thompson, EIT
Traffic Engineer



AECOM

Memo

Josh A. Bocks, AICP, MBA
Senior Transportation Planner/Project Manager

FAÇADE REVIEW



March 14, 2019

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

Façade Review Status Summary:
Approved; consistent with prior approvals.

Re: **FACADE ORDINANCE REVIEW – Preliminary and Final Site Plan**
Jaguar / Land Rover, SDO Concept Plan, JSP17-65
 Façade Region: 1, Zoning District: B-3, GE

Dear Ms. McBeth;

The following is the Façade Review for revisions to the Jaguar / land Rover Building. This review is based on the drawings prepared by Rogvoy Architects, dated 2/11/19. The percentage of materials on each elevation is shown in the table below. Materials in non-compliance, if any, are highlighted in bold.

	North (Grand River)	East (Meadowbrook)	South	West	Façade Ordinance Section 2520 Maximum
Brick (Endicott, Manganese Ironspot)	26%	26%	44%	69%	100% (30% Minimum)
Flat Metal Panels (Alubond, Champaign Metalic and Sunshine Grey)	57%	56%	39%	13%	50% (Footnote 9)
Horizontal Rib Metal Panels (Roof Screens)	17%	18%	17%	18%	0%

Recommendation – As shown above the parentages of façade materials have changed slightly but remain consistent with deviations from the Façade Ordinance previously approved by the City Council during their meeting on January 7, 2019. The drawings are also consistent with the SDO Agreement and concept approved by the City Council at that time.

Notes to the Applicant:

1. It should be noted that all proposed signs are not regulated by the Façade Ordinance and must comply with the City’s Sign Ordinance.
2. Inspections – The Façade Ordinance requires inspection(s) for all projects. Materials displayed on the approved sample board (in this case the adjacent existing material) will be compared to materials to be installed. 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 review, please do not hesitate to call.

Sincerely,
DRN & Architects PC



Douglas R. Necci, AIA

Attachment: sample board



Exterior Finish Materials				
Mark	Material	Location	Manufacturer	Color
A	Horizontal Metal Cladding Rooftop Screening	Rooftop Units	Pac Clad	Silver
B	Utility Brick	Main Building Wall	Brick Tech	BTA ECF Manganese Smooth
C	Metal Panels	Main Building Wall	Alubond	Sunshine Grey
D	Metal Panels	Main Building Wall	Alubond	Champagne

FIRE REVIEW



February 22, 2019

TO: Barbara McBeth- City Planner
Sri Ravali Komaragiri- Plan Review Center
Lindsay Bell-Plan Review Center
Hannah Smith-Planning Assistant

CITY COUNCIL

Mayor
Bob Gatt

Mayor Pro Tem
Dave Staudt

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Laura Marie Casey

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Director of EMS/Fire Operations
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Assistant Chief of Police
Erick W. Zinser

Assistant Chief of Police
Scott R. Baetens

RE: Jaguar/Land Rover

PSP# 19-0032

PSP# 18-0125

Project Description:

Build 53,211 S.Q.F.T. single story structure on the south west corner of Grand River and Meadowbrook.

Comments:

- **All** fire hydrants **MUST** in installed and operational prior to any building construction begins.
- A hazardous chemical survey is required to be submitted to the Planning & Community Development Department for distribution to the Fire Department at the time any Preliminary Site Plan is submitted for review and approval. Definitions of chemical types can be obtained from the Fire Department at (248) 735-5674.
- **All** roads **MUST** meet City of Novi weight requirements of 35 ton. (**Novi City Ordinance 15-17 503.2.3**).

Recommendation:

APPROVED WITH CONDITIONS

Sincerely,

A handwritten signature in black ink, appearing to read "KSP", with a long horizontal stroke extending to the right.

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

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

cityofnovi.org

cc: file

**PLANNING COMMISSION MEETING MINUTES
November 08, 2017
REZONING REQUEST**

REGULAR MEETING - PLANNING COMMISSION

CITY OF NOVI

November 8, 2017

Proceedings taken in the matter of the PLANNING COMMISSION, at City of Novi, 45175 West Ten Mile Road, Novi, Michigan, on Wednesday, November 8, 2017.

BOARD MEMBERS

Mark Pehrson, Chairperson

David Greco

Tony Anthony

John Avdoulos

Michael Lynch

Ted Zuchlewski

ALSO PRESENT:

Barbara, McBeth, City Planner

Elizabeth Saarela, City Attorney

Rick Meader, Landscape Architect

Sri Komaragiri, Planner

Darcy Rechtien, Plan Review Engineer

Certified Shorthand Reporter, Diane Szach

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Novi, Michigan.
Wednesday, November 8, 2017
7:00 p.m.

** ** *

CHAIRPERSON PEHRSON: I'd like to call to order the regular Planning Commission meeting of November 8th 2017. Sri, can you call the roll, please.

MS. KOMARAGIRI: Good evening.
Member Anthony?

MR. ANTHONY: Here.

MS. KOMARAGIRI: Member Avdoulos?

MR. AVDOULOS: Here.

MS. KOMARAGIRI: Member Greco?

MR. GRECO: Here.

MS. KOMARAGIRI: Member Lynch?

MR. LYNCH: Here.

MS. KOMARAGIRI: Chair Pehrson?

CHAIR PEHRSON: Here.

MS. KOMARAGIRI: Member Zuchlewski?

MR. ZUCHLEWSKI: Here.

CHAIR PEHRSON: With that, if we could rise for the Pledge of Allegiance.

(Pledge recited.)

CHAIR PEHRSON: Thank you. Look

1 for a motion to approve or amend the agenda.

2 MR. LYNCH: Motion to approve.

3 MR. ANTHONY: Second.

4 CHAIR PEHRSON: A motion and a
5 second. All those in favor?

6 THE BOARD: Aye.

7 CHAIR PEHRSON: Anyone opposed?

8 We have an agenda.

9 We have several audience
10 participations on the agenda today. We've come to the
11 first one. If you're here and wish to speak to the
12 Planning Commission on something other than one of the
13 matters for public hearing, please step forward at
14 this time.

15 Please come to the podium, state
16 your name and address, and you'll have three minutes
17 to be heard.

18 MR. MIGRIN: Good evening. My name
19 is Karl, K-a-r-l, last name Migrin, M-i-g-r-i-n. I
20 live at 49450 West Nine Mile Road, Novi, Michigan. I
21 just have a question more than anything. I noticed in
22 past public hearings when the residents submit their
23 comment sheets, the secretary doesn't always have the
24 time to read all the comments, and I can understand
25 for time sake that would take a lot of your time to

1 read all the comments. They are public records once
2 they are mailed to the Planning Commission and the
3 City. I'm wondering if there's any way that they
4 could be -- that the staff could scan in those
5 documents and put them as an attachment to the meeting
6 minutes, because when you read the meeting minutes,
7 there is no comments or no -- from any of the
8 residents on the response form, and it's pretty easy
9 just to scan them all in and put them as an attachment
10 to the meeting minutes.

11 CHAIR PEHRSON: Okay.

12 MR. MIGRIN: Thank you.

13 CHAIR PEHRSON: Ms. McBeth, can you
14 maybe enlighten us? Is that --

15 MS. MCBETH: We will look into
16 that. There are certain protocols for the minutes,
17 and so we will see what we can do to share that
18 information.

19 CHAIR PEHRSON: Thank you. Anyone
20 else?

21 With that we'll close the first
22 audience participation.

23 Correspondence?

24 MR. LYNCH: Just for the public
25 hearings.

1 CHAIR PEHRSON: Committee reports?
2 City Planner Report? Ms. McBeth.

3 MS. MCBETH: Thank you. Good
4 Evening. Nothing to report.

5 CHAIR PEHRSON: Very well. We'll
6 go to our first public hearing. Item Number 1 is
7 Erhard BMW of Novi Zoning Map Amendment 18.719. It's
8 a public hearing at the request of Rogvoy Architect,
9 P.C., for Planning Commission's recommendation to City
10 Council for a Zoning Map amendment from NCC
11 (Non-Center Commercial) and OS-1 (Office Service) to
12 GE (Gateway East). The subject property is comprised
13 of two parcels totaling 9.48 acres and it is located
14 on the southwest corner of Grand River Avenue and
15 Meadowbrook Road in Section 23.

16 Sri, good evening.

17 MS. KOMARAGIRI: Thank you. The
18 subject property is located at the southwest corner of
19 Grand River Avenue and Meadowbrook Road. The
20 development area is comprised of two parcels as
21 mentioned earlier. The northern parcel is zoned NCC
22 (Non-Center Commercial), and the southern parcel is
23 zoned OS-1 (Office Service.) The property is
24 identified as TC Gateway on our Future Land Use Map.
25 The applicant is requesting to rezone the property to

1 Gateway East, which is supported by the future land
2 use map recommendation.

3 A pre-application meeting was held
4 for the proposed development on October 3, 2017. At
5 that time staff recommended the applicant to apply for
6 a straight rezoning. If the rezoning is approved, the
7 applicant intends to propose an auto car dealership
8 and a service center for BMW at that location, which
9 could be considered as a Special Development Option in
10 the GE District. As this is not a PRO (Planned
11 Rezoning Overlay), the applicant is not bound to
12 develop a specific plan until after the rezoning has
13 been approved.

14 The property consists of some
15 regulated wetlands and woodlands. The wetland is
16 associated with a drain that runs from west to east
17 along the south side of the site and appears to drain
18 to Bishop Creek located east of Meadowbrook Road. The
19 mapped regulated woodland areas are indicated along
20 the southern section of the site. The applicant is
21 working with the City staff to determine the exact
22 boundaries for wetlands and provide an accurate tree
23 survey at the time of preliminary site plan.

24 The City's traffic consultants
25 reviewed rezoning traffic steady provided by the

1 applicant and indicated that the proposed use of an
2 auto dealership is projected to produce 2,638 fewer
3 trips than the existing zoning would allow per day.
4 It also produces 11 and 15 additional peak-hour trips,
5 respectively for A.M./P.M, than the maximum allowable
6 density for land-uses under the existing zoning.
7 Traffic requested that the applicant should perform a
8 full-scale Traffic Impact Study at the time of
9 Preliminary Site Plan submittal due to the projected
10 increase in peak hour trips.

11 Staff recommends approval of the
12 rezoning request for reasons stated in the review
13 letter and also as it is consistent with Future Land
14 Use map recommendations. Our traffic consultant
15 Sterling Frazier and our wetland consultant Pete Hill
16 are here if you have any questions in that regard.
17 The Planning Commission is asked tonight to hold a
18 public hearing and make a recommendation to City
19 Council.

20 The applicant Ken Widerstedt is
21 here with his architect Mark Drane if you have any
22 questions for them. Thank you.

23 CHAIR PEHRSON: Thank you. Does
24 the applicant wish to address the Planning Commission
25 at this time?

1 MR. DRANE: Good evening. My name
2 is Mark Drane. I'm with Rogvoy Architects. My
3 address is 32500 Telegraph Road, Suite 250, Bingham
4 Farms, Michigan. And I think Sri did a very nice job
5 outlining our proposal and I'm here with Ken to answer
6 any questions.

7 CHAIR PEHRSON: Very good. This is
8 a public hearing. If there's anyone in the audience
9 that wishes to address the Planning Commission at this
10 time, please step forward on this matter.

11 Seeing no one, I think we have some
12 correspondence.

13 MR. LYNCH: Yes, we do. I
14 summarized all three of the objections, and they're
15 primarily concerned about traffic and de-valuation of
16 the property values. The first one is an objection
17 from Jimmie Cranford, Jr., 24963 Bloomfield Court,
18 Novi. Jacob C. Oommen, 41336 Clermont Avenue, Novi.
19 And then Kristie J. Block, 41252 Clermont Avenue in
20 Novi. I have one support from a Joe Haddad, 41490
21 Grand River Avenue in Novi.

22 CHAIR PEHRSON: Thank you. With
23 that we'll close the public hearing on this matter and
24 turn it over to the Planning Commission for your
25 consideration.

1 Member Anthony.

2 MR. ANTHONY: Thank you. You know,
3 this is really two parcels when you look at this, and
4 the top parcel, which is the corner of Grand River and
5 Meadowbrook, you know, it makes sense being consistent
6 with the Future Land Use Plan and there being a type
7 of commercial or retail there. That portion of the
8 property I really don't have a problem with this
9 request on the rezoning. Where I really start to
10 question it and I struggle with a little bit is on the
11 portion that's the OS-1. And part of why I question
12 that is when you take a look at that neighborhood, for
13 instance the neighborhood for Cherryhill, you can see
14 that -- you know, and we've run into this in some
15 other projects as well, is that whenever we look at
16 single-family neighborhoods, we like to have a buffer
17 around us, and that buffer being a multi-family, being
18 office, single-story office with similar roofs. And
19 so when I look at this area and I see that we have on
20 Cherryhill single family, and I look at how the buffer
21 has been working, other than what really pre-existed
22 quite a while ago over towards the railroad tracks
23 where you have some industrial, we've done a good job
24 of doing a buffering zone. If you were able to look
25 at an aerial, you'd see towards the north of that

1 neighborhood we have multi-family, and we see that
2 behind the main street area, again followed by
3 multi-family, condo, apartments. We just approved
4 another multi-family right on Grand River, which is a
5 nice apartment complex, roofs are matching the theme,
6 they're going with that. But now you take the next
7 step over, and that OS-1 really provides a buffer and
8 it continues that buffer for those neighborhoods, both
9 the neighborhoods on the Cherryhill side and on the
10 Clermont side. And with an office space, if you look
11 at some of the single nearby offices that were
12 approved near there, you know, they have similar
13 roofs, they really do look like they conform.

14 When we look at -- when we look at
15 a dealership, I think when we look at the front of it
16 we think of it from Grand River and we think, okay,
17 you know, from the front of, Grand River, it fits, it
18 conforms with what we have on Grand River. But if you
19 now go to the back side and you look at that,
20 dealerships are traditionally a large parking lot that
21 is filled with cars. That really seems to be a
22 dramatic departure from what we're seeing. Even in
23 Meadowbrook Commons you have common roof patterns that
24 match the residential neighborhoods. The parking lot
25 areas, and they're substantial parking lot, but yet

1 they're low intensity, they're integrated with a park
2 like setting. It's not this high density area. And
3 so you really see more of a -- you get the feeling of
4 a mixed use that is walkable. And now when you
5 integrate the high density parking lot that occurs on
6 the OS-1 portion of the property, it really seems to
7 be a dramatic departure and nonconforming from that
8 area.

9 And I also think back to about a
10 month ago we were looking at trying to help a
11 transition between industrial-zoned property and
12 single-family residential, and we really looked at
13 trying to grab on to what ordinances that the zoning
14 allowed us to use when we created that buffer, and I
15 think we did the best we could considering that. But
16 that was because we were absent of any zoning buffer
17 that would have been between a higher intense use and
18 neighborhoods. And here my reluctance is that in
19 removing the OS-1, we are removing that buffer and
20 we're removing that transition zone. And when we do
21 that, we're always talk about property rights. And we
22 talk about property rights that we have to function
23 within that. My concern is that if we remove that
24 OS-1, we're not considering the rights and reasonable
25 expectations of all of the people, whether they're the

1 people that live there in the multi-family or in the
2 single-family. So I'm very hesitant in approving the
3 change on the OS-1 portion.

4 CHAIR PEHRSON: Thank you. Anyone
5 else?

6 Member Avdoulos.

7 MR. AVDOULOS: I had similar
8 concerns, especially that piece of the property, the
9 rear piece let's say, the OS-1, and then across the
10 street where the residential, if you took that
11 property line and you line it up, you know, it's at
12 the halfway point. And I'm looking at an aerial I
13 guess that a little better depicted. It's on one of
14 the write-ups, I think it's Page 4 of 5, and it's
15 right next to where it says Natural Features. But you
16 could see the R-2 development below that.

17 And if I could ask a question of
18 the architect. I know that there is no concept plan,
19 but if you were to do a layout of this, would we
20 basically have a building up front on Grand River, and
21 the rear would be parking, and then do we know like
22 that corner piece as it shows here, I don't know if
23 that's a wetland that would also act as a buffer to
24 the residential.

25 MR. DRANE: I think the answer to

1 all of those questions are yes. And we do have a
2 concept plan. But I think the answer is that there is
3 a wetland and a buffer, a natural buffer there
4 already. The grade slopes down from high to low from
5 Grand River down to, I'm sorry, I don't know what the
6 back street there is.

7 CHAIR PEHRSON: Cherryhill.

8 MR. DRANE: Cherryhill. And our
9 plan, our concept plan doesn't have any development
10 within from the Cherryhill property line going north
11 125 feet. We have all open area. It's going to be
12 stormwater management, wetlands and landscape
13 buffering.

14 MR. AVDOULOS: Okay.

15 MR. DRANE: So the land itself
16 really has its own natural buffer. And I do
17 understand about having that zoning buffer, but our
18 plan doesn't have any buildings back there. Like you
19 said, it's low intensity parking.

20 MR. AVDOULOS: And I thank you for
21 that. I had the same concerns. I drove by there and
22 then I saw that when I was there and then looking at
23 the plan. And then transitioning from that piece of
24 property to the, you know, multi-use property, you
25 know, I don't feel it's going to be that detrimental.

1 I think it follows with the master plan, you know, for
2 land use for the concept of what we're trying to do
3 for that Gateway East area of the city.

4 So I do have the same concerns, but
5 I think it's appropriate rezoning, and for the fact
6 that when it comes in, we could look if the buffer
7 there is going to be appropriate or if we need to
8 enhance anything.

9 MR. DRANE: Yes. And I apologize,
10 I didn't answer all of your questions. The building
11 is at the corner with zero lot lines and landscape
12 buffering, but it's very similar frontage as the
13 Cadillac dealership.

14 MR. AVDOULOS: Right. Okay. Those
15 are my questions.

16 CHAIR PEHRSON: Thank you, sir.

17 Member Lynch.

18 MR. LYNCH: Something very quick.
19 You know, before we -- if we were to change this from
20 OS-1 to what you're requesting, what guarantee do we
21 have that, you know, you're going to maintain. I do
22 agree that there really has to be a transition there,
23 and since we're taking the office transition off,
24 there has to be some sort of buffer to block the
25 lights, block the view of the parking lot, things like

1 that. 125 feet, you know, sounds like a lot as long
2 as it has foliage in it. I mean, I don't know that we
3 have -- I mean, what right --

4 CHAIR PEHRSON: We would have a
5 plan to review and approve at that point in time.

6 MR. LYNCH: So we would -- we're
7 not under any --

8 CHAIR PEHRSON: No.

9 MR. ANTHONY: Is there a way to put
10 in there an expectation so that it's known that
11 when --

12 CHAIR PEHRSON: We're doing that
13 right now. Absolutely.

14 MR. LYNCH: Okay. So by approving
15 this, we're putting in the expectation that there is
16 going to be a significant transition?

17 CHAIR PEHRSON: They still have to
18 come before us for the plan.

19 MR. LYNCH: Thank you.

20 CHAIR PEHRSON: Member Zuchlewski.

21 MR. ZUCHLEWSKI: I have a question
22 for Barb. Barb, the OS-1 that we're discussing now,
23 what has been the development community? What kind of
24 interest has there been in this property for the last
25 30 years?

1 MS. MCBETH: So through the chair.

2 MR. ZUCHLEWSKI: I mean, has
3 anybody come to us and said, well, we want that piece,
4 that OS-1, and if it stays OS-1, and, you know,
5 somehow Cadillac says, well, we can make or BMW says
6 we can make this work just for conversation, doesn't
7 that OS-1 property, doesn't that become more of a
8 secondary site, and isn't that going to be kind of
9 like the Peachtree site that we're struggling with now
10 not having any exposure, you know, just being buried
11 in effect? And the chance of us having anything else
12 go there, you know, is the chance that great that we
13 have people that want to go on a secondary site like
14 that? Is that going to stay like that for -- I mean,
15 in your opinion? Well, is there any interest in it?

16 MS. MCBETH: So through the chair.
17 In my 16 years as being with the City of Novi, I've
18 known the property owner who owns both parcels who has
19 expressed various interest over the years, but never
20 really taken any action. When the Huntley Manor
21 project came in, at the beginning there was thought
22 they might join forces and do a development together,
23 and that didn't happen for whatever reason.

24 So I think with the property with
25 the split zoning like that doesn't really offer a

1 substantial area for any particular development, and
2 you're right, with the frontage on Meadowbrook Road it
3 wouldn't be as attractive as something on Grand River.

4 MR. ZUCHLEWSKI: Thank you.

5 CHAIR PEHRSON: Just my two cents.
6 I agree with everyone's thoughts, and I hope you get
7 the sense of where we're leaning to. I have no issue
8 taking both lots and changing the zoning, because it
9 does fit exactly what I think the master plan was
10 looking for. And I think the expectation of anything
11 that comes back to us would be scrutinized very
12 diligently relative to that buffer that's trying to be
13 between Cherryhill and the dealership. So that's my
14 two cents.

15 Member Greco.

16 MR. GRECO: Very good. With all of
17 those comments, which I agree with for the most part,
18 I would like to make a motion. In the matter of the
19 request of Erhard BMW of Novi for Zoning Map Amendment
20 18.719, motion to recommend approval to City Council
21 to rezone the subject property from NCC, Non-Center
22 Commercial, and OS-1, Office Service, to GE, Gateway
23 East, for the reasons set forth on the motion sheet,
24 with the understanding that the applicant will be
25 submitting plans and will be going through a review

1 for what the Planning Commission will be expecting at
2 that time.

3 MR. AVDOULOS: Second.

4 CHAIR PEHRSON: We have a motion by
5 Member Greco, second by Member Avdoulos. Any other
6 comments?

7 Sri, can you call the roll, please.

8 MS. KOMARAGIRI: Member Lynch?

9 MR. LYNCH: Yes.

10 MS. KOMARAGIRI: Chair Pehrson?

11 CHAIR PEHRSON: Yes.

12 MS. KOMARAGIRI: Member Zuchlewski?

13 MR. ZUCHLEWSKI: Yes.

14 MS. KOMARAGIRI: Member Anthony?

15 MR. ANTHONY: No.

16 MS. KOMARAGIRI: Member Avdoulos?

17 MR. AVDOULOS: Yes.

18 MS. KOMARAGIRI: Motion passes 4 to

19 1.

20 CHAIR PEHRSON: Thank you.

21 MS. KOMARAGIRI: Oh, Member Greco.

22 MR. GRECO: Yes.

23 CHAIR PEHRSON: Don't want to leave
24 him out. He made a wonderful motion.

25 MS. KOMARAGIRI: Motion passes 5 to

PLANNING COMMISSION MEETING MINUTES EXCERPT
September 26, 2018
SDO CONCEPT PLAN



PLANNING COMMISSION MINUTES

CITY OF NOVI

Regular Meeting

September 26, 2018 7:00 PM

Council Chambers | Novi Civic Center

45175 W. Ten Mile (248) 347-0475

CALL TO ORDER

The meeting was called to order at 7:00 PM.

ROLL CALL

Present: Member Avdoulos, Member Greco, Member Lynch, Member Maday, Chair Pehrson

Absent: Member Anthony (excused)

Also Present: Barbara McBeth, City Planner; Sri Komaragiri, Planner; Lindsay Bell, Planner; Darcy Rechten, Staff Engineer; Rick Meader, Landscape Architect; Thomas Schultz, City Attorney; Peter Hill, Environmental Consultant; Maureen Peters, Traffic Consultant; Doug Necci, Façade Consultant

PLEDGE OF ALLEGIANCE

Member Avdoulos led the meeting attendees in the recitation of the Pledge of Allegiance.

APPROVAL OF AGENDA

Moved by Member Lynch and seconded by Member Avdoulos.

VOICE VOTE TO APPROVE THE SEPTEMBER 26, 2018 AGENDA MOTION MADE BY MEMBER LYNCH AND SECONDED BY MEMBER AVDOULOS.

Motion to approve the September 26, 2018 Planning Commission Agenda. Motion carried 5-0.

AUDIENCE PARTICIPATION

Nobody in the audience wished to speak.

CORRESPONDENCE

There was no correspondence.

COMMITTEE REPORTS

There were no Committee Reports.

CITY PLANNER REPORT

City Planner McBeth said there were a couple of items that City Council considered on Monday. The City Council granted tentative approval for the Zoning Map Amendment and Planned Rezoning Overlay agreement for the Adell Center, which is proposed for 21 acres located south of I-96 and west of Novi Road. We expect that that matter will return to

- d. Waiver for driveway spacing of 140 feet from the driveway to the east, where 230 feet is required, *which is hereby granted because of constraints on the site and in the Twelve Mile right-of-way;*
- e. The conditions and items listed in the staff and consultant review letters being addressed on the Final Site Plan.

This motion is made because the plan is otherwise in compliance with the Article 3, Article 4 and Article 5 of the Zoning Ordinance and all other applicable provisions of the Ordinance. *Motion carried 5-0.*

ROLL CALL VOTE TO APPROVE WETLAND PERMIT MOTION MADE BY MEMBER LYNCH AND SECONDED BY MEMBER AVDOULOS.

In the matter of Fountain View AKA Stoneridge West II, JSP 18-30, motion to approve the Wetland Permit based on and subject to 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. This motion is made because the plan is otherwise in compliance with Chapter 12, Article V of the Code of Ordinances and all other applicable provisions of the Ordinance. *Motion carried 5-0.*

ROLL CALL VOTE TO APPROVE STORMWATER MANAGEMENT PLAN MOTION MADE BY MEMBER LYNCH AND SECONDED BY MEMBER AVDOULOS.

In the matter of Fountain View AKA Stoneridge West II, JSP 18-30, motion to approve the Stormwater Management Plan based on and subject to 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. 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. *Motion carried 5-0.*

3. JAGUAR LAND ROVER JSP17-65

Public Hearing at the request of Erhard Motor Sales, Inc. for Planning Commission's recommendation to City Council for consideration of a Special Development Option Concept Plan in the GE, Gateway East zoning district. The subject property is comprised of two parcels totaling 9.48 acres. It is located on the southwest corner of Grand River Avenue and Meadowbrook Road in section 23. The applicant is proposing to build a 58,663 square feet car sales facility for Jaguar Land Rover. The concept plan proposes 138 parking spaces and 287 parking spaces for storing cars for sale.

Planner Komaragiri said as some of you may be aware, the subject property was rezoned from Non-Center Commercial, NCC, and Office Service, OS-1, districts to Gateway East, GE, at the December 4, 2017 City Council meeting. The applicant is now proposing to use the Special Development Option available under Gateway East zoning to propose an auto car dealership.

The subject property is located at the "entry" area of the Gateway East District, since it is located on one of the four properties at the intersection of Grand River and Meadowbrook. The SDO option allows a non-residential use permitted elsewhere in the Ordinance, but not otherwise permitted in the GE District for one of these properties,

subject to City Council's approval based on Planning Commission's recommendation.

The property is now currently zoned to Gateway East and is bordered by Gateway East to the west, Multiple Family RM-2 to the south, Single Family Residential and OS-1 Office service to the east and Non-Center Commercial to the west and north across Grand River Avenue. Except for the property to the east, all other properties are currently developed or under construction. The Future Land Use map recommends residential land uses to the south and Town Center Gateway district on all other sides.

The Plan indicates one area of wetland on this site located along the southern boundary of the subject site. The current plan is not proposing any impacts to the existing wetlands on site. Regulated woodlands are located in the southwest section of the site. This map is slightly misleading – it shows wetlands in the middle of the property, but they are essentially located to the south.

The subject property is comprised of two parcels totaling 9.48 acres. The applicant is proposing to build a 58,663 square feet car sales facility for Jaguar Land Rover. The proposed facility includes sales and service area located in the southwest corner of the building and also proposes 138 parking spaces for employee and visitors, and 287 parking spaces for storing cars for sale.

At the time of consideration of the rezoning request, the Planning Commission noted that the applicant should maintain a reasonable buffer between the parking lot and the residential uses to the south. A storm water pond is proposed on the south side that also acts a buffer from the residential use on south side of Cherry Hill Road. The site has access from both Meadowbrook Road and Grand River Avenue.

As mentioned before, there are no impacts proposed to the wetlands but there are some impacts proposed within the 25 foot buffer. A total of 149 regulated trees are proposed to be removed, which accounts for up to 48 percent of trees on site. About 172 replacements trees are required, which are proposed to be planted on site at this moment. The Woodland Replacement trees are proposed around the stormwater detention basin, along the west edge of the property, near the loading zone, and within several parking lot islands. The location of the trees in the parking lot islands and perhaps near the loading zone is not consistent with the intent of the Woodland Ordinance; they are hard to be preserved in a conservation easement. The applicant agreed to relocate the trees out of the parking lot.

Traffic review recommends approval with additional comments to be addressed with the Preliminary Site Plan. A Traffic Impact Study would be required based on the trip generation for this site; however, item e. in the motion refers to two options – either to waive the requirement or defer it to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing study by the City. Staff supports either of those options.

As indicated in the motion sheet, the Concept Plan requires multiple deviations. Staff is in support of all the deviations except for first two items listed in the motion sheet.

The first item refers to the Open Space requirement. 25% of the gross area of each development within the GE District shall be comprised of open space. Substantially all of

the total open space area must be designed as useable space. The plans provided, which were included in the packet, did not provide enough information to make that determination. However, since we uploaded the packets online, the applicant has been actively working with Staff to find alternate options. The revised plans show additional details for the pocket park at the northeast corner shown in the red boundary here and added a trail around the stormwater pond with possible seating around it for employees. The total space provided is now approximately 11.5%. The applicant is suggested to work with staff to find other options to provide more usable open space. However, only a part of the requirement appears to be met. They may require a deviation for not meeting the total percentage.

Façade requires deviations for underage of brick, overage of flat metal panels and overage of horizontal rib metal panels for rooftop screening, all supported by Staff. Façade boards and colored renderings are included in the packet and are available in front of the podium.

Per Section 3.11.8, street corner building should have greater massing and height. The proposed façade did not meet the intent at the time of review. However, as mentioned, the applicant has proposed some changes since then. They propose to drop the grade level at the corner of Grand River and Meadowbrook, and propose to use landscaping design to create interest at the corner instead of using building materials to create the massing. Staff is in agreement with the concept of it, but we still feel like we need to address some details prior to the approval of the SDO Concept Plan.

The applicant has submitted a Noise Impact Statement to address the possible noise concerns, due to the proximity to the residential neighborhood. The report was very well detailed and demonstrates that the noise levels will be kept under the Ordinance minimum. Site lighting is proposed to be turned on all day and night for security reasons. The applicant is suggested to consider reduced lighting for security purposes after hours due to proximity to residential uses. The Planning Commission may consider adding this as an additional condition if the suggestion seems reasonable.

All reviews are recommending approval with additional information to be addressed as noted in the review letters and tonight's presentation.

The Planning Commission is asked tonight to hold the public hearing and make a recommendation to City Council for approval of SDO Concept Plan.

The applicants and staff are here tonight to answer any questions you may have.

Mark Drane, with Rogvoy Architects, said I am the architect for the project and I am representing their group. I'm here to answer questions, it sounded like a mouthful what Sri had but they are very small, minor items. We're here to do a good job.

Chair Pehrson asked if there was anyone in the audience that wished to address the Planning Commission regarding this project. Seeing no one, he asked if there was any correspondence.

Member Lynch said there are two. Jimmie Cranford, 24693 Bloomfield Court, is concerned about the residential neighborhoods on all four sides of the development. If the

development is approved, a berm or wall is suggested at the south and east boundary to provide some separation. And another objection from Jacob Oomen, 41336 Clermont Avenue, said the construction of Jaguar Land Rover will decrease the property value of my home and homes in this area, and he objects to this construction.

Chair Pehrson closed the public hearing and turned it over to the Planning Commission for their consideration.

Member Avdoulos said I have a couple of questions. One to Sri – in the report, you had indicated that right now, you're not recommending approval because of a lot of deviations and things that need to be done. Is that where you are still landing?

Planner Komaragiri said the two major items why we are recommending that is the Open Space requirement, and the Façade and massing. But like I mentioned, the applicant has been working with us. They seem to be moving in the right direction, just a few details need to be worked out.

Member Avdoulos said and then related to Landscaping and buffer with the adjacent residential area, we had some concerns that what they have provided will provide buffering throughout all four seasons. Where are with that?

Landscape Architect Meader said in my opinion, there is sufficient buffering. Along the southern edge along Cherry Hill, there's a ditch with heavy natural – I'm not going to call it native – but natural vegetation there that's going to stay. And then in addition, they're adding two or three more layers of plantings at various heights and types through there. So I think that any view from there is going to extremely screened, I mean if you really look you might be able to see some but I don't think it's anything that's major. They're also extending the berm along the left side down to the wetland buffer and we don't want them to go further, and that's heavily planted with a lot of woodland replacement trees. So in my opinion, they have enough screening. You can always add a few more plants to it, but I'm not sure that's really necessary.

Member Avdoulos said thank you, I just wanted to make sure we had that. Those were my only questions.

Member Greco said before I make a motion, I have a question. On the motion sheet, 1b. Would the Planning Commission prefer that, as we discussed the architectural standards, that the applicant work with the Façade consultant?

Chair Pehrson said I think that's best, in my opinion.

Member Greco said and 1e. the traffic deviation to waive the requirement for the Traffic Impact Study or defer it to the time of Preliminary Site Plan review – are there comments on that?

Member Maday said can we just defer it to the time of Preliminary Site Plan?

Member Avdoulos said I'm okay with that.

Chair Pehrson said that's fine.

Member Greco said okay. With that, I'd like to make a motion.

Motion made by Member Greco and seconded by Member Lynch.

ROLL CALL VOTE TO RECOMMEND APPROVAL OF SDO CONCEPT PLAN MOTION MADE BY MEMBER GRECO AND SECONDED BY MEMBER LYNCH.

1. The recommendation shall include the following ordinance deviations:
 - a. The applicant shall work with staff to provide acceptable amount of Open Space as defined in Section 3.11.7 GE District required conditions, prior to City Council's consideration of SDO Concept Plan;
 - b. The applicant shall work with City's Façade consultant to provide alternate design elements to meet the intent of Section 3.11.8;
 - c. Planning deviation from Section 3.11.8 for absence of required sidewalk along Cherry Hill Road due to existing wetlands;
 - d. Deviations from Section 5.15. Exterior Building Wall Façade Materials for the following:
 - i. Underage of brick (30% minimum required, 25% on north façade and 28% on east façade proposed);
 - ii. Overage of flat metal panels (50% maximum allowed, 58% on north façade and 56% on east façade proposed);
 - iii. Overage of horizontal rib metal panels for roof top screening (0% allowed, 17% on north, 16% on east, 12% on south and 18% on west proposed);
 - e. Defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City;
 - f. Traffic deviation for variance from Design and Construction Standards Section 11-216(d) for not meeting the minimum distance required for same-side commercial driveways along Grand River Avenue;
 - g. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Grand River Road frontage due to lack of space (8 trees required);
 - h. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Cherry Hill Road frontage due to lack of space (8 trees required);
 - i. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings in area of wetland in order to preserve wetland along Cheery Hill Road frontage;
 - j. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings between Cherry Hill and the parking lot area not behind the wetland;
2. The Applicant shall comply with the conditions and items listed in the staff and consultant review letters as a requirement noted in the Special Development Option Agreement.

This motion is made based on the following findings:

- a. The project results in a recognizable and substantial benefit to the ultimate users of the project and to the community, where such benefit would otherwise be unfeasible or unlikely to be achieved by a traditional development;
- b. In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B the proposed type and density of development does not result in an

- unreasonable increase in the use of public services, facilities and utilities, and does not place an unreasonable burden upon the subject and/or surrounding land and/or property owners and occupants and/or the natural environment;
- c. Based upon proposed uses, layout and design of the overall project, the proposed building facade treatment, the proposed landscaping treatment and the proposed signage, the Special Development Option project will result in a material enhancement to the area of the City in which it is situated;
 - d. The proposed development does not have a materially adverse impact upon the Master Plan for Land Use of the City, and is consistent with the intent and spirit of this Section;
 - e. In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B, the proposed development does not result in an unreasonable negative economic impact upon surrounding properties;
 - f. The proposed development contains at least as much usable open space as would be required in this Ordinance in relation to the most dominant use in the development (*provided the applicant makes the required revisions*);
 - g. Each particular proposed use in the development, as well as the size and location of such use, results in and contributes to a reasonable and mutually supportive mix of uses on the site, and a compatibility of uses in harmony with the surrounding area and other downtown areas of the City;
 - h. The proposed development is under single ownership and/or control such that there is a single person or entity having responsibility for completing the project in conformity with this Ordinance;
 - i. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service;
 - j. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area;
 - k. Relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats;
 - l. Relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood;
 - m. Relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use.
 - n. Relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner; and
 - o. Relative to other feasible uses of the site, the proposed use is (1) listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and (2) is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.

Motion carried 5-0.

4. KEFORD COLLISION AND TOWING JZ18-32 with REZONING 18.725

Public hearing at the request of Keford Collision and Towing for Planning

- j. City Council variance from Sec. 11-239(b)(1),(2)of Novi City Code for absence of hard surface for parking lot and driveway;
- k. City Council variance from Sec. 11-239(b)(1),(2)of Novi City Code for absence of curb and gutter for parking lot and driveway;
- l. City Council variance from Sec. 11-239(b)(3) of Novi City Code for absence of pavement markings and layout including end islands;
- m. City Council approval for lack of required Traffic Impact study based on existing conditions and proposed mitigation measures near Beck Road and Eleven Mile Road entrances;
- n. 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.

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. *Motion carried 4-1 (Lynch).*

ROLL CALL VOTE TO APPROVE STORMWATER MANAGEMENT PLAN MOTION MADE BY MEMBER GRECO AND SECONDED BY MEMBER AVDOULOS.

In the matter of City of Novi Bosco Park, JSP 18-42, motion to approve the Stormwater Management Plan, based on and subject to 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. This motion is made because it otherwise in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance. *Motion carried 4-1 (Lynch).*

SUPPLEMENTAL ISSUES

City Planner McBeth said because of the Planning Commission calendar for the year, we have another meeting next week. So we look forward to seeing you here again next week.

AUDIENCE PARTICIPATION

Nobody in the audience wished to speak.

ADJOURNMENT

Moved by Member Lynch and seconded by Member Avdoulos.

VOICE VOTE ON THE MOTION TO ADJOURN MADE BY MEMBER LYNCH AND SECONDED BY MEMBER AVDOULOS.

Motion to adjourn the September 26, 2018 Planning Commission meeting. *Motion carried 5-0.*

The meeting was adjourned at 9:16 PM.

CITY COUNCIL MEETING MINUTES
November 13, 2018

Subdivision. She said she was glad they are preserving wetlands. She said when the City built the Senior Center; they got everyone in Meadowbrook Glens together and discussed concerns. At that time in the plan, the entrance onto Cherry Hill was going to be a driveway with a break-away gate for emergency only. The driveway is there, but there is no break-away gate. Because of that, the City decided they needed a light at Cherry Hill and Meadowbrook Rd. She said they are concerned however this is approved, they will put a driveway onto Cherry Hill. Lastly the plan calls for a right turn lane off Meadowbrook onto Cherry Hill. There is a right hand turn lane onto Cherry Hill and they will put their entrance which will encroach on that turn lane. Exactly where the turn lane starts, there is a fire hydrant. The plan says they are going to elongate and taper the right hand turn lane. If you extend that any farther north, you will be on Grand River. So you will go from the right hand turn lane on Grand River, to the right hand turn lane on Meadowbrook that will either lead you into the dealership or onto Cherry Hill. She thought that was way too much. We do agree when they looked at the plan, it said it will not have a berm. That's great, leave wetlands alone. No sidewalk is ok. There is a sidewalk on the other side of the road. She said she was concerned that it is the letter of the law and what is common sense. The three letters that you have in your packet that have a problem with this are people who live in the subdivision across the street of Meadowbrook. They will be less affected. We on Cherry Hill closes to this and on Kings Pointe didn't receive anything because we are not within the area of "what they had to do". Sometimes you need to use common sense and send things to people who will be affected. She said she hoped they would some of her concerns into account when approving it as it is drawn the way it is now.

Public hearing closed at 7:06 PM

PRESENTATIONS:

1. Novi Road and Grand River Avenue Area Multi-Development Traffic Impact Study - AECOM

Maureen Peters, representative from AECOM highlighted the presentation on the traffic study. Earlier this year as development started to boom in that area, they embarked on multi-development traffic study. As part of that, the City contacted AECOM. She said the general study area included Novi Road/Grand River between 10 Mile and 12 Oaks Mall and generally between Novi Road and Meadowbrook. The first analysis looked at existing conditions. As part of that it was discovered Novi Road and Grand River intersection was over-capacity under existing conditions. Several other turning movements were seeing poor operations as well. From there the City and AECOM determined which developments should be incorporated into the study that might have an impact on this general area. They were further defined into two general categories considered as background developments or those that had already been approved or were expected to be approved in the near term. The other category would be future developments not within few months month. She said moving into the background conditions analysis the team decided to project traffic out to the year to 2028 with the assumption that they would be built by then. In order to get to the year

as a part of the Emerson Park development, located on the west side of Novi Road, north of Ten Mile Road, in Section 22 of the City.

- H. Approval to award a unit price contract for Street Sweeping Services to G&M Enterprises, Ltd, the low bidder, for a one-year term with two one-year renewal options at an estimated annual cost of \$78,168.
- I. Approval of a Street Light Purchase Agreement with The Detroit Edison Company for the installation and operating cost of seven (7) street lights; one (1) at the entrance of Manchester on Novi Road, and six (6) along the Manchester development frontage on Novi Road, and approval of an agreement with Manchester 13 Mile Road, LLC, for the sharing of installation and ongoing operation costs per the City's Street Lighting Policy.
- J. Approval of a Quit Claim Deed for a parcel located on the southwest corner of 12 Mile Road and Taft Road to dedicate the 60-foot master planned right-of-way along 12 Mile Road to the Road Commission for Oakland County (parcel 50-22-16-226-019).
- K. Approval of Claims and Accounts – Warrant No. 1023

CM 18-11-174 Moved by Staudt, seconded by Markham; MOTION CARRIED: 5-0

To approve the Consent Agenda as amended.

Roll call vote on CM 18-11-174

**Yeas: Breen, Casey, Markham, Gatt, Staudt
Nays: None
Absent: Mutch**

MATTERS FOR COUNCIL ACTION

- 1. Consideration for tentative approval of the request of Erhard Motor Sales, Inc., for a Special Development Option (SDO) Concept Plan in the GE, Gateway East District. The subject property is 9.48 acres of land located at the southwest corner of Grand River Avenue and Meadowbrook Road, in Section 23. The applicant is proposing a 58,663 square foot car sales facility for Jaguar Land Rover.

Mark Drane said he was there representing Rogvov Architects and he would answer any questions.

Member Casey stated that this issue was in front of Council as a rezoning request for an auto dealership back in November 2017. At that time she identified that the dealership in question was a competitor to the dealership across the street who sells vehicles that are made by her employer General Motors. She stated at that time she did not think she could be objective on the questions and her colleagues allowed her recusal.

This issue is before us again, the only difference is the dealership has changed but the segment has not and this dealership in questions is still a competitor for the dealership across the street that sells vehicles from her employer. She requested that her colleagues grant her a recusal from her.

CM 18-11-175 Moved by Staudt, seconded by Gatt; MOTION CARRIED: 5-0

To approve Member Casey's request for recusal.

Roll call votes on CM 18-11-175

**Yeas: Casey, Markham, Gatt, Staudt, Breen
Nays: None
Absent: Mutch**

Member Casey abstained from voting, left Council Chambers during the discussion, and returned after the vote had been taken.

Mayor Pro Tem Staudt asked if somebody took notes of the audience participation regarding this particular subject. He asked City Planner McBeth to step up and address some of the issues that had been brought up during the public hearing.

City Planner McBeth said she did take a few notes, but she didn't think she would have to answer them directly, she said she would do her best. She recalled there was one question specifically about the pedestrian access. She said that believed it was the walkway that went around pond in the open space, not a direct access from Cherry Hill. It was part of the required open space. The walkway enhances open space in pedestrian areas. She mentioned the question about the taper along Grand River and that has been analyzed in terms of concept plan. It was generally acceptable as a concept plan, but would be reviewed in more detail when preliminary site plan comes forward. She said there was reference to a fire hydrant and she said they would have to take a look at that in more detail as well. Mayor Pro Tem Staudt wondered if this property was part of the old landfill. He stated that this property has been sitting empty as long as he has lived in Novi. There have been challenges in developing it. What's changed without having remediation to property? City Planner McBeth said there has been extensive review of this by the applicant, they did a community impact statement as well as soil borings to find out what's there. The Applicant has strong interest in locating in this spot. It was rezoned consistent to the Master Plan and it is one of the uses that Council could consider as a permitted use because of this location. Mayor Pro Tem Staudt asked the architect for his comment on traffic. He asked for a comment on the traffic study, because basically between 4 PM and 6 PM it's gridlock. This will be directly in front of the dealership and people will need access to it. What is your clients view? Mr. Drane said the client thought it was a nice site, perfect size and location. He said they understood there will be some challenges at certain points of day for access. He said the way it is currently zoned it would have generated more traffic than what they anticipated creating with this project. It is an auto dealer, drop off in morning and pick up in evening. Mayor Pro Tem Staudt wondered if there would there be carriers in

the off hours. His experience when approaching the Suburban Collection is that auto carrier's like to park there in afternoon which causes greater traffic. He wondered if there has been any discussion that will help remediate traffic around the dealership, like delivery of vehicles. Mr. Drane said they will be able to handle the delivery of the vehicle within the site, not on Grand River. He said generally they are done at non-peak hours. Mayor Pro Tem Staudt said he wanted to hear in the non-peak hours. He stated that this has been tough site to develop. When they heard about car dealership there they asked why. He said on the flip side its great location and city to be in.

Member Markham said she was interested if there were efforts towards sustainability in the design of this. She wondered specifically are you using permeable pavements, renewal energy, native plants, and capture runoff from pavement. Mr. Drane said that they are meeting or exceeding all of the City's wetland and woodlands, and stormwater management ordinance requirements. He said they can take efforts to do interior finishes with low VOC's and low light levels. They have high insulation and state of the art HVAC equipment.

Member Breen said originally when this came to Council it was BMW dealership proposal. Why now has it changed? Mr. Drane said Earhart's BMW is down the street. They wanted to relocate, but BMW of North America wouldn't let them use the Earhart name. That would be a huge brand killer for them. They will remodel existing facility and move Land Rover and Jaguar dealerships and combine them where they can use the Earhart name. Member Breen wondered if the Jaguar facility was relocating. Mr. Drane said it was Farmington Hills dealership and it will relocate here. Member Breen had questions for staff. She asked if the residents had been notified for other developments, but not this one and she wondered why? City Planner McBeth said the notification procedures are set by ordinance and they followed ordinance. Member Breen wondered if they were notified before about rezoning, why didn't they receive it now? City Planner McBeth said they could look into it. It occurred many years ago and ordinance may have been different. When property was rezoned last year, there were signs on property that would have notified public. Member Breen stated this is a recurring theme whenever we rezone something. We have certain perimeter that we notify and people who live close don't get notified. The City needs to think about this and notify people beyond what current ordinance calls for so nearby residents are notified. They went through traffic study and there will be impact above threshold. She was concerned we keep changing Master Plan for a single parcel. Coupled with lack of notice, it troubles her. She would like to see if colleagues have comments.

CM 18-11-176 Moved by Staudt, seconded by Gatt; MOTION CARRIED: 3-1

In the matter of Jaguar JSP17-65 motion to approve the Special Development Option Concept Plan, and direction to the City Attorney to prepare a Special Development Option (SDO) Agreement to return to the City Council for consideration and approval.

1. This motion is based on following conditions and deviations:
 - a. The applicant shall work with staff to provide acceptable amount of Open Space as defined in Section 3.11.7 GE District required conditions, prior to City Council's consideration of SDO Concept Plan;
 - b. The applicant shall work with City's Façade consultant to provide alternate design elements to meet the intent of Section 3.11.8;
 - c. Planning deviation from Section 3.11.8 for absence of required sidewalk along Cherry Hill Road due to existing wetlands;
 - d. Deviations from Section 5.15. Exterior Building Wall Façade Materials for the following:
 - i. Underage of brick (30% minimum required, 25% on north façade and 28% on east façade proposed);
 - ii. Overage of flat metal panels (50% maximum allowed, 58% on north façade and 56% on east façade proposed);
 - iii. Overage of horizontal rib metal panels for roof top screening (0% allowed, 17% on north, 16% on east, 12% on south and 18% on west proposed);
 - e. Defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City;
 - f. Traffic deviation for variance from Design and Construction Standards Section 11-216(d) for not meeting the minimum distance required for same-side commercial driveways along Grand River Avenue;
 - g. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Grand River Road frontage due to lack of space (8 trees required);
 - h. Landscape deviation from Section. 5.5.3.E.i.c for lack of street trees along Cherry Hill Road frontage due to lack of space (8 trees required);
 - i. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings in area of wetland in order to preserve wetland along Cherry Hill Road frontage;
 - j. Landscape deviation from Section 5.5.3.B.ii and iii for not providing greenbelt berm or plantings between Cherry Hill and the parking lot area not behind the wetland;
 - k. The Applicant shall comply with the conditions and items listed in the staff and consultant review letters as a requirement noted in the Special Development Option Agreement.

2. **The applicant's compliance with the conditions and items listed in the staff and consultant review letters shall be noted in the Special Development Option Agreement.**
3. **The City Council authorizes the approval of the SDO Concept Plan which consists of a non-residential use permitted elsewhere in this Zoning Ordinance but not otherwise permitted in the GE district, on the condition that such use meets all of the following criteria, as determined by the City Council:**
 - a. **The proposed use exemplifies the intent of the GE district as stated in Section 3.1.16.A, and the intent of the SDO as stated in Section 3.1.16. (since the *proposed plan provides for a high-quality and distinctive development that will complement and support the City's Main Street/Town Center area.*)**
 - b. **The proposed use incorporates as a predominant physical component of the development that provides a unique entry feature along Grand River Avenue for the GE district, characterized by a distinct, high-profile appearance (since, in the opinion of the City's Façade consultant and Landscape Architect, the rendering provided by the applicant after the preparation of the review letters, provides a unique entry feature including a small park and attractive landscaping).**
 - c. **The proposed use is compatible with, and will promote, the uses permitted with the GE district and SDO.**
 - d. **The proposed use will not create an inconsistency with the City's Master Plan for Land Use in terms of the general activities on the site and the impacts upon the surrounding area (since the area is developed with commercial and multiple family uses, and landscape buffering is being provided to the extent possible).**
 - e. **The proposed use is designed in a manner that will result in traffic and pedestrian safely, consistent with the adjoining pedestrian and vehicular thoroughfares (as noted in the Traffic Engineer's Review letter).**
 - f. **The proposed use is designed with exceptional aesthetic quality, including building design, building materials and landscaping design, not likely to be achieved except based upon this authorization (since, in the opinion of the City's Façade consultant and Landscape Architect, the rendering provided by the applicant after the preparation of the review letters, provides a unique entry feature including a small park and attractive landscaping).**

4. This motion is made based on the following findings:

- a. The project results in a recognizable and substantial benefit to the ultimate users of the project and to the community, where such benefit would otherwise be unfeasible or unlikely to be achieved by a traditional development;
- b. In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B the proposed type and density of development does not result in an unreasonable increase in the use of public services, facilities and utilities, and does not place an unreasonable burden upon the subject and/or surrounding land and/or property owners and occupants and/or the natural environment (*as noted in the Community Impact Statement*);
- c. Based upon proposed uses, layout and design of the overall project, the proposed building facade treatment, the proposed landscaping treatment and the proposed signage, the Special Development Option project will result in a material enhancement to the area of the City in which it is situated (*as the proposed corner park and building facade are designed to enhance the gateway to Town Center*);
- d. The proposed development does not have a materially adverse impact upon the Master Plan for Land Use of the City, and is consistent with the intent and spirit of the Zoning Ordinance (*as the development is consistent with the standards provided for the Special Development Option, particularly related to the four corners of the intersection of Grand River and Meadowbrook Road*);
- e. In relation to a development otherwise permissible as a Principal Permitted Use under Section 3.1.16.B, the proposed development does not result in an unreasonable negative economic impact upon surrounding properties (*as the proposed use is comparable to the vehicle dealership on the opposite corner, and the proposed placement of the building near Grand River Avenue and Meadowbrook Road Right of Way, along with the proposed landscaping provide buffers to the nearby residential uses*);
- f. The proposed development contains at least as much usable open space as would be required in this Ordinance in relation to the most dominant use in the development (*as the applicant has provided two usable open space areas for public use as part of the development*);
- g. Each particular proposed use in the development, as well as the size and location of such use, results in and contributes to a reasonable and mutually supportive mix of uses on the

site, and a compatibility of uses in harmony with the surrounding area and other downtown areas of the City *(as the use is compatible with an existing car dealership use on the northeast corner of Grand River Avenue and Meadowbrook Road, and other commercial uses along Grand River;*

- h. The proposed development is under single ownership and/or control such that there is a single person or entity having responsibility for completing the project in conformity with this Ordinance *(as the proposed development is owned and operated by Erhard Motor Sales, Inc.);*
- i. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service *(as noted in Traffic Engineering review letter);*
- j. Relative to other feasible uses of the site, the proposed use will not cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area *(as noted in the Community Impact Statement);*
- k. Relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats *(as the plan does not propose any impacts to wetlands and acceptable impacts to woodlands and wetlands buffers);*
- l. Relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood *(as noted in the Community Impact Statement);*
- m. Relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use *(as the development fosters economic growth);*
- n. Relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner; and
- o. Relative to other feasible uses of the site, the proposed use is (1) listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this

Ordinance, and (2) is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.

Roll call vote on CM 18-11-176

Yeas: Markham, Gatt, Staudt

Nays: Breen

Absent: Mutch

Abstain: Casey

Member Casey returned to the Council Chambers at 8:11 PM.

2. Consideration for tentative approval of the request of Keford Collision and Towing, JSP 18-31, with Zoning Map Amendment 18.725, to rezone property in Section 15, located on the south side of Grand River Avenue, east of Taft Road, from I-1 (Light Industrial) to I-2 (General Industrial) with a Planned Rezoning Overlay (PRO) and corresponding Concept Plan. The property totals 7.61 acres and contains two existing buildings. The applicant is proposing to reuse the existing larger building (23,493 square feet) for an auto body collision repair shop and related offices, with accessory car rental services, and use the rear portion of the property as a vehicle tow yard.

David Landry addressed City Council on behalf of Keford Collision and Towing. Mr. Landry said they were there on behalf of an application for rezoning with PRO overlay. He said it was 7.6 acres which is currently Zoned I-1, Light Industrial and they want to rezone it to Zoned I-2 simply and to limit the I-2 uses to the auto engine and body repair and outdoor storage. He said the reason is that they are losing their lease. Keford Collision and Towing has been in Novi over 30 years. The property is owned by Mercedes Benz. They received notice a year ago that Mercedes Benz received notice from Germany that they want to move into our building. They have been wonderful landlords, and they have had a great relationship them. They said unfortunately Germany wants them to expand. They don't want to leave Novi. Keford is a reputable company. The City has done business with them for years. They simply need a place to stay in Novi. This site is perfect. This particular site is moving to a less congested place. He said it is surrounded on three sides by industrial property. The south is residential, but no residents will ever live there because it's a regional stormwater detention area. All property is owned by City of Novi. It never will be populated as residence. The rear is completely screened by existing building which covers north end of this. You won't see cars being stored from Grand River because of screening. He said that the existing use is Industrial which it has been since the 1940's. It has been operated by a company called Amcorp since 1987. They manufacture and assemble large machinery. They did a Phase 1 Report and it was reported that the interior was loaded with solvents, oils, petroleum projects, with concerns about leaking onto ground. He said then they did a Phase 2 Report and luckily it came up that there were no volatiles on this property and no reason why it has to be remediated. They did find some soil there is arsenic and chromium. When the City built the stormwater detention, they added dirt which now contains arsenic and chromium. That will not require anything more than baseline

CITY COUNCIL MEETING MINUTES
SDO Agreement Approval
January 07, 2019

**REGULAR MEETING OF THE COUNCIL OF THE CITY OF NOVI
MONDAY, JANUARY 7, 2019 AT 7:00 P.M.
COUNCIL CHAMBERS – NOVI CIVIC CENTER – 45175 TEN MILE ROAD**

Mayor Gatt called the meeting to order at 7:00 P.M.

PLEDGE OF ALLEGIANCE

ROLL CALL: Mayor Gatt, Mayor Pro Tem Staudt, Council Members Breen, Casey, Mutch, Verma

ALSO PRESENT: Pete Auger, City Manager
Victor Cardenas, Assistant City Manager
Thomas Schultz, City Attorney

APPROVAL OF AGENDA:

CM 19-01-001 Moved by Casey, seconded by Breen; MOTION CARRIED 6-0

**Roll call vote on CM 19-01-001 Yeas: Staudt, Breen, Casey, Mutch, Verma, Gatt
Nays: None**

PUBLIC HEARING: None

PRESENTATIONS:

1. Recognition of Council Member Markham

Mayor Gatt called Gwen Markham to the podium. He noted Gwen Markham sat on City Council for the last five-years and before that gave a lot of service to the community. He stated that Gwen was successful in her last campaign and is now a Commissioner with the Oakland County Board of Commissioners. Mayor read the Proclamation. Gwen thanked the Mayor. She thanked the voters of Novi and the community for giving her the opportunity to serve on City Council and to move up. She appreciated that the community looks at her as a leader. She also thanked City staff and all of her colleagues. She said she was really proud to serve on the Novi City Council. She gave special thanks to her colleague, Andrew Mutch, her mentor. She learned so much about Novi from him. She thanked him for everything that he does for the community.

2. Proclamation in recognition of Surya Namaskar (SUN Salutation) Awareness Period, January 12 – 27, 2019 – Srinivas Dundigalla

Swahitha Pareddy said she was an 11th grader at Novi High School. She represented the Michigan Chapter of Hindu Swayamsevak Sangh (HSS.) She thanked Mayor Gatt, City Council and all of the guests that evening. Surya Namaskar is nothing but SUN Salutation. The sun is the source of life on earth. Surya Namaskar is one way to acknowledge this and pay respect to the sun. Surya Namaskar integrates simple yoga postures in ten simple steps along with an easy breathing technique and can provide immense health benefits to both the body and the mind. One of the primary benefits

of doing Surya Namaskar is that it improves the mental as well as physical balance of the person's body. It develops patience, and builds stamina by increasing the mental capacity of the brain and the body. She stated that yoga helps to reduce stress, anxiety, improve fitness, posture, flexibility and balance. Yoga has contributed to a widespread appeal to ancient discipline. Hindu Swayamsevak Sangh promotes the wellbeing of all and promotes a healthy lifestyle regardless of one's age, gender, age, religion, ethnicity, or nationality. January 14th marks the first day of the sun's transit into the Capricorn phase. It also marks the end of the winter solstice and the start of longer days. She said to celebrate this occasion; HSS has organized a two-week long Surya Namaskar Yoga-thon from January 12-27. The yogathon is to bring awareness of yoga and a practice of Surya Namaskar to the community at large. She said they invite all Novi residents to a concluding ceremony at the SV Temple on Saturday January 26, 2019. The Hindu Swayamsevak Sangh Michigan Chapter is grateful for this Proclamation.

AUDIENCE COMMENT:

Dave Galloway, 1197 East Lake Drive, Novi stated that he was there to speak about the Canadian geese. He said when we started the Lake Board the beaches of Walled Lake had been closed seven weeks due to e-coli. He said the first thing the contractors did was remove reeds from their beach. He said they haven't had a beach closing on Walled Lake since then. He said the second priority on the Lake Board is to keep the weeds from the parks and beaches of Novi. He said they have not gotten rid of the e-coli, but the lakes dilute the e-coli. He stated that the e-coli are still going downstream over to Old Novi. He said the geese produce about 3 to 4 pounds of fecal matter per day. He said they gave a full page of pros and cons on what to do with the geese. He said the second item was a reprint of an article that was in the Detroit Free Press. According to the research done by the newspaper in 1970 we had 9,000 geese in Michigan. In 2017 we had 300,000 geese in Michigan. He said they have two pages of the pros and cons of the different methods of handling the geese. He said one of them was to remove the geese to the north and we used to remove them to Kentucky or Arkansas, and Missouri. He stated that now it is only to the north. They do come back. It is a long process. It took several years for the lake to get back to its more natural state. It would take a long time for the geese to get back to a natural state. He said the last package that will come to Council is the public health issues. He will submit that it is a nuisance. In reality this is a public health problem.

Mike Duchesneau, 1191 S. Lake Dr. He stated that the budget meeting is this Saturday and he didn't know if he will be able to attend the meeting. He wanted them to consider road improvements which are the most costly on his list, along with WiFi in the parks. He thought that we need to shore up the Asian book collection. He said we should support the goose egg destruction program for Walled Lake and Shawood Lake. He said as far as the road improvements, Grand River Corridor and the Ring Road. He said the Taft Road extending over freeway has been discussed many times. He thought a few simple things that could be done would be a right turn lane on West Park Drive needs to be extended. You should not have to wait to turn right. Same applies to West

Park Drive at Pontiac Trail. He stated that there is an initiative to get Pavilion Shores and Lakeshore with WiFi. Hopefully that's funded.

CONSENT AGENDA REMOVALS AND APPROVALS:

- A. Approve Minutes of:
 - 1. December 17, 2018 – Regular meeting
- B. Approval to award a contract for professional services to Landscape Architects and Planners, Inc. for development of the 2020-2024 Strategic Community Recreation and Master Park Plan, in an amount not to exceed \$25,000.
- C. Approval of Claims and Accounts – Warrant No. 1027

CM 19-01-002 Moved by Casey, seconded by Mutch; MOTION CARRIED: 6-0

To approve the Consent Agenda as presented.

Roll call vote on CM 19-01-002

**Yeas: Breen, Casey, Mutch, Verma, Gatt,
 Staudt**

Nays: None

MATTERS FOR COUNCIL ACTION

- 1. Approval of the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for a Special Development Option (SDO) Agreement in the GE, Gateway East District. The subject property is 9.48 acres of land located at the southwest corner of Grand River Avenue and Meadowbrook Road, in Section 23. The applicant and Developer are proposing a 58,663 square foot car sales facility for Jaguar Land Rover.

Mayor Gatt reminded the audience that Member Casey had recused herself from this item at the last meeting, and that recusal is still in effect.

Member Casey left the Council Chambers at 7:22 p.m.

Mayor Pro Tem Staudt said that this property has been unused and pretty stagnant for many, many years. He said that in 25 years in Novi he has been driving by wondering why we couldn't sell that piece of property. He thought it was exciting to see that a very strong business is interested in moving into it.

CM 19-01-003 Moved by Staudt, seconded by Gatt; MOTION CARRIED: 3-2

To approve of the request of Applicant Erhard Motor Sales, Inc., and Developer Winfried Dahm for a Special Development Option (SDO) Agreement for the Jaguar Land Rover development JSPI 7-65,

consisting of a 58,663 square foot car sales facility, subject to execution of the Consent to Agreement by the Owners of the property and also subject to final review and approval of the Agreement as to form, including any required minor and non-substantive changes, by the City Manager and City Attorney's office. This motion is made because the Agreement meets the spirit and intent of the tentative approval granted by the City Council at the meeting of November 13, 2018.

Member Mutch said he had a question for City Attorney Schultz about the site plan included in our packet. He said the applicant is dedicating right-of-way along Meadowbrook Road, but when he read through the Special Development Agreement he didn't see any reference to that. For the sake of clarity and for consistency between those documents, he thought it seems appropriate that it would be included. He wondered if the maker of the motion is amenable to including that requirement and if the applicant doesn't have any issues with including that as well. Mayor Pro Tem Staudt said he was amenable to that. Member Mutch stated that he wasn't at the last meeting when it came through the first time. He thought it looked like a nice project. There was attention given to maintaining the buffer area that exists along Cherry Hill Road. He said that is important because it's residential to the west in Meadowbrook Glens as well as the Novi Senior Center. With a car dealership there will be a lot of lights and vehicular traffic. He was pleased to see those items were addressed. He also mentioned that he saw an attempt to incorporate some of the features of the Gateway East District which is how this property is zoned in the Master Plan with having some amenities related to that. He was having a problem with it for this location. He didn't feel like what the City set out to accomplish with this district and this area of Grand River Avenue, that this is the right use for this location. He understood Mayor Pro Tem Staudt's sentiment that this property has sat vacant for a number of years. He didn't know if that was a function of the property itself or it was choices made by the property owners in terms of what they were waiting to see happen there. When City Council approved the new, very nice, very urban style residential development directly to the west and even went to the effort to ensure there would be a connection between that residential development to the west to this property, it really changed what he thought would happen in the area. This property, consistent with Gateway East District and consistent with the Master Plan, was going to be developed in a mixed use residential, commercial style development that would be complimentary to the residential development directly to the west. He said that unfortunately that is not going to happen. As nice as the structure is and the reputation is good, a car dealership next to residential isn't the right mix. Because of the reasons stated he could not support the proposal as presented. He would love this use somewhere else in the community. He said that the intent was to have something much different in this location. He thought they cast the die with the approval of the development to the west. Unfortunately he couldn't support the motion as presented.

Member Breen echoed Member Mutch and his concerns. She understood the property was difficult to develop. She appreciated everything that the developer has tried to

do. We have heard from residents who live near the property. She was troubled by the fact that the intent was supposed to be mixed use area and to make it a more walkable area. She thought this was a good business, but the wrong place. She had problems supporting it as is. She wanted to hear from the rest of her colleagues to see if they have anything else to say. When looking at rezoning and special uses, she believed that they should stick by the original intent, listen to input from community, and adhere to what was originally discussed when those changes were made.

Mayor Gatt said he has worked in and around Novi for 45 years now. That property has remained vacant for all that time. He has been on Council for nearly 20 years and there has never been a proposal to build on this property. Now a world class business is interested and he is in favor of moving forward with this project. It's good for Novi. He didn't believe it would cause concerns for residents in the area.

Roll call votes on CM 19-01-003

Yeas: Verma, Gatt, Staudt

Nays: Mutch, Breen

Recused: Casey

Member Casey returned to the Council Chambers at 7:31 p.m.

2. Consideration to Introduce Ordinance No. 19-193, an ordinance to amend the City of Novi Code of Ordinances, Chapter 22, "Offenses," Article 1, "In General," to add a new Section 22-9, "Marijuana Establishments Prohibited," to prohibit marijuana establishments within the boundaries of the City pursuant to the Michigan Regulation and Taxation of Marijuana Act, Initiated Law 1 of 2018, MCL 333.27951, et seq.; and to provide penalties for violation of such ordinance.

FIRST READING

City Manager Auger said this sets us up to wait and see what the State rules and regulations will be before we consider moving into this field.

Mayor Gatt asked City Attorney Schultz if he could give everyone a few words of wisdom on this subject.

City Attorney Schultz said one of the provisions of the Recreational Marijuana Ballot Proposal was a provision that allows municipalities to "opt out" of the business aspect of what was authorized by voters which is the commercial entities that grow or sell marijuana. Many things were authorized by virtue of the fact that it passed, like personal uses. The State is still deciding how it will regulate the business side. The idea of opting out now and deciding later is just to make sure if and when the State adopts regulations the Council has time to decide. It allows them to watch and see how it unfolds. Mayor Gatt stated that this is a fail-safe for us, it is a way of protecting us and our citizens in case Lansing acts in a way we don't like or quicker than we expect. He wondered if it was accurate to say that more municipalities have taken this position to "opt out" right now. City Attorney Schultz thought that is accurate.

Community Relations Department. They have also released a video in a series of monthly videos that are going to take a different topic every month and feature some aspect of our history. This is the first one, it was introduced by Mayor Gatt and it talked about how Novi was founded. She encouraged everyone to go to the Facebook Page and watch that video. It was well done by our Community Relations Department. We also have a public reception scheduled for February 11, 2019 at 6:00 p.m., preceding the Council meeting. That is to help us recognize and celebrate the day that the City became incorporated. It was voted on February 19, 1969. More details for that will be also on Facebook or our on cityofnovi.org if you would like to come celebrate with us. There will be a Team Novi Pep Rally on January 24, 2019 started at 3:00 p.m. on a Thursday. There will be members of the Detroit Tigers Organization present. There will also be groups from the High School performing as well.

MAYOR AND COUNCIL ISSUES: None

CONSENT AGENDA REMOVALS FOR COUNCIL ACTION: None

ADJOURNMENT – There being no further business to come before Council, the meeting was adjourned at 8:13 P.M.

Cortney Hanson, City Clerk

Robert J. Gatt, Mayor

Transcribed by Deborah S. Aubry

Date approved: February 11, 2019

APPLICANT RESPONSE LETTER



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March 25, 2019

PEA Project No: 2017-176

Ms. Sri Komaragiri, Planner
City of Novi
45175 Ten Mile Road
Novi, MI 48375

**RE: Planning Review Report
Jaguar / Land Rover of Novi
South of Grand River Avenue, East of Meadowbrook Road
Novi Project Number: JSP 17-65**

Dear Ms. Komaragiri:

This office is in receipt of your review letter dated March 18, 2019, regarding the subject development. We have included our responses to Staff comments below, for Preliminary Site Plan submittal.

Planning Review Report

Conditions of the SDO Agreement:

The following conditions from the SDO agreement should be met prior to final site plan approval.

1. All loading and unloading from car carriers shall occur at non-peak traffic hours.

Response: Noted.

2. Remaining woodlands and wetlands areas on the southerly portion of the property are to be placed in a conservation easement, in a form and manner to be approved by the City attorney, in accordance with applicable ordinances and regulations. Please provide draft easements for review.

Response: Draft easements will be provided with resubmittal package.

3. Dedication of the right-of-way, to the proposed future right-of-way line, along Meadowbrook Road, as shown on the approved Site Plan. Please provide the drafts and related ROW exhibits for review.

Response: Draft ROW exhibits will be provided with resubmittal package.

4. Traffic Impact Study: As part of the SDO Concept plan approval, the applicant received approval to defer the Traffic Impact Study to the time of Preliminary Site Plan review, as the site falls under the study boundaries for the ongoing Comprehensive Traffic study by the City. The applicant has shared a Full Impact Study recently. It is currently under review.

Response: Noted.

5. Bicycle Parking (Sec. 4.16): When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations. All six spaces are provided in one location. This deviation was not included in the SDO agreement. Please revise to conform.

Response: Bicycle parking will be revised to multiple locations in resubmittal.

6. 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. Spillover exceeds 1 along Grand River and Meadowbrook frontage near the entry drive. Please revise.

Response: A revised photometric plan will be provided with the resubmittal package.

7. Conservation Easements: Draft conservation easements are required along with electronic site plan submittal.

Response: Draft easements will be provided with resubmittal package.

8. Plan Review Chart: Planning review chart provides additional comments and requests clarification for certain items. Please address them in addition to the comments provided in this letter.

Response: All review comments are addressed herein.

9. Exterior 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 submitted, reviewed, and approved as part of a site plan application. In that case, the 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 after Site plan approval. 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.

Response: Noted.

PLANNING REVIEW CHART

Notes to District Standards for GE/SDO Option (Sec 3.6.2)

1. Parking setback screening (Sec 3.6.2.P): Required parking setback area shall be landscaped per Sec. 5.5.3. Abutting residential requires a berm. Meets the minimum requirements. **Refer to Landscape review for additional comments.**

Response: Landscape comments are addressed below.

District Required Conditions for GE (Sec. 3.11)

2. Parking Lot Screening (Sec. 3.11.6.B): Parking lots shall be screened from all major thoroughfares by a 2.5-foot brick or stone wall or 3-foot planting screen or existing vegetation to achieve 80% winter opacity and 90% summer opacity. Meets the minimum requirements. **Refer to Landscape review for additional comments.**

Response: Landscape comments are addressed below.

District Required Conditions for GE (Sec. 3.11)

3. Building Façade and Scale: Street corner buildings should have greater massing and height. Additional height up to 40 ft. may be approved by Council to provide additional massing. **Current elevations do meet the massing requirement.**

Response: Noted

4. Adjacency (Sec. 3.11.14): City Council may impose additional conditions in order to ensure compatibility with and between adjacent properties. City Council did not include additional conditions at the time of SDO Concept plan approval. **This plan City Council approval for Preliminary site plan.**

Response: Noted

Site Standards: Parking and Circulation

5. End Islands (Sec. 5.3.12): End Islands with landscaping and raised curbs are required at the end of all parking bays that abut traffic circulation aisles. The end islands shall generally be at least 8 feet wide, have an outside radius of 15 feet, and be constructed 3' shorter than the adjacent parking stall as illustrated in the Zoning Ordinance. **Refer to Traffic for more comments.**

Response: Traffic comments are addressed below.

Site Standards: Bicycle Parking

6. Bicycle Parking General requirements (Sec. 5.16): No farther than 120 ft. from the entrance being served. When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations. Spaces to be paved and the bike rack shall be inverted "U" design. Shall be accessible via 6 ft. paved sidewalk. All 6 spaces provided in one location. **This is considered a deviation for having more than 4 spaces in one location. This deviation was not included in the SDO agreement. Please revise to conform.**

Response: Bicycle parking will be revised to multiple locations in resubmittal.

Site Standards: Loading and Dumpsters

7. Loading Spaces (Sec. 5.4.2): Loading, unloading space shall be provided in the rear yard at a ratio of 10 sq. ft. for each front foot of building. Except in the case of a double frontage lot, loading- unloading, as well as trash receptacles may be located in an interior side yard beyond the minimum side yard setback requirement of the district. Loading space proposed in side yard. 2460 square feet space is provided. It appears to meet the requirement. **Provide the required and proposed loading area calculation.**

Response: Loading space calculations will be provided in the resubmittal.

Site Standards: Lighting and Rooftop

8. Exterior lighting (Sec. 5.7): All residential developments shall provide lighting at each entrance intersecting with a major thoroughfare sufficient to illuminate the entrance of the development. Minimum illumination shall be 0.2 fc. Fixtures shall not exceed 25 ft. Lighting shall be subject to the requirements of this Section of the Zoning Ordinance. Lighting plan is provided. **Provide the missing information with the next submittal.**

Response: A revised photometric plan will be provided with the resubmittal.

9. 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. **Provide location of utility equipment.**

Response: Location of utility equipment will be provided with the resubmittal.

10. Roof top appurtenances: Roof top appurtenances shall be screened in accordance with applicable facade regulations, and shall not be visible from any street, road or adjacent property. **Will be reviewed for conformance at the time of site plan review.**

Response: Roof top screening shall be screened in accordance with ordinance standards.

Building Code and other design standard Requirements

11. Building Exits Michigan Building Code 2012: Building exits must be connected to sidewalk system or parking lot. **Some of the exits are not connected to a sidewalk system or parking lot.**

Response: All exits are connected to either to the parking areas or sidewalk system.

12. 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). **Refer to all review letters for additional dimensions requested.**

Response: Additional dimensions will be provided as requested.

Lighting and Photometric Plan (Sec. 5.7)

13. 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. One is provided. **Some information is missing.**

Response: Revised photometric plan will be provided with the resubmittal.

14. 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. **Not provided. Will be reviewed for conformance at the time of site plan review.**

Response: Building wall fixture locations and illuminance levels will be provided with the resubmittal.

15. 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. **Abuts non-residential on the south North West. Spillover exceeds 1 along Grand River and Meadowbrook frontage near the entry drive. Please revise. Spillover should be calculated at the future ROW line.**

Response: A revised photometric plan will be provided with the resubmittal.

ENGINEERING REVIEW REPORT

General

1. Revise the plan set to tie in at least one city established benchmark. An interactive map of the City's established survey benchmarks can be found under the 'Map Gallery' tab on www.cityofnovi.org. City benchmark number 2411 is located southeast of the Grand River and Meadowbrook intersection.

Response: A City BM will be added as required.

2. Provide a note along with the traffic control sign table stating all traffic signage will comply with the current MMUTCD standards.

Response: The MMUTCD note will be added.

3. Provide a note stating if dewatering is anticipated or encountered during construction a dewatering plan must be submitted to the Engineering Division for review.

Response: The dewatering note will be added.

4. Generally, all proposed trees shall remain outside utility easements. Where proposed trees are required within a utility easement, the trees shall maintain a minimum 5-foot horizontal separation distance from any existing or proposed utility. All utilities shall be shown on the landscape plan, or other appropriate sheet, to confirm the separation distance.

Response: Utilities will be shown on the landscape plan as required.

5. Provide the City's standard detail sheets for water main (5 sheets-rev. 02/16/2018), sanitary sewer (3 sheets- rev. 02/16/2018), storm sewer (2 sheets- rev. 02/16/2018), paving (2 sheets-rev. 03/05/2018) and Pathways (1 sheet-rev. 04/12/2018) at the time of the Stamping Set submittal. These details can be found on the City's website at this location:
<http://cityofnovi.org/Government/City-Services/Public-Services/Engineering-Division/Engineering-Standards-and-Construction-Details.aspx>

Response: The current Novi standard details will be added to the plan set.

Water Main

6. A tapping sleeve, valve and well is required at the connection to the existing water main.

Response: A TSV note will be added.

7. Add shut-off valves to the two leads to the building.

Response: Shutoffs will be shown for building leads.

8. Three (3) sealed sets of revised utility plans along with the MDEQ permit application (06/12 rev.) for water main construction and 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.

Response: The required utility plans and permit applications will be submitted for the water main.

Sanitary Sewer

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

Response: A monitoring manhole with access easement will be shown on the plan set.

10. Revise the sanitary sewer basis of design using the City's Standard Sewer Unit Factor Chart (attached). A value of 3.2 people per REU should be used instead of 3.5 people per REU.

Response: The BOD calculations will be updated.

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

Response: Sanitary material notes will be updated.

12. Provide a note on the Utility Plan and sanitary profile stating the sanitary leads will be buried at least 5 feet deep where under the influence of pavement.

Response: The required bury note will be added.

Storm Sewer

13. A minimum cover depth of 3 feet shall be maintained over all proposed storm sewer. Grades shall be elevated and minimum pipe slopes shall be used to maximize the cover depth. In situations where the minimum cover cannot be achieved, Class V pipe must be used with an absolute minimum cover depth of 2 feet. An explanation shall be provided where the cover depth cannot be provided.

Response: Required minimum cover or appropriate alternative pipe and explanation will be provided.

14. Label the four-foot deep sump and an oil/gas separator in the last storm structure prior to discharge to the storm water basin.

Response: The oil/water separator note will be added.

15. An easement is required over any storm sewers accepting and conveying off-site drainage.

Response: Noted.

16. Provide a schedule listing the casting type and other relevant information for each proposed storm structure on the utility plan. Round castings shall be provided on all catch basins except curb inlet structures.

Response: Castings will be added to the structure table.

17. Show and label all roof conductors, and show where they tie into the storm sewer.

Response: Roof conductors will be shown and labeled.

Storm Water Management Plan

18. 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.

Response: Noted.

19. Provide calculations verifying the post-development runoff rate directed to the proposed receiving drainage course does not exceed the pre- development runoff rate for the site.

Response: Pre- and post- runoff calculations will be added to the plans.

20. Provide release rate calculations for the three design storm events (first flush, bank full, 100-year).

Response: Per coordination with City Engineering, the pond will function as a forebay to a regional detention basin. Only first flush calculations are required.

21. Label the 5-foot wide stone bridge/access route allowing direct access to the standpipe from the bank of the basin during high-water conditions (i.e. stone 6-inches above high-water elevation). Provide a detail and/or note as necessary.

Response: Labels will be added as required.

22. Provide an access easement for maintenance over the pretreatment structure.

Response: An access easement will be added as required.

23. Provide a soil boring in the vicinity of the storm water basin to determine soil conditions and to establish the high-water elevation of the groundwater table.

Response: A soil boring will be provided as required.

24. A 4-foot wide safety shelf is required one-foot below the permanent water surface elevation within the basin.

Response: A safety shelf will be labeled as required.

Paving and Grading

16. Provide a minimum of 6 spot elevations where the pathway crosses each driveway (one at each corner and two in the center of the driveway on each side of the pathway). Spot elevations shall be provided to demonstrate a level landing adjacent to each side of the pathway crossing.

Response: Spot elevations will be added as required.

17. Detectable warning plates are required at all barrier free ramps, hazardous vehicular crossings and other areas where the sidewalk is flush with the adjacent drive or parking pavement. The barrier-free ramps shall comply with current MDOT specifications for ADA Sidewalk Ramps. Provide the latest version of the MDOT standard detail for detectable surfaces.

Response: Detectable warnings will be shown and detailed as required.

18. The grade of the drive approach shall not exceed 2-percent within the first 25 feet of the intersection. Provide spot grades as necessary to establish this grade.

Response: Spot elevations will be shown and detailed as required.

19. If the materials for the sidewalk within the right-of-way are used for the drive, the sidewalk shall be striped through the approach. Provide additional spot grades as necessary to verify the maximum 2-percent cross-slope is being maintained along the walk.

Response: Additional spot elevations will be shown as required.

20. The end islands shall conform to the City standard island design, or variations of the standard design, while still conforming to the standards as outlined in Section 2506 of Appendix A of the Zoning ordinance (i.e. 2' minor radius, 15' major radius, minimum 8' wide, 3' shorter than adjacent 19' stall).

Response: Islands will be revised and dimensioned as required.

21. Provide top of curb/walk and pavement/gutter grades to indicate height of curb adjacent to parking stalls and drive areas.

Response: Top of curb elevations will be added as required.

22. Provide a line designation representing the effective 19-foot stall length for 17-foot perimeter stalls.

Response: Lines and notes will be added as required.

23. Provide dimensions for all parking spaces.

Response: Dimensions will be added as required.

24. Provide the standard MDOT detail 'M' approach at the Grand River Avenue and Meadowbrook Road driveway entrances.

Response: Approaches will be in compliance with MDOT standards.

25. Per Section 26.5-35(c), a statement is required on any plan containing a private street with the following language: "City of Novi has no responsibility to improve or maintain the private streets contained within or private streets providing access to the property described in this plan".

Response: The statement will be added as required.

Soil Erosion and Sediment Control

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

Response: An SESC permit application will be submitted.

Off-Site Easements

27. Any off-site utility easements anticipated must be executed prior to final approval of the plans. If you have not already done so, drafts of the easements and a recent title search shall be submitted to the Community Development Department as soon as possible for review, and shall be approved by the Engineering Division and the City Attorney prior to executing the easements.

Response: No offsite easements are planned for this development.

The following must be submitted with the Revised Final Site Plan:

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

Response: A revision letter will be included with the resubmittal.

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

Response: A construction cost estimate will be included with the resubmittal.

LANDSCAPING REVIEW REPORT

LANDSCAPE DEVIATIONS GRANTED BY THE CITY COUNCIL ON JANUARY 7, 2019:

1. Deviation to not provide street trees along Grand River (8 trees)
2. Deviation to not provide street trees along Cherry Hill (11 trees)
3. Deviation to not provide greenbelt berm or plantings in area of wetland in order to preserve wetland
4. Deviation to not provide greenbelt berm in greenbelt between Cherry Hill and the parking lot area not behind the wetland

Please copy the above deviations, including the meeting date, to Sheet L-1.0 of the Landscape Plans.

Response: Noted. Deviations will be added to sheet L-1.0.

Ordinance Considerations

1. Existing Soils (Preliminary Site Plan checklist #10, #17)
Please provide somewhere in the set.

Response: Soils data will be added to the plan set.

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

1. Provided.

Response: Noted.

2. The overhead utility lines in the vicinity of the project are clearly noted.

Response: Noted.

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

1. Provided.

Response: Noted.

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

1. While the property is not adjacent to residentially zoned property, the property to the west is a multi-family project under construction.

Response: Noted.

2. The 5-foot-tall berm provided meets the requirement for parking adjacent to residential and the west property line is heavily landscaped with a mix of woodland replacement deciduous canopy trees.

Response: Noted.

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

1. The required greenbelt width is provided along both frontages.

Response: Noted.

2. There are some minor shortages in landscaping provided along the frontages that are outlined on the landscape chart, and should be corrected on the revised Final Site Plans.

Response: Landscape calculations will be verified and corrected.

3. Please increase the height of the berm along Meadowbrook, especially south of the entry to at least 3 feet, to block lights from the residence across Meadowbrook.

Response: Berm heights will be labeled to show a minimum of 3' height above pavement along Meadowbrook.

4. The applicant is not providing a berm or landscaping in the Cherry Hill Road greenbelt in order to preserve existing trees and the wetland. This waiver was granted by the Planning Commission.

Response: Noted.

5. Please change at least the southern three Crimean lindens east of the parking lot to large evergreens to help block lights from impacting the single-family residence across Meadowbrook.

Response: The Crimean lindens are the ROW trees required between sidewalk and road and are 15' of an overhead electrical line. The Hophornbeams that are counted as perimeter parking and greenbelt trees along the parking lot will be replaced for evergreens.

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

6. Street trees are provided along Meadowbrook as required.

Response: Noted.

7. Street trees are not provided along either Grand River or Cherry Hill. These deviations are supported by staff because a drainage ditch and utility lines do not provide room for the trees along Grand River, and a deep ditch along Cherry Hill does not allow room for street trees there.

Response: Noted.

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

1. Based on the vehicular use areas, 4,751 sf of islands and 24 trees are required. 12,620 sf of islands and 24 trees are provided.

Response: Noted.

2. Each interior island and endcap island must have 200sf of green space and have at least one tree planted in it.

Response: Noted.

3. The corner island on the south side of the Meadowbrook entry without a tree should have a tree in it. It can be one of the 3 perimeter trees east of the pathway.

Response: Light pole will be relocated and a tree added to the island

4. Please shift the detention basin access aisle to the east 5 feet and plant endcap tree(s) in the space between the aisle and the parking lot.

Response: Gravel access will be shifted to allow for requested plantings.

5. Please increase the width of the endcap closest to the loading zone to at least 10 feet.

Response: Curbed planting bed will be shown to be 5' wide.

6. Woodland replacement trees should not be planted in parking lot islands. Please remove them from all interior islands and access way perimeters (they should all be able to be included in a conservation easement).

Response: Woodland replacement trees will be relocated to perimeter areas and included in a conservation easement.

7. There must be at least 200sf of green space per tree planted in interior islands. Please remove trees from islands as necessary to meet that requirement.

Response: Noted.

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

1. Based on the 2,072 lf of perimeter, 59 trees are required. 44 new canopy trees, 7 greenbelt canopy trees within 15 feet of the parking lot being double-counted as perimeter trees, and 7 existing trees being preserved that are within 15 feet of the parking lot are provided.

Response: Noted.

2. To increase the screening of lights from the residence across Meadowbrook Drive, please replace at least the southern 3 of the Crimean lindens being double-counted as perimeter and greenbelt trees with a large evergreen such as white spruce or Norway spruce.

The Crimean lindens are the ROW trees required between sidewalk and road and are within 15' of an overhead electrical line. The Hophornbeams that are counted as perimeter parking and greenbelt trees along the parking lot will be replaced with evergreens.

Loading Zone screening (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)

1. Provided

Response: Noted.

Building Foundation Landscape (Zoning Sec 5.5.3.D.)

1. Based on the building perimeter, less doors and other paved entry points, 6,712sf of foundation landscape area is required, and 6,902sf are provided adjacent to the building.

Response: Noted.

2. Greater than 60% of the building along both frontages has foundation landscaping.

Response: Noted.

Woodland Replacement Trees (Section 37)

1. Please do not locate woodland replacement trees in areas where they cannot be protected, such as in the greenbelt where utilities are nearby, in parking lot islands, etc.

Response: Woodland replacement trees will be relocated to perimeter areas and included in a conservation easement.

2. Please show the boundaries of the protective conservation easement for the replacement trees on the landscape plan.

Response: Conservation easement will be added to the landscape plan.

Plant List, Notations and Details (LDM 2.h. and t., LDM 4)

1. Provided.

Response: Noted.

2. The diversity requirements apply to non-replacement trees. Please see the Landscape Chart and attached spreadsheet regarding *Ostrya virginiana* and the diversity requirements.

Response: noted. One *Ostrya Virginiana* will be changed.

3. 25 of 36 species (69%) non-replacement species are native to Michigan.

Response: Noted.

4. Please note that straight species (not Grow Low) *Rhus aromatica* should be used around the detention basin.

Response: Species will be updated.

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

1. Provided

Response: Noted.

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

1. The proposed landscaping must be provided with sufficient water to become established and survive over the long term.

Response: An irrigation plan will be added to the set.

2. Please note how this will be accomplished if an irrigation plan is not provided.

Response: An irrigation plan will be added to the set.

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

1. Provided

Response: Noted.

Proposed trees to be saved (Sec 37 Woodland Protection 37-9, LDM 2.e.(1))

1. Provided

Response: Noted.

Corner Clearance (Zoning Sec 5.9)

1. Provided

Response: Noted.

2. The 25-foot clearance zone lines can be removed from the Grand River entry.

Response: The corner clearance lines will be removed.

LANDSCAPING REVIEW CHART

Landscape Plan Requirements (LDM (2))

1. Zoning (LDM 2.f.): Include all adjacent zoning. Parcel: GE, North: Grand River East: Meadowbrook Rd South: Cherry Hill Rd West: GE & NCC. **Please show zoning of all adjacent parcels on landscape plan.**

Response: Adjacent zoning will be added to the plan.

2. Existing plant material Existing woodlands or wetlands (LDM 2.e.(2)): Show location type and size. Label to be saved or removed. Plan shall state if none exists.
 - a. See ECT review for full analysis of Wetlands & Woodlands.

Response: ECT review responses are included in this letter.

- b. Please provide all replacement trees in areas that can be protected with a conservation easement.

Response: Woodland replacement trees will be relocated to perimeter areas and included in a conservation easement.

- c. Please show tree protection fencing on Demolition Plan.

Response: Tree protection fencing will be shown on Demolition Plan.

3. Soil types (LDM.2. r.): As determined by Soils survey of Oakland county. Show types, boundaries. **Please provide somewhere in plan set.**

Response: Soil map will be added to SESC plan.

4. Proposed grading. 2' contour minimum (LDM 2.e.(1)): Provide proposed contours at 2' interval.

- a. Please increase height of berm along Meadowbrook Road to at least 3 feet, with undulations above that if possible. This is especially important in the frontage south of the Meadowbrook entry.

Response: Berm heights will be labeled to show a minimum of 3' height above pavement along Meadowbrook.

- b. Slopes should be no steeper than 1:3.

Response: Berm slopes will be no steeper than 1:3.

General (Zoning Sec 5.5.3.C.ii)

1. Clear Zones (LDM 2.3.(5)): 25 ft corner clearance required. Refer to Zoning Section 5.5.9.
 - a. The city clear vision zone can be removed from the Grand River entry.

Response: The corner clearance lines will be removed.

- b. Please revise the clear zone at the Meadowbrook Road entry per the drawing at the bottom of this chart and remove any shrubs taller than 30" or trees from the zone.

Response: The clear zone will be updated, and no shrubs taller than 30" will be in the zone.

All Categories

1. $D = C/200$ Number of canopy trees required: $4751/200 = 24$ Trees
 - a. Please increase the size of the inset showing the island areas and perimeter line by at least 25% to make it more legible.

Response: Line around tree islands will be made wider to show what area is included.

- b. Please move woodland replacement trees from areas where they can't be placed in a conservation easement.

Response: All replacement trees will be located in a conservation easement.

- c. If they cannot fit on the site in acceptable locations, a deposit for the trees that can't be planted can be made to the city's tree fund.

Response: All replacement trees will be located in a conservation easement.

- d. Please move one of the OVs from the interior island with less than 400sf to another location.

Response: Noted.

- e. Please add an interior tree to the interior corner island of the Meadowbrook entry without a tree. That area should be at least 10 feet wide with a greenspace of at least 200sf.

Response: Light pole will be relocated and a tree added to the island.

- f. Please increase the width of the green space between the detention basin access drive and the edge of the curb to 10 feet and plant at least one tree in that area, which is an endcap.

Response: Gravel drive will be relocated and additional trees added in the required green space.

- g. Please increase the width of the narrow endcap closest to the southern loading zone to at least 10 feet.

Response: Curbed planting bed will be shown to be 5' wide. Island cannot be increased further without creating access issues for trucks on site.

2. Perimeter Green space: 1 Canopy tree per 35 lf. $2072/35 = 59$ trees. 44 new trees + 8 perimeter trees + 7 existing trees within 15 feet of the curb to remain.
 - a. Please make the perimeter line more visible for verification.

Response: Perimeter line will be clarified on the landscape plan.

- b. Please make sure all perimeter trees are within 15 feet of the curb. One of the double-counted greenbelt trees appears to be more than 15 feet from the nearest curb.

Response: A line will be added to show the 15' buffer area.

- c. If any of the existing trees to remain are damaged in the course of construction, they need to be replaced with new perimeter canopy trees.

Response: Noted.

Adjacent to Public Rights-of-Way (Sec 5.5.B) and (LDM 1.b)

1. Berm requirements (Zoning Sec 5.5.3.A.(5)): An undulating berm a minimum of 3 feet high with a 3-foot wide crest is required between parking and right-of-way.
 - a. Please ensure the proposed berms along Grand River and Meadowbrook have a maximum slope of 1:3.

Response: Berm slopes will be a minimum of 1:3.

- b. Please increase the height of the Meadowbrook Road berm south of the entry to at least 3 feet.

Response: Berm heights will be labeled to show a minimum of 3' height above pavement along Meadowbrook.

- c. Due to the preservation of the wetland, a landscape deviation to not provide the required berm in that area of the Cherry Hill greenbelt was granted by the Planning Commission.

Response: Noted.

- d. A landscape deviation was also granted to not provide the greenbelt berm between the detention pond and Cherry Hill Road to preserve the existing trees.

Response: Noted.

Cross-Section of Berms (LDM 2.j)

1. Slope, height and width: Label contour lines, Maximum 33%, Min. 3 feet flat horizontal area, Minimum 3 feet high, Constructed of loam with 6' top layer of topsoil. **Please provide berm cross sections that includes maximum slopes, loam construction and 6" layer of topsoil callouts.**

Response: Cross Sections will be added to the plans.

ROW Landscape Screening Requirements (Sec 5.5.3.B. ii)

1. Minimum berm height (9): Some of the berms are sufficient in height, others aren't.
 - a. Please increase the minimum height for the Meadowbrook Road berms to 3 feet.

Response: Berm heights will be labeled to show a minimum of 3' height above pavement along Meadowbrook.

- b. Please make sure the slopes are no steeper than 1:3.

Response: Berm slopes will be a minimum of 1:3.

2. Canopy deciduous or large evergreen trees Notes (1) (10):
 - a. Please use more evergreen woodland replacement trees between Cherry Hill Road and the detention pond to increase the screening of the parking lot. Up to 10% of the total number of woodland replacements planted on the site can be evergreen.

Response: Evergreen trees will be added between Cherry Hill and the pond.

- b. Please show the location of the building address number and keep it unscreened from road(s).

Response: Building address location will be added.

- c. Please place the 4 white pines further apart. Large canopy trees are defined as reaching a minimum mature width of at least 15 feet so they should be allowed to meet that width.

Response: Tree location will be adjusted.

- d. Please change at least the southern 3 Crimean lindens east of the parking lot to large evergreens to help block lights from impacting the residence across Meadowbrook.

The Crimean lindens are the ROW trees required between sidewalk and road and are 15' of an overhead electrical line. The Hophornbeams that are counted as perimeter parking and greenbelt trees along the parking lot will be replaced with evergreens.

3. Sub-canopy deciduous trees Notes (2)(10):
 - a. Please provide 1 more subcanopy tree along Grand River

Response: An additional tree will be added.

- b. Please locate at least 3 subcanopy trees along the Grand River building frontage, evenly spaced, to soften the view from the road since no street trees can be planted.

Response: A waiver is requested from this requirement. Due to the nature of this business, clear visibility into the showroom from the road is of paramount importance to the client, and their development standards specify no trees planted in front of their windows.

- c. Please provide 2 more subcanopy trees in the Meadowbrook greenbelt.

Response: A waiver is requested from this requirement. Due to the nature of this business, clear visibility into the showroom from the road is of paramount importance to the client, and their development standards specify no trees planted in front of their windows.

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

1. Screening of outdoor storage, loading/unloading (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5): Loading zone on the south side of the building faces Meadowbrook. A heavily landscaped berm is proposed in the greenbelt which will screen that loading zone. **Please limit the berm's slope to 1:3.**

Response: Berm slopes will be a minimum of 1:3.

2. Transformers/Utility boxes (LDM 1.e from 1 through 5): A minimum of 2ft. separation between box and the plants. Ground cover below 4" is allowed up to pad. No plant materials within 8 ft. from the doors. **Please add a note stating that the screening shrubs are to be maintained at a height at least as tall as the electrical box.**

Response: The required note will be added.

Detention/Retention Basin Requirements (Sec. 5.5.3.E.iv)

1. Planting requirements (Sec. 5.5.3.E.iv): **Please add a note stating that straight species Rhus aromatica should be used.**

Response: Species will be updated.

LANDSCAPING NOTES, DETAILS AND GENERAL REQUIREMENTS

1. Irrigation plan (LDM 2.s.): A fully automatic irrigation system or a method of providing sufficient water for plant establishment and survival is required on Final Site Plans.
 - a. Please add an irrigation plan or information as to how plants will be watered sufficiently for establishment and long- term survival.

Response: An irrigation plan will be added to the plan set.

- b. If xeriscaping is used, please provide information about plantings included.

Response: An irrigation plan will be added to the plan set.

- c. Irrigation plans/information need to be provided in electronic stamping sets at the latest. When they are provided, the system should be set up to not over-water species along the north side of the building, which don't need as much water for maximum performance.

Response: An irrigation plan will be added to the plan set.

Plant List (LDM 2.h., LDM 4) – Include all cost estimates

1. Botanical and common names:
 - a. Please reduce the number of OV's used in the general site tree plantings (i.e. not woodland replacements) to 19 per the attached diversity table to meet the standards of the Landscape Design Manual.

Response: The number of OV's will be adjusted per diversity requirement.

- b. There is no limit to how many Ironwoods may be used as woodland replacements.

Response: Noted.

- c. 26 of 37 species used (70%) are native to Michigan.

Response: Noted.

Planting Details/Info (LDM 2.i) – Utilize City of Novi Standard Details

1. Tree protection fencing: **Please show the tree fencing line on the Demolition Plan.**

Response: Tree protection fencing will be shown on Demolition Plan.

WETLAND REVIEW OF THE PRELIMINARY & FINAL SITE PLAN (PSP19-0032)

Proposed Wetland/Watercourse Impacts

1. As noted above, the Plan indicates one (1) area of wetland on this site located along the southern boundary. Portions of this wetland area appear to be included on the City of Novi Regulated Wetlands and Watercourse Map (see Figure 1, attached). The Plan appears to propose one (1) area of wetland/watercourse impact for the removal of existing culvert end sections, the installation of a storm water outlet pipe from the proposed detention basin to the drain, and associated grading.

Response: Noted.

2. The current Plan does not appear to label or quantify the proposed impacts to the wetland/watercourse or the 25-foot natural features setback. This information shall be added to the Plan. The Applicant shall indicate and quantify (square feet or acres) all areas of direct impact (cut or fill) within the wetland/watercourse boundaries on subsequent plan submittals.

Response: All wetland impact areas will be labeled and quantified on the plans.

3. With regard to the 25-foot wetland setbacks, the Plan appears to propose encroachment into the 25-foot wetland buffer south of the proposed detention basin for the purpose of constructing the stormwater outlet pipe (30" diameter concrete pipe). These impacts have not been indicated or quantified on the current Plan. The Applicant shall indicate, quantify (square feet or acres of fill or excavation within the wetland buffer limits, if applicable) on subsequent plan submittals. The City of Novi regulates a 25-foot buffer surrounding all wetland and watercourses.

Response: All wetland buffer impact areas will be labeled and quantified on the plans.

Wetland/Watercourse Comments

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

1. ECT encourages the Applicant to minimize impacts to on-site wetlands and 25-foot wetland setbacks to the greatest extent practicable. The Applicant should consider modification of the proposed site design to preserve all wetland and wetland buffer areas. Specifically, the applicant shall work to avoid any proposed encroachment into the 25-foot wetland buffer for the purpose constructing the proposed stormwater detention basin. The City regulates wetland buffers/setbacks. Article 24, Schedule of Regulations, of the Zoning Ordinance states that:

"There shall be maintained in all districts a wetland and watercourse setback, as provided herein, unless and to the extent, it is determined to be in the public interest not to maintain such a setback. The intent of this provision is to require a minimum setback from wetlands and watercourses".

The SESC Plan (Sheet C-5.0) appears to indicate that the majority, if not all, of the existing 25-foot natural features setback will receive temporary seed and mulch. The Grading Plan (Sheet C-4.0) does not appear to indicate grading within the 25-foot setback, except for within the area of the stormwater detention basin outfall pipe. The applicant shall clarify the intent of the temporary seed and mulch that is proposed within the 25-foot setback. Twenty-five-foot buffers are intended to contain native plant types, and sod or common grass seed is not desirable in these areas. Please clarify the intent and type of the proposed seed mix and mulch within this area.

Response: The SESC plan will be revised to show temporary seeding only in necessary areas. An appropriate seed mix will be added for those small areas of grading impact in the 25-foot buffers.

2. The current Plan appears to propose direct impact to wetland/watercourse for the removal of some existing storm water pipe and the installation of a stormwater outfall pipe from the proposed detention basin. The applicant shall provide information on subsequent plans that clearly indicates the existing areas of onsite wetlands as well as the area of the 25-foot wetland buffers (i.e., square feet or acres of existing natural features). In addition, the Plan shall clearly indicate the area (square feet or acres) of all wetland and wetland buffer impacts (both permanent and temporary, if applicable) and the volume (cubic yards) of all wetland impacts.

Response: All wetland impact areas will be labeled and quantified on the plans.

3. It appears as though a City of Novi Minor Use Wetland and likely a MDEQ Wetland Permit would be required for the proposed wetland impacts. A City of Novi Authorization to Encroach the 25-Foot Natural Features Setback would be required for any proposed impacts to on-site 25-foot wetland buffers.

Response: The required Novi and MDEQ permits will be obtained for the proposed work.

4. It should be noted that it is the Applicant's responsibility to confirm the need for a Permit from the MDEQ for any proposed wetland impacts. Final determination as to the regulatory status of any on-site wetlands shall be made by MDEQ. The Applicant should provide a copy of the MDEQ Wetland Use Permit application to the City (and our office) for review and a copy of the approved permit upon issuance. A City of Novi Wetland Permit cannot be issued prior to receiving this information.

Response: A copy of the required MDEQ permits will be provided to Novi for the proposed work.

5. The Plan should address how any temporary impacts to wetland buffers shall be restored, if applicable. A proposed seed mix should be provided on the Plan for restoration of these wetland buffer areas. Sod or common grass seed will not be authorized in these areas.

Response: The SESC plan will be revised to show temporary seeding only in necessary areas. An appropriate seed mix will be added for those small areas of grading impact in the 25-foot buffers.

6. The Applicant is encouraged to provide wetland conservation easements for any areas of remaining wetland and 25-foot wetland buffer. 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 as shown on the approved plans. 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 Wetland and Watercourse permit. An easement that includes the existing wetland/watercourse and the 25-foot wetland buffer appears to be shown on the Easement Plan (Sheet C-6.1).

Response: A wetland conservation easement will be provided for the onsite wetlands and 25' buffer.

7. As noted above, should impacts to the wetland area be proposed, the applicant shall provide correspondence from the MDEQ clarifying the regulatory status of Wetland A. A City of Novi Wetland Permit cannot be issued prior to receiving this information.

Response: A copy of the required MDEQ permits will be provided to Novi for the proposed work.

WOODLAND REVIEW OF THE PRELIMINARY & FINAL SITE PLAN (PSP19-0032)

Woodland Comments

The following are repeat comments from our Woodland Review of the SDO Concept Plan (PSP18-0125) dated August 29, 2018. The current status of each comment follows in bold italics. Please consider the following comments when preparing subsequent site plan submittals:

1. ECT encourages the Applicant to minimize impacts to on-site woodlands to the greatest extent practicable. Currently, the Plan proposes to remove 149 of the 310 surveyed trees (48% of the on-site regulated trees). The current required Woodland Replacement Credit quantity is 172 Woodland Replacement Credits.

This comment still applies. The Plan indicates the removal of 150 Regulated Trees requiring a total of 173 Woodland Replacement Credits. The current Plan does however propose to replace all required Woodland Replacement Credits through on-site planting of deciduous and coniferous tree plantings.

Response: Noted.

2. The Plan includes a Tree Plant List on Sheet T-1.0, that lists the species of the proposed Woodland Replacement Trees; however, it does not currently appear to specify the quantity of each species that will be used as Woodland Replacement tree credits. The applicant should, for example, specify how many of the 28 hophornbeam listed in the list are Woodland Replacement Trees as opposed to Perimeter Parking Lot or Landscape trees, etc.

This comment still applies. The Tree List is included on Sheet L-1.0 (Landscape Plan). The applicant should, for example, specify how many of the 25 hophornbeam listed in the list are Woodland Replacement Trees as opposed to Perimeter Parking Lot or Landscape trees, etc. ECT requests that the applicant provide the quantity of each species of tree being used as Woodland Replacement Credit in the 'Replacement Tree' column of the table.

Response: A separate list will be used to call out only the replacement trees.

3. For trees proposed for removal, the Tree Plant List should include a column indicating the number of Woodland Replacement Credits Required.

This comment still applies. See Comment #2, above.

Response: noted.

4. All of the tree species proposed as Woodland Replacement Tree material appears to be acceptable per the City's Woodland Tree Replacement Chart, however, the applicant shall specify the thornless honeylocust (*Gleditsia triacanthos inermis*) on the Plan.

This comment still applies.

Response: noted.

5. A Woodland Permit from the City of Novi would be required for proposed impacts to any trees 8-inch diameter-at-breast-height (DBH) or greater and located within an area designated as City Regulated Woodland, or any tree 36-inches DBH regardless of location on the site. Such trees shall be relocated or replaced by the permit grantee. All deciduous replacement trees shall be two and one-half (2 ½) inches caliper or greater and count at a 1-to-1 replacement ratio and all coniferous replacement trees shall be six (6) feet in height (minimum) and count at a 1.5-to-1 replacement ratio. All Woodland Replacement trees shall be species that are listed on the City's Woodland Tree Replacement Chart (attached).

This comment still applies.

Response: noted.

6. 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. Currently, the Woodland Replacement Performance Guarantee would be \$68,800 (172 Woodland Replacement Credits Required x \$400/Credit). Based on a successful inspection of the installed on-site Woodland Replacement trees, the original Woodland Financial Guarantee shall be returned to the Applicant. Twenty-five percent (25%) of the value of the Woodland Replacement material shall be kept for a period of 2-years after the successful inspection of the tree replacement installation as a Woodland Maintenance and Guarantee Bond. This Woodland Maintenance and Guarantee Bond value is to be \$17,200.

This comment still applies, however, currently the Woodland Replacement Performance Guarantee would be \$69,200 (173 Woodland Replacement Credits Required x \$400/Credit). The Woodland Maintenance and Guarantee Bond value will be \$17,300.

Response: Noted.

7. If applicable, Woodland 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.

This comments still applies.

Response: Noted.

8. If applicable, 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 are proposed on-site that cannot be placed on-site at the time of landscaping.

This comment still applies.

Response: Noted.

9. The applicant currently proposes to provide 172 Woodland Replacement Credits on site. The Applicant shall provide preservation/conservation easements as directed by the City of Novi Community Development Department for any areas of woodland replacement trees. The applicant shall demonstrate that the all proposed woodland replacement trees 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. The applicant shall clearly indicate the proposed conservation easement boundaries on the Plan.

This comment still applies; however, the applicant currently proposes to provide 173 Woodland Replacement Credits on-site. The applicant is now demonstrating on the Plan (Sheet C-6.1) that all proposed Woodland Replacement Trees will be guaranteed to be preserved as planted within a conservation easement or landscape easement to be granted to the City.

Response: Noted.

10. As noted, some of the proposed Woodland Replacement trees are within the parking lot or close to the proposed loading zone. The location of these trees is not consistent with the intent of the Woodland Ordinance in mitigating for the loss of woodland tree canopy. ECT suggests that these proposed Woodland Replacement Trees be relocated to another area of the site that can more easily be placed into a conservation easement.

This comment has been satisfactorily addressed.

Response: Noted.

FACADE ORDINANCE REVIEW

Notes to the Applicant:

1. It should be noted that all proposed signs are not regulated by the Façade Ordinance and must comply with the City's Sign Ordinance.

Response: Proposed building signage will be submitted at a later date.

2. Inspections – The Façade Ordinance requires inspection(s) for all projects. Materials displayed on the approved sample board (in this case the adjacent existing material) will be compared to materials to be installed. 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>.

Response: A material board has been submitted and the required inspections will be scheduled at the appropriate time.

FIRE REVIEW

Comments:

1. All fire hydrants **MUST** in installed and operational prior to any building construction begins.

Response: Noted.

2. A hazardous chemical survey is required to be submitted to the Planning & Community Development Department for distribution to the Fire Department at the time any Preliminary Site Plan is submitted for review and approval. Definitions of chemical types can be obtained from the Fire Department at (248) 735-5674.

Response: A hazardous chemical survey will be submitted.

3. All roads **MUST** meet City of Novi weight requirements of 35 ton. (Novi City Ordinance 15-17 503.2.3).

Response: Noted.

JAGUAR TRAFFIC IMPACT STUDY REVIEW

SUMMARY AND RECOMMENDATIONS

1. The applicant should update the study with newer traffic counts and work with the City's traffic consultant, AECOM, to include more background development assumptions and to develop an agreed upon methodology and scope.

F&V Response: Per the City of Novi Site Plan and Development Manual: Traffic count data shall not be over two years old, except the City may permit counts up to three years old to be increased by a factor supported by documentation or a finding that traffic has increased at a rate less than two percent annually in the past three to five years. The traffic count data used in the study is not more than 2 years old; therefore, this data is still acceptable for use in this analysis.

The background development assumptions, study methodology and scope of work were agreed upon with AECOM via e-mail correspondence dated August 29, 2017.

2. The applicant should update the size of the development in their analysis.

F&V Response: In July 2018 the size of the development increased by 5,452 SF. This change was discussed with AECOM via e-mail correspondence dated July 19, 2018 and a cover letter was provided showing the minor increases in traffic volumes associated with the change in SF.

- The applicant should update the version of the ITE Trip Generation Manual used in their calculations.

In September 2018, ITE the Trip Generation Manual 10th Edition. The study and the revised trip generation analysis memo was performed before the ITE 10th edition was published. The 10th edition does include a new land use for that is applicable for this development, Automobile Sales (New). A comparison of the trip generation analysis evaluated in the traffic study and the updated trip generation is summarized below. Overall, the changes in trip generation due to the new manual and the revised development size are negligible.

Land Use		ITE Trip Gen Edition	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
							In	Out	Total	In	Out	Total
BMW	Automobile Sales	9th Edition	841	53,211	SF	1,719	77	25	102	50	75	125
Land Rover	Automobile Sales (New)	10th Edition	840	58,663	SF	1,633	80	30	110	51	76	127
Difference				5,452	SF	-86	3	5	8	1	1	2

JAGUAR/LAND ROVER PRELIMINARY/FINAL TRAFFIC REVIEW

GENERAL COMMENTS

- The applicant, Erhard Motor Sales Inc., is proposing a Jaguar/Land Rover motor sales facility on the southwest corner of Meadowbrook Road and Grand River Avenue. The applicant is proposing a 53,211 square foot building that will include both sales and service areas.
 - The applicant should update site plans to be consistent with the building size. Both 53,211 and 58,663 are listed as building size on the plans.

Response: The building sizes will be updated on the plans.

- Meadowbrook Road is under the jurisdiction of the City of Novi and Grand River Avenue is under the jurisdiction of the Road Commission for Oakland County.

Response: Noted.

- The parcel is currently under NCC (Non-Center Commercial) and OS-1 (Office Service) Zoning. The applicant is proposing to re-zone the parcel to GE (Gateway East) zoning via a special development overlay (SDO).

Response: Noted.

TRAFFIC IMPACTS

- Based on the City thresholds and the expected trips to be generated, the estimated trips do trigger the needs for a traffic impact study. The applicant has provided a TIS that was reviewed.

Response: Noted.

- The applicant should refer to the TIS Review Letter for more specific comments regarding traffic.

Response: The TIS letter comments are addressed elsewhere in this letter.

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 one entrance from Grand River Avenue and one entrance from Meadowbrook Road.

Response: Noted.

2. The Grand River Avenue driveway is a right-in/one-way-out driveway proposed to be within the existing right turn lane along eastbound Grand River Avenue.
 - a. The driveway dimensions for width are in compliance with the City standards for this particular type of driveway and meet fire department requirements.

Response: Noted.

- b. The entering and exiting radii are within the allowable range per Figure IX.2 from the City's Code of Ordinances but could consider reducing to 20' to meet the standard. Alternatively, because of the right- in/right-out design, the entering and exiting radii may need to deviate from the standard dimensions.

Response: Noted.

- c. The applicant should dimension the right-in/right-out island on Grand River Avenue.

Response: The island will be dimensioned on future submittals.

3. The proposed Meadowbrook Road driveway is a two-way driveway. The width of 30 feet meets City standards and although the turning radii dimensions are within the allowable range, the applicant should consider increasing to 20 feet.

Response: Noted.

4. The Meadowbrook Road driveway is proposed at the current location of a right turn lane taper. The applicant is extending the right turn lane north of the site driveway so that it also acts as a right turn lane for the development. The applicant provided dimensions for the taper and turn lane that are within range of Figure IX.11 in the City's Code of Ordinances. There is not an exiting taper due to the existing right turn lane for Cherry Hill Road.

Response: Noted.

5. The applicant provided sight distance at both driveways that are in accordance with Figure VIII-E in the City's Code of Ordinances.

Response: Noted.

INTERNAL SITE OPERATIONS

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

1. General Traffic Flow

- a. The applicant has provided large vehicle turning paths entering from Meadowbrook Road and exiting at Grand River Avenue. The applicant should also include large vehicle delivery truck patterns into and out of the proposed loading zone.

Response: Vehicle turning templates will be added for the loading zone.

- b. The City requires a loading zone totaling 10 square feet for each front foot of building. Reference section 5.4 of the City's Zoning Ordinance for more information.
 - i. The applicant has provided a 2,465 S.F. loading zone located adjacent to the 10 visitor and ADA accessible parking at the main entrance to the building. There is a note stating that no long-term delivery truck parking is allowed on site but the applicant should consider revising that to not allow deliveries during normal business hours so that the trucks do not block those 10 parking spaces. Per Section 5.4.2 the loading zone should "not have a disruptive effect on the safe and efficient flow of pedestrian and vehicular traffic within the site". Alternatively, the parking space access and/or loading zone access may be revised.

Response: Delivery policy notes will be updated.

- ii. The proposed trash enclosure area is not expected to interfere with parking operations.

Response: Noted.

- c. The applicant has indicated that the intent of the proposed 13-foot-wide access pathway near the Grand River Avenue driveway is to facilitate the movement of vehicles in and out of the showroom.

Response: Noted.

2. Parking Facilities

- a. As per the City's Zoning Ordinance, the applicant is required to provide one parking space for each 200 square feet of usable floor area of sales room and one for every one auto service stall in the service room. The building information listed on sheet C-2.0 (and in the revised RTIS) is 58,663 S.F. where the label on the building plan on sheet C-2.0 is 53,211 S.F. The applicant should update the facility size to be consistent across all records.

Response: The building size will be updated to be consistent.

- i. The applicant should review the parking calculations table and the parking space labels on the plans to ensure they are consistent. For example, the parking calculations table indicates 287 storage spaces, the plan label is 291 and the total counted is 290.

Response: The parking calculations will be updated to be consistent.

- b. The applicant has provided a total of 426 parking spaces.
 - i. It should be noted that the Novi City Council is currently reviewing an amendment to the Zoning Ordinance that limits the number of on-site parking spaces to 125 percent of the required parking. The amendment is expected to be approved prior to the Jaguar/Land Rover development being reviewed by the Planning Commission. Therefore, the applicant should accommodate for this amendment within their site plan or seek a special land use subject to Planning Commission approval.

Response: A parking waiver will be requested if required.

- ii. Of the total 426 spaces provided, 138 of those are required for visitor, employee and service bay parking and there are only 136 shown. The applicant should designate (2) more spaces or a waiver may be required.

Response: Visitor parking will be updated to be consistent.

- iii. Five (5) barrier free parking spaces are required and five (5) are proposed with one (1) of those spaces being van accessible. The dimensions of these spaces are in compliance with ADA Standards for Accessible Design.

Response: Noted.

- c. The applicant has provided parking space lengths for parking spaces throughout the development. The applicant has proposed four-inch curbs around the perimeter of the development, which require a parking space length of 17 feet. Please reference Section 5.3.2 of the City's Zoning Ordinance for further clarification.

Response: Noted.

- i. It should also be noted that the note on sheet C-3.0 indicates four-inch curbs while the detail on sheet C-8.0 indicates 6" curbs.

Response: City of Novi curb details will be utilized.

- ii. The applicant should indicate that 6" curbs are required at the parking end islands.

Response: 6" curbs will be specified at the end islands.

- d. The applicant should provide the width of all aisles on the site to ensure compliance.

Response: All drive aisles will be dimensioned.

- e. The applicant should provide width dimensions for the proposed landscape islands, or indicate that the dimensions provided are typical throughout the site unless otherwise noted. The applicant has indicated that the landscape islands are 4.25' shorter than the adjacent parking space, which does not meet the 3' requirement. Also, the 1.5' radius does not meet the 2' requirement. In some locations, the exterior radius is less than 15' and should be increased to 15'. Please reference Section 5.3.12 for more information and update the plans to meet City standards.

Response: Islands will be dimensioned and verified to be in compliance with City standards.

- f. The applicant is required to provide two (2) bicycle parking spaces for the service center section of the development and six (6) have been provided. A bicycle parking layout is shown on sheet C-3.0 but a dimension for the width of the sidewalk should also be included.

Response: The sidewalk dimension will be added to the plans.

- i. The detail shown is for four (4) bicycle parking spaces and not the six (6) that the data table on sheet C3.0 states are provided.

Response: 4 bicycle parking spaces are planned near the building entry. A single bike loop is planned for the corner entry plaza, and another single bike loop is planned for one of the pedestrian plazas near the pond, for a total of 6 spaces. Notes and details will be updated for consistency.

- ii. The bike loop detail on sheet C-8.0 is in compliance with City standards.

Response: Noted.

3. Sidewalk Requirements

- a. The applicant has proposed an 8' sidewalk adjacent to Grand River Avenue in order to be in compliance with the City's Non-Motorized Master Plan.

Response: Noted.

- b. The proposed sidewalks throughout the site are generally in compliance with City standards; however, additional dimensions are required for the sidewalks on the southeast side of the building.

Response: Additional dimensions will be added.

- c. The applicant has provided sidewalk connections from the site to the required sidewalks along Grand River Avenue and Meadowbrook Road.

Response: Noted.

- d. The applicant has provided sidewalk ramp and detectable warning surface locations and details.

Response: Noted.

- e. The applicant should indicate the need for and intent of the proposed gray paver walkway on the site. The placement of such walkway is not ideal in that it is placed between the parking spaces and the end islands. The end islands should be relocated to be adjacent to the parking spaces.

Response: The gray paver pathway is a requirement of the Jaguar Land Rover design standards, and is intended to provide guidance and connectivity from the main door of the showroom to all guest parking areas. It is located behind the end islands to provide physical separation between pedestrian and vehicle areas.

SIGNING AND STRIPING

1. All on-site signing and pavement markings shall be in compliance with the Michigan Manual on Uniform Traffic Control Devices (MMUTCD). The following is a discussion of the proposed signing and striping.
 - a. The applicant has provided a signing layout, quantities table, and details.

Response: Noted.

- b. The proposed stop sign (R1-1) should be 30" in size.

Response: The sign will be specified as 30".

- c. The applicant could consider adding a Keep Right (R4-7) and a No Left Turn (R3-2) sign in the island of the Grand River Avenue entrance. These signs are listed in the quantity table but are not labeled on the plans.

Response: The signs will be appropriately labeled.

2. The applicant has provided pavement marking details for the ADA accessible parking but should also indicate pavement marking details including color, dimensions and location throughout the site and entrances in future submittals.

Response: Colors and dimensions for all striping will be added.

- a. The applicant could consider pavement markings for the pedestrian crossing at the Meadowbrook entrance.

Response: Striping will be added for the Meadowbrook pedestrian crossing.

We trust these revisions meet requirements. If you should have any questions or require any additional information, please feel free to contact this office.

Sincerely,

PEA, Inc.



Becky Klein, PE, LEED AP BD+C
Project Manager

Attachment:

Cc