



## VILLAS AT STONEBROOK JSP17-62

### VILLAS AT STONEBROOK JSP17-62

Public hearing at the request of Pulte Home of Michigan, LLC for recommendation to the City Council for Concept Plan approval under the Planned Suburban Low Rise Overlay District. The subject property is located on the east side of Wixom Road, north of Eleven Mile Road (Section 17). The applicant is proposing a 43 duplex (86 total units) "age-restricted" ranch style housing units. The subject property is currently zoned I-2, General Industrial with Planned Suburban Low-Rise Overlay.

### Required Action

Recommend approval/denial of the Planned Suburban Low-Rise (PSLR) Overlay Concept Plan to the City Council.

REVIEW	RESULT	DATE	COMMENTS
Planning	Approval recommended	01-30-18	Deviations to: <ul style="list-style-type: none"> <li>• Defer Façade review for proposed building elevations at the time of Preliminary Site Plan</li> <li>• Allow a Traffic Impact Assessment in lieu of required Traffic Impact study</li> <li>• Allow building to front on an approved private driveway, which does not conform to the City standards,</li> <li>• To allow the required front and side setbacks as indicated on the PSLR Concept plan</li> <li>• Allow reduction of minimum distance between buildings by 5 feet</li> <li>• Allow reduction of minimum percentage of active recreation areas</li> <li>• Defer the submittal of Lighting and Photometric plan at the time of Preliminary Site Plan Submittal</li> <li>• Allow full time access drives to be connected to a section-line road as opposed to a non-section line roads</li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Engineering	Approval recommended	01-30-18	<ul style="list-style-type: none"> <li>• Deviation for absence of a stub street required at 1,300 feet interval along the property boundary</li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Landscaping	Approval	01-12-18	Deviations to:

	recommended		<ul style="list-style-type: none"> <li>• <b>Allow placement of street trees between the sidewalk and the building</b> (<i>not supported by staff</i>)</li> <li>• <b>Allow additional sub-canopy trees in lieu of deciduous canopy or large evergreen trees provided the applicant limits the percentage of proposed sub-canopy trees within 25 percent of total required canopy trees</b></li> <li>• <b>Allow absence of required landscaped berm along Wixom Road frontage</b></li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Traffic	Approval recommended	01-25-18	<p>Deviation for:</p> <ul style="list-style-type: none"> <li>• <b>Reducing the distance between the sidewalk and back of the curb</b></li> <li>• <b>Reduction of residential driveway taper depth</b></li> <li>• <b>Allowing increase in the length of divided driveway island</b></li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Wetland	Approval recommended	01-29-18	<ul style="list-style-type: none"> <li>• <b>City of Novi Wetland permit and wetland buffer authorization required</b></li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Woodland	Approval recommended	01-29-18	<ul style="list-style-type: none"> <li>• <b>City of Novi Woodland permit required.</b></li> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>
Façade	Undetermined		<ul style="list-style-type: none"> <li>• <b>Deviation to defer façade review to Preliminary Site Plan. Additional discussion required prior to PSLR agreement approval</b></li> </ul>
Fire	Approval recommended	01-12-18	<ul style="list-style-type: none"> <li>• Items to be addressed on the Preliminary Site Plan submittal</li> </ul>

## Motion Sheet

### Approval –PSLR Overlay Concept Plan

In the matter of Villas at Stonebrook JSP17-62, motion to **recommend approval** of the Planned Suburban Low-Rise (PSLR) Overlay Development Agreement Application and Concept Plan based on the following findings, City Council deviations, and conditions:

1. The PSLR Overlay Development Agreement and PSLR Overlay Concept Plan will result in a recognizable and substantial benefit to the ultimate users of the project and to the community. *[The applicant could revise the concept layout and type of housing to better meet the intent of PSLR Ordinance. The site proposes a connection to extensive pathway system within Providence park hospital campus to the east. ]*
2. In relation to the underlying zoning or the potential uses contemplated in the City of Novi Master Plan, the proposed type and density of use(s) will not result in an unreasonable increase in the use of public services, facilities and utilities, and will not place an unreasonable burden upon the subject property, surrounding land, nearby property owners and occupants, or the natural environment. *[The applicant has provided a Traffic Impact Assessment and a Community Impact Statement which indicates minimal impacts on the use of public services, facilities and utilities. The proposed concept plan impacts about 0.56 acres of existing 1.96 acre wetlands and proposes approximately 54 % of regulated tree removals. The plan indicates appropriate mitigation measure on-site and off-site.]*
3. In relation to the underlying zoning or the potential uses contemplated in the City of Novi Master Plan, the proposed development will not cause a negative impact upon surrounding properties. *[The proposed buildings have been buffered by proposed landscape. The applicant provides an access easement on the north side of the proposed entry drive for future connection capability to neighboring properties to eliminate multiple exits onto Wixom Road. ]*
4. The proposed development will be consistent with the goals and objectives of the City of Novi Master Plan, and will be consistent with the requirements of this Article [Article 3.1.27]. *[The proposed development provides fills the gap for active adults housing need, which is the recommended missing middle housing in the City's 2016 Master Plan for Land Use.]*
5. City Council deviations for the following (as the Concept Plan provides substitute safeguards for each of the regulations and there are specific, identified features or planning mechanisms deemed beneficial to the City by the City Council which are designed into the project for the purpose of achieving the objectives for the District as stated in the planning review letter):
  - a. Deviation to defer Façade review for proposed building elevations at the time of Preliminary Site Plan, provided the applicant agrees to comply with the requirements of Façade Ordinance and conditions suggested in the Planning Review Letter;
  - b. Deviation to allow a Traffic Impact Assessment in lieu of required Traffic Impact study as the number of estimated trips from this development do not exceed the City's threshold.

- c. Deviation from Sec. 3.21.2.A.i to allow building to front on an approved private driveway, which does not conform to the City standards with respect to required sixty foot right-of-way, due to the type of development proposed for active senior adult development, and because of the offer to provide an easement for the adjacent property to share access if needed;
- d. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow modifications to the required front and side setbacks( as indicated on the PSLR Concept plan) due to the type of development proposed for active senior adult development;
- e. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow reduction of minimum distance between buildings by 5 feet (30 feet required, 25 feet proposed) due to the type of development proposed for active senior adult development;
- f. Deviation from Sec. 3.21.2.A.v to allow reduction of minimum percentage of active recreation areas (50% of open spaces required, approximately 27% provided) as the development proposes connection to Providence hospital tail system;
- g. Deviation from Sec. 3.21.2.A.x to defer the submittal of Lighting and Photometric plan at the time of Preliminary Site Plan Submittal as the applicant intends to conform to the Zoning Code requirements;
- h. Deviation from Sec. 3.21.2.B to allow full time access drives to be connected to a section-line road as opposed to a non-section line roads as the applicant is proposing to provide access and utility easement to neighboring properties to eliminate multiple curb cuts on Wixom Road;
- i. The applicant should work with City's Landscape Architect to revise the landscape plan to conform with the requirements of the Landscape Ordinance;

**OR**

Deviation from Sec. 5.5.3.F.ii.b.(2) to allow placement of street trees between the sidewalk and the building as opposed to between the sidewalk and curb, due to type of development proposed.

- j. Deviation from Sec. 5.5.3.F.ii.b.(1) to allow additional sub-canopy trees in lieu of deciduous canopy or large evergreen trees provided the applicant limits the percentage of proposed sub-canopy trees within 25 percent of total required canopy trees, as it will provide additional visual and species diversity to the site;
- k. Deviation from Sec. 3.21.2.A.iii and Sec. 5.5.3 to allow absence of required landscaped berm along Wixom Road frontage due to limited frontage and flag shaped lot;
- l. Deviation from Sec. 4.04, Article IV, Appendix C-Subdivision ordinance of City Code of Ordinances for absence of a stub street required at 1,300 feet

interval along the property boundary to provide connection to the adjacent property boundary, due to conflict with existing wetlands;

- m. Deviation from Chapter 7(c) (1) of Engineering Design manual for reducing the distance between the sidewalk and back of the curb. A minimum of 7.5 feet can be supported by staff;
  - n. Deviation from Section 11-216 (Figure IX.5) of City's Code of Ordinances for reduction of residential driveway taper depth (10 feet required, 7.5 feet proposed) due to proximity of proposed sidewalk within the development.
  - o. Deviation from Section 11-216 (Figure IX.2) of City's Code of Ordinances for allowing increase in the length of divided driveway island (35 feet required, 100 feet proposed) as it is within the allowable range;
- 6. The findings of compliance with Ordinance standards in the staff and consultant review letters and the conditions and the items listed in those letters being addressed on the Preliminary Site Plan; and
  - 7. *(additional comments here if any)*

*(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.)*

**-OR-**

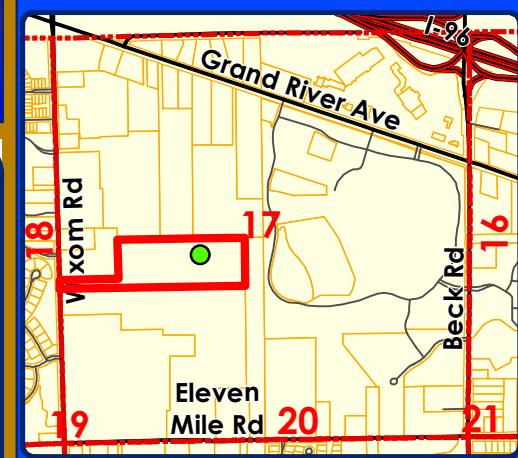
**Denial – PSLR Overlay Concept Plan**

In the matter of Villas at Stonebrook JSP17-62, motion to **recommend denial** of the Planned Suburban Low-Rise (PSLR) Overlay Development Agreement Application and Concept Plan...*(because the proposed concept plan would not satisfy the findings and conditions noted in Article 23B of the Zoning Ordinance.)*

Maps  
Location  
Zoning  
Future Land Use  
Natural Features

# JSP 17-62 VILLAS AT STONEBROOK

## Location Map

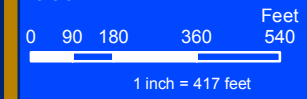


**LEGEND**  
[Red Outline] Sections



**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: 02/02/18  
Project: JSP 17-62 VILLAS AT STONEBROOK  
Version #: 1

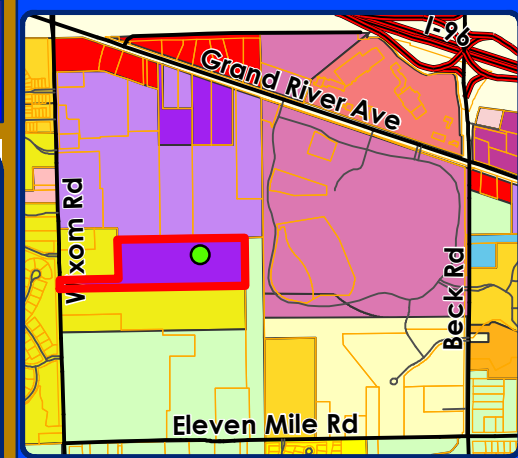
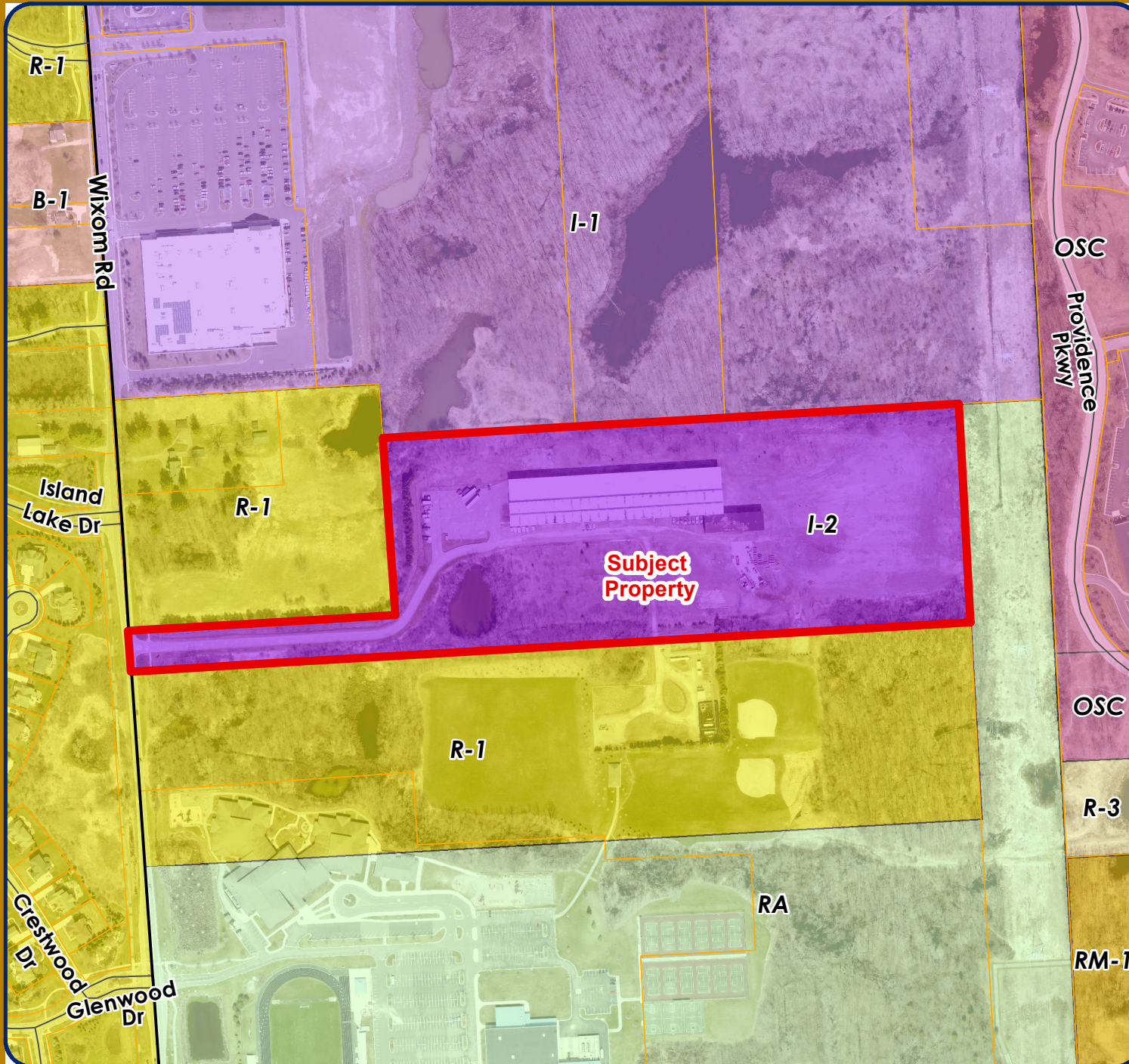


**MAP INTERPRETATION NOTICE**

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 17-62 VILLAS AT STONEBROOK

## Zoning Map



**LEGEND**

	R-A: Residential Acreage
	R-1: One-Family Residential District
	R-3: One-Family Residential District
	R-4: One-Family Residential District
	RM-1: Low-Density Multiple Family
	RM-2: High-Density Multiple Family
	B-1: Local Business District
	B-2: Community Business District
	B-3: General Business District
	FS: Freeway Service District
	I-1: Light Industrial District
	I-2: General Industrial District
	OS-1: Office Service District
	OSC: Office Service Commercial
	OST: Office Service Technology

**CITY OF**  
  
**NOVI**  
 cityofnovi.org

**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: 02/02/18  
 Project: JSP 17-62 VILLAS AT STONEBROOK  
 Version #: 1

0 90 180 360 540 Feet  
  
 1 inch = 417 feet

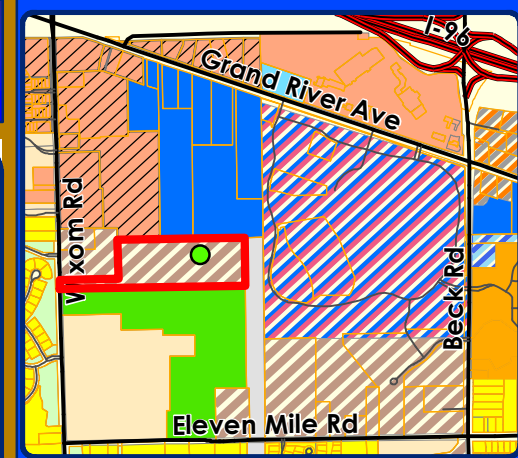
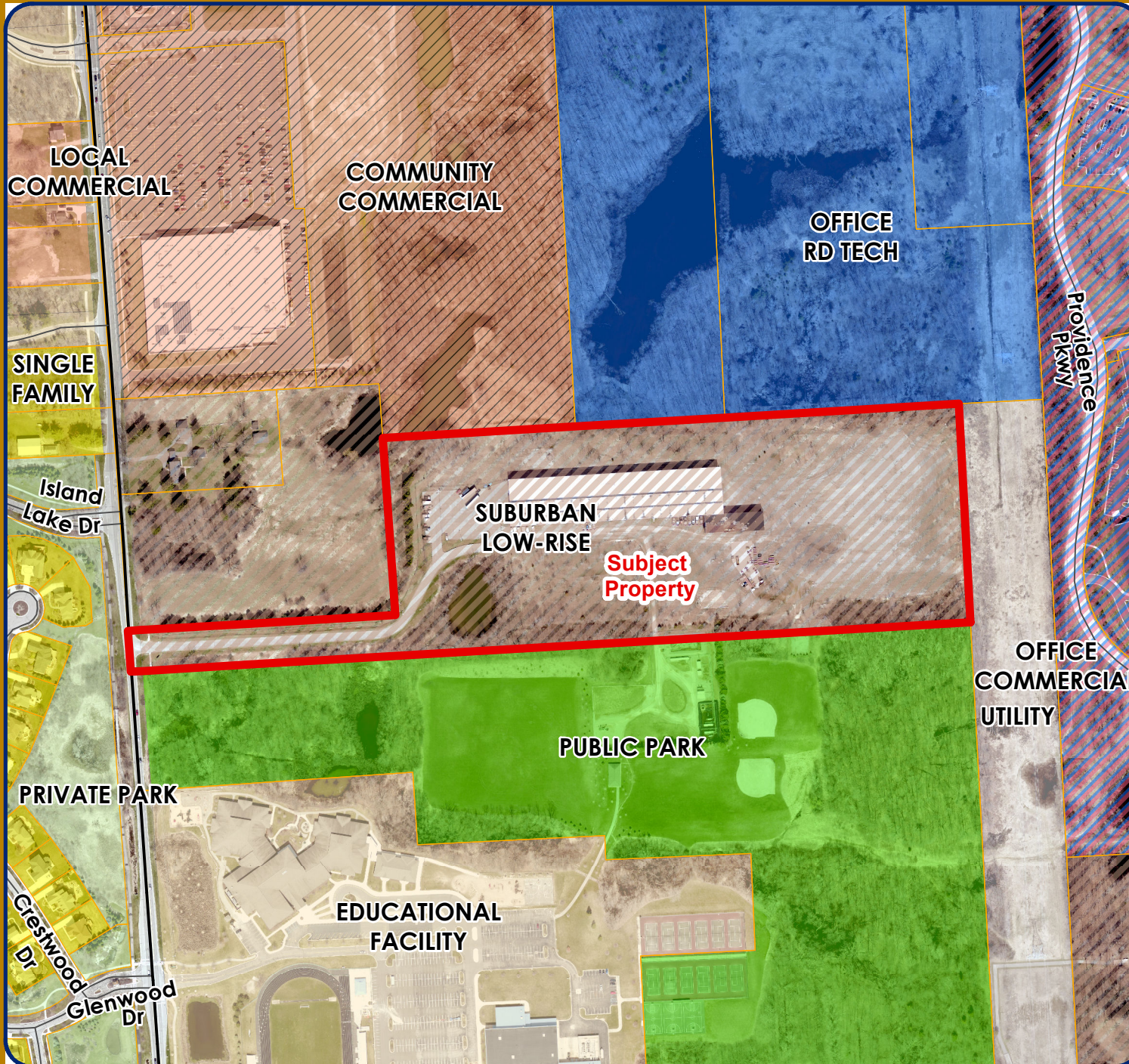
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# JSP 17-62 VILLAS AT STONEBROOK

## Future Land Use Map



**LEGEND**

**FUTURE LAND USE**

- Single Family
- Multiple Family
- Suburban Low-Rise
- Community Office
- Office RD Tech
- Office Commercial
- Office Research W/Retail Overlay
- Local Commercial
- Community Commercial
- Educational Facility
- Public
- Public Park
- Private Park
- Utility

**CITY OF NOVI**  
 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: 02/02/18  
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 Version #: 1

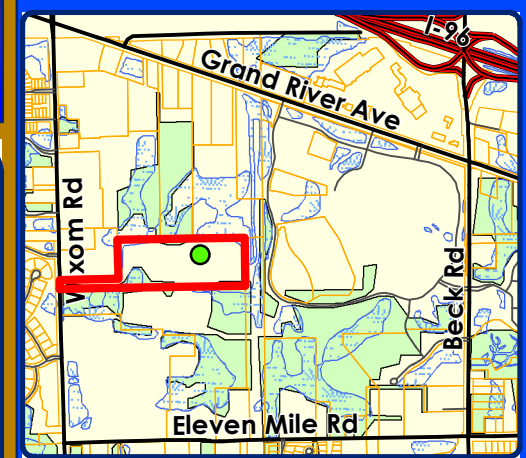
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 1 inch = 417 feet

**MAP INTERPRETATION NOTICE**



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# JSP 17-62 VILLAS AT STONEBROOK

## Natural Features



### LEGEND

-  WETLANDS
-  WOODLANDS



## City of Novi

Dept. of Community Development  
City Hall / Civic Center  
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1 inch = 417 feet



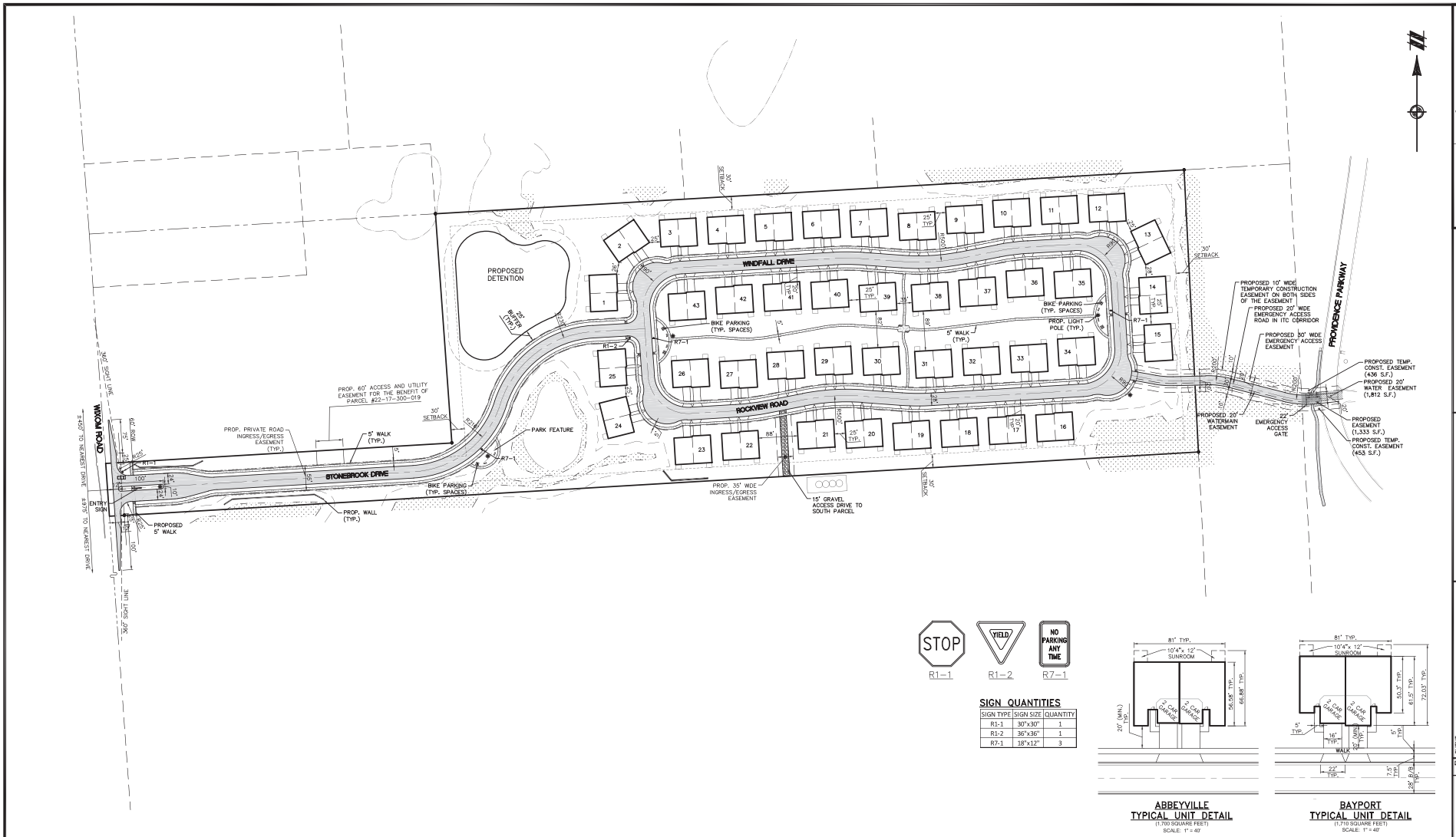
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**PSLR OVERLAY CONCEPT PLAN**

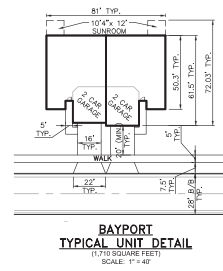
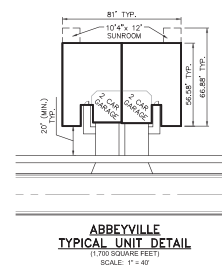
(Full plan set available for viewing at the Community Development Department.)





**SIGN QUANTITIES**

SIGN TYPE	SIGN SIZE	QUANTITY
R1-1	30"x30"	1
R1-2	36"x36"	1
R7-1	38"x12"	3



**LAYOUT NOTES**

- THE PROPOSED DEVELOPMENT IS PLANNED TO BE DEVELOPED USING THE CITY'S PLANNED SUBURBAN LOW-RISE (PSLR) OVERLAY DEVELOPMENT OPTION, UNDER OVERLAY SPECIAL USE APPROVAL ALLOWING FOR "LOW-RISE MULTIPLE-FAMILY" RESIDENTIAL USES.
- THE PURPOSE OF THIS CONCEPT PLAN SUBMITTAL IS FOR PRELIMINARY ZONING REVIEW WITH THE CITY, IN ACCORDANCE WITH THE EXISTING PSLR OVERLAY.
- THE DEVELOPMENT WILL CONTAIN PRIVATE ROADS. THE PROPOSED CONNECTION WILL BE COORDINATED WITH THE CITY OF NOVI.
- ALL SIDEWALKS AND SIDEWALK RAMPS WILL BE ADA COMPLIANT.
- SEE DETAIL SHEET FOR EYEBROW DIMENSIONAL DETAIL.
- NO ON-STREET PARKING IS PROPOSED. UNIT GARAGE AND DRIVE WAY PARKING EXCEEDS CITY PARKING REQUIREMENTS.
- THE TOTAL PROPOSED SQUARE FOOTAGE OF EACH DWELLING UNIT IS SHOWN ON THE TYPICAL UNIT DETAIL SHOWN ON THIS SHEET.
- PROPOSED TO BE SERVED BY PUBLIC SEWER AND WATER. THE LOCATIONS OF THE EXISTING WATER AND SEWER AS SHOWN ARE APPROXIMATE. FIRE PROTECTION IN ACCORDANCE WITH CITY OF NOVI STANDARDS WILL BE DEPICTED ON SUBSEQUENT SUBMITTALS.
- STORM WATER MANAGEMENT IS PROPOSED TO BE ADDRESSED THROUGH THE CONSTRUCTION OF A DETENTION BASIN AS SHOWN. REFER TO THE GRADING AND DETAILS SHEET FOR CONCEPTUAL SIZING CALCULATIONS. THE STORM WATER OUTLET IS CURRENTLY PLANNED TO BE DETAINED FOR THE 100-YEAR EVENT ON-SITE AND THEN DIRECTED TO THE REGIONAL DETENTION BASIN TO THE SOUTH.

**LEGEND**

---	BOUNDARY LINE
---	EXIST. EASEMENT
---	SECTION LINE
---	BOUNDARY/PROPERTY LINE
---	EXIST. CURB AND GUTTER
---	EXIST. WETLAND BUFFER
---	EXIST. WETLAND
---	PROP. SETBACK
---	PROP. BUILDING
---	PROP. BACK OF CURB
---	PROP. ASPH.
---	PROP. SIDEWALK RAMP
---	PROP. LIGHT POLE LOCATION

PRELIMINARY - NOT FOR CONSTRUCTION

Know what's below.  
Call before you dig.

THE LOCATION OF UTILITIES, UNDERGROUND UTILITIES AND ANY OTHER INFORMATION SHOWN ON THIS SHEET IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL OBTAIN THE NEAREST AVAILABLE RECORD DRAWINGS AND ADDRESS TO THE FULLY RESPONSIBLE FOR ANY OCCASION BY THE CONTRACTOR FAILURE TO EXAMINE RECORDS AND PREPARE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE: CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITE RESPONSIBILITY OF THE CONTRACTOR. REFER TO THE OTHER SHEETS FOR THE FULLY RESPONSIBLE FOR THE WORK OF PERSONS EMPLOYED IN THE WORK OF ANY MEMBER OF THE FIRM OR ANY OTHER PERSONS.

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**ATWELL**  
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1220 N. ASHLEY, SUITE 205  
ANN ARBOR, MICHIGAN 48106

SECTION 17  
TOWN 01 NORTH, RANGE 08 EAST  
CITY OF NOVI  
OAKLAND COUNTY, MICHIGAN

PULTE HOMES  
WIXOM ROAD  
MULTI-FAMILY  
PSLR OVERLAY CONCEPT PLAN  
LAYOUT PLAN

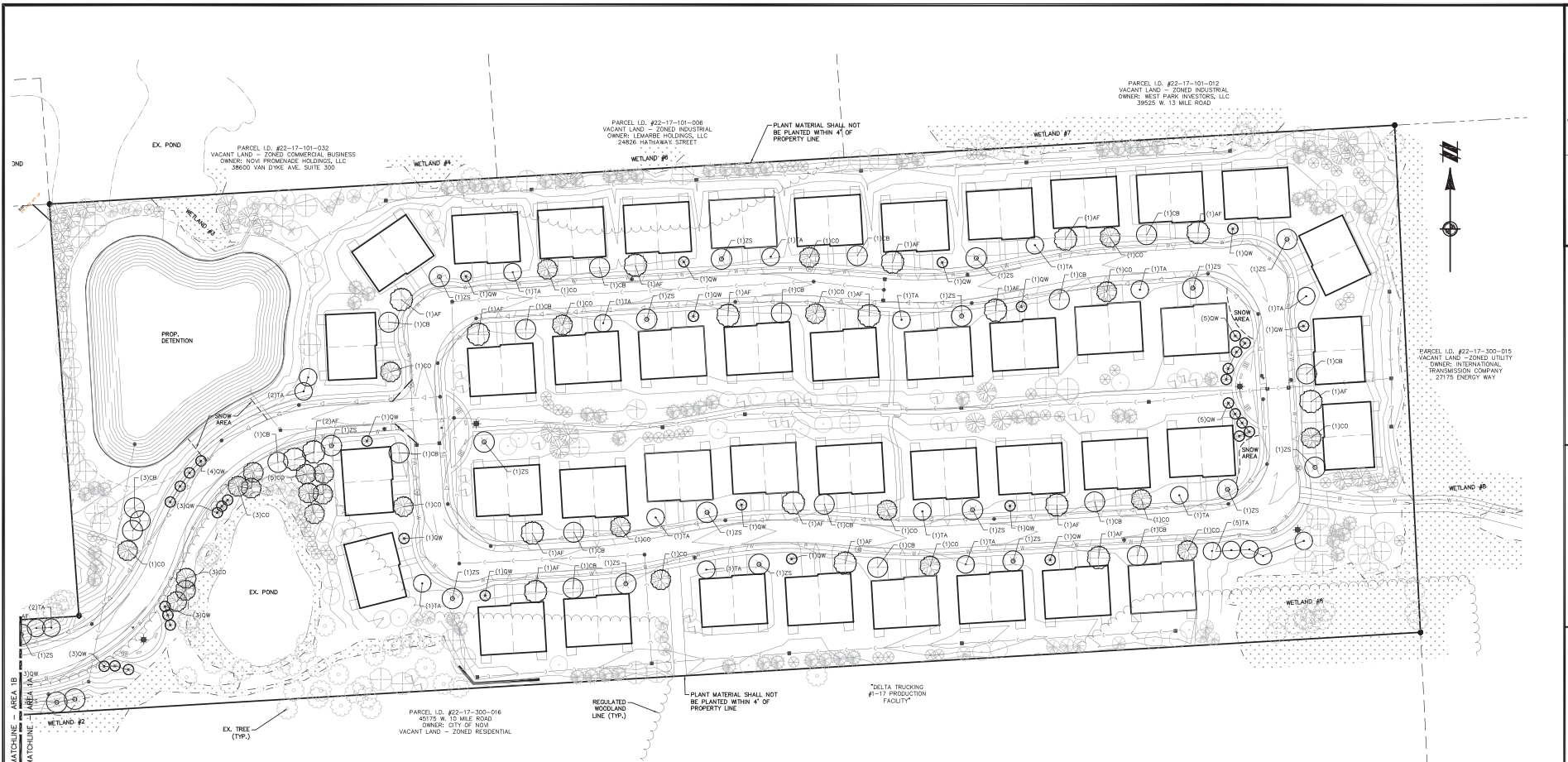
DATE: AUGUST 30, 2017  
31-13-2017 PER CITY  
31-28-2017 PUBLIC MEETING

SCALE: 0 50 100  
1" = 100 FEET

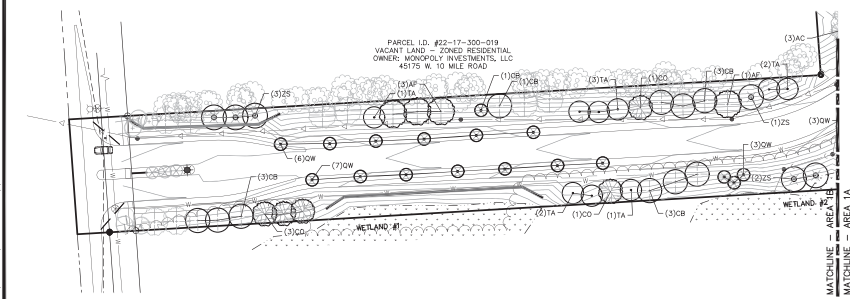
REVISONS

NO.	DATE	DESCRIPTION

BOOK: P.M. W. ANDERSON  
JOB: 17000933  
SHEET NO. 05



STREET TREE LANDSCAPE PLAN - AREA 1A



STREET TREE LANDSCAPE PLAN - AREA 1B

STREET TREE REQUIREMENTS

Street Tree	Required	Proposed	Notes
	1 Tree per 35 LF	Loop Road: Interior 2.5177' 5.176' Driveways/35' = 56 trees Exterior 2.7401' 1.048' Driveways/35' = 56 trees Entrance Drive: Centerline 1.3341(935+159+2) 78 trees	Centerline of entrance drive utilized for calculation. Back of curb line utilized for loop road (minus driveway) (interior and exterior)

NOTE:

- NO EXISTING OVERHEAD UTILITIES WILL REMAIN ON THE SITE.
- ALL TREES ARE TO BE PLANTED AT LEAST 10 FEET FROM HYDRANTS OR UTILITY STRUCTURES.

SEE SHEET 12 FOR MASTER PLANT LIST

LEGEND

—	BOUNDARY LINE	---	PROP. SETBACK
---	BOUNDARY/PROPERTY LINE	—	PROP. BUILDING
---	EXIST. CONTOUR	—	PROP. WALL
---	EXIST. CURB AND GUTTER	—	PROP. PARKING STRIPE
---	EXIST. FENCE	—	PROP. BACK OF CURB
---	EXIST. GRAVEL	---	PROP. CONTOUR
---	EXIST. WETLAND	---	PROP. SKI FENCE
---	EXIST. WETLAND BUFFER	---	PROP. STORM SEWER
---	EXIST. STORM	---	PROP. SANITARY
---	EXIST. WATER MAIN	---	PROP. WATER MAIN
---	EXIST. SANITARY	---	PROP. END SECTION
---	EXIST. CULVERT	---	PROP. CATCH BASIN/INLET
---	EXIST. GATE BASIN/INLET	---	PROP. WATER VALVE
---	EXIST. HYDRANT	---	PROP. FIRE HYDRANT
---	EXIST. VALVE	---	PROP. MANHOLE
---	EXIST. SANITARY SEWER	---	PROP. LIGHT POLE

PREPARED BY KATE BOND, PLA 1266

PRELIMINARY - NOT FOR CONSTRUCTION



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THE LOCATION OF UTILITIES UNDERGROUND UTILITIES AND ABOVE GROUND UTILITIES ARE SHOWN BY OR APPROXIMATE ANY UNDETERMINED UTILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL OBTAIN THE EXACT LOCATION OF ALL UTILITIES FROM THE UTILITY OWNERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES CAUSED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PREPARE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE: THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF UTILITIES UNDERGROUND UTILITIES AND ABOVE GROUND UTILITIES ARE SHOWN BY OR APPROXIMATE ANY UNDETERMINED UTILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL OBTAIN THE EXACT LOCATION OF ALL UTILITIES FROM THE UTILITY OWNERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES CAUSED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PREPARE ANY AND ALL UNDERGROUND UTILITIES.

ATWELL  
866.850.0000 www.atwell-group.com  
122 N. ASHLEY, SUITE 205  
ANN ARBOR, MI 48106



SECTION 17  
TOWN OF NORTH RANGE 08 EAST  
CITY OF NOVI  
OAKLAND COUNTY, MICHIGAN

PULTE HOMES  
WIXOM ROAD  
MULTI-FAMILY  
PSLR OVERLAY CONCEPT PLAN  
LANDSCAPE PLAN

CLIENT  
DATE  
AUGUST 30, 2017  
31-13-2017 PER CITY  
31-28-2017 PUBLIC MEETING

REVISIONS

NO.	DATE	DESCRIPTION

SCALE 0 30 60  
1" = 60 FEET

DRAWN BY: J. LON, MEB  
P.L. W. ANDERSON  
BOOK  
JOB 17000933  
SHEET NO. 08

DATE PLOTTED: 10/03/2017 09:13:00 AM

**CONCEPTUAL RENDERINGS**

# Abbeyville

1683 SQ FT



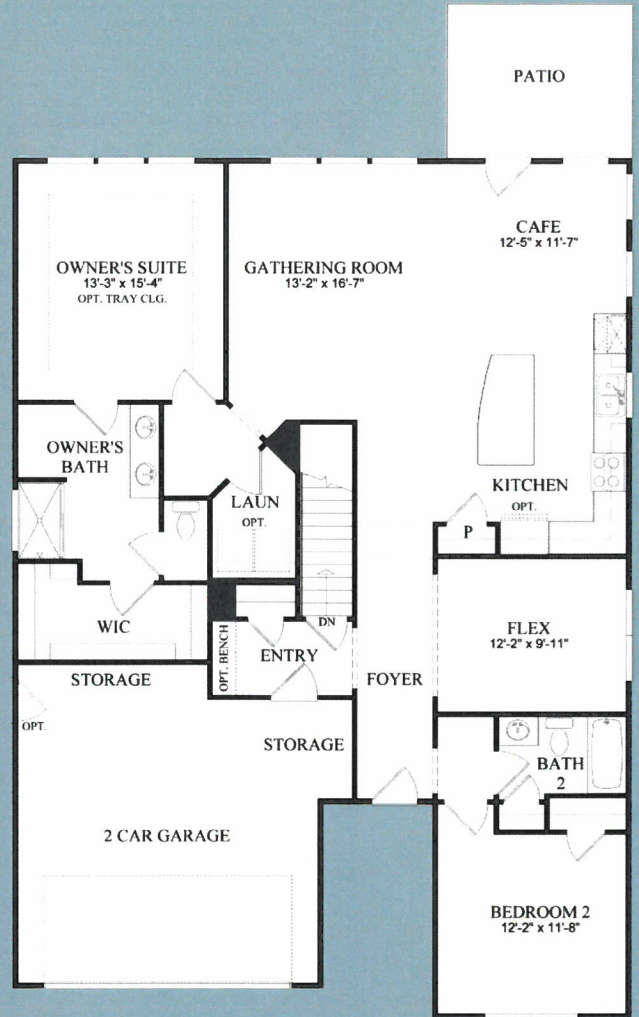
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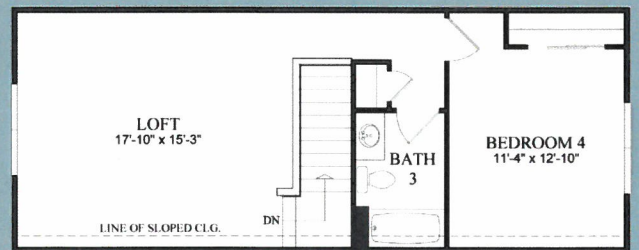
ELEVATION 11



ELEVATION 4



FIRST FLOOR



OPTIONAL LOFT





# Bayport

1702 SQ FT



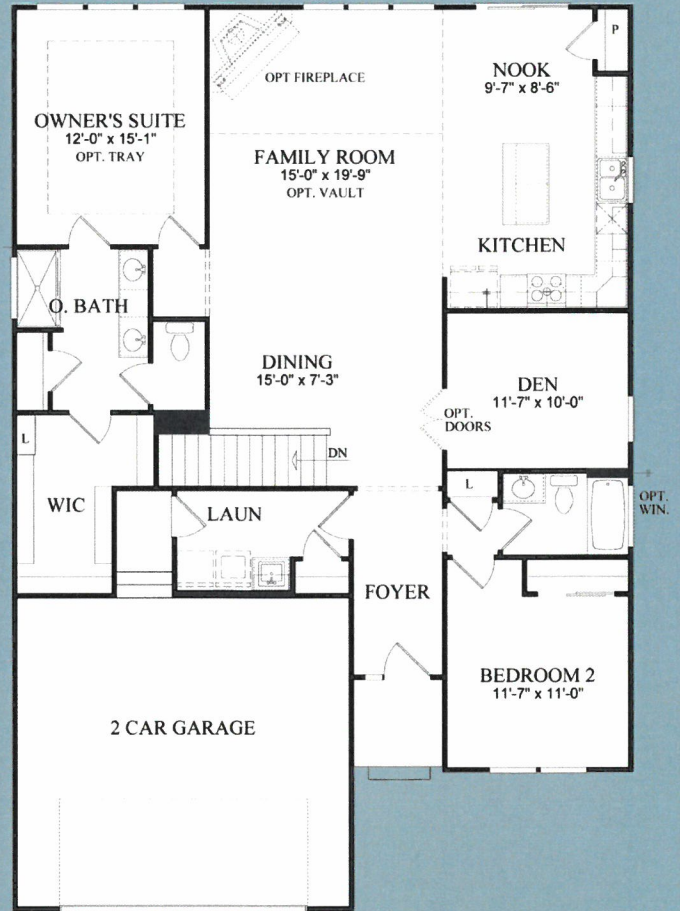
ELEVATION 2



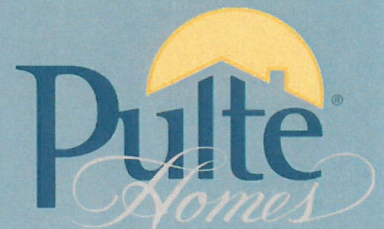
ELEVATION 3



ELEVATION 4



FIRST FLOOR





PSLR NARRATIVE



January 3, 2018

Ms. Sri Komaragiri  
**City of Novi – Planning Department**  
45175 West Ten Mile Road  
Novi, Michigan 48375

Re: Pulte Homes, Villas at Stonebrook  
PSLR Overlay Concept, Resubmittal Package

Dear Ms. Komaragiri,

In response to the comments issued on December 20 and our subsequent meeting held with City staff on December 21, we are pleased to present the enclosed PSLR Overlay Concept resubmittal package for the above referenced development. Based on the feedback received at this meeting and the perceived uncertainty with staff interpretations of what it means to comply with the “Independent Elderly Living” special land use, the project team has decided to go back to proposing a “for sale” attached multi-family (duplex) residential unit development. This product is allowable under the “low-rise multiple-family residential” special land use. The proposed units will be “age-targeted”, catering to the active senior adult population and providing for the “missing middle” housing type as recommended in the 2016 City of Novi Master Plan. The separation between buildings has also been increased with the latest revision to the plans.

Please accept this letter document, accompanying plans that have been revised in accordance with the recent review letters and meetings with City staff, and the site plan revision application for our client’s Villas at Stonebrook development. We are providing these for your distribution and approval in anticipation for being placed on the next agenda for a Planning Commission meeting. As discussed in our meeting on December 21, we have revised the plans the over the holidays and have provided the resubmittal package prior to January 10 in order to meet the following schedule for PSLR Concept consideration and approvals:

- February 7 – Planning Commission Meeting
- February 26 – City Council Meeting

Please let us know at any time if additional information or items are needed to issue the appropriate notices and facilitate this schedule. It is understood by the developer that there is inherent risk with this schedule in that the planning commission may be held without full support from planning staff.

## **PROJECT OVERVIEW**

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The Villas at Stonebrook is an exclusive 86-unit multi-family residential community located on an approximate 26-acre parcel in Section 17 in the City of Novi, Oakland County, Michigan. The proposed parcel is located on the east side of Wixom road, north of 11 Mile Road and south of Grand River Avenue. The property is being acquired and is to be developed by land developer and homebuilder, Pulte Homes. The subject parcel is currently zoned L-2 (General Industrial) with a PSLR Zoning District Overlay and is the site of the existing Profile Steel industry building.

The development will utilize the existing Planned Suburban Low-Rise (PSLR) overlay development option allowing for “low-rise multiple-family residential” as a special land use. The proposed residential use is more compatible with the City’s Master Plan for a future “suburban low-rise” use and with the existing adjacent developments. The “age-targeted” product proposed would be strategically located near the Providence Hospital system to the west and will provide the “missing middle” housing for active senior adults, which is a recommended housing types in the 2016 City of Novi Master Plan. The development proposes a number of community pocket parks and public gathering spaces which will provide opportunities for social and passive recreation interaction at these pedestrian nodes. This will be a true condominium development and the exterior maintenance will be provided by the future home owners’ association. The project also proposes a direct connection to the Providence Hospital system pathway via the ITC corridor to the west. The developer is working with the Hospital to provide additional enhancements and pathway improvements to the existing Providence Hospital pathway system.

The development will contain private roads and is proposed to be served by public sewer and water located within the Wixom Road right-of-way. These public utilities are assumed to have the capacity to serve the development. Storm water management is proposed to be addressed through the construction of a detention basin designed in accordance with the city's requirements for 100-year detention, which the outlet will be direct to the regional detention basin to the south. The subject parcel contains a minimal amount of city regulated woodlands and wetlands on site. The open body of water and the majority of higher quality woodland trees are to be preserved with the proposed development. The development is currently planned to be constructed in one phase.

**REQUESTED OVERLAY DEVIATIONS**

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The following deviations from the existing PSLR Overlay requirement are being requested as a condition of the special land use approval. These are being requested to preserve the natural features on site, provide for additional screening, while also creating an appropriate density character.

	<u>PSLR Overlay Requirements</u>	<u>Requested Deviation</u>
• Building Separation	30 feet (minimum side) 15 feet (minimum corner)	25 feet (minimum side) 25 feet (minimum corner)
• Stub Street (4.04)	Secondary stub road to property	No stub road provided*
• Sidewalk location (Eng 7.4.2.C.1)	10 feet separation from road	7.5 feet*
• Driveway taper length	10 feet	7.5 feet*
• Boulevard island length	35 feet	100 feet (in acceptable range)*
• No berm is being provided at Wixom Road frontage due to existing site conditions (limited frontage)*		
• Buildings shall front on a dedicated non-section line public street or an approved private drive. Site fronts on a Section line public road.*		
• Full time access drives shall be connected only to non-section line roads. The proposed drives are connected to proposed private drive.*		

\* = Anticipated staff supported deviation.

## DEVELOPMENT PUBLIC BENEFITS

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The requested special land use under the existing PSLR overlay would be in the public's best interest when compared to the existing development or another development that could occur under the site's current zoning. We offer the following City public benefits associated with the project and in accordance with the requested standards deviations;

- Providing Strategic Alternative Housing: The "age-targeted" product proposed with the development will fit the low-maintenance needs of older populations and the development would be strategically located near the Providence Hospital system to the east. This development meets the "missing middle" housing for active senior adults, which is one of the recommended housing types in the 2016 City of Novi Master Plan. The exterior maintenance will be provided by the future home owner's association, as this will be a true condominium development.
- Site Amenities: The development proposes a number of community pocket parks and public gathering spaces. These amenities will provide opportunities for social and passive recreation interaction at these pedestrian nodes. Additional internal connections have been added to provide additional accessibility to the central open space area.
- Connection to Providence Hospital: The project proposes a connection to the Providence Hospital system pathway via the ITC corridor to the west. The project also proposes additional enhancements to the existing Providence Hospital system pathway. As discussed, the Client will provide an easement to the neighboring property should a future connection be needed.
- Redevelopment of Existing Industrial Facility: The redevelopment proposes the removal and remediation of an existing industrial facility and Brownfield site. This redevelopment provides for a residential use that is more compatible with the City's Master Plan for a future "suburban low-rise" use and with the surrounding existing uses (commercial, residential, hospital, and school uses).

We look forward to your earliest review of this development and inclusion on the planning commission agenda for review. We note that all reviews except for Planning department are currently recommending approvals. For your record, included with this submittal are the following documents:

- One (1) copy of the original signed "site plan revision" application
- Seven (7) copies of the revised PSLR Overlay Concept Plans – signed & sealed
- One (1) comment response letter addressing staff comments
- One (1) copy of the proposed attached unit elevations (preliminary only for use/reference)

Thank you for your assistance and cooperation with respect to this project. If you should have any questions or need any additional information, please contact us.

Sincerely,

**ATWELL, LLC**



Matthew W. Bush, PE, LEED AP  
Project Manager / Engineer

## COMMUNITY IMPACT STATEMENT





CONSULTING. ENGINEERING. CONSTRUCTION.

## Villas of Stonebrook

Prepared November 10, 2017

### Community Impact Statement

The following statement provides comment on the social impacts and environmental factors that are associated with the proposed active adult single-family residential development in the City of Novi.

#### Social Impacts

The City of Novi is actively looking for additional single-family housing that caters to the active adult community. The proposed residential housing project will fill that demographic need. The proposed homes will have high-end finishes that the active adult user's desire, and be smaller in size for the empty-nester residents. The outside areas will be professionally maintained by a homeowners association, leaving the residents plenty of time to enjoy social activities throughout the community.

The close proximity and proposed connection to a major pedestrian pathway system (IE. The ITC non-motorized walkway system), and the Providence hospital, are perfect neighbors for this resident group. Moreover, as the active adult demographic tend to be actively involved in their local communities (i.e. charity volunteering, recreational activities, etc.), the entire city will benefit with more active adults that can own a home and property setting within the City fabric.

The active adult resident community is generally "empty nester" residents and will have little to no impact on increasing the school age children count on the public schools. Moreover, as active adults phase into retirement, their travel schedules can generally accommodate off-peak travel, and therefore, a meaningful reduction in peak traffic impacts are observed by this resident group.

#### Environmental factors

The existing 26 acre property sits on a vacant industrial property, immediately north of a school, and adjacent to a residential community to the west, across the street from Wixom Road. The project re-development will be good use of property that will have little negative impacts to surrounding wetlands and woodlands.

The existing site has significant wetland and associated drainage course to the north of the project and flowing to the south. The proposed project will collect, treat and release treated storm water at a reduced rate. As a majority of the proposed development will occupy existing pavement and disturbed land areas, the overall impact to the development will be minimal to the local eco system. Moreover, the existing property does have some environmental contamination on the property as part of historical industrial use. As part of the proposed project, the existing contaminated areas will be cleaned up and remediated. A Brownfield re-development will be established with the City of Novi to support and track the clean-up efforts.

## Economic Impact Statement

The following statement provides comment on the economic impact anticipated from the proposed active adult single-family residential development in the City of Novi.

The proposed development is located on Wixom Road, south of Grand River Avenue in the City of Novi, Oakland County, Michigan. The City of Novi is considered an economic cornerstone in Southwest Oakland County as well as one of the best places to live in the State of Michigan. The proposed development consists of 88 single-family homes that are designed and specifically tailored to appeal to the active adult (55+) demographic.

It is anticipated that no economic burden will be placed upon the school district by the proposed development. With a proposed density of 88 units, at least 90% of the households are anticipated to be active adult and thereby not requiring use of the public or private school systems. Yet their tax contributions will support revenue for the schools.

A residential development such as the Villas of Stonebrook has far reaching economic impacts for not only local residents but for the local government as well. The construction activity itself is an economic generator while the ongoing business associated with the housing development; helps sustain economic prosperity in the community. A development like this generates business for lenders, appraisers, inspectors, title companies, engineers, architects, insurance agents, among many others.

Economic impact begins long before construction does. Through the engagement of the design team that the applicant has hired to begin the entitlement process and the attorneys and other professionals needed to assist with the land acquisition, the economic ripple effect has already started.

One year impacts associated with the build out of the proposed 88 single family homes were generated through the use of a model produced by The National Association of Home Builders as documented in their publication ***The Economic Impact of Home Building in a Typical Local Area***. The information was extrapolated for Villas of Stonebrook;

The direct revenue sources to the city include;

- Utility fees – water and sewer
- Property taxes
- School funding
- State shared revenue

The indirect revenue and impacts include;

- Local income introduced and/or maintained in the city
- Available income for local business
  - The National Homebuilder Association estimates that 15% of available income is spent locally for goods/services, food, daycare, etc.
- New sustained jobs in the area
  - The National Homebuilder Association estimates that 2.1 new jobs are created during the construction phase of development, and 1.1 new long-term jobs are created with each new household.

Additional Economic Considerations:

**New Infrastructure Investment** – It is anticipated that the applicant will spend over \$5 million in construction costs for the proposed development.

**Public Utility Expansion** – The public sanitary sewer and water systems will have to be extended to and through the property for service to the new residents. In addition, roadway and pedestrian pathway improvements will be constructed both on and off-site, as well as other improvements associated with the project.

**Spillover Property Value Increases** – High quality housing stock has a ripple effect on the areas that surround it. Continued construction of this type of home draws business and prospective home buyer's thereby increasing value to adjacent properties.

**Diversity in Age Group** – The potential increase of 132 active adults within the development creates the demand for a market stream of products, services, recreation and lifestyle choices that are all economic drivers to the area.

## PLANNING REVIEW



# PLAN REVIEW CENTER REPORT

January 30, 2018

Planning Review

Villas at Stonebrook

JSP 17-62

**Petitioner**

Pulte Home of Michigan, LLC

**Review Type**

Revised PSLR Concept Plan

**Property Characteristics**

<b>Section</b>	17	
<b>Site Location</b>	east side of Wixom Road, north of Eleven Mile Road ; 26700 Wixom Rd; 50-22-17-300-013	
<b>Site School District</b>	Novi Community School District	
<b>Site Zoning</b>	I-2 General Industrial with Planned Suburban Low-Rise Overlay (PSLR)	
<b>Adjoining Zoning</b>	North	I-1 Light Industrial & R-1: One-Family Residential with PSLR overlay
	East	RA: Residential Acreage
	West	R-1: One-Family Residential
	South	R-1: One-Family Residential
<b>Current Site Use</b>	Existing Industrial Building	
<b>Adjoining Uses</b>	North	Vacant industrial land; future towing location
	East	Industrial Office
	West	Island Lakes residential subdivision
	South	Owned by City of Novi
<b>Site Size</b>	26 acres (Gross); 23.87 (Net)	
<b>Plan Date</b>	12-29-17	

**Project Summary**

The subject property is currently vacant, previously occupied by Profile steel industry and measures 26 acres. The applicant is proposing 86 Two-family attached "Age targeted" ranch-style duplex housing units with a proposed density of 3.6 units per acre using PSLR overlay option. The concept plan indicates a central courtyard, a couple of pocket parks and sidewalks within the community. A secondary emergency access is provided to the east connecting to Providence Parkway. Access to the existing well site will be maintained as shown on the plans. The applicant is also proposing a connection to the trail system within Providence park hospital campus via ITC corridor to the east. The subject property would require brownfield remediation. **Low-rise multiple-family residential uses are considered a Special land use under PSLR overlay.**

**Recommendation**

Approval of the PSLR Concept Plan is currently recommended.

**PSLR Overlay Standards and Procedures**

The PSLR Overlay District requires the approval of a PSLR Overlay Development Agreement and Concept Plan by the City Council following a public hearing and recommendation from the Planning Commission.

In making its recommendation to the City Council, the Planning Commission shall consider the following

factors. *(Staff comments are provided in italics and bracketed.)*

- a. The PSLR Overlay Development Agreement and PSLR Overlay Concept Plan will result in a recognizable and substantial benefit to the ultimate users of the project and to the community. *[The applicant could revise the concept layout and type of housing to better meet the intent of PSLR Ordinance. The site proposes a connection to extensive pathway system within Providence park hospital campus to the east. ]*
- b. In relation to the underlying zoning or the potential uses contemplated in the City of Novi Master Plan, the proposed type and density of use(s) will not result in an unreasonable increase in the use of public services, facilities and utilities, and will not place an unreasonable burden upon the subject property, surrounding land, nearby property owners and occupants, or the natural environment. *[The applicant has provided a Traffic Impact Assessment and a Community Impact Statement which indicates minimal impacts on the use of public services, facilities and utilities. The proposed concept plan impacts about 0.56 acres of existing 1.96 acre wetlands and proposes approximately 54 % of regulated tree removals. The plan indicates appropriate mitigation measure on-site and off-site.]*
- c. In relation to the underlying zoning or the potential uses contemplated in the City of Novi Master Plan, the proposed development will not cause a negative impact upon surrounding properties. *[The proposed buildings have been buffered by proposed landscape. The applicant provides an access easement on the north side of the proposed entry drive for future connection capability to neighboring properties to eliminate multiple exits onto Wixom Road. ]*
- d. The proposed development will be consistent with the goals and objectives of the City of Novi Master Plan, and will be consistent with the requirements of this Article [Article 3.1.27]. *[The proposed development provides fills the gap for active adults housing need, which is the recommended missing middle housing in the City's 2016 Master Plan for Land Use.]*

The City Council, after review of the Planning Commission's recommendation, consideration of the input received at the public hearing, and review of other information relative to the PSLR Overlay Development Agreement Application and PSLR Overlay Concept Plan, may indicate its tentative approval of the PSLR Overlay Development Agreement Application and PSLR Overlay Concept Plan, and direct the City Administration and City Attorney to prepare, for review and approval by the City Council, a PSLR Overlay Development Agreement or deny the proposed PSLR Overlay Concept Plan.

If tentative approval is offered, following preparation of a proposed PSLR Overlay Development Agreement, the City Council shall make a final determination regarding the PSLR Overlay Concept Plan and Agreement.

After approval of the PSLR Overlay Concept Plan and Agreement, site plans shall be reviewed in accordance with the requirements of Section 6.1 and Section 3.21 of the Ordinance and for general compliance with the approved PSLR Overlay Development Agreement and PSLR Overlay Concept Plan. After Council approves the PSLR Concept Plan and the agreement, the applicant should submit plans for Planning Commission approval of Preliminary Site Plan, Special Land Use, Wetland Permit and Woodland Permit.

### **Ordinance Deviations**

Section 3.21.1.D permits deviations from the strict interpretation of the Zoning Ordinance within a PSLR Overlay agreement. These deviations can be granted by the City Council on the condition that "there are specific, identified features or planning mechanisms deemed beneficial to the City by the City Council which are designed into the project for the purpose of achieving the objectives for the District." The applicant shall provide substitute safeguards for each item that does not meet the strict requirements of the Zoning Ordinance.

The concept plan submitted with an application for a PSLR Overlay is not required to contain the same level of detail as a preliminary site plan, but the applicant has provided enough detail for the staff to

identify the deviations from the Zoning Ordinance are currently shown. The following are deviations from the Zoning Ordinance and other applicable ordinances shown on the concept plan.

1. Deviation to allow a Traffic Impact Assessment in lieu of required Traffic Impact study as the number of estimated trips from this development do not exceed the City's threshold.
2. Deviation from Sec. 3.21.2.A.i to allow building to front on an approved private driveway, which does not conform to the City standards with respect to required sixty foot right-of-way, due to the type of development proposed for active senior adult development, and because of the offer to provide an easement for the adjacent property to share access if needed;
3. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow modifications to the required front and side setbacks( as indicated on the PSLR Concept plan) due to the type of development proposed for active senior adult development;
4. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow reduction of minimum distance between buildings by 5 feet (30 feet required, 25 feet proposed) due to the type of development proposed for active senior adult development;
5. Deviation from Sec. 3.21.2.A.v to allow reduction of minimum percentage of active recreation areas (50% of open spaces required, approximately 27% provided) as the development proposes connection to Providence hospital tail system;
6. Deviation from Sec. 3.21.2.A.x to defer the submittal of Lighting and Photometric plan at the time of Preliminary Site Plan Submittal as the applicant intends to conform to the Zoning Code requirements;
7. Deviation from Sec. 5.5.3.F.ii.b.(2) to allow placement of street trees between the sidewalk and the building as opposed to between the sidewalk and curb, due to type of development proposed. **This is not supported by staff. However, staff understands that the complying with the requirement would result in redesign of the layout or utility design.**
8. Deviation from Sec. 5.5.3.F.ii.b.(1) to allow additional sub-canopy trees in lieu of deciduous canopy or large evergreen trees, as it will provide additional visual and species diversity to the site; **This is not supported by staff, unless the applicant keeps the percentage of proposed sub-canopy trees within 25 percent of total required canopy trees. (Currently more than 33% of the required trees are subcanopy trees).**
9. Deviation from Sec. 5.5.3.B.ii to allow reduction of required greenbelt trees, due to woodlands replacement trees proposed within the greenbelt. **This is not supported by staff. Staff recommends finding alternate location for woodland replacement trees within the site and meet the required greenbelt tree count.**
10. Deviation from Sec. 3.21.2.A.iii and Sec. 5.5.3 to allow absence of required landscaped berm along Wixom Road frontage due to limited frontage and flag shaped lot;
11. Deviation from Sec. 3.21.2.B to allow full time access drives to be connected to a section-line road as opposed to a non-section line roads as the applicant is proposing to provide access and utility easement to neighboring properties to eliminate multiple curb cuts on Wixom Road;
12. Deviation from Sec. 4.04, Article IV, Appendix C-Subdivision ordinance of City Code of Ordinances for absence of a stub street required at 1,300 feet interval along the property boundary to provide connection to the adjacent property boundary, due to conflict with existing wetlands;

13. Deviation from Chapter 7(c) (1) of Engineering Design manual for reducing the distance between the sidewalk and back of the curb. A minimum of 7.5 feet can be supported by staff;
14. Deviation from Section 11-216 (Figure IX.5) of City's Code of Ordinances for reduction of residential driveway taper depth (10 feet required, 7.5 feet proposed) due to proximity of proposed sidewalk within the development.
15. Deviation from Section 11-216 (Figure IX.2) of City's Code of Ordinances for allowing increase in the length of divided driveway island (35 feet required, 100 feet proposed) as it is within the allowable range;

### **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 revised PSLR Concept Plan submittal:

1. **Design Changes:** A pre-application meeting was held in September, 2017 where the applicant proposed a similar layout with two-family attached unit development. The applicant then submitted a Concept plan with detached units (Independent Elderly Living), which was denser with smaller distances between buildings of up to 10 feet. Staff did not recommend approval as it did not meet the intent of Independent elderly living units under PSLR ordinance. The applicant has addressed some major comments provided by staff since then. Following are some of the notable features of proposed concept plan.
  - a. The unit types are now two-family detached, which are permitted under PSLR.
  - b. Buildings are design as ranch style housing with optional loft or basement space.
  - c. Density is kept under the maximum allowed under PSLR. PSLR district allows up to 6.5 DUA for low-density multi-family development. The current concept plan proposes 3.6 units/acre.
  - d. Distance between buildings has been increased to 25 feet.
  - e. A slight curvature is added to the loop road in order to offset the units.
  - f. The concept plan proposes a 60 feet access and utility easement for benefit of northern property to minimize traffic from development sites onto section line roads.
  - g. The applicant added additional pocket park to evenly distribute active recreation areas throughout the community.
  - h. The concept plan proposes a connection to Providence Park Hospital trail system. The project also proposes additional enhancement to the existing trail system.
  - i. The project proposes removal and remediation of the existing industrial facility and brownfield site.

**Staff Comments:** The proposed plan provides housing for active senior adults, which is one of the recommended housing types in our 2016 City of Novi Master Plan. It fills the gap for much needed active adult development. **Staff agrees with the targeted market segment and the location closer to the hospital, commercial development at Grand River and Wixom intersection and public park system.** Walkability is a key to capturing this market segment.

In Chapter 4, Market Assessment, in our Master plan, there is an example for Missing Middle Housing that illustrates how smaller units, clustered together, could potentially be added in well-chosen locations in the City. **While the proposed concept plan does not deviate significantly from Ordinance requirements, it is staff's opinion that the design lacks interest and a sense of community. Inclusion of pocket parks and connection to the trail system make up for passive and active recreation to some extent. There are also no provisions for guest parking or common**



**mailbox location.** The proposed layout maximizes the development on site. The applicant intends to provide a low-maintenance development for active senior adults.

2. **Deviations:** The Majority of the deviations identified on Page 3 are a result of type of development the applicant is proposing that is targeting active senior adult community. **Staff supports the deviations, but recommends that the applicant should consider some additional changes to the design to create some visual relief. Please confirm what deviations you would seek and what you wouldn't by making related changes to the Concept plan.**
3. **Facade:** City's façade consultant has looked into multiple elevations as part of the Pre-application meeting and provided some comments. **The applicant should provide elevations that conform to the requirements prior to Council approval of PSLR concept plan. The elevation should reflect the comments provided below.**
  - a. Multiple dwelling units are subject to the PLSR Ordinance. Section 3.21.C of the Ordinance sets additional requirements for buildings in the PLSR District.
  - b. Buildings in Façade Region 1 require 30% minimum brick on all facades. Provided that the proposed building are single floor building with front garages, it appears that the entire front façade should consist of brick or stone to conform to the requirements..
  - c. Dimensional drawings for all elevations will be required to make definitive measurements as to compliance with this Section.
  - d. Interesting front façade using floor plan articulation, multiple gable rooflines, return cornices, decorative railings, shutters, window surrounds, etc. would be desirable.
  - e. Enhanced garage doors are recommended.
  - f. Generally, the recommendations for Emerson Park, another project proposed by the applicant, would apply.
4. **Plan Review Chart:** Please refer to Planning Review Chart for other comments that need to be included on the Site plan.

#### **Other Reviews**

- a. **Engineering Review:** A few deviations are identified. Additional comments to be addressed with Preliminary Site Plan. Engineering recommends approval.
- b. **Landscape Review:** A few deviations are identified. Additional comments to be addressed with Preliminary Site Plan. Landscape recommends approval.
- c. **Wetland Review:** A City of Novi Wetland Non-Minor Use Permit and a City of Novi Authorization to Encroach the 25-Foot Natural Features Setback would be required. A MDEQ Wetland Permit may be required. Additional comments to be addressed prior to receiving Wetland approval of the Preliminary Site Plan. Wetlands recommend approval.
- d. **Woodland Review:** A Woodland Permit from the City of Novi would be required. Additional comments to be addressed prior to receiving Woodland approval of the Preliminary Site Plan. Woodlands recommend approval.
- e. **Traffic and Traffic Study Review:** A few deviations are identified. Additional comments to be addressed with Preliminary Site Plan. Traffic recommends approval.
- f. **Facade Review:** Unable to make a determination due to insufficient information.
- g. **Fire Review:** Written permission may be needed and or required by International Transmission Company for the proposed secondary emergency access through their property (as well as Providence Park Hospital). Fire recommends approval.

#### **NEXT STEP: Planning Commission Meeting**

The site plan is scheduled for a public hearing on February 07, 2018 meeting. Please provide the following **no later than 9 am February 02, 2018.**

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 and **a request for waivers as you see fit.**

3. A color rendering of the Site Plan, if any.

#### **Site Addressing**

**A new address is required for this project.** The applicant should contact the Building Division for an address prior to applying for a building permit. Building permit applications cannot be processed without a correct address. The address application can be found by clicking on this [link](#). Please contact the Ordinance Division 248.735.5678 in the Community Development Department with any specific questions regarding addressing of sites.

#### **Signage**

**Exterior Signage is not regulated by the Planning Division or Planning Commission. Applicant is recommended to provide information to identify any possible deviations to be included in PSLR agreement.** Alternatively, an applicant may choose to submit a sign application to the Building Official for administrative review. Following preliminary site plan approval, any application to amend a sign permit or for a new or additional sign shall be submitted to the Building Official. Please contact the Ordinance Division 248.735.5678 for information regarding sign permits.

#### **Street and Project Name**

**This project received approval from the Street and Project Naming Committee for the proposed development name and street names.** Please include the Please contact Richelle Leskun (248-347-0579) in the Community Development Department for additional information. The address application can be found by clicking on this [link](#).

#### **Parcel Split/Combination**

**There is no property split/combination proposed.** The applicant must create this parcel prior to Stamping Set approval and/or applying for new site address. Plans will not be stamped until the parcel is created.

#### **Pre-Construction Meeting**

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





## PLANNING REVIEW CHART : PSLR: Planned Suburban Low-Rise Overlay District

**Review Date:** January 30, 2018  
**Review Type:** Revised PSLR Concept Plan  
**Project Name:** JSP17-62 THE VILLAS AT STONEBROOK  
**Plan Date:** November 29, 2017  
**Prepared by:** Sri Komaragiri, Planner  
**Contact:** E-mail: skomaragiri@cityofnovi.org; Phone: (248) 735-5607

Items in **Bold** need to be addressed by the applicant with PSLR Concept Plan. Underlined items need to be addressed prior to the approval of the Site Plan

Item	Required Code	Proposed	Meets Code	Comments
<b>Zoning and Use Requirements</b>				
<b>Master Plan</b> (adopted August 23, 2017)	Suburban Low-Rise	Suburban Low-Rise	Yes	
<b>Area Study</b>	The site does not fall under any special category	NA	Yes	
<b>Zoning</b> (Effective December 25, 2013)	I-2 General Industrial with PSLR(Planned Suburban Low-Rise )overlay	PSLR	Yes	<b>PSLR Agreement and PSLR Concept Plan must be approved by the City Council.</b>
<b>Uses Permitted</b> (Sec 3.1.27.B & C)	Sec 3.1.27.B Principal Uses Permitted. Sec 3.1.27.C Special Land Uses	86 Two-family attached dwellings proposed	Yes ??	<b>Special Land Use Permit required.</b>
<b>Approval Process</b>	<ol style="list-style-type: none"> <li>1. PSLR overlay development agreement application and overlay concept plan submittal</li> <li>2. Planning commission review, public hearing and recommendation to City Council</li> <li>3. City council review and consideration of concept plan and PSLR Agreement</li> <li>4. Review and approval of site plans per section 6.1.</li> </ol>			
<b>Housing for the Elderly (Sec. 4.20)</b>				
<b>Low-rise multiple-family residential uses</b> (Sec. 4.70)	- In the PSLR district, low-rise multiple-family residential uses are permitted as a special land use up to a maximum of six and one-half (6.5) dwelling units per net acre, excluding existing road rights-of way.	3.6 Dwelling units per acre; 86 Units per 23.87 Net acres	Yes	<b>Even though the density is below the maximum allowed, the current layout is resulting in most of deviations. Staff recommends that the applicant reconsider the density to reduce the extent of the deviations sought or to provide more interest in the design of the project.</b>
<b>3.21 PSLR Required Conditions</b>				
<b>Narrative</b> (Sec. 3.32.3.A)	Explain how the development exceeds the standards of this	A narrative is provided	Yes	

Item	Required Code	Proposed	Meets Code	Comments
	ordinance			
<b>PSLR Overlay Concept Plan: Required Items</b> (Sec. 3.21.1.A)	i. Legal description and dimensions	Provided	Yes	
	ii. Existing zoning of site/adjacent properties	Provided partly	Yes	
	iii. Existing natural features such as wetlands and proposed impacts	Some wetlands exist on site with an open body of water	Yes	<b>Refer to Wetlands review for more details</b>
	iv. Existing woodlands and proposed impacts	Regulated woodlands on site. Narrative indicates a majority of trees will be saved	Yes	<b>Refer to Woodlands review for more details</b>
	v. Existing and proposed rights-of-way and road layout	Existing 60 feet ROW along Wixom road frontage is indicated. The current site plan indicates private roads within the development	No	
	vi. Bicycle/pedestrian plan	Proposed sidewalk along Wixom road	Yes?	
	vii. Conceptual storm water management plan	Provided	Yes	<b>Please refer to Engineering comments for more details.</b>
	viii. Conceptual utility plan	Provided	Yes	
	ix. Building Parking and Wetland Setback requirements	30 feet setback lines on all four sides indicated on the plans. No common parking proposed.	Yes	
	x. Conceptual layout	Provided	Yes	
	xi. Conceptual open space/recreation plan	Information provided	Yes	
	xii. Conceptual streetscape landscape plan	Provided	Yes	<b>Refer to Landscape review for more details</b>
<b>PSLR Overlay Concept Plan: Optional Items</b> (Sec. 3.21.1.A)	xiii. Parking plan	Provided	Yes?	Refer to Traffic review letter for additional comments
	xiv. Detailed layout plan	Provided	Yes	
	xv. Residential density calculations and type of units	3.7 DUA proposed	Yes	
	xvi. Detailed open space/recreation		NA	

Item	Required Code	Proposed	Meets Code	Comments
	xvii. Detailed streetscape landscape plan	Conceptual plan provided	NA	
	xviii. Graphic description of each deviation from the applicable ordinance requested	Written description provided in the narrative	Yes?	
	xix. Phasing plan	Phasing not indicated	NA	
<b>Community Impact Statement</b> (Sec. 3.21.1.B)	<ul style="list-style-type: none"> <li>- All non-residential projects over 30 acres for permitted use</li> <li>- All non-residential over 10 acres for special land use</li> <li>- Residential over 150 units</li> <li>- Mixed use, staff determines</li> <li>- Requirements within study (include: social impacts, environmental factors)</li> </ul>	<p>Total project area is 26 Acres, units 88;</p> <p>A brief community impact statement is provided</p>	Yes?	<b>Provide a revised Community Impact Statement that addresses all items listed on page 52 of Site plan manual.</b>
<b>Traffic Impact Study</b> (Sec. 3.21.1.C)	Study as required by the City of Novi Site Plan and Development Manual	A traffic impact assessment is provided in lieu of Traffic study; Right turn lanes/tapers and left turn passing lanes are not warranted.	Yes	<p>Refer to Traffic Study review for further details.</p> <p><u>Traffic supports the deviation for an abbreviated study in lieu of a full Traffic Impact study.</u></p>
<b>Proposed Ordinance Deviations</b> (Sec. 3.21.1.D)	List all proposed ordinance deviations with supporting narrative.	Staff identified multiple deviations in the proposed site plan. Refer to the entire chart and other review letters for more details	Yes?	Please refer to Planning review for more details.
<b>City Council may approve deviations from the Ordinance standards as part of a PSLR Overlay Development Agreement provided there are specific, identified features or planning mechanisms deemed beneficial to the City which are designed into the project for the purpose of achieving the objectives for the District. Safeguards shall be provided for each regulation where there is noncompliance on the PSLR Overlay Concept Plan.</b>				
<b>Required PSLR Overlay Use Standards/ Conditions for special land uses (Sec. 3.21.2)</b>				
<b>Site Standards (Sec. 3.21.2.A)</b>				
<b>Building Frontage</b> (Sec. 3.21.2.A.i)	Buildings shall front on a dedicated non-section line public street or an approved private drive	Site fronts on Section line public road. All individual dwellings front on proposed private driveway	<b>No</b>	<p><b>Note that private drive shall be built according to private road standards per DCS Manual</b></p> <p><u>The private drive does not proposed the required 60</u></p>

Item	Required Code	Proposed	Meets Code	Comments
				<p><u>feet right of way. This is considered a deviation. However, given the site location and shape, staff is willing to support the deviation provided provisions are made to provide access to neighboring properties.</u></p> <p>Applicant indicated a 60 foot access/utility easement for the property to the north. Please remove any proposed landscape within the proposed easement location.</p>
<b>Building Setbacks</b> (Sec. 3.21.2.A.ii) & (Sec 3.1.27.D)	Minimum front yard setback: 30 ft*** Maximum front yard setback: 75 ft.			<p>Building setbacks should be measured off the Proposed ROW (or access easement). In this case, staff will be able to support the deviation if a part of proposed drive is placed in a dedicated access easement as discussed at the meeting</p> <p><u>Request an ordinance deviation from City Council</u></p> <p><u>This is considered a deviation.</u></p>
*** The maximum front and exterior side yard setback requirement when adjacent to roads and drives (other than planned or existing section line road right-of-way) is 75 feet.	Minimum rear yard setback: 30 ft	30 feet rear setback provided	Yes	
	Exterior side yard adjacent to roads and drives 30 ft***	Not fronting on major roads or section line roads	NA	
	Exterior side yard adjacent to planned or existing section line road ROW 50 ft	Not fronting on major roads or section line roads	NA	
	Interior side yard 30 ft	25 ft proposed between two buildings)	No	
	Building to building 30 ft	25 ft proposed between two buildings)	No	
	Building Corner to corner: 15 ft	25 ft.	Yes	
<b>Landscape Buffer</b> (Sec. 3.21.2.A.iii) and Berms (Sec. 5.5.3)	All buildings, parking lots and loading areas shall be separated from section line road rights-of-way by a <b>50 ft. landscape buffer</b> containing an undulating 3-5 ft. tall landscaped berm.	No berm is provided	No	<p><u>Landscape review supports the deviation. Refer to landscape review for more details</u></p>
<b>Parking spaces for all uses in the</b>	Located only in the rear yard or interior side yard	Garage parking	Yes	

Item	Required Code	Proposed	Meets Code	Comments
district (except for townhouse style multiple-family dwellings that provide private garages for each dwelling unit) (Sec. 3.21.2.A.iv)	Screened by 3-5 ft. undulating berm from adjacent streets per Section 5.5.3.	Not abutting other streets	NA	
	All parking and access aisles shall be Min. 15 ft. from all buildings	Edge of pavement is 20 feet away from buildings	Yes	
<b>Parking Setbacks</b> (Sec. 3.21.2.A.iv.d)  * except that parking spaces for townhouse developments shall be permitted in the front yard setback when the parking area is also a driveway access to a parking garage contained within the unit.	Front yard parking is not permitted*	No parking proposed	NA	<b>Staff recommends proposing some dedicated parking spaces for guests, as well as a place for group mailboxes, if needed. Please refer to the requirements while finding a suitable location</b>
	Exterior side yard adjacent to a section line road - 50 ft. min	No parking proposed	NA	
	Exterior side yard adjacent to a local street - 30 ft. min	No parking proposed	NA	
	Interior side yards adjacent to single family residential districts - 30 ft. min	No parking proposed	NA	
	Interior side yards not adjacent to a single family residential district - 15 ft. min	No parking proposed	NA	
<b>Open Space Recreation requirements for Multi-Family Residential Developments</b> (Sec. 3.21.2.A.v)	Minimum of 200 square feet per dwelling unit of private opens space accessible to building (includes covered porches, balconies and patios)	2.6 acres	Yes	
	Common open space areas as central to project as possible	Appears to be in conformance. Exhibit provided on sheet 13	Yes	
	Active recreation areas shall be provided with at least 50 % of the open spaces dedicated to active recreation	Total open spaces: 9.4 acres Usable open space: 2.6 acres	No	<b><u>This is a considered a deviation.</u> The concept plan proposes connection to Providence hospital trail system, three pocket parks and internal walks running through the central courtyard.</b>
	Active recreation shall consist 10% of total site area.	Appears to be in conformance?	Yes?	<b>Provide information to verify conformance</b>
<b>Other</b>	Loading and Unloading	Loading spaces are not	NA	

Item	Required Code	Proposed	Meets Code	Comments
<b>Applicable Zoning Ordinances</b> (Sec. 3.21.2.A.vi, vii and ix)	per Section 5.4	required		
	Off-street Parking per Section 5.2 and 5.3	Garage parking and driveway parking	Yes?	
	Landscaping per Section 5.5, All sites shall include streetscape amenities such as but not limited to benches, pedestrian plazas, etc.	Couple of pocket parks included	Yes	
<b>Building Length</b> (Sec. 3.21.2.A.vii)	Maximum building length as described in Sec 3.21.3.A.vii shall not exceed <b>180 ft.</b>	Not applicable	NA	
	City Council may modify the minimum length up to a maximum of 360 ft. if: Building includes recreation space for min. 50 people Building is setback 1 ft. for every 3 ft. in excess of 180 ft. from all residential districts.	Not applicable	NA	
<b>Outdoor Lighting</b> (Sec. 3.21.2.A.x)	Maximum height of light fixtures: 20 ft.	Not provided	No	<b>A lighting and photometric plan is required with the PSLR Concept plan submittal.</b>  <b><u>The applicant requests to defer the requirement to the time of Preliminary site plan submittal. An intent to comply is stated in the response letter. This is considered a deviation.</u></b>
	Cut-off angle of 90 degrees or less	Not provided	No	
	No direct light source shall be visible at any property line abutting a section line road right-of-way at ground level.	Not provided	No	
	Maximum Illumination at property line: 0.5fc	Not provided	No	
<b>Circulation Standards (Sec. 3.21.2.B)</b>				
<b>Full Time Access</b> (Sec. 3.21.2.B)	Full time access drives shall be connected only to non-section line roads	Full time access drives are connected to a proposed private drive	No	<b><u>This is considered a deviation. Refer to related comments below.</u></b>
<b>Emergency Access</b> (Sec. 3.21.2.B)	Emergency access with access gate may be connected to section line roads when no other practical location is available	Emergency access is provide to the east to connect to Providence Parkway	Yes	
<b>Connection to Neighboring Properties</b> (Sec. 3.21.2.B.i)	New roads should provide public access connections to neighboring properties at location(s) acceptable	Connections to neighboring parcels are not proposed at this time. A 60 feet access easement is provided	No	



Item	Required Code	Proposed	Meets Code	Comments
	to the City and the neighboring property	for future connections		
<b>New Roads</b> (Sec. 3.21.2.B.ii.a)	New roads shall be designed as pedestrian/bicycle focused corridors as identified in the Non-Motorized Master Plan			
<b>Non-Motorized Facilities</b> (Sec. 3.21.2.B.ii.b)	Facilities shall be connected to the existing pedestrian network	Sidewalks are proposed within the site and connected to Wixom Road	Yes	
<b>Proposed Non-Motorized Facilities</b> (Sec. 3.21.2.B.ii.c)	Where existing non-motorized facilities do not exist on adjacent neighboring properties, facilities shall be stubbed to the property line.	A 5 foot sidewalk is proposed on either side of the proposed private drive	Yes	<b><u>A deviation is sought for reduction of distance between the edge of road and sidewalk</u></b>
<b>Building Design Standards (Sec. 3.21.2.C)</b>				
<b>Building Height</b> (Sec. 3.21.2.C.i)	35 ft. or 2 ½ stories	32 ft	Yes	
<b>Building Design</b> (Sec. 3.21.2.C.ii)	Buildings must be designed with a "single-family residential character"	Two-family attached housing	Yes	<b>Refer to Façade review for additional comments</b>
<b>Maximum % of Lot Area Covered</b> (Sec. 3.1.27.D)	25%	20%	Yes?	
<b>Note To District Standards (Sec 3.6.2)</b>				
<b>Off-Street Parking in Front Yard</b> (Sec 3.6.2.E)		Parking proposed in front yard	NA	
<b>Parking setback screening</b> (Sec 3.6.2.P)	Required parking setback area shall be landscaped per sec 5.5.3.	Landscape plan is provided	Yes	<b>Refer to Landscape review letter</b>
<b>Modification of parking setback requirements</b> (Sec 3.6.2.Q)	Refer to Sec 3.6.2 for more details	Modifications are not requested	NA	
<b>Parking, Loading and Dumpster Requirements</b>				
<b>Number of Parking Spaces</b>	Two (2) for each dwelling unit	Two spaces per unit in Garage	Yes	
<b>Residential, one-family and two family</b> (Sec. 5.2.12.A)	For 86 units, 172 spaces			

Item	Required Code	Proposed	Meets Code	Comments
<b>Parking Space Dimensions and Maneuvering Lanes</b> (Sec. 5.3.2)	90° parking layout: 9' x 19' parking space dimensions and 24' wide drives	Not provided	NA	
	9' x 17' if overhang on 7' wide interior sidewalk or landscaped area as long as detail indicates 4'' curb	Not provided	NA	
<b>Parking stall located adjacent to a parking lot entrance</b> (public or private) (Sec. 5.3.13)	- shall not be located closer than twenty-five (25) feet from the street right-of-way (ROW) line, street easement or sidewalk, whichever is closer		NA	
<b>End Islands</b> (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	Not provided	NA	
<b>Barrier Free Spaces</b> <i>Barrier Free Code</i>	1 barrier free parking spaces (for total 26 to 50)& 1 van barrier free parking space	Not provided	NA	
<b>Barrier Free Space Dimensions</b> <i>Barrier Free Code</i>	- 8' wide with an 8' wide access aisle for van accessible spaces - 5' wide with a 5' wide access aisle for regular accessible spaces	Not provided	NA	
<b>Barrier Free Signs</b> <i>Barrier Free Code</i>	One sign for each accessible parking space.	Not provided	NA	
<b>Minimum number of Bicycle Parking</b> (Sec. 5.16.1)	One (1) space for each twenty (20) employees on the maximum shift, minimum two (2) spaces	Not provided	NA	
<b>Bicycle Parking General requirements</b>	- No farther than 120 ft. from the entrance being served	Bike racks provided near pocket parks	Yes	

Item	Required Code	Proposed	Meets Code	Comments
(Sec. 5.16)	<ul style="list-style-type: none"> <li>- When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations</li> <li>- Spaces to be paved and the bike rack shall be inverted "U" design</li> <li>- Shall be accessible via 6 ft. paved sidewalk</li> </ul>			
<b>Bicycle Parking Lot layout</b> (Sec 5.16.6)	Parking space width: 6 ft. One tier width: 10 ft. Two tier width: 16 ft. Maneuvering lane width: 4 ft. Parking space depth: 2 ft. single, 2 ½ ft. double	Information not provided	No	<u>Please provide the layout as required at the time of Preliminary site plan</u>
<b>Loading Spaces</b> (Sec. 5.4.1) Location of such facilities in a permitted side yard shall be subject to review and approval by the City	As needed	Not required	NA	
<b>Dumpster</b> (Sec 4.19.2.F)	<ul style="list-style-type: none"> <li>- Located in rear yard or interior side yard in case of double frontage</li> <li>- Attached to the building or</li> <li>- No closer than 10 ft. from building if not attached</li> <li>- Not located in parking setback</li> <li>- If no setback, then it cannot be any closer than 10 ft. from property line.</li> <li>- Away from Barrier free Spaces</li> </ul>	The applicant indicated at the Pre-application meeting that Trash will be picked up by the curb	Yes	
<b>Dumpster Enclosure</b> (Sec. 21-145.(c) City code of Ordinances)	<ul style="list-style-type: none"> <li>- Screened from public view</li> <li>- A wall or fence 1 ft. higher than height of refuse bin</li> <li>- And no less than 5 ft. on three sides</li> </ul>	Not provided	NA	

Item	Required Code	Proposed	Meets Code	Comments
	<ul style="list-style-type: none"> <li>- Posts or bumpers to protect the screening</li> <li>- Hard surface pad.</li> <li>- Screening Materials: Masonry, wood or evergreen shrubbery</li> </ul>			
<b>Sidewalk Requirements</b>				
<b>ARTICLE XI. OFF-ROAD NON-MOTORIZED FACILITIES</b> <i>Sec. 11-256. Requirement. (c) &amp; Sub. Ord. Sec. 4.05,</i>	<ul style="list-style-type: none"> <li>- In the case of new streets and roadways to be constructed as part of the project, a sidewalk shall be provided on both sides of the proposed street or roadway.</li> <li>- Sidewalks along arterials and collectors shall be 6 feet or 8 feet wide as designated by the "Bicycle and Pedestrian Plan," but not along industrial service streets per Subdivision Ordinance</li> <li>- Whereas sidewalks along local streets and private roadways shall be five (5) feet wide.</li> </ul>	The applicant proposed connecting to the existing trail system within Providence hospital campus. They also noted about proposing new pathway along Providence park way. Details to be provided with next submittal	Yes	
<b>Pedestrian Connectivity</b>	<ul style="list-style-type: none"> <li>- Whether the traffic circulation features within the site and 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</li> <li>- Building exits must be connected to sidewalk system or parking lot.</li> </ul>	Provide sidewalks on both sides of the private drive	Yes	
<b>Other Requirements</b>				
<b>Design and Construction Standards Manual</b>	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).		Yes	
<b>General layout and dimension</b>	Location of all existing and proposed buildings,	Mostly provided. Some dimensions are required	Yes	Refer to all review letter for comments

Item	Required Code	Proposed	Meets Code	Comments
<b>of proposed physical improvements</b>	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).	to provide more clarity.		
<b>Economic Impact</b>	- Total cost of the proposed building & site improvements - Number of anticipated jobs created (during construction & after building is occupied, if known)	Information provided as part of Community Impacts statement. Over 5 million in construction costs.	Yes	
<b>Legal Documents</b>	PSLR Development Agreement is required  Master Deed would be required for the ROW dedication with Final Site Plan review	One is not required at this time	No	<u>A draft agreement would be required once City Council approves the Concept Plan</u>
<b>Development and Street Names</b>	Development and street names must be approved by the Street Naming Committee before Preliminary Site Plan approval	Application submitted and is under review	No	The project requires a project and street naming application. Please contact Hannah Smith at 248-347-0579
<b>Development/ Business Sign</b>	- Signage if proposed requires a permit. - Exterior Signage is not regulated by the Planning Division or Planning Commission.	None indicated. Proposed sign is outside the sight distance triangles	Yes?	<u>This review does not include signage. The applicant should apply for a sign permit prior to installation.</u>
<b>NOTES:</b>				
1. This table is a working summary chart and not intended to substitute for any Ordinance or City of Novi requirements or standards. 2. The section of the applicable ordinance or standard is indicated in parenthesis. Please refer to those sections in Article 3, 4 and 5 of the zoning ordinance for further details. 3. Please include a written response to any points requiring clarification or for any corresponding site plan modifications to the City of Novi Planning Department with future submittals.				

## ENGINEERING REVIEW



# PLAN REVIEW CENTER REPORT

January 30, 2018

## Engineering Review

Villas at Stonebrook

JSP17-0062

### Applicant

Pulte Homes

### Review Type

Revised Concept plan for PSLR

### Property Characteristics

- Site Location: East of Wixom Road, south of Grand River Avenue
- Site Size: 26 acres
- Plan Date: 12/29/2017
- Design Engineer: Atwell

### Project Summary

- Proposed development of 86 duplex housing units. Site access from one driveway off Wixom Road with proposed private roadway in the development.
- Water service would be provided by connection to existing 16-inch water main in Wixom Road, and off-site connection to existing 12-inch water main in Providence Parkway for looped water service.
- Sanitary sewer service would be provided by connection to existing sanitary sewer in Wixom Road.
- Storm water would be collected by a single storm sewer collection system and detained on-site.

### Recommendation:

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

**Comments:**

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

General

1. **A stub street to the property boundary at intervals not to exceed 1,300 feet along the perimeter is required by ordinance. A deviation from Appendix C Section 4.04(A)(1) of the Novi City Code will be required, as noted on the PSLR Concept plan.**
2. A right-of-way permit will be required from the City of Novi for work in the Wixom Road right-of-way.
3. Show and label the master planned 60-foot half right-of-way width for Wixom Road. The dedication of the master-planned right-of-way half-width of sixty (60) feet is requested for the project. Show the additional right-of-way width to be dedicated along Wixom Road labeled as "proposed" right-of-way.
4. 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.
5. A letter from either the applicant or the applicant's engineer must be submitted with the Preliminary Site Plan submittal highlighting the changes made to the plans addressing each of the comments in this review.

Water Main

6. The City's Water Distribution Master Plan includes a 16-inch main connecting the Wixom Road 16-inch main to the 12-inch main in Providence Park. Provide a 16-inch water main through the south portion of the site in accordance with the City's Master Plan.
7. A profile for all proposed water main 8-inch and larger shall be included with Final Site Plan submittal.
8. At the time of Final Site plan, assuming no further design changes are anticipated, provide three (3) signed and sealed sets of revised utility plans along with the MDEQ permit application (1/07 rev.) for water main construction and the Streamlined Water Main Permit Checklist should be submitted to the Engineering Division. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets.

Sanitary Sewer

9. At the time of Final Site plan, assuming no further design changes are anticipated, provide seven (7) signed sealed sets of revised utility plans along with the MDEQ permit application (04/14 rev.) for sanitary sewer construction and the Streamlined Sanitary Sewer Permit Certification Checklist to the Engineering Division. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets. The MDEQ can be contacted for an expedited review by their office.



### Paving & Grading

10. **Sidewalks on private roadways should be located such that the outside edge of the sidewalk is a minimum of 15 feet from back of curb. The layout plan indicates that 12.5 feet are provided from the back of curb to outside edge. A request for deviation is noted on the PSLR Concept plan.**
11. Provide detailed site grading plan with future submittals.
12. An access easement for the property to the south will be required.
13. Provide an access easement on the entrance drive from Wixom Road to facilitate future connections to the property.
14. 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".

### Storm Sewer and Storm Water Management Plan

15. Show the 15 foot wide maintenance access route to the basin outlet structure. Include a detail illustrating maximum slope of 1V:5H, and cross section able to withstand the passage of heavy equipment. Verify the access route does not conflict with proposed landscaping.
16. A 25-foot vegetated buffer shall be provided around the perimeter of each storm water basin. This buffer cannot encroach onto adjacent lots.
17. Provide a site drainage area map.
18. The northeast corner of the site should be captured in the on-site storm sewer and storm water management basin. Alternatively, rain gardens can be proposed in this area.
19. In the southeast corner of the site, any storm water runoff from developed or disturbed areas must be captured in the on-site storm sewer and storm water management basin.

### Off-Site Easements

20. Off-site utility easements must be executed **prior to final approval of the plans**. Drafts shall be submitted as early as possible, with Preliminary Site Plan if possible, no later than with Final Site Plan submittal.
  - a. Off-site emergency access easement is required to the east.
  - b. Off-site public water main easement is required to the east.
  - c. Temporary off-site grading easement is required to the east.

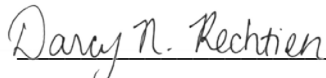
### **The following must be provided at the time of Preliminary Site Plan submittal:**

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

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

22. An itemized construction cost estimate must be submitted to the Community Development Department at the time of Final Site Plan submittal for the determination of plan review and construction inspection fees. This estimate should only include the civil site work and not any costs associated with construction of the building or any demolition work. **The cost estimate must be itemized** for each utility (water, sanitary, storm sewer), on-site paving, right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pretreatment structure and restoration).
23. Draft copies and/or revisions to the off-site utility and access easements, a recent title search, and legal escrow funds must be submitted to the Community Development Department for review and approval by the Engineering Division and the City Attorney prior to being executed.

Please contact Darcy Rechten at (248) 735-5695 with any questions.



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Darcy N. Rechten, P.E.  
Plan Review Engineer

## LANDSCAPE REVIEW



# PLAN REVIEW CENTER REPORT

January 12, 2018

## Revised PSLR Concept Plan - Landscaping

Villas at Stonebrook

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### Review Type

Revised PSLR Concept Landscape Review

### Property Characteristics

- Site Location: 26700 Wixom Road - north of Wildlife Woods Park
- Site Acreage: 25.88 acres
- Site Zoning: I-2 with PSLR overlay
- Adjacent Zoning: North: R-1 and I-1, East: RA (ITC corridor), South, West: R-1
- Plan Date: 12/29/2017

### Ordinance Considerations

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

### Recommendation

The project is **recommended for approval**. The comments below should be corrected in Preliminary or Final Site Plans, as indicated by bold or underlined comments.

Deviations from Ordinance (this does not include errors or omissions such as the use of species as replacements that are not included on the Woodland Replacement Chart, which need to be corrected).

- **No berm is provided at the Wixom Road frontage.** This deviation is supported by staff as the available frontage width does not allow the required berm and the long entry makes the berm unnecessary for screening purposes.
- **Many subcanopy trees proposed as part of required Multi-family tree requirement.** If the number of sub-canopy trees can be brought down to 25% of the total 264 tree requirement, this deviation can be supported as a way to increase the diversity of the site.
- **Interior street trees are not located close to the road, between the sidewalk and curb.** This deviation is not supported by staff.
- **Replacement trees are being used to meet the greenbelt tree requirement. This ends up being a reduction in the number of greenbelt trees provided.** This deviation is not supported by staff as there is sufficient room on the site for those replacement trees to be planted elsewhere.

**General note:** The access easement shown for the property to the north should also be shown on the landscape plan, and no trees should be proposed within that easement.

### Ordinance Considerations

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

Provided.

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

1. Provided.
2. There are no overhead utility lines in the vicinity of the project.

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

1. A tree survey is provided and trees to be removed are clearly marked.
2. **Please show tree fencing at the Critical Root Zone (1' beyond dripline) for all existing trees to remain near the project area on the Demolition or Grading Plan when it is created.**

Woodland Replacement Trees

1. See ECT's review for a more detailed discussion of woodland replacement trees.
2. **Only species on the Section 37 Woodland Replacement Chart can be used as woodland replacements. Varieties with an unnatural appearance should not be used as replacement trees. These selections should be replaced as woodland replacements: *Acer x freemanii* 'Armstrong' and *Acer saccharum* 'Temple's Upright'.**
3. Please replace those with species from the Woodland Replacement Chart (attached).
4. *Picea mariana* is a valid replacement for *Picea abies*, however it is hard to find in the commercial trade and is typically found in wetlands. For this reason using White Pine (*Pinus strobus*) in place of *Picea mariana* is recommended.

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

Adjacent Industrial-zoned property to north is not developed. The property to the east is the ITC corridor. No berms need to be installed.

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

1. The only frontage is on Wixom Road. The 50 foot greenbelt depth required for a PSLR project on a section road is exceeded greatly. The frontage is 120 linear feet and the boulevard entry is 60 feet wide, leaving 60 feet of frontage for trees. Based on this, 2 canopy trees and 6 subcanopy trees are required.
2. It appears that 2 canopy trees and 5 subcanopy trees are provided, but it is difficult to be certain if replacement trees are used to meet this requirement. They cannot.
3. **Please label the plants uniquely so it can be determined if the requirement is met, add another subcanopy tree to meet that requirement and 2 canopy trees if they are needed.**

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

1. As mentioned above, the frontage on Wixom Road is 120 feet, but the clear vision zone does not allow any room for street trees so none are required.
2. **For interior street trees, the multifamily requirement should be followed (below). The trees should be located between the sidewalk and street.**

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

No parking lots are proposed.

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

No parking lots are proposed.

Boulevard island landscaping

Please identify the 3 trees in the entry island. Those can't count toward the street tree requirement.

Loading Zone screening (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)

No loading zone screening is required as part of this project.

Multi-family Landscaping (Zoning Section 5.5.3.E.ii)

1. For street trees, 1 tree per 35 lf of frontage, less driveways and interior road widths, is required for each side of the road. Per the calculations provided, 190 are required but only 186 were found. **Please make sure the required number of street trees are provided and clearly shown as street trees.**
2. There shall be 3 deciduous canopy or large evergreen trees provided for each ground floor dwelling unit. The plan shows 258 trees provided as required, however greater than 33% are subcanopy/ornamental trees, and two of the selections, Armstrong Maples and Temple's Upright maples do not meet the requirement of having a mature height of at least 30 feet and a mature canopy width of at least 20 feet.
3. **Using subcanopy trees in place of deciduous canopy or large evergreens is a deviation from the ordinance. If the percentage of subcanopy trees can be brought down to 25% or less, that deviation can be supported by staff to increase the diversity of plantings.**
4. **The Armstrong and Temple's Upright maples should be replaced with trees that have broader canopies.**
5. The typical unit landscaping detail shows that approximately 46% of each building's frontage along the interior drive is landscaped, which exceeds the 35% requirement.

Plant List (LDM 2.h. and t.)

1. **On Final site plans, please provide the anticipated costs of landscaping using the city standard costs at: <http://cityofnovi.org/Government/City-Services/Community-Development/Fees/Planning/FeeSchedule-OtherReviewFees.aspx> (the 3rd page).**
2. **Please follow the requirements of the Landscape Design Manual (LDM 4) for tree diversity.**

Planting Notations and Details (LDM)

**Please revise the details provided per the instructions on the landscape chart.**

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

The required shrubs are provided.

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

The proposed landscaping must be provided with sufficient water to become established and survive over the long term. Please note how this will be accomplished if an irrigation plan is not provided.

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

Provided.

Snow Deposit (LDM.2.q.)

Provided.

Proposed trees to be saved (Sec 37 Woodland Protection 37-9, LDM 2.e.(1))

**Few trees outside of the preserved wetlands are being preserved. Please add tree protection fencing for all trees to remain outside of the wetlands and keep the tree tag number on the landscape plan for use during inspections.**

Corner Clearance (Zoning Sec 5.9)

Provided.

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](mailto:meader@cityofnovi.org).

A handwritten signature in black ink, appearing to read "Rick Meader". The signature is written in a cursive, flowing style.

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Rick Meader – Landscape Architect

## LANDSCAPE REVIEW SUMMARY CHART – revised PSLR Concept

**Review Date:** January 12, 2018  
**Project Name:** JSP17 – 0062: VILLAS AT STONEBROOK  
**Plan Date:** December 29, 2017  
**Prepared by:** Rick Meader, Landscape Architect E-mail: [rmeader@cityofnovi.org](mailto: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.

### DEVIATIONS FROM ORDINANCES:

- No berm is provided at Wixom Road frontage. **Supported by staff.**
- Street trees are not located close to road, between sidewalk and curb. **Not supported by staff.**
- Use of subcanopy trees in place of some required deciduous canopy or evergreen trees. **Staff would support up to 25% of the multifamily site landscaping requirement of 3 trees per ground level dwelling unit to increase diversity but current plan proposes more than 33% of trees to be subcanopy.**

Item	Required	Proposed	Meets Code	Comments
<b>Landscape Plan Requirements (LDM (2))</b>				
<b>Landscape Plan</b> (Zoning Sec 5.5.2, LDM 2.e.)	§ New commercial or residential developments § Addition to existing building greater than 25% increase in overall footage or 400 SF whichever is less. § 1"=20' minimum with proper North. Variations from this scale can be approved by LA § Consistent with plans throughout set	Yes	Yes	1. Overall Plan Scale 1"=60' 2. Details Scale: 1"=30' (acceptable)
<b>Project Information</b> (LDM 2.d.)	Name and Address	Yes – on cover sheet	Yes	<b>Please include location map on landscape plan to assist contractor.</b>
<b>Owner/Developer Contact Information</b> (LDM 2.a.)	Name, address and telephone number of the owner and developer or association	Yes – on cover sheet	Yes	
<b>Landscape Architect contact information</b> (LDM 2.b.)	Name, Address and telephone number of RLA	Yes	Yes	
<b>Sealed by LA.</b> (LDM 2.g.)	Requires original signature	No		<u>Need for Final Site Plans</u>
<b>Miss Dig Note</b> (800) 482-7171 (LDM.3.a.(8))	Show on all plan sheets	Yes	Yes	



Item	Required	Proposed	Meets Code	Comments
<b>Zoning</b> (LDM 2.f.)	Include parcel and all adjacent parcels' zoning	<u>Parcel:</u> I-2 with PSLR overlay <u>North:</u> R-1 and I-1 <u>East:</u> RA (ITC easement) <u>South, West:</u> R-1	Yes	<b>Please show zoning on Landscape Plan Sheet 8.</b>
<b>Survey information</b> (LDM 2.c.)	§ Legal description or boundary line survey § Existing topography	Topo and description	Yes	Sheet 02
<b>Existing plant material</b> <b>Existing woodlands or wetlands</b> (LDM 2.e.(2))	§ Show location type and size. Label to be saved or removed. § Plan shall state if none exists.	§ Tree survey is provided on Sheets 02 and 03. § Replacement calculations shown on Sheet 03. § Replacements are shown on Sheet 09	Yes	<ol style="list-style-type: none"> <li>1. Regulated woodlands boundary is shown on Sheet 4. <b>Please copy that boundary to Sheet 2.</b></li> <li>2. Except within wetlands to be preserved, most trees are being removed from the site.</li> <li>3. <b>Please add tree fencing to protect trees to be preserved if located outside of wetlands on Grading and/or Demolition Plans.</b></li> <li>4. <b>Please see ECT's review for required woodland replacements and provide required trees from Woodland Replacement Chart.</b></li> </ol>
<b>Soil types</b> (LDM.2.r.)	§ As determined by Soils survey of Oakland county § Show types, boundaries	Yes	Yes	Sheet 02
<b>Existing and proposed improvements</b> (LDM 2.e.(4))	Existing and proposed buildings, easements, parking spaces, vehicular use areas, and R.O.W	Yes	Yes	
<b>Existing and proposed utilities</b> (LDM 2.e.(4))	Overhead and underground utilities, including hydrants	Yes	Yes	<ol style="list-style-type: none"> <li>1. <b>Please show utility leads to buildings to help avoid conflicts.</b></li> <li>2. <b>Please move utility lines outside of landscape strip between the sidewalk and the</b></li> </ol>

Item	Required	Proposed	Meets Code	Comments
				curb so the required street trees can be placed there.
<b>Proposed grading. 2' contour minimum (LDM 2.e.(1))</b>	Provide proposed contours at 2' interval	Yes	Yes	
<b>Snow deposit (LDM.2.q.)</b>	Show snow deposit areas on plan	Yes	Yes	
<b>LANDSCAPING REQUIREMENTS</b>				
<b>Berms, Walls and ROW Planting Requirements</b>				
<b>Berms</b>				
§ 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 of loam with 6" layer of top soil.				
<b>Residential Adjacent to Non-residential (Sec 5.5.3.A) &amp; (LDM 1.a)</b>				
<b>Berm requirements (Zoning Sec 5.5.A)</b>	Not required for residential property abutting undeveloped industrially zoned property or ITC corridor.	NA		
<b>Planting requirements (LDM 1.a.)</b>	LDM Novi Street Tree List	NA		
<b>Adjacent to Public Rights-of-Way (Sec 5.5.B) and (LDM 1.b)</b>				
<b>ROW Landscape Screening Requirements (Sec 5.5.3.B. ii)</b>				
<b>Greenbelt width (2)(3) (5)</b>	50 feet	Approx 1300 ft	Yes	
<b>Berm requirements (Zoning Sec 5.5.3.A.(5) and 3.21.2.A.iii)</b>	Undulating berm 3-5 feet tall with a 4 foot wide crest	None	No	1. No berm is provided due to lack of room at the entry. For this reason, a deviation is requested. 2. Given the width of the entry drive and the width of the property at Wixom, there is not sufficient room for a berm of any size. <b>The landscape waiver/ deviation is supported by staff.</b>
Min. berm crest width	4 feet	None		See above
Minimum berm height (9)	3-5 feet	None		See above
3' wall	(4)(7)	No		
<b>Canopy deciduous or large evergreen trees</b>	§ 1 per 35 lf § (120-60)/35 = 2 trees	0 trees	No	1. Replacement trees can't be used in

Item	Required	Proposed	Meets Code	Comments
Notes (1) (10)				place of required greenbelt trees. <b>Please show 2 canopy trees in greenbelt as greenbelt trees, not replacements.</b> 2. <b>Please label greenbelt trees uniquely to indicate the requirement they meet.</b>
<b>Sub-canopy deciduous trees</b> Notes (2)(10)	§ 1 tree per 20 lf § (120-60)/20 = 6 trees	3 trees	No	1. See above 2. <b>Please provide required trees and label uniquely as greenbelt trees.</b>
<b>Canopy deciduous trees in area between sidewalk and curb</b> <i>(Novi Street Tree List)</i>	<u>Wixom Road:</u> § 1 tree per 20 lf § (120-85)/35 = 1 trees <u>Interior</u> § See the Multi-family landscaping discussion below.	<u>Wixom Road:</u> § 0 trees	Yes	1. The clear vision zone, combined with the central placement of the entry does not leave sufficient room for any street trees. Despite the calculation indicating 1 tree is possible, in fact there isn't sufficient room for any street trees in the Wixom Road frontage. 2. All interior and access drive trees should be deciduous canopy trees with a minimum mature height of 30 feet and canopy width of 20 feet. <b>Please use only species/varieties that meet these standards.</b>
<b>Cross-Section of Berms (LDM 2.j)</b>				
Slope, height and width	§ Label contour lines § Maximum 33% § Min. 4 feet flat horizontal area § Minimum 3 feet high § Constructed of loam with 6' top layer of topsoil.	No berm is provided.		

Item	Required	Proposed	Meets Code	Comments
Type of Ground Cover		NA		
Setbacks from Utilities	Overhead utility lines and 15 ft. setback from edge of utility or 20 ft. setback from closest pole	NA		
<b>Walls (LDM 2.k &amp; Zoning Sec 5.5.3.vi)</b>				
<b>Material, height and type of construction footing</b>	Freestanding walls should have brick or stone exterior with masonry or concrete interior	No walls are proposed.		
<b>Walls greater than 3 ½ ft. should be designed and sealed by an Engineer</b>		NA		
<b>Multi-family/Attached Dwelling Units (Zoning Sec 5.5.3.F.ii)</b>				
Interior Street Trees (Sec 5.5.3.F.ii.b(2))	<ul style="list-style-type: none"> <li>1 deciduous canopy tree per 35 lf of interior roadway (both sides), excluding driveways, parking entry drives and interior roads adjacent to public rights-of-way</li> <li>Entrance Drive: (1334*2)/35 = 76 trees</li> <li>Interior loop drive: (2517-576+2740-1040)/35 = 112 trees</li> </ul>	Entrance drive: 78 trees Loop drive:	No	<ol style="list-style-type: none"> <li>Canopy trees should be species/varieties with a minimum mature height of 30 feet and a minimum mature canopy width of 20 feet. <b>Armstrong maples and Temple Sugar maples do not meet this minimum requirement and should be replaced with larger varieties.</b></li> <li>All interior and access drive trees should be deciduous canopy trees with a minimum mature height of 30 feet and canopy width of 20 feet. <b>Please use only species/varieties that meet these standards.</b></li> <li>The interior street trees should be located between the sidewalk and street, within 15 of the back of curb. They are shown as being</li> </ol>

Item	Required	Proposed	Meets Code	Comments
				<p>approximately 20 feet or more behind the curb. <b>The proposed deviation is not supported by staff.</b></p> <p>4. Please realign the utilities to allow the street trees to be located between the sidewalk and the street.</p> <p>5. Please move trees further than 20 feet from the road to a position between sidewalk and curb if sufficient room (7 feet) is provided. If the deviation is accepted by the Planning Commission, all street trees should be planted no more than 20 feet from the back of curb.</p>
<p>Site Landscaping                      (Sec. 5.5.3.E.ii.b.(1))</p>	<ul style="list-style-type: none"> <li>• (3) deciduous canopy trees or large evergreen trees for each dwelling unit on the ground floor.</li> <li>• 86 units * 3 = 258 trees</li> <li>• Evergreens not closer than 20 ft from roadway</li> </ul>	<p>258 trees</p>	<p>Yes/No</p>	<p>1. Using subcanopy trees for up to 25% of the total number of trees has been approved for other projects to increase diversity. This project proposes well over 33% of the trees to be subcanopy trees, which is not consistent with the ordinance requirements and greater than 25% <b>is not supported by staff.</b></p> <p>2. Please reduce the number of subcanopy trees used to meet the site landscaping to 25% or less of the total (ie no more than 65). This would be a</p>

Item	Required	Proposed	Meets Code	Comments
				deviation from the ordinance but it would be supported by staff to increase diversity on the site.
Foundation plantings (Sec 5.5.3.E.ii.B.(3))	Mix of shrubs, subcanopy trees, groundcover, perennials, annuals and ornamental grasses provided at the front of each ground floor unit covering at least 35% of the front building façade.	<ul style="list-style-type: none"> <li>• A typical building landscape plan is provided.</li> <li>• 19 feet (46%) of frontage is landscaped.</li> <li>• One subcanopy tree is shown in front of each unit as part of the foundation landscaping.</li> </ul>	Yes/No	See above note regarding use of subcanopy site trees as part of foundation landscaping.
<b>LANDSCAPING REQUIREMENTS</b>				
<b>Parking Area Landscape Requirements LDM 1.c. &amp; Calculations (LDM 2.o.)</b>				
<b>General requirements (LDM 1.c)</b>	§ Clear sight distance within parking islands § No evergreen trees	NA		No parking lots are proposed.
<b>Name, type and number of ground cover (LDM 1.c.(5))</b>	As proposed on planting islands	NA		
<b>General (Zoning Sec 5.5.3.C.ii)</b>				
<b>Parking lot Islands (a, b. i)</b>	§ 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	NA		No parking lots are proposed.
<b>Curbs and Parking stall reduction (c)</b>	Parking stall can be reduced to 17' and the curb to 4" adjacent to a sidewalk of minimum 7 ft.	NA		No parking spaces are proposed.
<b>Contiguous space limit (i)</b>	Maximum of 15 contiguous spaces	NA		No parking spaces are proposed.
<b>Plantings around Fire Hydrant (d)</b>	No plantings with matured height greater than 12' within 10 ft. of fire hydrants	No	Yes	
<b>Landscaped area (g)</b>	Areas not dedicated to	Seed is proposed.	TBD	

Item	Required	Proposed	Meets Code	Comments
	parking use or driveways exceeding 100 sq. ft. shall be landscaped			
<b>Clear Zones</b> (LDM 2.3.(5))	25 ft corner clearance required. Refer to Zoning Section 5.5.9	Yes	Yes	
<b>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)</b>				
A = Total square footage of vehicular use areas up to 50,000sf x 7.5%	<ul style="list-style-type: none"> <li>• <math>A = x \text{ sf} * 7.5 \% = A \text{ sf}</math></li> <li>• <math>Xxx * 7.5\% = xx \text{ sf}</math></li> </ul>	NA		No parking lots are proposed.
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"> <li>• <math>B = x \text{ sf} * 1\% = B \text{ sf}</math></li> <li>• <math>(xxx - 50000) * 1\% = xx \text{ sf}</math></li> </ul>	NA		See above
<b>Category 2: For: I-1 and I-2 (Zoning Sec 5.5.3.C.iii)</b>				
A. = Total square footage of vehicular use area up to 50,000 sf x 5%	$A = x \text{ sf} * 5\% = A \text{ sf}$	NA		
B = Total square footage of additional paved vehicular use areas over 50,000 SF x 0.5%	$B = 0.5\% \times 0 \text{ sf} = B \text{ SF}$	NA		
<b>All Categories</b>				
C = A+B Total square footage of landscaped islands	$xxx + xxx = xx \text{ SF}$	NA		No parking lots are proposed.
D = C/200 Number of canopy trees required	$xx/200 = xx \text{ Trees}$	NA		No parking lots are proposed.
<b>Parking land banked</b>	NA	No		
<b>Non-Residential Zoning Sec 5.5.3.E.iii &amp; LDM 1.d (2)</b> Refer to Planting in ROW, building foundation landscape, parking lot landscaping and LDM				
<b>Interior Street to Industrial subdivision</b> (LDM 1.d.(2))	<ul style="list-style-type: none"> <li>§ 1 canopy deciduous or 1 large evergreen per 35 l.f. along ROW</li> <li>§ No evergreen trees closer than 20 ft.</li> <li>§ 3 sub canopy trees per 40 l.f. of total linear frontage</li> <li>§ Plant massing for 25% of ROW</li> </ul>	NA		
<b>Screening of outdoor</b>		NA		

Item	Required	Proposed	Meets Code	Comments
<b>storage, loading/unloading</b> (Zoning Sec. 3.14, 3.15, 4.55, 4.56, 5.5)				
<b>Transformers/Utility boxes</b> (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	No	No	§ <b>When transformer locations are finalized, screening shrubs per standard detail are required.</b> § <b>Please add detail to plans.</b>
<b>Detention/Retention Basin Requirements (Sec. 5.5.3.E.iv)</b>				
<b>Planting requirements</b> (Sec. 5.5.3.E.iv)	§ Clusters shall cover 70-75% of the basin rim area § 10" to 14" tall grass along sides of basin § Refer to wetland for basin mix	Required shrubs and species are provided around 70% of rim.	Yes	
<b>LANDSCAPING NOTES, DETAILS AND GENERAL REQUIREMENTS</b>				
<b>Landscape Notes – Utilize City of Novi Standard Notes</b>				
<b>Installation date</b> (LDM 2.i. & Zoning Sec 5.5.5.B)	Provide intended date	Between Mar 15 and Nov 15.	Yes	
<b>Maintenance &amp; Statement of intent</b> (LDM 2.m & Zoning Sec 5.5.6)	§ Include statement of intent to install and guarantee all materials for 2 years. § Include a minimum one cultivation in June, July and August for the 2-year warranty period.	Yes	Yes	
<b>Plant source</b> (LDM 2.n & LDM 3.a.(2))	Shall be northern nursery grown, No.1 grade.	Yes	Yes	
<b>Irrigation plan</b> (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		1. <u>Please add 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>



Item	Required	Proposed	Meets Code	Comments
<b>Other information</b> (LDM 2.u)	Required by Planning Commission	NA		
<b>Establishment period</b> (Zoning Sec 5.5.6.B)	<b>2 yr. Guarantee</b>	Yes	Yes	
<b>Approval of substitutions.</b> (Zoning Sec 5.5.5.E)	City must approve any substitutions in writing prior to installation.	Yes	Yes	
<b>Plant List (LDM 2.h.) - Include all cost estimates</b>				
Botanical and common names	Refer to LDM suggested plant list	No	No	<ol style="list-style-type: none"> <li>1. Armstrong maple and Temple Sugar Maple can't be used as replacements. Armstrong maple does not appear on the woodland chart and the form of Temple Sugar Maple is not at all natural. The intent of the woodland ordinance is to restore or provide natural woodlands to replace the natural trees that were removed.</li> <li>2. <b>Please replace those two with selections from the Woodland Replacement Chart that are more natural in appearance.</b></li> <li>3. <b>While Black Spruce is on the Woodland Replacement chart, it is hard to come by in commercial trade. Using White Pine in place of that is recommended.</b></li> <li>4. <b>See ECT review for other woodland replacement issues.</b></li> </ol>
Quantities and sizes		No	No	
Root type		No	No	
Type and amount of lawn		No		<u>Please add areas of each in cost table.</u>
Cost estimate (LDM 2.t)	For all new plantings, mulch and sod as listed on the plan	No		<u>Please add to final site plan.</u>

Item	Required	Proposed	Meets Code	Comments
<b>Planting Details/Info (LDM 2.i) – Utilize City of Novi Standard Details</b>				
Canopy Deciduous Tree	Refer to LDM for detail drawings	Yes	Yes	Please specify fabric straps as material for guys per Tree Staking detail – no wire should be used.
Evergreen Tree		Yes	Yes	See above
Multi-stem 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	
<b>Other Plant Material Requirements (LDM 3)</b>				
<b>General Conditions (LDM 3.a)</b>	Plant materials shall not be planted within 4 ft. of property line	Yes	Yes	
<b>Plant Materials &amp; Existing Plant Material (LDM 3.b)</b>	Clearly show trees to be removed and trees to be saved.	No	No	1. Provide tree fence protection for all trees to remain on site on demolition plan and grading plan. 2. Please leave labels of all existing trees to remain on Landscape Plans for use in site inspections.
<b>Landscape tree credit (LDM3.b.(d))</b>	Substitutions to landscape standards for preserved canopy trees outside woodlands/ wetlands should be approved by LA. Refer to Landscape tree Credit Chart in LDM	No		
<b>Plant Sizes for ROW, Woodland replacement and others (LDM 3.c)</b>	2.5" canopy trees 6' evergreen trees	Provided on plant list.	Yes	
<b>Plant size credit (LDM3.c.(2))</b>	NA	No		

Item	Required	Proposed	Meets Code	Comments
<b>Prohibited Plants</b> (LDM 3.d)	No plants on City Invasive Species List	No	Yes	
<b>Recommended trees for planting under overhead utilities</b> (LDM 3.e)	Label the distance from the overhead utilities		TBD	
<b>Collected or Transplanted trees</b> (LDM 3.f)		No		
<b>Nonliving Durable Material: Mulch</b> (LDM 4)	§ Trees shall be mulched to 3" depth and shrubs, groundcovers to 2" depth § Specify natural color, finely shredded hardwood bark mulch. Include in cost estimate. § Refer to section for additional information	Yes	Yes	

**NOTES:**

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

WETLAND REVIEW

January 29, 2018  
ECT No. 170773-0300

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

Re: Villas at Stonebrook (JSP17-0062)  
Wetland Review of the Revised Planned Suburban Low-Rise (PSLR) Concept Plan (PSP18-0004)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the Revised Planned Suburban Low-Rise (PSLR) Concept Plan for the proposed Villas at Stonebrook project prepared by Atwell dated December 29, 2017 and stamped "Received" by the City of Novi Community Development Department on January 5, 2018 (Plan). The Plan was reviewed for conformance with the City of Novi Wetland and Watercourse Protection Ordinance and the natural features setback provisions in the Zoning Ordinance.

**ECT recommends approval of the Revised PSLR Concept Plan for Wetlands; however, the Applicant should address the items noted below in the *Wetland Comments* Section of this letter prior to receiving Wetland approval of the Preliminary Site Plan.**

The following wetland related items are required for this project:

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

The proposed development is located north of West Eleven Mile road and east of Wixom Road in Section 17. The overall project site area is approximately 26 acres and is currently occupied by a Profile Steel and Wire, Inc. building/warehouse. The project includes the construction of 86 single-family detached residential units, entrance drive, utilities and a stormwater detention basin. ECT suggests that the City of Novi Engineering Department review this plan in order to verify that the site's stormwater will be adequately managed and meet the City's stormwater storage requirements.

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. ECT continues to recommend that we conduct a wetland and

woodland field evaluation at the time of Preliminary Site Plan submittal in order to verify the existing on-site wetland boundaries and any available woodland information (tree sizes, species, conditions, etc.).

### **Wetland Evaluation**

#### ***City of Novi Wetland Ordinance Requirements***

The City of Novi Wetland and Watercourse Protection Ordinance (City of Novi Code of Ordinances, Part II, Chapter 12, and Article V) describes the regulatory criteria for wetlands and review standards for wetland permit applications.

As stated in the Ordinance, it is the policy of the city to prevent a further net loss of those wetlands that are: (1) contiguous to a lake, pond, river or stream, as defined in Administrative Rule 281.921; (2) two (2) acres in size or greater; or (3) less than two (2) acres in size, but deemed essential to the preservation of the natural resources of the city under the criteria set forth in subsection 12-174(b).

The wetland essentiality criteria as described in the Wetland and Watercourse Protection Ordinance are included below. Wetlands deemed essential by the City of Novi require the approval of a use permit for any proposed impacts to the wetland:

*All noncontiguous wetland areas of less than two (2) acres which appear on the wetlands inventory map, or which are otherwise identified during a field inspection by the city, shall be analyzed for the purpose of determining whether such areas are essential to the preservation of the natural resources of the city. . . . In making the determination, the city shall find that one (1) or more of the following exist at the particular site:*

- (1) The site supports state or federal endangered or threatened plants, fish or wildlife appearing on a list specified in Section 36505 of the Natural Resources Environmental Protection Act (Act 451 of 1994) [previously section 6 of the endangered species act of 1974, Act No. 203 of the Public Acts of 1974, being section 229.226 of the Michigan Compiled Laws].*
- (2) The site represents what is identified as a locally rare or unique ecosystem.*
- (3) The site supports plants or animals of an identified local importance.*
- (4) The site provides groundwater recharge documented by a public agency.*
- (5) The site provides flood and storm control by the hydrologic absorption and storage capacity of the wetland.*
- (6) The site provides wildlife habitat by providing breeding, nesting or feeding grounds or cover for forms of wildlife, waterfowl, including migratory waterfowl, and rare, threatened or endangered wildlife species.*
- (7) The site provides protection of subsurface water resources and provision of valuable watersheds and recharging groundwater supplies.*
- (8) The site provides pollution treatment by serving as a biological and chemical oxidation basin.*
- (9) The site provides erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.*
- (10) The site provides sources of nutrients in water food cycles and nursery grounds and sanctuaries for fish.*

*After determining that a wetland less than two (2) acres in size is essential to the preservation of the natural resources of the city, the wetland use permit application shall be reviewed according to the standards in subsection 12-174(a).*

The on-site wetlands appear to meet one or more of the essentiality criteria and are therefore City regulated.

**Proposed Wetland Impacts**

The Plan indicates numerous areas of existing wetlands on the site. In general, these wetland areas are located along the perimeter of the project site. Portions of these wetland areas appear to be included on the City of Novi Regulated Wetlands and Watercourse Map (see Figure 1, attached).

The Plan indicate eleven (11) existing wetlands on the site. All of these wetlands are regulated by the City of Novi and are also likely regulated by the Michigan Department of Environmental Quality (MDEQ). The DEQ must determine the following before a permit can be issued:

- The permit would be in the public interest.
- The permit would be otherwise lawful.
- The permit is necessary to realize the benefits from the activity.
- No unacceptable disruption to aquatic resources would occur.
- The proposed activity is wetland dependent **or** no feasible and prudent alternatives exist.

As noted above, several areas of wetland have been confirmed on the subject property by the applicant’s wetland consultant. The Plan continues to indicate direct impacts to six (6) of the eleven (11) on-site wetlands. The Plan indicates the following wetland impacts:

Wetland	City Regulated?	MDEQ Regulated?	Wetland Area (Acres)	Wetland Impact Area (Square Feet)	Wetland Impact Area (Acres)	Wetland Impact Volume (Cubic Yards)
1	Yes	Yes	0.04	0	0.00	0
2	Yes	Yes	0.89	3,537	0.08	160
3	Yes	Yes	0.08	0	0.00	0
4	Yes	Yes	≤0.01	0	0.00	0
5	Yes	Yes	0.10	4,221	0.10	70
6	Yes	Yes	≤0.01	0	0.00	0
7	Yes	Yes	0.06	0	0.00	0
8	Yes	Yes	0.61	8,460	0.19	300
9	Yes	Yes	0.10	4,176	0.10	400
10	Yes	Yes	0.03	1,245	0.03	100
11	Yes	Yes	0.04	1,863	0.04	75
<b>Total</b>			<b>1.97</b>	<b>23,502</b>	<b>0.54</b>	<b>1,105</b>
<b>Mitigation Ratio</b>				--	<b>1.5</b>	
<b>Off-Site Mitigation</b>				--	<b>0.81</b>	

As noted above, the proposed development includes direct impacts to Wetlands 2, 5, 8, 9, 10, and 11 for the construction of the proposed buildings and driveways, etc.

With regard to the 25-foot wetland setbacks, the Plan appears to propose encroachment into several of these setback areas. As with the proposed wetland impacts, the Applicant shall indicate, quantify and label all proposed impacts to wetlands and 25-foot wetland buffers on subsequent plan submittals. The City of

Novi regulates a 25-foot buffer surrounding all wetland and watercourses. These impact areas have not yet been indicated on the Plan.

### **Wetland Mitigation**

The MDEQ generally requires mitigation for impacts greater than one-third (0.33) acre and the City usually requires mitigation for impacts greater than one-quarter (0.25) acre. The Plan (*Existing Conditions Plan*, Sheet 02) notes that 0.81-acre of compensatory wetland mitigation is to be provided off-site. Subsequent plan submittals shall provide additional details regarding the location of the proposed wetland mitigation area. Mitigation for impacts to emergent and/or scrub shrub wetlands shall be mitigated for at a ratio of 1.5-to-1.

ECT urges the Applicant to strive to minimize wetland and wetland buffer impacts in their site layout. The applicant should provide justification for the construction of the number of residential units currently proposed and provide an alternatives analysis to rule out less intrusive choices. By avoiding a portion of the current wetland impacts, the applicant could avoid the threshold for wetland mitigation of 0.25-acre.

### **Wetland Permits & Regulatory Status**

Based on the criteria set forth in The City of Novi Wetlands and Watercourse Protection ordinance (Part II-Code of Ordinances, Ch. 12, Article V.), the on-site wetlands appear to meet the definition of a City-regulated wetland and meet one or more of the essentially criteria (i.e., wildlife habitat, storm water control, etc.). A wetland and watercourse use permit would be required for any proposed activities within City regulated wetlands. An on-site wetland verification will be completed at the time of preliminary site plan submittal in order to determine/finalize the regulatory status of all on-site wetlands and verify the wetland boundaries.

It appears as though a City of Novi *Wetland Non-Minor Use Permit* as well as a MDEQ Wetland Permit would be required for the proposed impacts to on-site wetlands. In general, Non-Minor wetland permits are required for projects proposing wetland impacts greater than 10,000 square feet and/or 300 cubic yards of fill. The current Plan proposes 23,502 square feet (and 1,105 cubic yards of fill). 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. It should be noted that it is the Applicant's responsibility to contact MDEQ in order to determine the need for a permit from the state.

In 1979, the Michigan legislature passed the Geomare-Anderson Wetlands Protection Act, 1979 PA 203, which is now Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). The MDEQ has adopted administrative rules which provide clarification and guidance on interpreting Part 303.

In accordance with Part 303, wetlands are regulated if they are any of the following:

- A. Connected to one of the Great Lakes or Lake St. Clair.
- B. Located within 1,000 feet of one of the Great Lakes or Lake St. Clair.
- C. Connected to an inland lake, pond, river, or stream.
- D. Located within 500 feet of an inland lake, pond, river or stream.
- E. Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but are more than 5 acres in size.
- F. Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than 5 acres in size, but the DEQ has determined that these wetlands are essential to the preservation of the state's natural resources and has notified the property owner.



The law requires that persons planning to conduct certain activities in regulated wetlands apply for and receive a permit from the state before beginning the activity. A permit is required from the state for the following:

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development in a wetland.
- Drain surface water from a wetland.

### **Wetland Comments**

The following are repeat comments from our *Wetland Review of the Planned Suburban Low-Rise (PSLR) Concept Plan (PSP17-0166)* letter dated December 1, 2017. The current status of each comment follows in ***bold italics***. ECT recommends that the Applicant address the items noted below in subsequent site plan submittals:

1. It appears as though a MDEQ Wetland Permit and a City of Novi *Wetland Non-Minor Use Permit* would be required for any proposed impacts to site wetlands. 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.

***This comment still applies.***

2. ECT encourages the Applicant to minimize impacts to on-site wetlands and wetland setbacks to the greatest extent practicable. The Applicant should consider modification of the proposed site design to preserve wetland and wetland buffer areas. 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”.*

***This comment still applies.***

3. The applicant should clearly show and label any wetland ***and*** 25-foot natural features setback (buffer) boundaries on all future plan submittals. In addition, please provide on the Plan, the date that the original wetland delineation was conducted.

***This comment has been successfully addressed. The wetland buffers have now been indicated on the Plan and the Plan (Sheet 02) notes that the wetland delineation was conducted on June 20, 2017.***

4. In general, the following information shall be provided on future site plan submittals:
  - Acreages of all on-site wetlands (square feet or acres);
  - Indicate and label all 25-foot wetland buffers as necessary on the Plan;

- Indicate, label and quantify any proposed impacts to the wetland and 25-foot wetland buffers on the Plan. The area (square feet or acres) of all impacts to the wetland and 25-foot buffers shall be indicated on the Plan. All impacts (both permanent and temporary shall be indicated on the Plan);
- The volume (cubic feet or cubic yards) of all permanent wetland impacts shall be indicated on the Plan, if applicable.

***This comment has been partially addressed. The applicant shall indicate the area of the existing 25-foot wetland setbacks and all proposed impacts (square feet or acres) to the 25-foot wetland setbacks on the Plan.***

5. The Plan should address how any temporary impacts to wetland buffers shall be restored, if applicable.

***The applicant has successfully addressed this comment. In the applicant's response letter dated January 5, 2018, it is noted that no temporary wetland impacts are being proposed at this time.***

6. The City's threshold for the requirement of wetland mitigation is 0.25-acre of proposed wetland impact and the MDEQ's threshold is 0.33-acre. As such, the Plan appears to propose a total of 0.83-acre of off-site wetland mitigation. Subsequent site plan submittals shall provide detailed information related to the proposed wetland mitigation. The current Plan does not appear to indicate how this mitigation requirement will be met.

***This comment still applies. It should be noted that the current Plan requires 0.81-acre of wetland mitigation. The applicant's response letter dated January 5, 2018, notes that additional details, including off-site wetland mitigation plans will be provided with future submittals. This information will be required for approval of future site plan submittals.***

7. The Applicant should demonstrate that alternative site layouts that would reduce the overall impacts to wetlands and wetland setbacks have been reviewed and considered.

***This comment still applies. The applicant's response letter dated January 5, 2018, notes that additional details will be provided with future site plan submittals.***

8. Please provide copies of correspondence for any wetland delineations performed for this property as well as any 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 are 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.

***This comment still applies.***

9. The Applicant shall provide wetland conservation easements as directed by the City of Novi Community Development Department for any areas of remaining wetland as well as for any proposed wetland mitigation areas (if necessary). A Conservation Easement shall be executed covering all remaining wetland areas on site. This language shall be submitted to the City Attorney for review. The

Villas at Stonebrook (JSP17-0166)  
Wetland Review of the Revised PSLR Concept Plan (PSP18-0004)  
January 29, 2018  
Page 7 of 8

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

***This comment still applies.***

**Recommendation**

ECT recommends approval of the Revised PSLR Concept Plan for Wetlands; however, the Applicant should address the items noted below in the *Wetland Comments* Section of this letter prior to receiving Wetland approval of the Preliminary Site Plan.

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

Sincerely,

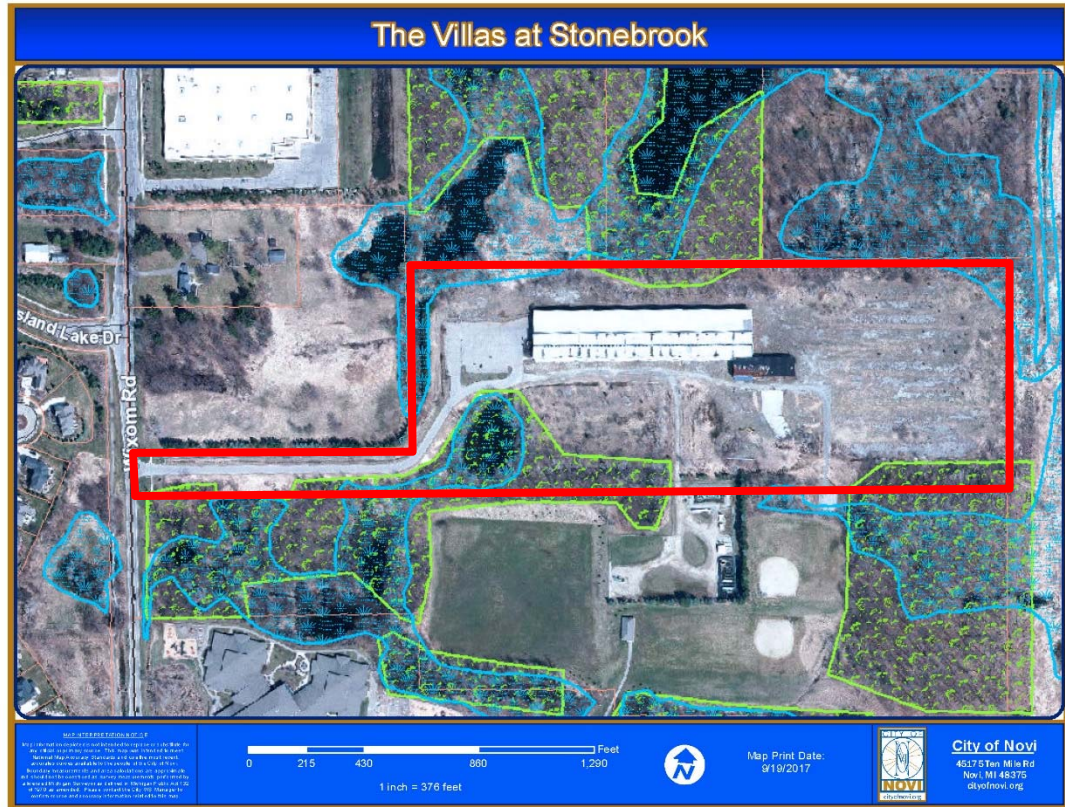
**ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.**



Peter Hill, P.E.  
Senior Associate Engineer

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

WOODLAND REVIEW

January 29, 2018  
ECT No. 170773-0400

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

Re: Villas at Stonebrook (JSP17-0062)  
Woodland Review of the Revised Planned Suburban Low-Rise (PSLR)  
Concept Plan (PSP18-0004)

Dear Ms. McBeth:

Environmental Consulting & Technology, Inc. (ECT) has reviewed the Revised Planned Suburban Low-Rise (PSLR) Concept Plan for the proposed Villas at Stonebrook project prepared by Atwell dated December 29, 2017 and stamped "Received" by the City of Novi Community Development Department on January 5, 2018 (Plan). The Plan was reviewed for conformance with the City of Novi Woodland Protection Ordinance Chapter 37.

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

The following woodland related items are required for this project:

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

The proposed development is located north of West Eleven Mile road and east of Wixom Road in Section 17. The overall project site area is approximately 26 acres and is currently occupied by a Profile Steel and Wire, Inc. building/warehouse. The project includes the construction of 86 single-family detached residential units, entrance drive, utilities and a stormwater detention basin. A tree survey has been completed for the site and is included with the current Plan.

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. ECT recommends that we conduct a wetland and woodland field evaluation at the time of Preliminary Site Plan submittal in order to verify the existing on-site wetland boundaries and any available woodland information (tree sizes, species, conditions, etc.).

The purpose of the Woodlands Protection Ordinance is to:

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

#### **Woodland Plan Analysis**

In addition to review of the current Revised Concept Plan, 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 area located along the northern (central) and southern edge of the subject property.

The applicant has provided a *Woodland Analysis* (Sheet No. 04) that highlights a total of six (6) vegetation zones on-site. The applicant indicates that all 6 zones are considered relatively low quality and essentially contain young cottonwood (*Populus deltoides*) and black willow (*Salix nigra*) trees.

An existing tree survey has been completed for the site and a *Tree List* is included as Sheet 03. This sheet identifies tree tag numbers, diameter-at-breast-height (DBH), common/botanical name, condition, regulatory status, removal status and woodland replacements required for the proposed tree removals. In general, the on-site trees consist of eastern cottonwood (*Populus deltoides*), Norway spruce (*Pinus nigra*), Austrian pine (*Picea abies*), blue spruce (*Picea pungens 'Glauca'*), black willow (*Salix nigra*) and several other species.

In terms of habitat quality and diversity of tree species, based on the Plan the overall subject site consists of fair to good quality trees. In terms of a scenic asset, wildlife habitat, windblock, noise buffer or other environmental asset, the forested areas located on the subject site appear to be considered to be of fair 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 List*) indicates the following:

- Total Trees Surveyed: 357
- Total Trees Removed: 193 (54% of total surveyed)

The Landscape Plan (Sheet 09) notes that 118 Woodland Replacement Tree credits are required and that a total of 118 on-site Woodland Replacement Tree credits are proposed. These are noted as being a mix of canopy deciduous, evergreen, and sub-canopy trees. The Plan does not currently appear to provide the quantity, species, locations and sizes of the proposed Woodland Replacement material. Subsequent site Plans should include this information. The Plan should clearly indicate the locations, sizes, species and quantities of all woodland replacement trees to be planted on-site. The applicant should review and revise the Plan in order to better indicate how the on-site Woodland Replacement requirements will be met.

It continues to be recommended that the applicant provide a table that specifically describes the species and quantities of proposed Woodland Replacement trees. 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).

With regard to the location of woodland replacement trees, the Woodland Ordinance states:

- *The location of replacement trees shall be subject to the approval of the planning commission and 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;*
- *Where the tree relocation or replacement is not feasible within the woodland area, the relocation or replacement plantings may be placed elsewhere on the project property;*
- *Where tree relocation or replacement is not feasible within the woodland area, or on the project property, the permit grantee shall pay into the city tree fund monies for tree replacement in a per tree amount representing the market value for the tree replacement as approved by the planning commission. The city tree fund shall be utilized for the purpose of woodland creation and enhancement, installation of aesthetic landscape vegetation, provision of care and maintenance for public trees and provision and maintenance of specialized tree care equipment. Tree fund plantings shall take place on public property or within right-of-ways with approval of the agency of jurisdiction. Relocation or replacement plantings may be considered on private property provided that the owner grants a permanent conservation easement and the location is approved by the planning commission;*
- *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 shall demonstrate 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 Planned Suburban Low-Rise (PSLR) Concept Plan (PSP17-0166)* letter dated December 1, 2017. The current status of each comment follows in ***bold italics***. ECT recommends that the Applicant address the items noted below in subsequent site plan submittals:

1. ECT recommends that we conduct a woodland field verification at the time of Preliminary Site Plan submittal in order to verify existing regulated tree sizes and locations and confirm the proposed tree replacement quantities, etc.

***This comment still applies.***

2. The Plan does not currently appear to indicate the proposed sizes and species and locations of the proposed on-site Woodland Replacement Trees. The Plan should clearly indicate the locations, sizes, species and quantities of all woodland replacement trees to be planted. It is recommended that the applicant provide a table that specifically describes the species and quantities of proposed Woodland Replacement trees. 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).

***This comment still applies. A Master Plant List is included on the Landscape Details Plan (Sheet 12). The applicant shall indicate which trees in this list are proposed as Woodland Replacement Trees.***

- The applicant should clearly indicate on the Plan if existing trees are proposed for removal. The Applicant shall report the number of trees that are proposed to be removed within the following categories and indicate how many Woodland Replacement are required for each removed tree:

**Replacement Tree Requirements**

Removed Tree D.B.H. (In Inches)	Ratio Replacement/ Removed Tree
8 < 11	1
>11 < 20	2
> 20 < 29	3
> 30	4

*This comment has been successfully addressed.*

- It should be noted that when a proposed tree to be removed has multiple trunks, each multi-stemmed tree's caliper inch diameter shall be totaled and then divided by 8 to determine the required number of Woodland Replacement trees. The result shall be rounded up to determine the number of replacement credits required. For example, a multi-stemmed tree with 10", 12" and 13" trunks (10+12+13=34 divided by 8 = 4.25. Therefore, rounding to the next full number, five (5) replacement credits would be required.

*This comment has been successfully addressed.*

- The Applicant shall provide preservation/conservation easements as directed by the City of Novi Community Development Department for any areas of remaining woodland and woodland replacement trees. The applicant shall demonstrate that the all proposed woodland replacement trees and existing regulated woodland trees to remain will be guaranteed to be preserved as planted with a conservation easement or landscape easement to be granted to the city. This language shall be submitted to the City Attorney for review. The executed easement must be returned to the City Attorney within 60 days of the issuance of the City of Novi Woodland permit. These easement areas shall be indicated on the Plan.

*This comment still applies.*

- A Woodland Replacement 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 credit value of \$400.

***This comments still applies. Currently, the required Woodland Replacement financial guarantee shall be \$47,200 (118 Woodland Replacement Credits required x \$400/Credit).***

- Based on a successful inspection of the installed on-site Woodland Replacement trees, the Woodland Replacement financial guarantee will be returned to the Applicant. A Woodland

Maintenance financial guarantee in the amount of twenty-five percent (25%) of the original Woodland Replacement financial guarantee shall then be provided by the applicant. This Woodland Maintenance financial guarantee will be kept for a period of 2-years after the successful inspection of the on-site woodland replacement tree installation.

***This comments still applies. Currently, the required Woodland Maintenance financial guarantee will be \$11,800 (118 Woodland Replacement Credits required x \$400/Credit x 0.25).***

8. The Applicant will be required to pay the City of Novi Tree Fund at a value of \$400/credit for any Woodland Replacement tree credits that cannot be placed on-site.

***This comments still applies.***

9. 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.***

**Recommendation**

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

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

Respectfully submitted,

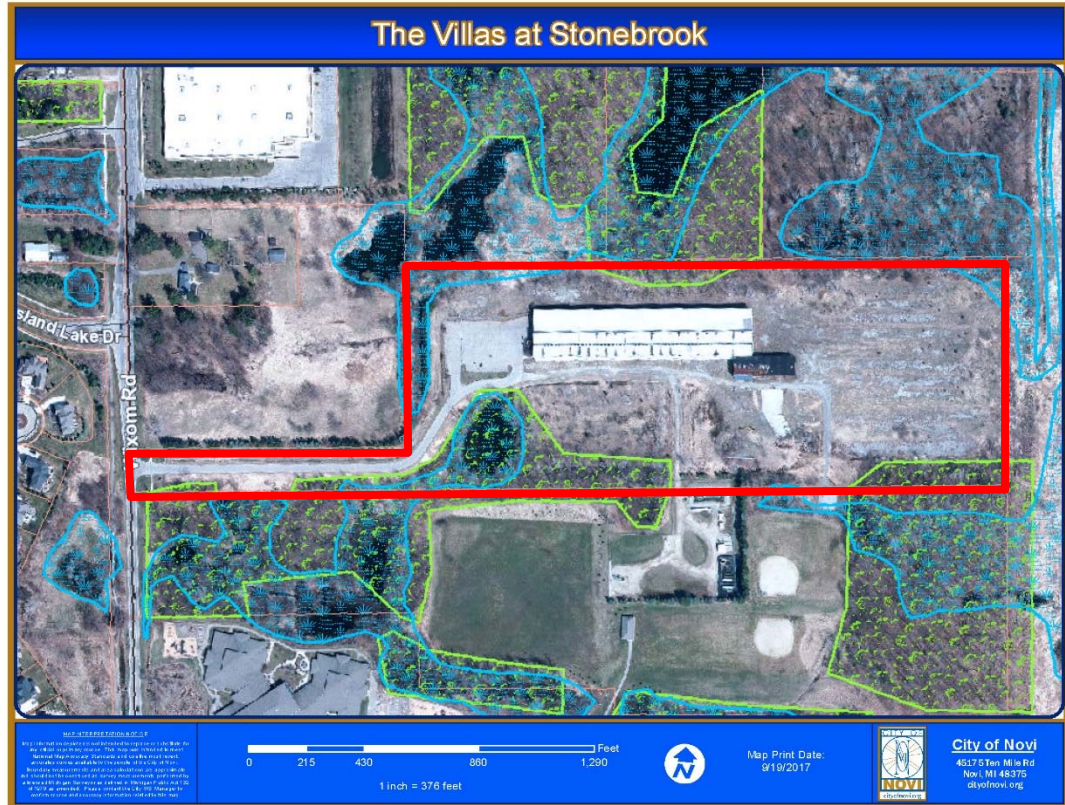
**ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.**



Pete Hill, P.E.  
Senior Associate Engineer

cc: 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



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

TRAFFIC REVIEW



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

**Project name:**  
JSP17-0062 Villas at Stonebrook Revised  
Concept Traffic Review

**From:**  
AECOM

**Date:**  
January 25, 2018

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

**CC:**  
Sri Komaragiri, Lindsay Bell, George Melistas,  
Theresa Bridges, Darcy Rechten, Hannah Smith

# Memo

**Subject:** Villas at Stonebrook Revised Concept Traffic Review

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

## GENERAL COMMENTS

1. The applicant, Pulte Homes of Michigan, LLC, is proposing a 43-unit, age-restricted housing development on the east side of Wixom Road between Grand River Avenue and 11 Mile Road.
2. The site is currently zoned I-2 (General Industrial); however, the applicant plans to use a Planned Suburban Low-Rise (PSLR) overlay option that allows for the special land use.
3. Wixom Road is under the jurisdiction of the City of Novi.
4. The site is located near the Providence Hospital system and the applicant intends to provide an emergency access connection to the hospital via the ITC corridor that is located east of the proposed development.
5. Summary of traffic-related waivers/variances:
  - a. The applicant is seeking a deviation for the proposed sidewalk offset distance from the roadway. City standards require a 10 foot offset and the applicant is requesting a 7.5 foot offset.
  - b. The applicant is seeking a City Council variance for the residential driveway taper depth. City standards require a 10 foot taper depth and the applicant is proposing 7.5 feet.
  - c. The applicant is seeking an administrative variance for the divided driveway island length. City standards require a 35 foot island length and the applicant is proposing 100 feet, which is within the allowable range.

## TRAFFIC IMPACTS

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

ITE Code: 220 - Multi-Family (Low-Rise)  
Development-specific Quantity: 43 Units  
Zoning Change: PSLR Overlay for I-2 Zoning

Trip Generation Summary				
	City of Novi Threshold	Estimated Trips	Method	Above Threshold?
<b>AM Peak-Hour, Peak-Direction Trips</b>	100	17	Fitted Curve Equation	No
<b>PM Peak-Hour, Peak-Direction Trips</b>	100	18	Fitted Curve Equation	No
<b>Daily (One-Directional) Trips</b>	750	284	Fitted Curve Equation	No

- The number of trips does not exceed the City's threshold of more than 750 trips per day or 100 trips per either the AM or PM peak hour. However, because of the PSLR overlay to the existing I-2 zoning, the applicant was required to provide a traffic impact assessment (TIA).
- The TIA was reviewed by AECOM and comments were submitted in a letter dated December 5<sup>th</sup>, 2017. The results of the TIA indicate that the development and adjacent roadways will experience acceptable levels-of-service and delays.

## EXTERNAL SITE ACCESS AND OPERATIONS

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

- The applicant has proposed a divided driveway off of Wixom Road. With the exception of island length, the driveway is in compliance with City standards. The applicant should seek an administrative variance for the 100 foot long island or revise the island to meet the City's standard of 35 feet.
  - The applicant should update the proposed boulevard cross-section detail on Sheet 13 to reflect the dimensions indicated on Sheet 05.
- Although not warranted by the data presented in the TIA, the applicant has proposed both an entering and exiting right turn lane. Both lanes are designed in compliance with City standards.
- The applicant has indicated that there is an adequate amount of sight distance in both directions on Wixom Road (35 mph).
- The TIA determined that the proposed driveway is adequately spaced between the adjacent same-side and opposite-side driveways.
- The applicant has proposed an emergency access pathway to Providence Hospital. Both the emergency access pathway width and emergency access gate are in compliance with City standards. The applicant should indicate the turning radii where the proposed emergency path meets Providence Parkway. Figure VIII-K in the City's Zoning Ordinance requires a 10 foot radius where the emergency access path meets Providence Parkway.
- The applicant has indicated an additional access drive on the south side of the development to be used in case of an emergency. If the driveway is for emergency purposes it is required to be designed as a paved emergency access drive as indicated in Figure VIII-K. The applicant should re-design the access driveway to be in compliance with City standards or consider removing it from the site.

## INTERNAL SITE OPERATIONS

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



1. General Traffic Flow
  - a. The applicant should provide the dimension for turning radius at the intersection of Stonebrook Drive with Rockview Drive and Windfall Drive. Section 11-194.b.8 of the City's Code of Ordinances requires all local street intersections to have a minimum turning radius of 25 feet.
  - b. The proposed roadway widths are in compliance with City standards.
  - c. Large trucks and emergency vehicles are anticipated to be able to access and maneuver throughout the site such that the comment above (1.a) is satisfied.
  - d. The proposed dimensions for the residential driveways are generally in compliance with City standards. However, the proposed taper depth is 7.5 feet while the City requires a taper depth of 10 feet. **The applicant has requested a variance for the taper depth of 7.5 feet.**
  - e. The proposed eyebrow designs are in compliance with City standards.
2. Parking Facilities
  - a. The City requires 2.5 parking spaces per unit. Each unit has a two car garage and driveway for two parked vehicles, thereby providing four spaces per unit and exceeding City standards.
  - b. On-street parking is not proposed throughout the development.
  - c. The applicant has provided a total of 20 bicycle parking spaces, which exceeds City requirements (18 spaces – one space for every five units). The bicycle parking layout detail is in compliance with City standards.
3. Sidewalk Requirements
  - a. The applicant has proposed five foot sidewalks throughout the development.
  - b. Sidewalk ramps are in compliance with City standards.
  - c. **The applicant is seeking a City Council variance for the 10 foot sidewalk offset in lieu of the required 15 foot sidewalk offset from the roadway.**
  - d. The applicant could consider providing a non-motorized neighborhood connection to the ITC corridor by means of an ADA compliant sidewalk adjacent to (or within) the emergency access road.
  - e. The applicant should provide width details for the proposed sidewalk along Providence Pkwy.
  - f. The applicant should provide width details for the proposed sidewalk segments along Wixom Road.
4. 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. All signing and striping details are required by the final site plan.
  - b. All roadside signs should be installed two feet from the face of the curb or edge of the sidewalk to the near edge of the sign.
  - c. The applicant should indicate a sign height of 7 feet from the top of grade to the bottom of the sign.
  - d. The applicant should relocate the proposed R1-2 (Yield) sign to be in front of the sidewalk ramp.
  - e. The applicant could consider relocating/updating the No Parking sign layout to be more evident that parking is not permitted along any portion of the roadway, especially near the eyebrows.
  - f. The applicant could consider placing a W14-2 (no outlet) sign at the site entrance to indicate to motorists that they are entering a roadway network from which there is no exit. The W14-2 sign may be used in combination with a D3-1 (street name) sign. Reference MMUTCD Section 2C.26 for more information.
  - g. The applicant could consider W11-2 (pedestrian crossing) signs near the two locations throughout the site where sidewalk ramps are present at the roadway. Reference Section 2C.50 of the MMUTCD for more information.
  - h. The applicant should provide details for the use of any D3-1 (street name) signs at the entrance and throughout the development. D3-1 (street name) signs shall be designed per the City of Novi Traffic Control Sign Standards to:
    - i. Have a green field, white letters, and a white border
    - ii. Text shall consist of a capitalized first letter with the remaining letters lowercase
    - iii. Have a minimum height of 12 inches and minimum lettering height of eight inches for the capital letters and six inches for the lowercase letters, if located adjacent to a road with a speed limit of 30 mph or greater

- iv. Have a minimum height of eight inches and minimum lettering height of 4.5 inches, if located at residential street intersections
- v. Have lettering height of three inches for supplementary lettering to indicate street type (drive, avenue, etc.)
- vi. All street name signs within the City's right of way or located on public streets at the intersection of a public street and a private street shall be mounted on a 3 lb. or greater U-channel post as dictated by the weight of the proposed signs. Street name signs with a nominal height of 12 inches shall be single sided and sandwiched on a 1 ¼" x 1 ¼" 12-gauge perforated galvanized steel insert with the ends of the signs **bolted** together. The steel insert shall have a minimum length of 36 inches and must extend a minimum of 12 inches into the 3 lb. or heavier U-channel post. In previous experiences, the City has discovered that the connection often must be replaced when rivets are used to join the ends of the signs. The bolts to adjoin the signs are not required on street signs placed on private roadways since private roadway signs are not maintained by the City. The City should also provide a detailed specification for the required 1 ¼" x 1 ¼" 12-gauge perforated galvanized steel insert so that it may be included and checked for in future plan sets.
  - i. Single signs with nominal dimensions of 12" x 18" or smaller in size shall be mounted on a galvanized 2 lb. U-channel post. Multiple signs and/or signs with nominal dimension greater than 12" x 18" shall be mounted on a galvanized 3 lb. or greater U-channel post as dictated by the weight of the proposed signs.
  - j. Traffic control signs shall use the FHWA Standard Alphabet series.
  - k. Traffic control signs shall have High Intensity Prismatic (HIP) sheeting to meet FHWA retroreflectivity requirements.

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

Sincerely,

**AECOM**



Sterling Frazier, PE  
Reviewer, Traffic/ITS Engineer



Maureen N. Peters, PE  
Senior Traffic/ITS Engineer

**FIRE REVIEW**



January 12, 2018

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

RE: Villias at Stonebrook – Concept Plan

PSP17 - 0166  
**PSP18 - 0004**

**Project Description:**

New residential subdivision with proposed 88 homes on 23.87 acres. Located at Parcel ID #22-17-300-016, Wixom road north of 11 mile road. 26700 Wixom Road.

**Comments:**

This is a revised conceptual plan. Pending all fire department and City of Novi - Fire Prevention ordinances are followed there are no objections at this time.

Note – Written permission may be needed and or required by **International Transmission Company**, 27175 Energy Way, Novi Mi. 48377 – due to the proposed “secondary emergency egress lane” that will cross under power & utility lines and across property parcel ID # 22-17-300-015.

**Recommendation:**

The Fire Department has no objections at this time, pending items #1-5 noted on plans and all other Fire Prevention ordinances are followed.

Sincerely,

Andrew Copeland – Acting Fire Marshal  
City of Novi – Fire Dept.

APPLICANT RESPONSE LETTER



February 2, 2018

Ms. Sri Komaragiri  
City of Novi  
45175 10 Mile Road  
Novi, MI 48375

*RE: JSP 17-62 THE VILLAS AT STONEBROOK  
ALL REVIEWS  
Comment Responses Letter*

Dear Ms. Komaragiri:

Thank you for providing the recent PSLR Concept Plan comments for the above referenced project. We understand that all disciplines recommend approval of the PSLR Concept Plan and the project has been placed on the February 07, 2018 Planning Commission agenda. Per request and on behalf of our Client, we offer the following responses to the City staff review comments issued via email on February 1, 2018:

#### **REQUESTED DEVIATIONS**

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We understand the following deviations are staff supported and the project will continue to request the following deviation waivers with the submittal, unless otherwise noted as follows:

1. Deviation to allow a Traffic Impact Assessment in lieu of required Traffic Impact study as the number of estimated trips from this development do not exceed the City's threshold.
2. Deviation from Sec. 3.21.2.A.i to allow building to front on an approved private driveway, which does not conform to the City standards with respect to required sixty foot right-of-way, due to the type of development proposed for active senior adult development, and because of the offer to provide an easement for the adjacent property to share access if needed;
3. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow modifications to the required front and side setbacks( as indicated on the PSLR Concept plan) due to the type of development proposed for active senior adult development;
4. Deviation from Sec. 3.21.2.A.ii & Sec 3.1.27.D to allow reduction of minimum distance between buildings by 5 feet (30 feet required, 25 feet proposed) due to the type of development proposed for active senior adult development;
5. Deviation from Sec. 3.21.2.A.v to allow reduction of minimum percentage of active recreation areas (50% of open spaces required, approximately 27% provided) as the development proposes connection to Providence hospital trail system;

6. Deviation from Sec. 3.21.2.A.x to defer the submittal of Lighting and Photometric plan at the time of Preliminary Site Plan Submittal as the applicant intends to conform to the Zoning Code requirements;
7. Deviation from Sec. 5.5.3.F.ii.b.(2) to allow placement of street trees between the sidewalk and the building as opposed to between the sidewalk and curb, due to type of development proposed. **This is not supported by staff. However, staff understands that complying with the requirement would result in redesign of the layout or utility design.**  
**Response:** Location of the street trees on the exterior side of the walk does not detract from the appearance of a tree lined street. At maturity, the canopy of many of the proposed trees will extend over the street. The intent of the street tree ordinance appears to have been met while at the same time affording a utility layout that is efficient and serviceable.
8. Deviation from Sec. 5.5.3.F.ii.b.(1) to allow additional sub-canopy trees in lieu of deciduous canopy or large evergreen trees, as it will provide additional visual and species diversity to the site; **This is not supported by staff, unless the applicant keeps the percentage of proposed sub-canopy trees within 25 percent of total required canopy trees. (Currently more than 33% of the required trees are sub-canopy trees).**  
**Response:** A deviation is not being requested for this item. The applicant's landscape architect will work with the City to arrive at the 25% total.
9. Deviation from Sec. 5.5.3.B.ii to allow reduction of required greenbelt trees, due to woodlands replacement trees proposed within the greenbelt. **This is not supported by staff. Staff recommends finding an alternate location for woodland replacement trees within the site and meet the required greenbelt tree count.**  
**Response:** A deviation for the number of greenbelt trees is not being requested. All trees required have been provided as indicated on sheet 11 in both the ROW landscape requirement chart in the lower left hand corner and illustrated in the ROW landscape screening detail to its right. Three (3) sub-canopy trees and two (2) canopy trees have been provided represented by the following; (2)CC, (1)AM, (2)AF. The two canopy trees (2) AF are not also counted as replacement trees. The calculations provided by the City of Novi for this requirement are confusing as they do not appear to be correct for the sub-canopy tree, nor do they indicate that trees have been provided. The applicant's landscape architect will continue work with the City to arrive at an understanding.
10. Deviation from Sec. 3.21.2.A.iii and Sec. 5.5.3 to allow absence of required landscaped berm along Wixom Road frontage due to limited frontage and flag shaped lot;
11. Deviation from Sec. 3.21.2.B to allow full time access drives to be connected to a section-line road as opposed to a non-section line roads as the applicant is proposing to provide access and utility easement to neighboring properties to eliminate multiple curb cuts on Wixom Road;
12. Deviation from Sec. 4.04, Article IV, Appendix C-Subdivision ordinance of City Code of Ordinances for absence of a stub street required at 1,300 feet interval along the property boundary to provide connection to the adjacent property boundary, due to conflict with existing wetlands;

13. Deviation from Chapter 7(c) (1) of Engineering Design manual for reducing the distance between the sidewalk and back of the curb. A minimum of 7.5 feet can be supported by staff;
14. Deviation from Section 11-216 (Figure IX.5) of City's Code of Ordinances for reduction of residential driveway taper depth (10 feet required, 7.5 feet proposed) due to proximity of proposed sidewalk within the development.
15. Deviation from Section 11-216 (Figure IX.2) of City's Code of Ordinances for allowing increase in the length of divided driveway island (35 feet required, 100 feet proposed) as it is within the allowable range;

## PLANNING REVIEW

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No required response or objections to addressing with future submittals, except as follows:

- **Comment:** Community Impact Statement – Provide a revised Community Impact Statement that addresses all items listed on page 52 of Site plan manual.  
**Response:** *A revised Community Impact Statement will be provided with future submittals.*
- **Comment:** Building setbacks should be measured off the Proposed ROW (or access easement). In this case, staff will be able to support the deviation if a part of proposed drive is placed in a dedicated access easement as discussed at the meeting  
**Response:** *We respectfully request the staff supported building setback deviation to allow for a minimum setback of 15' from the proposed road access easement. In no case will there be less than 20 feet from the garage to the back of walk.*
- **Comment:** Staff recommends proposing some dedicated parking spaces for guests, as well as a place for group mailboxes, if needed. Please refer to the requirements while finding a suitable location.  
**Response:** *The applicant will continue to work with staff and additional dedicated parking spaces for guests and group mailbox location will be provided with future submittals.*
- **Comment:** Active recreation areas shall be provided with at least 50 % of the open spaces dedicated to active recreation. This is a considered a deviation. The concept plan proposes connection to Providence hospital trail system, three pocket parks and internal walks running through the central courtyard.  
**Response:** *Noted. The current submittal proposes 10.1 acres of open space and 3.0 acres of usable open space, which varies from values listed in the comments. The active open space exceeds the minimum 10% of the site area.*
- **Comment:** Active recreation shall consist 10% of total site area. Provide information to verify conformance.  
**Response:** *Verification has been provided in the concept plan. 3.0 acres of usable open space is provided in the detail on sheet 13. This is greater than 10% (12.5%) of the total net site area of 23.87 acres as provided in the site data table on the cover sheet.*
- **Comment:** Bicycle Parking – Please provide the layout as required at the time of Preliminary site



plan.

**Response:** *Bicycle parking has been shown on sheet 05 of the last Concept Plan submittal. Refer to traffic review comments.*

- **Comment:** The project requires a project and street naming application. Please contact Hannah Smith at 248-347-0579

**Response:** *A street naming application has been submitted and the road names shown on sheet 05 have been approved by the street naming committee.*

## ENGINEERING REVIEW

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No required response or objections to addressing with future submittals, except as follows:

- **Comment:** The City's Water Distribution Master Plan includes a 16-inch main connecting the Wixom Road 16-inch main to the 12-inch main in Providence Park. Provide a 16-inch water main through the south portion of the site in accordance with the City's Master Plan.  
**Response:** *The proposed main sizing and the need for the 16-inch main through the development will be further coordinated during future site plan submittals.*
- **Comment:** A 25-foot vegetated buffer shall be provided around the perimeter of each storm water basin. This buffer cannot encroach onto adjacent lots.  
**Response:** *A 25-foot vegetated buffer is designated and shown on sheet 05 of the plans. This buffer does not encroach into the lots.*
- **Comment:** The northeast corner should be captured in the on-site storm sewer and storm water management basin. Alternatively, rain gardens can be proposed in this area.  
**Response:** *Detailed grading will be provided with final site plan. Impervious areas will be captured or directed to alternate BMP such as rain gardens. Other pervious site runoff will be captured where it is possible.*
- **Comment:** In the southeast corner, any storm water runoff from developed or disturbed areas must be captured in the on-site storm sewer and storm water management basin.  
**Response:** *Detailed grading will be provided with final site plan. Impervious areas will be captured or directed to alternate BMP such as rain gardens. Other pervious site runoff will be captured where it is possible.*

## LANDSCAPE REVIEW

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No required response or objections to addressing with future submittals, except as follows:

**Response:** *The applicant's landscape architect will work with the City of Novi landscape architect to resolve any outstanding items.*

## WOODLAND REVIEW

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No required response or objections to addressing with future submittals, except as follows:

- **Comment:** ECT recommends that we conduct a woodland field verification at the time of

Preliminary Site Plan submittal in order to verify existing regulated tree sizes and locations and confirm the proposed tree replacement quantities, etc.

**Response:** *The applicant is open to ECT verifying at their earliest convenience so any verification comments can be incorporated into the Preliminary Site Plan submittal.*

- **Comment:** 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.

**Response:** *The applicant will continue to work with the engineering department and ECT and efforts will be made to address this where possible on future submittals.*

#### **WETLAND REVIEW**

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No required response or objections to addressing with future submittals, except as follows:

- **Comment:** ECT encourages the Applicant to minimize impacts to on-site wetlands and wetland setbacks to the greatest extent practicable. The Applicant should consider modification of the proposed site design to preserve wetland and wetland buffer areas.

**Response:** *The currently layout has gone through a number of iterations to reduce the proposed amount of wetland and wetland buffer impact. The applicant will continue to work with the ECT.*

#### **FAÇADE REVIEW**

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No required response or objections to addressing with future submittals. Scalable and detailed elevations will be provided for review with future submittals. It is the developer's intent to comply with the City's façade ordinance.

#### **TRAFFIC REVIEW**

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No required response or objections to addressing with future submittals, except as follows:

- **Comment:** The applicant has proposed a divided driveway off of Wixom Road. With the exception of island length, the driveway is in compliance with City standards. The applicant should seek an administrative variance for the 100 foot long island or revise the island to meet the City's standard of 35 feet.

**Response:** *The applicant will look to reduce the boulevard length as much as possible to meet the requested 35 feet length with future submittals. An administrative variance will be applied for if 35 feet is not possible.*

#### **FIRE REVIEW**

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No required response or objections to addressing with future submittals.

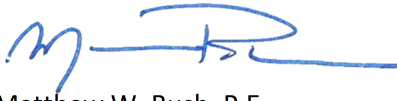
We look forward to presenting the Villas at Stonebrook project to the City Planning Commission on the February 07, 2018 agenda. Per your request, included with this submittal response letter correspondence are the following documents:

- Original Site Plan (PDF format, previously submitted)
- Color rendering of the site plan (PDF format)

Thank you for your continued assistance with this project. If you should have any questions or need any additional information, please do not hesitate to contact us.

Sincerely,

**ATWELL, LLC**

A handwritten signature in blue ink, appearing to read 'M. W. Bush', with a long horizontal flourish extending to the right.

Matthew W. Bush, P.E.  
Project Manager / Engineer

# TRAFFIC IMPACT ASSESMENT

# Memo

VIA EMAIL

---

**To:** Mr. Joe Skore  
Pulte Group

---

**From:** Brandon M. Hayes, PE, P.Eng.  
Fleis & VandenBrink

---

**Date:** November 10, 2017

---

**Re:** Villas at Stonebrook Residential Development  
City of Novi, Michigan  
Traffic Impact Assessment

---

## Introduction

This memorandum presents the results of the Traffic Impact Assessment (TIA) for the proposed Villas at Stonebrook residential development. The Wixom Road residential development features 88 detached housing (for sale) units in Novi, Michigan. The units will be age-restricted. Site access is proposed via one site driveway to Wixom Road. Per the City of Novi Community Development Department's *Site Plan and Development Manual (Section 1)*, a Traffic Impact Assessment (TIA) is required.

The development is located on 26.0 acres on the east side of Wixom Road between 11 Mile Road and Grand River Avenue in the City of Novi, Michigan. The site was previously used as general industrial, with one driveway providing access to Wixom Road. The northern portion of the site contains an existing industrial building as well as asphalt and gravel parking areas to the west. While the current zoning and future land use designation is general industrial, the parcel has an existing Planned Suburban Low-Rise (PSLR) overlay associated with it. There is an existing residential development to the west of the site and Providence Hospital is to the east. Two signalized intersections are located near the existing site driveway: one is located approximately 1,700 feet to the north at the main entrance to Detroit Catholic Central High School, and one is located approximately 950 feet to the south at the main entrance to Deerfield Elementary School.

This segment of Wixom Road is under the jurisdiction of the City of Novi. This TIA has been completed to identify the impacts (if any) of the proposed development on the Wixom Road intersection with the proposed site driveway.

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 the City of Novi traffic consultant, AECOM.

## Existing Conditions

The existing weekday traffic volume data on Wixom Road was referenced from the SEMCOG traffic database. Available one-way hourly traffic counts were referenced for northbound Wixom Road south of Grand River Avenue and for southbound Wixom Road north of 10 Mile Road, on Monday and Tuesday, June 23-24, 2014. Peak hour directional counts were referenced for the weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods on Wixom Road and combined to arrive at estimated two-way traffic volumes for the corridor adjacent to the existing (unused) site driveway. This data was used as a baseline to establish existing traffic conditions without the proposed development. The peak hour volumes for the roadway were utilized for

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

this study. Additionally, F&V collected an inventory of existing lane use and traffic controls, as shown in the attached Figure 1. The applicable data referenced in this memorandum are attached.

Since the former Profile Steel Site (the proposed site of the Villas at Stonebrook residential development) is currently vacant, no existing vehicular traffic volume is entering or exiting the site. Therefore, no existing conditions traffic assessment was conducted. Notwithstanding, existing traffic volumes along Wixom Road were projected from the 2014 data by applying a growth factor based on historical traffic data, as discussed below. The 2017 existing traffic volumes are shown in Figure 2.

### 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 2022. The historical growth rates for Wixom Road were referenced. SEMCOG data indicates that between 2009 and 2014, the Annual Average Daily Traffic (AADT) were generally fluctuating in both an increasing and decreasing direction. Generally, moderate growth has been observed through the corridor for the years where data was available. 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. Considering the historical traffic growth and population and employment growth trends, a conservative background traffic growth of 2% per year was assumed for this study.

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. No background developments were identified near the study area that are expected to be completed prior to the site buildout of the proposed development.

The conservative growth rate was applied to the existing (2017) traffic volumes shown in Figure 1 to project the background (2022) traffic volumes shown in the attached Figure 3.

### Site Trip Generation Analysis

The number of AM and PM peak hour vehicle trips that would be generated by the age-restricted fully-detached residential development were forecast based on data published by ITE in the *Trip Generation Manual, 10<sup>th</sup> Edition*. The site trip generation forecast for the proposed development is summarized in Table 1.

**Table 1: Site Trip Generation**

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Senior Adult Housing - Detached	251	88	D.U.	503	12	25	37	26	17	43

In the preliminary site trip generation analysis performed by AECOM in the *Villas at Stonebrook Pre-App Traffic Review* memo dated September 21, 2017, the *Multifamily Housing (Low-Rise)* land use code was used for the Site Trip Generation analysis performed in this study. Since the submission of the last concept plan upon which the AECOM review was based, the *Villas at Stonebrook* residential development was redesigned as a fully-detached single-family age-restricted residential development (i.e. the units are no longer townhomes/duplexes).

The vehicle trips that would be generated by the proposed development were assigned to the study road network based on existing peak hour traffic patterns, the proposed site plan, and the methodologies published by ITE. This methodology indicates that new trips will return to their direction of origin. The site trip distributions used in the analysis are summarized in Table 2.

**Table 2: Site Trip Distribution**

To / From	New Trips Via	AM	PM
North	Wixom Road	80%	50%
South	Wixom Road	<u>20%</u>	<u>50%</u>
		100%	100%

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

**Future Conditions**

Future peak hour vehicle delays and LOS *with the proposed development* were calculated based on the existing lane use and traffic control, the future traffic volumes, the proposed site access plan, and the methodologies presented in the HCM. Additionally, SimTraffic simulations were reviewed to evaluate network operations and vehicle queues. The results of the future conditions analysis are attached and are summarized in Table 3.

**Table 3: Future Intersection Operations**

Intersection	Control	Approach	AM Peak		PM Peak	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS
1. Wixom Road & Site Driveway	STOP (Minor)	WB	24.9	C	28.3	D
		NB	Free		Free	
		SB LT	11.1	B	9.5	A

The results show that all study intersection approaches and movements are expected to operate acceptably during both the AM and PM peak hours. With the addition of the proposed development, the Site Driveway operates at a LOS D or better during both the AM and PM peak hours. However, the traffic analysis models do not account for the adjacent signalized intersections, which are likely to provide semi-frequent gaps for site-egressing vehicles to complete turning movements. These egressing vehicles should experience less delay than reported in the models.

**Access Management**

*Turn Lanes*

The City of Novi warrants for a right-turn lane and a left-turn passing lane were evaluated at the site access point to Wixom Road. The results of this analysis show that neither a right-turn deceleration taper nor a left-turn treatment are required.

*Driveway Spacing*

The offset distance at the proposed site driveway to Wixom Road was evaluated according to the residential driveway spacing requirements outlined in Section 11-216 of the City Ordinance. No specific residential driveway spacing requirements are published; therefore, the commercial driveway spacing requirements were assessed. These requirements state that for a 35 mph roadway, the proposed site driveway requires a minimum offset of 150 feet from the adjacent Island Lake Drive intersection. The proposed distance between the Site Driveway intersection and the adjacent Island Lake Drive intersection is approximately 375 feet, and therefore exceeds the recommended spacing.

## Conclusions

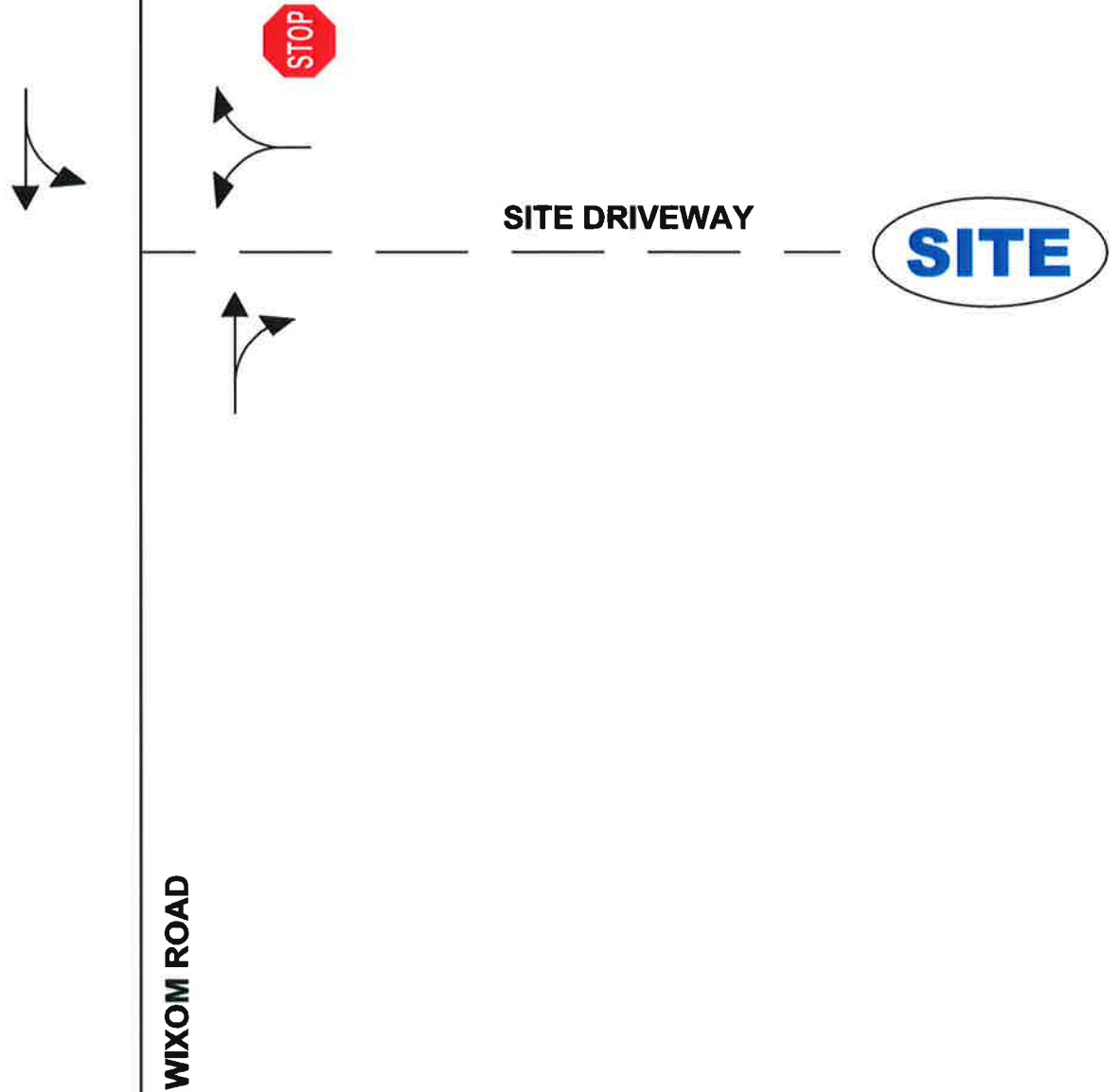
*The conclusions of this Traffic Impact Assessment are as follows:*

1. Existing traffic volumes along Wixom Road were projected from the published 2014 SEMCOG data by applying a 2% per year growth factor based on historical traffic data.
2. The analysis of future conditions **with the proposed development** show acceptable traffic operations. A review of network simulations showed acceptable traffic operations observed during both the AM and PM peak hours. No significant vehicle queues are expected at the proposed Site Drive. The development is not expected to have a significant impact on existing or projected Wixom Road traffic.
3. The results of the turn lane warrant analysis showed that neither a right-turn deceleration taper nor a left-turn treatment are required.
4. The proposed Site Driveway should be designed in accordance with City of Novi requirements.

**Attached:**      Figures 1-5  
                      Traffic Volume Data  
                      SEMCOG Data  
                      Synchro / SimTraffic Results  
                      City of Novi Auxiliary Lane Warrants

BMH:sjr:jmk







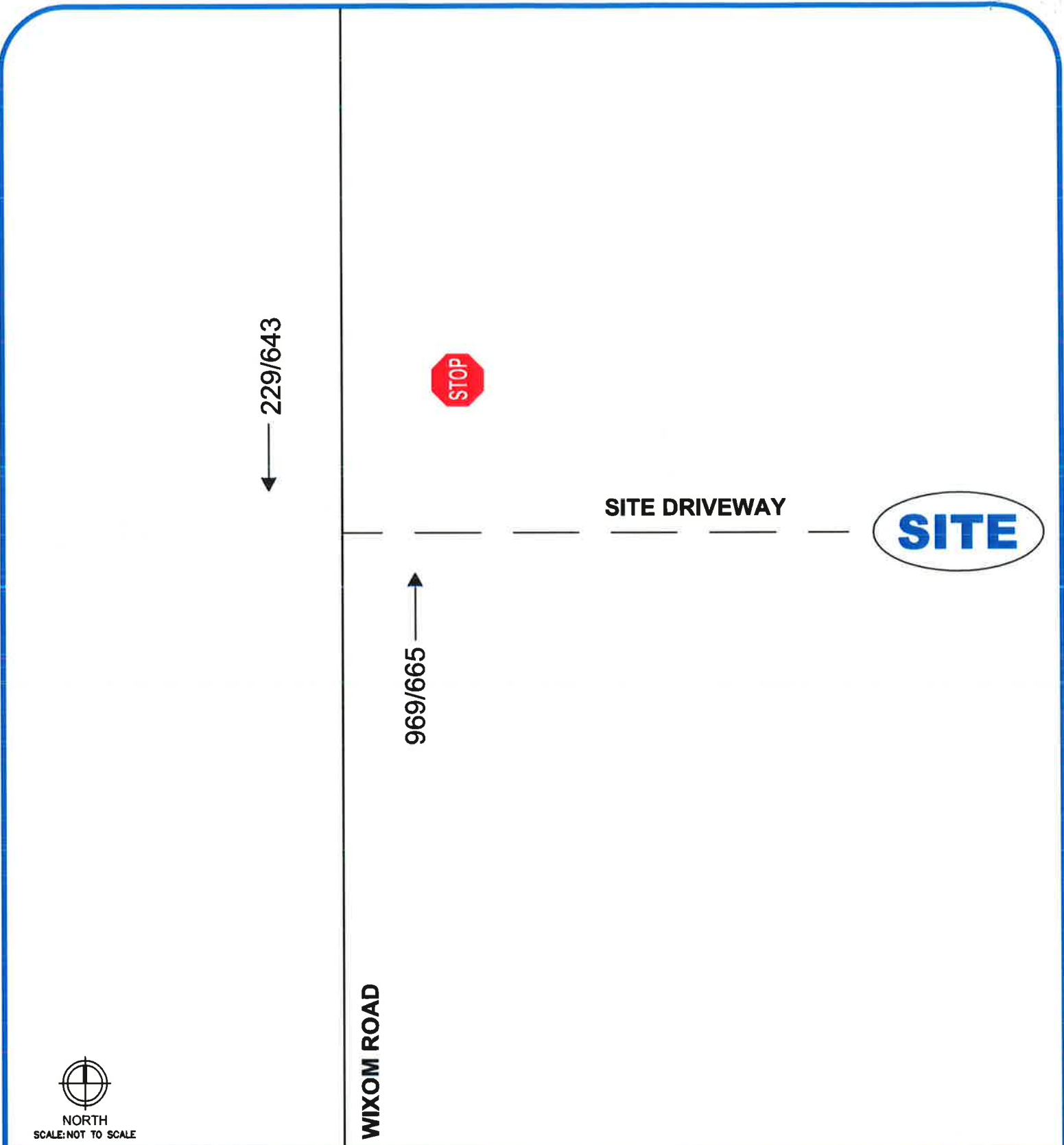


# FIGURE 1 LANE USE AND TRAFFIC CONTROL

VILLAS AT STONEBROOK TIA - NOVI, MI

## LEGEND

-  ROADS
-  LANE USE
-  SIGNALIZED INTERSECTION
-  UNSIGNALIZED INTERSECTION



WIXOM ROAD

SITE DRIVEWAY

SITE

229/643




969/665



## FIGURE 2 EXISTING TRAFFIC VOLUMES

VILLAS AT STONEBROOK TIA - NOVI, MI

### LEGEND

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

253/710



SITE DRIVEWAY

SITE

1070/735

WIXOM ROAD







NORTH  
SCALE: NOT TO SCALE



# FIGURE 3 BACKGROUND TRAFFIC VOLUMES

VILLAS AT STONEBROOK TIA - NOVI, MI

## LEGEND

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



NORTH  
SCALE: NOT TO SCALE

WIXOM ROAD

SITE DRIVEWAY





**SITE**



## FIGURE 4 SITE-GENERATED TRAFFIC VOLUMES

VILLAS AT STONEBROOK TIA - NOVI, MI

### LEGEND

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

253/710  
10/13



20/9  
5/9

SITE DRIVEWAY



1070/735  
2/12

WIXOM ROAD



NORTH  
SCALE: NOT TO SCALE



# FIGURE 5 FUTURE TRAFFIC VOLUMES

VILLAS AT STONEBROOK TIA - NOVI, MI

## LEGEND

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



**Intersection: 1: Wixom Road & Site Driveway**

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	44	138
Average Queue (ft)	15	15
95th Queue (ft)	41	71
Link Distance (ft)	735	2154
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Zone Summary**

Zone wide Queuing Penalty: 0

Intersection: 1: Wixom Road & Site Driveway

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	64	78
Average Queue (ft)	18	11
95th Queue (ft)	48	47
Link Distance (ft)	735	2154
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 0



HCM 6th TWSC  
1: Wixom Road & Site Driveway

Future Conditions  
PM Peak Hour

Intersection

Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↘			↗
Traffic Vol, veh/h	9	9	735	12	13	710
Future Vol, veh/h	9	9	735	12	13	710
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	10	799	13	14	772

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1606	806	0	0	812	0
Stage 1	806	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	116	382	-	-	814	-
Stage 1	439	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	113	382	-	-	814	-
Mov Cap-2 Maneuver	113	-	-	-	-	-
Stage 1	426	-	-	-	-	-
Stage 2	442	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.3	0	0.2
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	174	814
HCM Lane V/C Ratio	-	-	0.112	0.017
HCM Control Delay (s)	-	-	28.3	9.5
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

HCM 6th TWSC  
1: Wixom Road & Site Driveway

Future Conditions  
AM Peak Hour

Intersection

Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	5	20	1070	2	10	253
Future Vol, veh/h	5	20	1070	2	10	253
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	22	1163	2	11	275

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1461	1164	0	0	1165
Stage 1	1164	-	-	-	-
Stage 2	297	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	142	237	-	-	600
Stage 1	297	-	-	-	-
Stage 2	754	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	139	237	-	-	600
Mov Cap-2 Maneuver	139	-	-	-	-
Stage 1	290	-	-	-	-
Stage 2	754	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.9	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	208	600
HCM Lane V/C Ratio	-	-	0.131	0.018
HCM Control Delay (s)	-	-	24.9	11.1
HCM Lane LOS	-	-	C	B
HCM 95th %tile Q(veh)	-	-	0.4	0.1

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

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

## Components of Population Change

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

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

Search...

YOU ARE VIEWING DATA FOR:

## City of Novi

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

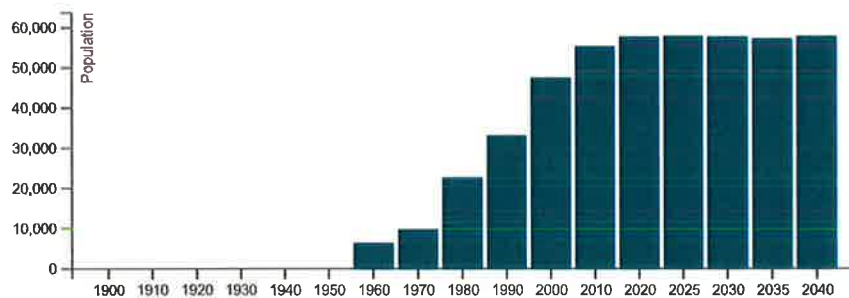


Census 2010 Population:  
55,374  
Area: 31.2 square miles

### 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.

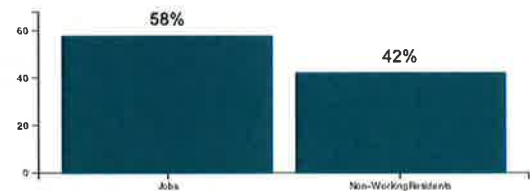
Forecasted Jobs by Industry	2010	2015	2020	2025	2030	2035	2040	Change 2010 - 2040
<b>Forecasted Jobs By Industry</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>	<b>Change 2010 - 2040</b>
<b>Natural Resources, Mining, &amp; Construction</b>	1,559	1,828	1,904	1,933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

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
<b>Daytime Population</b>	<b>65,629</b>



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>

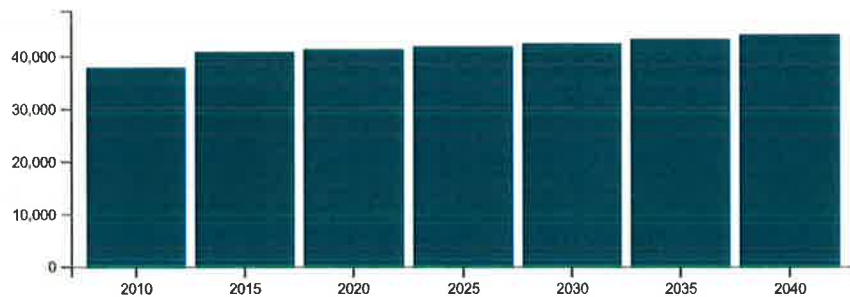


Census 2010 Population:  
55,374  
Area: 31.2 square miles

### Economy & Jobs

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

### Forecasted Jobs



Source: SEMCOG 2040 Forecast produced in 2012.



Location Info	
Location ID	7294
Type	I-SECTION
Functional Class	-
Located On	WIXOM
Between	AND
Direction	NB
Community	Novi
MPO_ID	22994
HPMS ID	
Agency	Road Commission for Oakland County

Count Data Info	
Start Date	6/23/2014
End Date	6/24/2014
Start Time	12:00 PM
End Time	12:00 PM
Direction	
Notes	
Count Source	FO396_____
File Name	D0623008.prn
Weather	
Study	
Owner	tiacounts

Interval: 60 mins	
Time	Hourly Count
00:00 - 01:00	47
01:00 - 02:00	24
02:00 - 03:00	15
03:00 - 04:00	10
04:00 - 05:00	31
05:00 - 06:00	153
06:00 - 07:00	588
07:00 - 08:00	1129
08:00 - 09:00	1069
09:00 - 10:00	819
10:00 - 11:00	776
11:00 - 12:00	853
12:00 - 13:00	973
13:00 - 14:00	819
14:00 - 15:00	831
15:00 - 16:00	903
16:00 - 17:00	1009
17:00 - 18:00	1233
18:00 - 19:00	1007
19:00 - 20:00	770
20:00 - 21:00	599
21:00 - 22:00	321
22:00 - 23:00	120
23:00 - 24:00	65
TOTAL	9462



Location Info	
Location ID	7267
Type	I-SECTION
Functional Class	-
Located On	WIXOM
Between	AND
Direction	SB
Community	Novi
MPO_ID	23003
HPMS ID	
Agency	Road Commission for Oakland County

Count Data Info	
Start Date	6/23/2014
End Date	6/24/2014
Start Time	12:00 PM
End Time	12:00 PM
Direction	
Notes	
Count Source	F0354_____
File Name	D0623009.prn
Weather	
Study	
Owner	tiacounts

Interval: 60 mins	
Time	Hourly Count
00:00 - 01:00	23
01:00 - 02:00	13
02:00 - 03:00	7
03:00 - 04:00	5
04:00 - 05:00	4
05:00 - 06:00	34
06:00 - 07:00	88
07:00 - 08:00	216
08:00 - 09:00	197
09:00 - 10:00	232
10:00 - 11:00	222
11:00 - 12:00	225
12:00 - 13:00	310
13:00 - 14:00	258
14:00 - 15:00	280
15:00 - 16:00	308
16:00 - 17:00	460
17:00 - 18:00	606
18:00 - 19:00	464
19:00 - 20:00	282
20:00 - 21:00	234
21:00 - 22:00	132
22:00 - 23:00	57
23:00 - 24:00	45
TOTAL	4702

Location Info	
Location ID	7294
Type	I-SECTION
Functional Class	-
Located On	WIXOM
Between	AND
Direction	NB
Community	Novi
MPO_ID	22994
HPMS ID	
Agency	Road Commission for Oakland County

Count Data Info	
Start Date	6/23/2014
End Date	6/24/2014
Start Time	12:00 PM
End Time	12:00 PM
Direction	
Notes	
Count Source	FO396_____
File Name	D0623008.prn
Weather	
Study	
Owner	tiacounts

Interval: 60 mins	
Time	Hourly Count
00:00 - 01:00	24
01:00 - 02:00	11
02:00 - 03:00	8
03:00 - 04:00	5
04:00 - 05:00	27
05:00 - 06:00	119
06:00 - 07:00	500
07:00 - 08:00	913
08:00 - 09:00	872
09:00 - 10:00	587
10:00 - 11:00	554
11:00 - 12:00	628
12:00 - 13:00	663
13:00 - 14:00	561
14:00 - 15:00	551
15:00 - 16:00	595
16:00 - 17:00	549
17:00 - 18:00	627
18:00 - 19:00	543
19:00 - 20:00	488
20:00 - 21:00	365
21:00 - 22:00	189
22:00 - 23:00	63
23:00 - 24:00	20
TOTAL	9462

WIXOM ROAD & SITE DRIVEWAY RT LANE WARRANT

2022 ADT = 11,086  
+ 251 new daily trips  
= 11,337 2022 two-way 24 hour volume

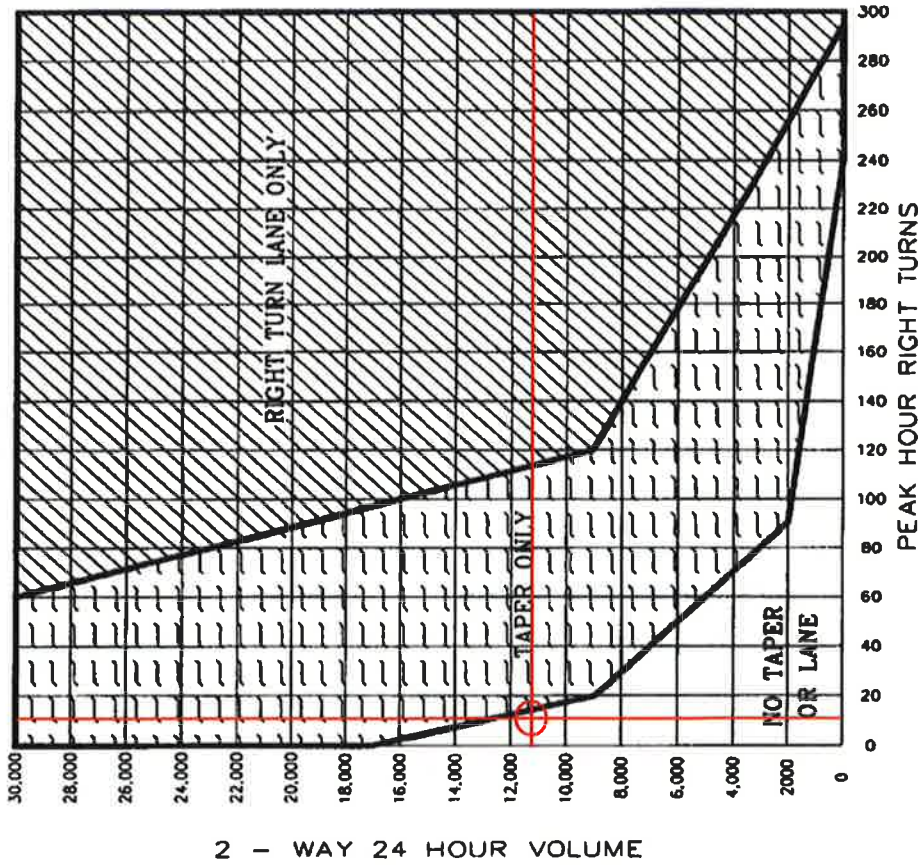


FIGURE IX.10

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

DATE: 27-Jan-99

AM: 2  
PM: 12  
RT DECELERATION  
TAPER NOT WARRANTED

WARRANT FOR RIGHT TURN DECELERATION LANE OR TAPER  
NO SCALE

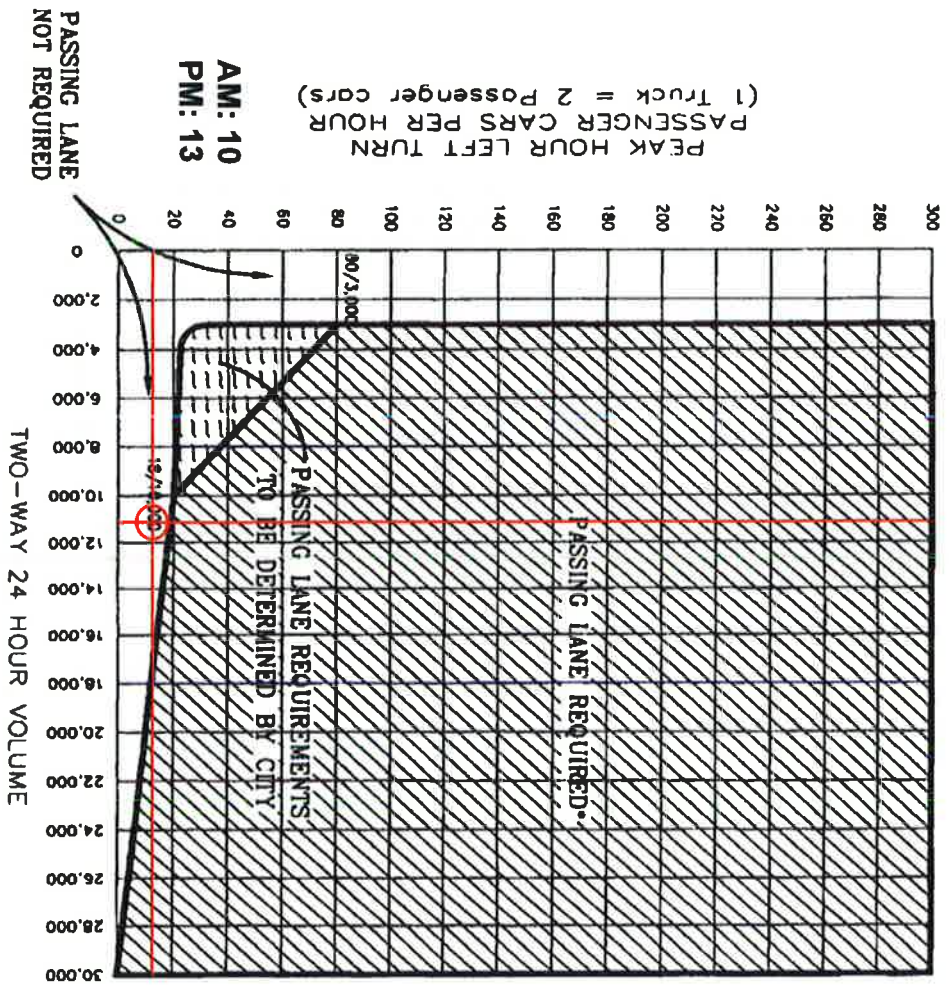
Figure IX.10

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

**WIXOM ROAD & SITE DRIVEWAY LT LANE WARRANT**

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

**Figure IX.8**



**LT TREATMENT NOT WARRANTED**  
 2022 ADT = 11,086  
 + 252 new daily trips  
 = 11,338 2022 two-way 24 hour volume

**WARRANT FOR LEFT TURN PASSING LANE**

NO SCALE

(Based on Total Development and Traffic Volumes at Buildout)

\* Optional: Prohibit inbound left turns.

**FIGURE IX.8**

**CITY OF NOVI**  
 STANDARD  
 WARRANT FOR LEFT  
 TURN PASSING LANE

DATE: 01-Feb-99

GEO-TECHNICAL INVESTIGATION LETTER



Civil Engineers | Land Surveyors | Landscape Architects

experienced. responsive. passion for quality.

Corporate Office: 2430 Rochester Court • Suite 100 • Troy, MI 48083  
t: 248.689.9090 • f: 248.689.1044 • [www.peainc.com](http://www.peainc.com)

August 18, 2017  
PEA Job No: 2017-261

via email: [Paul.Schyck@PulteGroup.com](mailto:Paul.Schyck@PulteGroup.com)

Mr. Paul Schyck  
Pulte Group  
100 Bloomfield Hills Parkway  
Suite 150  
Bloomfield Hills, MI 48304

**RE: Geotechnical Investigation  
Wixom Road Multi-Family Development  
Novi, Oakland County, Michigan**

Dear Mr. Schyck:

**PEA, Inc. (PEA)** has performed a geotechnical investigation for the proposed multi-family development planned at the Whitesell site located on the east side of Wixom Road between Island Lake Drive and Glenwood Drive in Novi, Michigan. The purpose of our investigation was to determine the general subsurface conditions throughout the proposed residential development in order to provide foundation and related site preparation recommendations.

Based on our investigation, the site soils throughout the site generally consist of topsoil, soil stone mixture, gravel or asphalt pavement which overlies a very stiff to hard silty clay. Occasional layers of sand were encountered in some borings. The sand varied in gravel, silt and clay content. Fill was encountered extending to depths ranging from 1 to 5.5 feet below the surface in six borings. The clay is believed to be native to the site and is recommended for the bearing layer.

Groundwater was encountered in five of the soil borings. Some of the encountered groundwater is believed to be perched. Groundwater may impact construction of the basements.

A topographic survey of the site was conducted but was not available at the time of this report. PEA was able to obtain the surface elevations at each boring location from the surveyors. A proposed grading plan of the site has not been provided. Based on available topographic information in the area of the project site, the site appears to be generally level. Due to the generally level nature of the site, we anticipate minimal cuts and fills (less than 4 feet), with the exception of the basement excavations. Following successful completion of earthwork operations, we recommend that the proposed residential units 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 multi-family residential development is located at a current Whitesell manufacturing facility on the west side of Wixom Road in Novi, Michigan. The property is approximately 26.6 acres in size and

is currently occupied with a 77,000-square foot (sf) building with an attached 9,000 sf outbuilding. The main drive lane and parking area is paved with asphalt pavement while gravel drives give access along the south edge of the building to the yard area on the east end of the building and to a Sumoco well point off the south edge of the property. The site is bordered by Wixom Road to the west, grass, trees and ponds to the north, the Providence Park Hospital complex to the east, and trees and Wildlife Woods Park to the south. The site is relatively level with a ground surface elevation of about 970 feet. According to a dated aerial photograph and topographic map, the Whitesell building was constructed between 1971 and 1973. The multi-family residential units are anticipated to be two stories tall with a basement.

Although no specific loading information was available for the proposed residential units, 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 that the proposed finish first floor elevations will be within about 1 to 2 feet of the existing grade at each building location.

### **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 end moraines of medium textured till. Based on the Oakland County Bedrock Topography Map, bedrock is about elevation 720 or 250 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 site by drilling thirteen test borings designated TB-1 to TB-13, and are presented as Figures 1-13. Brax Drilling Company drilled the test borings on August 4 and 10, 2017. Test borings were all drilled within proposed residential units and driveways, and are shown on the Test Boring Location Plan. Ground surface elevations were obtained from a survey completed by Diffin-Umlor & Associates.

Test borings extended to depths ranging from 5 to 20 feet advanced by 2-1/4-inch inner diameter hollow-stem augers. 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 13. The nomenclature used on the boring logs and elsewhere are presented on the Soil Terminology sheet, Figure 14. 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.

In addition to the laboratory testing, pocket penetrometer measurements of the compressive strengths of cohesive soils were determined in the field. The strength values determined by the penetrometer are also presented on the test boring logs.

## Soil Conditions and Evaluations

From the information developed during this investigation, subsoil conditions are generally similar throughout the site. Surface cover varies across the site and includes topsoil, a soil stone mixture, gravel, and asphalt pavement. Fill was encountered in six of the soil borings and extended to depths ranging from 1 to 5.5 feet below the surface. Below the surface materials and/or fill, native soils consisting of very stiff to hard brown or grey silty clay extends to boring termination depth. Sand layers were encountered at various depths throughout the site. The sand had varying amounts of gravel, silt and clay. Some of the sand seams encountered were wet.

We do not consider the topsoil suitable for the support of building foundations, floor slabs, pavements or for use as engineered fill material. However, this material can be reused for landscaping. The fill generally consisted of clay soil mixed with stone, placed gravel, or clay with slag seams. The fill is not recommended to support foundations, however, fill free of topsoil and debris may be suitable to support floor slabs and pavements or to be reused as engineered fill provided the site preparation recommendations are followed. Fill containing topsoil should only be used in landscaped areas and not be used to support pavement or floor slabs.

If pulverized, the existing bituminous pavement is considered suitable for use as common fill and subbase. The existing aggregate base is considered suitable to support pavements, or reuse as common fill and subbase. If the gradation can be maintained by keeping fines from contaminating the material, the existing aggregate base and pulverized pavement can be reused for the same purpose.

Underlying the fill or surface material, and extending the remaining depths of exploration is a very stiff to hard silty clay with varying amounts of sand and gravel. The native clay soils underlying the topsoil and fill are considered suitable for the direct support of foundations, floor slabs, and pavement and reuse as compacted fill.



## 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 pavement. Basement excavations are expected. We recommend the following earthwork operations be performed.

For Building and Pavement areas:

- 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.
- Any existing fill with topsoil or debris should be removed. All existing fill should be removed from under footings.
- The existing structures, together with their foundations, floors, and basement walls, should be removed in their entirety from within the proposed residential unit areas. These excavations should be backfilled with engineered backfill to the level of the surrounding area in accordance with recommendations provided in the following sections. Within areas of proposed pavement, the existing structures should be removed to a depth of not less than 3 feet below proposed finished grade.
- Abandoned utilities inside the proposed residential units should be removed in their entirety. Outside the buildings, 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 granular soils are exposed prior to fill placement in fill areas, and after rough grade has been achieved in cut areas (if any), the subgrade should be thoroughly compacted with vibratory roller by making a minimum of 10 passes in each of two perpendicular directions covering the proposed floor area. In addition to detecting unstable areas, the proof-compaction operation should serve to densify the shallow granular deposits that overlie the site.
- 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 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 native on-site soils may be used for engineered fill provided that they are approximately at the optimum moisture content. The silty/sandy clay soils may require aeration and drying before they can be properly compacted. At the time of this investigation the silty clays are near or above the expected optimum moisture content.
- Free-draining granular soils should be used for trench backfill and in confined spaces.
- Granular Material of various gradations that are presented below as Granular Fill, Sand Gravel Fill and Crushed Stone gradations can consist of various materials. Natural aggregates originate from geologically from stone quarries, gravel, sand or igneous/metamorphic rock deposits. Other aggregates types are slag aggregates, crushed concrete aggregates, salvaged aggregates and manufactured aggregates. Locally sand, gravel and limestone are the common natural aggregate while crushed concrete is common for coarse aggregate fill and pavement base.
- Crushed concrete can be produced to meet MDOT specifications or as a commercially marketed product. For the premier reuse such as gravel aggregate in concrete, MDOT requires the source must be concrete previously used on MDOT construction. For dense graded aggregates for base courses, in addition to meeting the grading requires including loss by wash limits, the material must not contain building rubble as evidenced by the presence of more than 5.0 percent, by count, building brick, wood, plaster or similar materials. In addition, crushed concrete cannot be used where a geotextile liner or membrane with permeability requirements is used and pavement structures with an underdrain unless a filter material is used between the crushed concrete and the underdrain. The filter must be a barrier to leachate. Crushed concrete is not allowed for Open Graded Aggregates for earthwork, open-graded drainage and underdrains. Crushed concrete is also not allowed for backfill for trenches with metal pipes.

As noted above, for crushed concrete to meet MDOT specifications, the source is controlled and the material must meet strict requirements and uses. The sources for commercial crushed concrete can come from multiple sources and can including building rubble. Without strict control, excess building material, fines and organics, may be part of the commercial product. For some uses the commercial product is suitable such as temporary uses, haul roads, construction staging areas, and stabilizing the bottom of undercuts. If crushed concrete is to be used as aggregate base, we recommend strict testing control to verify that it can be used.

- **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 buildings	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 clayey 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 residential units are 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.

If site conditioning and earthwork operations are to be performed during wet or cold weather (i.e. any time other than late spring to early fall), significant difficulty should be anticipated in drying or stabilizing the on-site silty cohesive clay soils. Under such circumstances, it may become necessary to undercut the wet soils and backfill with clean granular soils to achieve proper stabilization. The near surface granular soils should extend the construction season. Furthermore, if site preparation operations are performed during the summer months, it may be possible to stabilize wet soils in place and to use

cohesive soils as fill with proper conditioning and moisture control in the field. However, as previously discussed using on-site cohesive soils as engineered fill may not be cost effective.

### **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 residential units be supported on shallow spread and/or strip footings. Foundation excavations adjacent to utilities, streets, driveways, and sidewalks require caution and care shall be given.

Following site preparation, including removal of existing floor slabs, foundations, pavements, and utilities, the building areas are likely to be comprised of existing fill and engineered fill for backfilling excavations for removal items and native soils. Without excellent field control, some areas may be overlooked for controlled fill and density. On this basis, in order to find the footings on uniform strata, we recommend all foundations be extended to the native soils underlying the existing fill or on engineered fill founded on native soils.

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 the native clays that are below any existing fill, or on engineered fill known to extend to the native soils. In addition, the bearing capacity can be increased by one third for transient loads, i.e. wind and earthquake. It is estimated that the total and differential foundation settlements should not exceed about 1 in. and  $\frac{3}{4}$  in., respectively.

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. Groundwater was encountered in five soil borings, TB-7, 8, 9, 10 and 11. During drilling operations water was encountered at depths ranging from 1 to 9.4 feet below the surface. After drilling operations, the observed water was at depths ranging from 7.6 to 18 feet below the surface. 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 soil, no significant groundwater accumulations are anticipated in construction excavations, although water may accumulate in excavations that extend through wet sand

seams. The very shallow water encountered is believed to be perched water. We expect that accumulations of groundwater or surface runoff water in such excavations should be controllable with normal pumping from properly constructed sumps.

To prevent the development of hydrostatic pressures on the basement floor and walls, a subdrain system should be installed at the foundation level. The perforated or slotted subdrains should be protected with coarse aggregates and wrapped with a suitable filter fabric to prevent the migration of natural soil fines into the subdrains. All exterior walls and floors below grade should be damp-proofed.

### **Pond Considerations**

Soil boring TB-3 was completed in the proposed pond area. The boring extended to 15 feet below the surface and showed a silty clay fill layer extending to 5.5 feet below the surface, which was underlain by a natural silty clay layer. Groundwater was not encountered in TB-3 although wet sand seams were encountered in other areas of the site. Due to the clay nature of the soils, very little infiltration of stormwater is expected through the soil.

### **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 existing fill, 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.

We recommend a porous granular blanket consisting of MDOT Class II sand or pea stone at least 4 inches thick under the floor slab. We also recommend a vapor barrier as required by code in residential living areas.

### **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 generally consist of clay or silty clay which can be classified as CL or ML-CL, 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.

We understand the following to be the required pavement thicknesses for private residential roads in Novi:

Bituminous Asphalt:	8.5 inches of Asphalt Surface Course 8 inches of Aggregate Base
Portland Cement Concrete:	7 inches of Asphalt Surface Course 8 inches of Aggregate Base

We recommend that the asphalt meet Michigan Department of Transportation (MDOT) specifications for MDOT 13A or a MDOT Low Volume Superpave mix. The aggregate base should meet criteria for MDOT 21AA limestone.

For pavements, we recommend that "stub" or "finger" drains be provided around 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.

### 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 residential units. 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:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION	966.1	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
965	0.1		TOPSOIL						
	1.0		Brown, SILTY CLAY	28 30					
	3.0	1-S	Brown, Loose, CLAYEY SAND with trace Gravel and Roots	22	52				
	5	2-S	Brown, Hard, SILTY CLAY with little Sand	3 3 5	8	17		8000*	
	5		End of Boring						
960									
955									
950									
945									
940									
935									
<b>Total Depth:</b> <i>5</i>		<b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i>			<b>Water Level Observation:</b> <i>Dry at Completion</i>				
<b>Drilling Date:</b> <i>8/4/17</i>		<b>Plugging procedure:</b> <i>Cuttings</i>			<b>Notes:</b> <i>* Pocket Penetrometer</i>				
<b>Inspector:</b> <i>JB</i>		<b>Contractor:</b> <i>Brax Drilling Company</i>							

DRAFT





## LOG OF TEST BORING NO. TB-2

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 969.9	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
TOPSOIL	0							
Brown, SILTY CLAY with Stone	0.3		1 7 5					
Brown, Very Stiff, SANDY CLAY with occasional Clayey Sand seams	1.0	1-S		12	18		4000*	
Brown & Grey, Hard, SILTY CLAY	3.0		4 6 7					
Brown, Stiff, SANDY CLAY	5.5	2-S		13	15		9000*	
Brown, Loose to Medium Compact, CLAYEY SAND with occasional Silty Clay seams	6.7		2 2 4					
End of Boring	10	3-S		6			3000*	
	10	4-S	7 8 10	18				
955	15							
950	20							
945	25							
940	30							
<b>DRAFT</b>								
<b>Total Depth:</b> <i>10</i> <b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Drilling Date:</b> <i>8/4/17</i> <b>Inspector:</b> <i>JB/JLN</i> <b>Plugging procedure:</b> <i>Cuttings</i> <b>Contractor:</b> <i>Brax Drilling Company</i>				<b>Water Level Observation:</b> <i>Dry at Completion Cave at 11'</i>  <b>Notes:</b> <i>* Pocket Penetrometer</i>				



# LOG OF TEST BORING NO. TB-3

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION		DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
971.5		0							
970	FILL: Brown, Hard, SILTY CLAY with trace Gravel and Sand, and occasional Sand (Slag) seams		1-S	35	21			9000*	
		11							
		10							
	Brown to Grey, Hard to Very Stiff, SILTY CLAY with little to trace Sand and trace Gravel	5	2-S	10	30			9000*	
		13							
		17							
965	Brown to Grey, Hard to Very Stiff, SILTY CLAY with little to trace Sand and trace Gravel		3-S	4	14	11		9000*	
		7							
		7							
	Grey, Very Stiff, SILTY CLAY with trace Sand	10	4-S	4	14	11		6000*	
		6							
		8							
960	Grey, Very Stiff, SILTY CLAY with trace Sand	12.0	5-S	2	6	12		4000*	
		2							
		4							
	End of Boring	15							
955									
		20							
950									
		25							
945									
		30							
940									

<b>Total Depth:</b> <i>15</i> <b>Drilling Date:</b> <i>8/11/17</i> <b>Inspector:</b> <i>JSB</i> <b>Contractor:</b> <i>Brax Drilling Company</i>	<b>Drilling Method:</b> <i>Hollow Stem Augers Auto Hammer</i> <b>Plugging procedure:</b> <i>Cuttings</i>	<b>Water Level Observation:</b> <i>Dry at Completion</i> <b>Notes:</b> <i>* Pocket Penetrometer</i>
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# LOG OF TEST BORING NO. TB-4

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA									
GROUND SURFACE ELEVATION 970.6	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)			
970	0	TOPSOIL									
	0.5		11 14 14	28			9000*				
	5	2-S	6 10 11	21	11		9000*				
965			3 7 9	16	9		9000*				
	8.0		3 4 6	10	11		7000*				
960	10	4-S									
	15	5-S	2 3 7	10			5000*				
955			3 4 6	10	11		6000*				
950	19.6	6-S									
	20	Brown, Medium Compact, SAND End of Boring									
945	25										
940	30										
<b>Total Depth:</b> 20 <b>Drilling Date:</b> 8/4/17 <b>Inspector:</b> JB <b>Contractor:</b> Brax Drilling Company				<b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Plugging procedure:</b> <i>Cuttings</i>				<b>Water Level Observation:</b> <i>Dry at Completion</i> <b>Notes:</b> * <i>Pocket Penetrometer</i>			



## LOG OF TEST BORING NO. TB-5

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 971.2	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
970	0							
	1.6		4 5 5					
	3.0	1-S		10	14		9000*	
	5		4 9 7					
	5	2-S		16				
965			3 6 7					
	10	3-S		13	9		6000*	
	10		2 7 9					
	10	4-S		16	13		9000*	
960			4 7 10					
	12.0	5-S		17			8000*	
955	15	End of Boring						
950	20							
945	25							
940	30							
<b>Total Depth:</b> <i>15</i> <b>Drilling Method:</b> <i>Hollow Stem Augers Auto Hammer</i>		<b>Water Level Observation:</b> <i>Dry at Completion Cave at 11.4'</i>						
<b>Drilling Date:</b> <i>8/11/17</i>		<b>Notes:</b> <i>* Pocket Penetrometer</i>						
<b>Inspector:</b> <i>JSB</i> <b>Plugging procedure:</b> <i>Cuttings</i>								
<b>Contractor:</b> <i>Brax Drilling Company</i>								



## LOG OF TEST BORING NO. TB-6

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 972.2	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
0	<b>TOPSOIL</b>							
0.5	Brown, Medium Compact, CLAYEY SAND with little Gravel							
1	1-S	6 10 8	18		11			
3.0	Brown, Hard, SILTY CLAY with little Sand, trace Gravel, and occasional Sand seams							
5	2-S	3 7 9	16				9000*	
6.5	3-S	3 6 8	14		10		9000*	
10	4-S	3 6 9	15				9000*	
15	5-S	3 8 10	18		9		9000*	
15	End of Boring							
20								
25								
30								
35								
40								
45								
50								
55								
60								
65								
70								
75								
80								
85								
90								
<b>Total Depth:</b> <i>15</i>		<b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i>			<b>Water Level Observation:</b> <i>Dry at Completion</i>			
<b>Drilling Date:</b> <i>8/4/17</i>		<b>Plugging procedure:</b> <i>Cuttings</i>			<b>Notes:</b> <i>* Pocket Penetrometer</i>			
<b>Inspector:</b> <i>JB</i>								
<b>Contractor:</b> <i>Brax Drilling Company</i>								

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# LOG OF TEST BORING NO. TB-7

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA							
GROUND SURFACE ELEVATION	971.6	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
970	0								
	3.0		1-S	3 3 4	7	7			
	5		2-S	13 15 15	30	8			
965	6.5		3-S	3 3 4	7			3000*	
	8.0								
	10		4-S	4 11 11	22	21			
960	12.0								
	15		5-S	1 4 5	9			9000*	
955	20		6-S	2 4 6	10	11		7000*	
	25								
945	30								
940									
End of Boring									
Total Depth: 20		Drilling Method: <i>Hollow Stem Augers Auto-Hammer</i>			Water Level Observation: <i>6.5' During Drilling 18' After Drilling Cave at 19'</i>				
Drilling Date: <i>8/11/17</i>		Plugging procedure: <i>Cuttings</i>			Notes: * <i>Pocket Penetrometer</i>				
Inspector: <i>JB</i>									
Contractor: <i>Brax Drilling Company</i>									



## LOG OF TEST BORING NO. TB-8

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 972.2	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
0								
		FILL: Black, Gravelly SAND (Slag)						
1.0								
970		1-S	13 5 6	11			9000*	
		Brown, Hard, SILTY CLAY with trace Gravel and Sand						
3.0								
		Brown, Very Stiff, SANDY CLAY						
5								
		2-S	2 3 4	7	14		7000*	
5.5								
		Brown, Hard to Very Stiff, SILTY CLAY with little to trace Sand						
965		3-S	1 3 4	7			9000*	
		Brown, Hard to Very Stiff, SILTY CLAY with little to trace Sand						
10								
		4-S	1 2 2	4	15		4000*	
12								
		Grey, Very Stiff, SILTY CLAY with little Sand and trace Gravel						
15								
		5-S	2 4 8	12			6000*	
20								
		End of Boring						
20		6-S	3 5 6	11	11		8000*	
950								
945								
940								

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<b>Total Depth:</b> 20 <b>Drilling Date:</b> 8/4/17 <b>Inspector:</b> JB <b>Contractor:</b> Brax Drilling Company	<b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Plugging procedure:</b> <i>Cuttings</i>	<b>Water Level Observation:</b> <i>1' During Drilling 16' After Drilling Cave at 16.2'</i>  <b>Notes:</b> * <i>Pocket Penetrometer</i>
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# LOG OF TEST BORING NO. TB-9

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 971.6	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
970	0	FILL: Brown, SILTY CLAY with some Gravel						
970	1.0	FILL: Black, Compact, Sandy GRAVEL (Slag)						
	3.0	1-S	15 24 10	34				
	5	2-S	3 4 5	9	13		9000*	
965	8.0	3-S	3 3 4	7	13		7000*	
	10	4-S	4 4 7	11			9000*	
960	15	5-S	3 5 8	13	13		8000*	
	20	End of Boring						
955	25							
950	30							
945								
940								
<b>Total Depth:</b> <i>15</i> <b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Drilling Date:</b> <i>8/4/17</i> <b>Inspector:</b> <i>JB</i> <b>Plugging procedure:</b> <i>Cuttings</i> <b>Contractor:</b> <i>Brax Drilling Company</i>		<b>Water Level Observation:</b> <i>2' During Drilling</i> <i>8.9' After Drilling</i> <i>Cave at 12.5'</i>  <b>Notes:</b> <i>* Pocket Penetrometer</i>						





## LOG OF TEST BORING NO. TB-10

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 971.2	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
970	0	FILL: Crushed Stone						
970	0.5	FILL: Brown, SAND						
970	1.0	1-S	6 3 4	7	14		6000*	
		Brown to Grey, Very Stiff to Hard, SILTY CLAY with some Sand, trace Gravel, frequent Sand seams						
970	5	2-S	2 4 5	9	19		9000*	
965	5.5	Brown, Very Stiff, SILTY CLAY						
965	9.4	3-S	1 3 4	7			8000*	
960	10	4-S	3 2 2	4	22		6000*	
960	10.0	Brown, Very Loose, SAND - wet						
955	15	5-S	3 5 7	12			8000*	
		Brown to Grey, Very Stiff to Hard, SILTY CLAY with little Sand and trace Gravel						
950	20	6-S	4 7 11	18	11		9000*	
950	19.6	Brown, Medium Compact, SAND End of Boring						
945	25							
940	30							
<b>Total Depth:</b> <i>20</i> <b>Drilling Date:</b> <i>8/4/17</i> <b>Inspector:</b> <i>JB</i> <b>Contractor:</b> <i>Brax Drilling Company</i>		<b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Plugging procedure:</b> <i>Cuttings</i>		<b>Water Level Observation:</b> <i>During drilling: 9.4' After drilling: 7.5' Cave at 10.6'</i>  <b>Notes:</b> <i>* Pocket Penetrometer</i>				



## LOG OF TEST BORING NO. TB-11

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 967.4	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
965	0 1.0		3 4 7	11			9000*	
FILL: Brown, SILTY CLAY with some Gravel								
Brown, Hard, SILTY CLAY with occasional Silt seams								
960	5 5.5		3 5 7	12	19		9000*	
Brown, Hard, SILTY CLAY with occasional wet Sand seams								
955	8.0 10		4 4 6	10	12		9000*	
Brown to Grey, Hard to Very Stiff, SILTY CLAY with little Sand and trace Gravel								
950	15		4 5 11	16			9000*	
End of Boring								
945	20		2 4 5	9	12		4000*	
940	25							
935	30							
<b>Total Depth:</b> <i>15</i> <b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Drilling Date:</b> <i>8/4/17</i> <b>Inspector:</b> <i>JB</i> <b>Plugging procedure:</b> <i>Cuttings</i> <b>Contractor:</b> <i>Brax Drilling Company</i>		<b>Water Level Observation:</b> <i>During drilling: 6.5'</i> <i>After drilling: 7.7'</i> <i>Cave at 10'</i>  <b>Notes:</b> <i>* Pocket Penetrometer</i>						



# LOG OF TEST BORING NO. TB-12

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION 968.6	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
0								
1.0		FILL: Brown SAND with Slag Sand						
965		1-S	3 2 4	6	15		6000*	
4.3		Brown, Very Stiff, SILTY CLAY with some Sand and trace Roots						
4.8		2-S	1 4 3	7	15		5000*	
960		Brown, Loose, SAND - wet						
10		3-S	3 7 10	17			9000*	
955		Brown, Hard to Very Stiff, SILTY CLAY with trace to little Sand and trace Gravel						
15		4-S	4 7 11	18	13		9000*	
950		End of Boring						
945		5-S	4 8 8	16			8000*	
940								

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**Total Depth:** *15*      **Drilling Method:** *Hollow Stem Augers*  
**Drilling Date:** *8/4/17*      *Auto-Hammer*  
**Inspector:** *JB*      **Plugging procedure:** *Cuttings*  
**Contractor:** *Brax Drilling Company*

**Water Level Observation:** *During Drilling: 4.3'*  
*Dry at Completion*  
*Cave at 11'*  
**Notes:** *\* Pocket Penetrometer*



# LOG OF TEST BORING NO. TB-13

**PROJECT NAME:** *Geotechnical Investigation*  
**LOCATION:** *Wixom Road*  
*Novi, MI*

**PEA Job No.:** *2017-261*  
**Reviewed by:** *JMS*

SUBSURFACE PROFILE		SOIL SAMPLE DATA						
GROUND SURFACE ELEVATION	DEPTH FEET	SAMPLE TYPE	BLOWS /6"	SPT "N"	Moisture Content (%)	Dry Density (pcf)	Unconf. Comp. Str. (psf)	Failure Strain (%)
	0	TOPSOIL						
	0.1	Brown, SILTY CLAY	4 5					
	1.0	Brown, Loose, CLAYEY SAND with trace Gravel and Roots	5 5	10	12			
	3.0	Brown, Hard, SILTY CLAY with little Sand	6 6 8	14	13		9000*	
	5	End of Boring						
	10							
	15							
	20							
	25							
	30							
<b>Total Depth:</b> <i>5</i> <b>Drilling Method:</b> <i>Hollow Stem Augers Auto-Hammer</i> <b>Drilling Date:</b> <i>8/4/17</i> <b>Inspector:</b> <i>JB</i> <b>Plugging procedure:</b> <i>Cuttings</i> <b>Contractor:</b> <i>Brax Drilling Company</i>				<b>Water Level Observation:</b> <i>Dry at Completion</i>  <b>Notes:</b> <i>* Pocket Penetrometer</i>				

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# 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 an evaluation 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.



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**BORING LOCATION MAP**

Vertical text on the right edge of the page, likely a file path or reference code.