



**Plan Commission
Meeting Agenda
Tuesday July 26, 2016
6:30 p.m. Village Hall Court Room
3930 N. Murray Ave Village of Shorewood, WI 53211**

1. Call to order.
2. Roll call.
3. Approval of June 28, 2016 meeting minutes.
4. Statement of Public Notice.
5. Consideration of conditional use application for installation of solar panels at residential property 3827 N. Prospect Ave.
6. Consideration of conditional use application for installation of solar panels at residential property 3813 N. Cramer St.
7. Discussion of proposed site plan for redevelopment at 4060 N. Oakland Avenue for two-story bank by North Shore Bank.
8. Consideration of conditional use application for a bank drive-through at commercial property 4060 N. Oakland Avenue.
9. Consideration of special exception for on-site parking for proposed bank redevelopment at commercial property 4060 N. Oakland Avenue.
10. Schedule next meeting.
11. Adjournment.

Dated at Shorewood, Wisconsin, this 12th day of July, 2016

Village of Shorewood

Tanya O'Malley, Village Clerk WCPC

**PLEASE BE ADVISED THAT A REPRESENTATIVE OF THE APPLICANT FOR THE
AGENDA ITEM MUST BE PRESENT AT THIS MEETING.**

Should you have any questions or comments regarding any item on this agenda, please contact Ericka Lang, Planning Director, Planning & Development Department, at (414) 847-2640.

Upon reasonable notice, efforts will be made to accommodate the needs of disabled individuals.

It is possible that members of and possibly a quorum of members of other governmental bodies of the municipality may be in attendance at the above stated meeting to gather information; no action will be taken by any governmental body at the above stated meeting other than the governmental body specifically referred to above in this notice.



Plan Commission Meeting Minutes

June 28, 2016

3930 N. Murray Ave Village of Shorewood, WI 53211

1. Call to order.

The meeting was called to order at 6:37 p.m.

2. Roll call.

Members present: Chairman/Village President Guy Johnson
Tr. Mike Maher
Leah Blankenship
Eric Couto
Chris Gallagher
Kari Smith
Members not present: Tim Hansmann
Nate Piotrowski

3. Approval of April 26, 2016 meeting minutes.

Mr. Maher moved to approve the minutes, seconded by Mr. Gallagher. Vote to approve 7-0.

4. Statement of Public Notice.

Planning Director Ericka Lang noted that the meeting was published and posted according to state statutes and local regulations.

5. Consideration of conditional use application for installation of solar panels at residential property 2504 E. Newton Ave.

Village Attorney Nathan Bayer provided background to the current zoning code for solar panels.

Ms. Lang stated that on June 2, 2016 the village received a conditional use application for installation of solar panels at residential property 2504 E. Newton Ave. The owner is Paul Zovic and the applicant is Arch Electric Inc.

Panel description: the application is for 10 solar modules mounted in two locations on the roof of the house: at the front of the and the back.

Per zoning code section 535-30D, installation and use of solar energy systems are a conditional use in all districts and that the plan commission shall review the proposed system and may only restrict if one of the following conditions is satisfied: [1] Serves to preserve or protect the public health or safety. [2] Does not significantly increase the cost of the system or significantly decrease its efficiency. [3] Allows for an alternative system of comparable cost and efficiency.

Mike Cornell from Arch Electric was present who is overseeing the City of Milwaukee/Village of Shorewood solar group buy. The group buy goal is 150 KW. This application is 3.3 KW. The applicant is ordering the standard grey panels, 40" x 70" x 2.5" D. The panel is laid on racking 4.5 inches off the roof deck. There will be panels at the front of the roof and a section at the rear and those would be tilted at a 30-degree angle because the rear section is flat.

Mr. Gallagher asked if there's another way to gain energy efficiency without increasing costs if move the front panels to a different location. Mr. Cornell said maximum efficiency for panels must face south. The applicant's residence faces south.

Mr. Couto believes the panels will be seen from the street, at pedestrian level. Ms. Kiely Miller did not think they would be.

Ms. Smith questioned if there's a tradeoff of aesthetic attractiveness and environmental attractiveness.

Members discussed placing front panels on the rear detached garage. If on garage, then would have to trench from the house meter, increasing cost by 60%.

Chairman Johnson opened the meeting to public comment. No comments received.

Mr. Maher moved to approve the conditional use application for solar panels on the dwelling roof at residential property 2504 E. Newton Ave after the plan commission reviewed the application against zoning section 535-30D, seconded by Mr. Couto. Vote to approve 7-0.

Attorney Bayer reminded members that once solar panels are installed that an easement is essentially created for access to the sunlight.

6. Schedule next meeting.

The next meeting is July 26, 2016.

7. Adjournment.

Mr. Maher moved to adjourn the meeting at 7:27 p.m., seconded by Ms. Kiely Miller. Vote 7-0.

Recorded by,

A handwritten signature in cursive script that reads "Ericka Lang". The signature is written in dark ink and is positioned above the printed name of the Planning Director.

Planning Director Ericka Lang

MEMORANDUM

July 8, 2016

To: Plan Commission
Cc: Village Manager Chris Swartz

From: Planning Director Ericka Lang

RE: Conditional Use for Solar Panel 3813 N. Cramer St



Agenda Item #: Consideration of Solar Panel CUP

On July 6, 2016 the village received a conditional use application for installation of solar panels at residential property 3813 N. Cramer St. The owner is Linda Beck and the applicant is Arch Electric Inc.

Panel Description

The application is for six [6] solar modules mounted on the south side of the single-car detached garage, located at the rear of the property. The panels are 40" x 70" x 2.5"d.

Code

Per 535-30D, installation and use of solar energy systems are a conditional use in all districts. The full code is attached. It also says that your commission shall review the proposed system and may only restrict if one of the following conditions is satisfied:

- [1] Serves to preserve or protect the public health or safety.
- [2] Does not significantly increase the cost of the system or significantly decrease its efficiency.
- [3] Allows for an alternative system of comparable cost and efficiency.

The review and approval criteria in 535-30D apply to solar and wind energy systems.



APPLICATION FOR CONDITIONAL USE PERMIT

Village of Shorewood
Planning & Development Department
3930 N. Murray Avenue
Shorewood, WI 53211
Phone (414) 847-2640
Facsimile (414) 847-2648
www.villageofshorewood.org
PAD@villageofshorewood.org

Office Use Only	
General Fee \$125	Solar Energy Fee \$75
Permit No.	16-1247
Zoning District	R-6
CUP Reason	solar
Code Reference	535-30
Plan Comm. Meeting	7-26-16
Outcome	

CONDITIONAL USE APPLICATIONS ARE CONSIDERED BY THE PLAN COMMISSION. MEETINGS ARE THE 4TH TUESDAY EACH MONTH, AS NEEDED. APPLICATIONS ARE DUE 4 WEEKS BEFORE SCHEDULED MEETINGS AND ADDITIONAL MATERIALS AS IDENTIFIED BY THE PLANNING & DEVELOPMENT DEPARTMENT.

PROPERTY ADDRESS: 3813 N. Cramer St.

PROPERTY OWNER

Owner Name: Linda Beck
Phone Number: 414-964-5485
Email: Ms.lindabeck@hotmail.com

Owner Address: 3813 N. Cramer St.
Shorewood, WI 53211

APPLICANT/BUSINESS

Name: Arch Electric Inc.
Phone Number: 920-893-8388
Email: jen@archelec.com

Address: W4499 Sumac Rd.
Plymouth, WI 53073

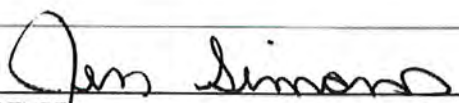
Check if prefer to receive Meeting Agenda by EMAIL: ☐ PROPERTY OWNER ☐ APPLICANT

BUSINESS INFORMATION

Name of Business Arch Electric Inc. Max # Employees On-site 3
Is a survey attached? (if required) _____
Is a parking plan attached? (if required) _____
*Provide copy of business plan _____

What do you wish to do that will require a Conditional Use Permit?

Install a fixed roof mounted Solar PV System, 6 Panels on single detached garage


SIGNATURE

7/6/16
DATE

3813 Cramer Solar Panels



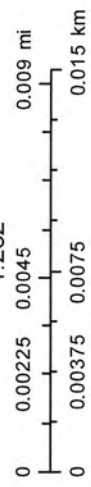
July 8, 2016

Address Numbers

Parcels

Streets

1:282



Milwaukee County Land Information Office





Q.PLUS L-G4.2 330-340

Q.ANTUM SOLAR MODULE

The Q.ANTUM solar module Q.PLUS L-G4.2 with power classes up to 340 Wp is the strongest module of its type on the market globally. Powered by 72 Q CELLS solar cells Q.PLUS L-G4.2 was specially designed for large solar power plants to reduce BOS costs. Only Q CELLS offers German engineering quality with our unique triple Yield Security.



LOW ELECTRICITY GENERATION COSTS

Higher yield per surface area and lower BOS costs thanks to higher power classes and an efficiency rate of up to 17.4 %.



INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.



ENDURING HIGH PERFORMANCE

Long-term yield security with Anti-PID Technology¹, Hot-Spot-Protect and Traceable Quality Tra.Q™.



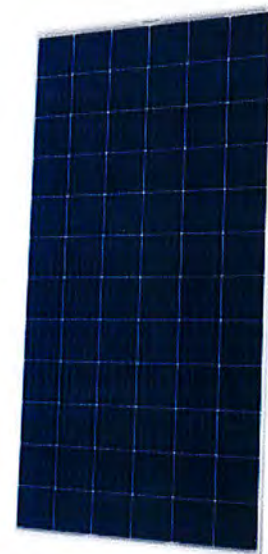
LIGHT-WEIGHT QUALITY FRAME

High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (2400 Pa).



A RELIABLE INVESTMENT

Inclusive 12-year product warranty and 25-year linear performance guarantee².



Q CELLS
Best polycrystalline
solar module 2013
Q.PRO-G2 235
151 modules tested

THE IDEAL SOLUTION FOR:



Ground-mounted
solar power plants

¹ APT test conditions: Cells at -1000V against grounded, with conductive metal foil covered module surface, 25 °C, 168 h

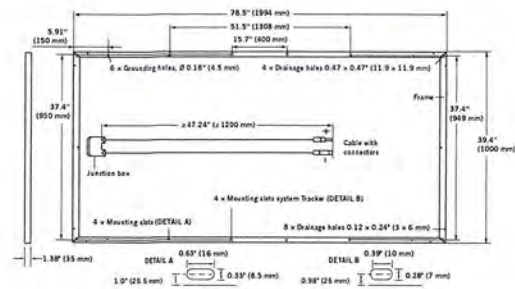
² See data sheet on rear for further information.

Engineered in **Germany**

Q CELLS

MECHANICAL SPECIFICATION

Format	78.5 in × 39.4 in × 1.38 in (including frame) (1994 mm × 1000 mm × 35 mm)
Weight	52.9 lb (24 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Anodised aluminum
Cell	6 × 12 Q.ANTUM solar cells
Junction box	3.35-4.13 in × 2.36-3.15 in × 0.59-0.67 in (85-105 mm × 60-80 mm × 15-17 mm), Protection class ≥ IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥ 47.24 in (1200 mm), (-) ≥ 47.24 in (1200 mm)
Connector	Amphenol H4 UTX, IP68



ELECTRICAL CHARACTERISTICS

POWER CLASS			330	335	340
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5 W / -0 W)					
Minimum	Power at MPP ²	P _{MPP} [W]	330	335	340
	Short Circuit Current*	I _{SC} [A]	9.49	9.54	9.59
	Open Circuit Voltage*	V _{OC} [V]	46.55	46.81	47.07
	Current at MPP*	I _{MPP} [A]	8.91	8.97	9.03
	Voltage at MPP*	V _{MPP} [V]	37.02	37.33	37.63
	Efficiency ²	η [%]	≥ 16.5	≥ 16.8	≥ 17.1
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NOC ³					
Minimum	Power at MPP ²	P _{MPP} [W]	244.7	248.4	252.1
	Short Circuit Current*	I _{SC} [A]	7.65	7.69	7.73
	Open Circuit Voltage*	V _{OC} [V]	43.44	43.68	43.92
	Current at MPP*	I _{MPP} [A]	6.99	7.04	7.09
	Voltage at MPP*	V _{MPP} [V]	35.01	35.29	35.56

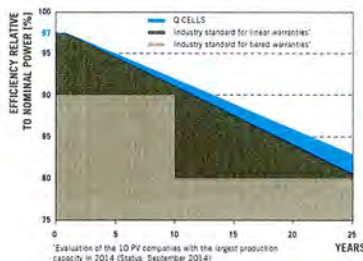
¹1000 W/m², 25°C, spectrum AM 1.5 G

²Measurement tolerances STC ± 3%; NOC ± 5%

³800 W/m², NOCT, spectrum AM 1.5 G

* typical values, actual values may differ

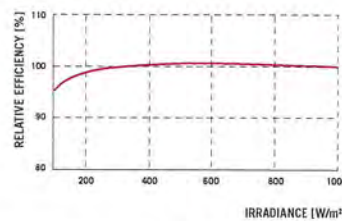
Q CELLS PERFORMANCE WARRANTY



At least 97% of nominal power during first year. Thereafter max. 0.6% degradation per year.
At least 92% of nominal power after 10 years.
At least 83% of nominal power after 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α	[%/K]	+0.04	Temperature Coefficient of V _{OC}	β	[%/K]	-0.29
Temperature Coefficient of P _{MPP}	γ	[%/K]	-0.40	Normal Operating Cell Temperature	NOCT	[°F]	113 ± 5.4 (45 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{sys}	[V]	1500 (IEC) / 1500 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	15	Fire Rating	C / TYPE 1
Max Load (UL) ²	[lbs/ft ²]	75 (3600 Pa)	Permitted module temperature on continuous duty	-40°F up to +185°F (-40°C up to +85°C)
Load Rating (UL) ²	[lbs/ft ²]	33 (1600 Pa)	² see installation manual	

QUALIFICATIONS AND CERTIFICATES

IEC 61215 (Ed. 2); IEC 61730 (Ed. 1), Application class A
This data sheet complies with DIN EN 50380.



PACKAGING INFORMATION

Number of Modules per Pallet	29
Number of Pallets per 40' Container	22
Pallet Dimensions (L × W × H)	81.3 × 45.3 × 46.9 in (2065 × 1150 × 1190 mm)
Pallet Weight	1671 lbs (758 kg)

NOTE: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS USA Corp.
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | WEB www.q-cells.com

Engineered in Germany

Q CELLS

Specifications subject to technical changes © Hanwha Q CELLS Q.PLUS L-G4.2_330-340_2015-09_Rev03_NA

Solar inverters

ABB micro inverter system MICRO-0.25/0.3/0.3HV-I-OUTD 0.25kW to 0.3kW



ABB's MICRO inverter enables individual panel output control when flexibility and modularity are required.

This ABB MICRO inverter enables individual panel output control.

Individual panel output control can reduce shading and mismatching effect. ABB's MICRO is the best alternative to the traditional string inverters that ABB is famous for. The individual panels can be installed in different orientations which reduce the efficiency losses in a variety of challenging conditions.

The Maximum Power Point Tracking (MPPT) algorithm maximizes energy and flexibility.

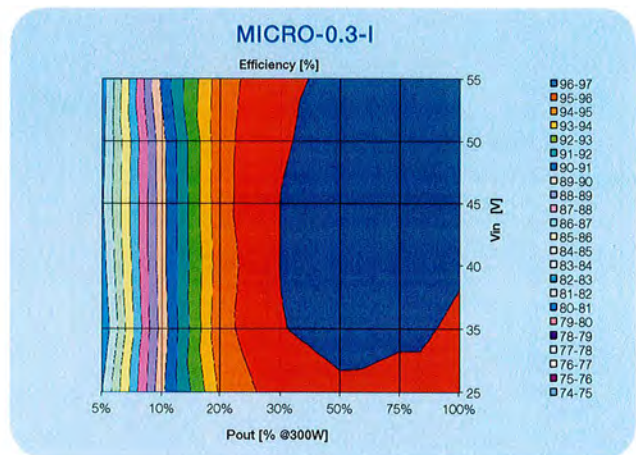
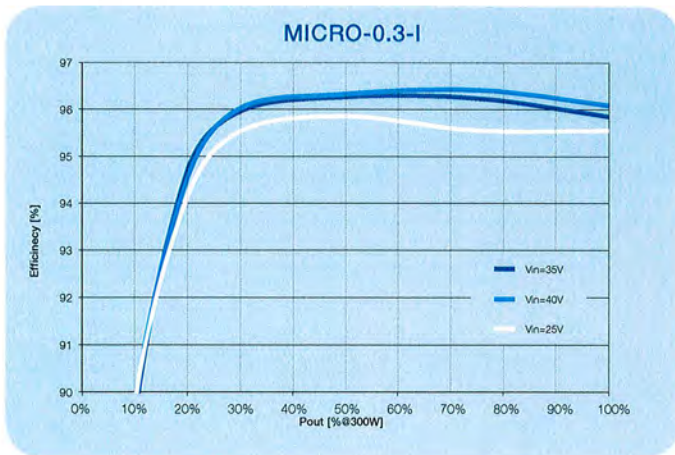
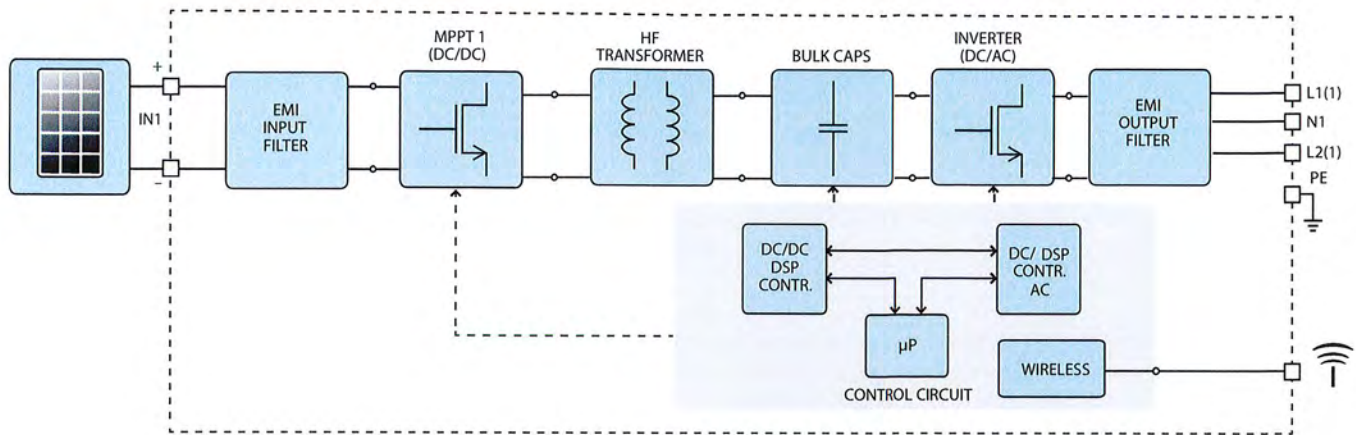
The proprietary MPPT algorithm works at the level of each solar panel in any light condition offering more energy output. This inverter has a maximum efficiency of 96.5%.

The electrolyte-free power converter further increases the life expectancy. The compatible and proprietary wireless communication hub, Concentrator Data Device (CDD), simplifies installation.

Highlights:

- The high speed and precise MPPT algorithm offers real time power tracking and improved energy harvesting.
- HF isolation to fit any application that requires the positive grounding of DC input terminals
- Reduced susceptibility to fault. In case of a component failure only the energy produced from one PV module will be lost.
- Outdoor enclosure for unrestricted use under any environmental conditions.

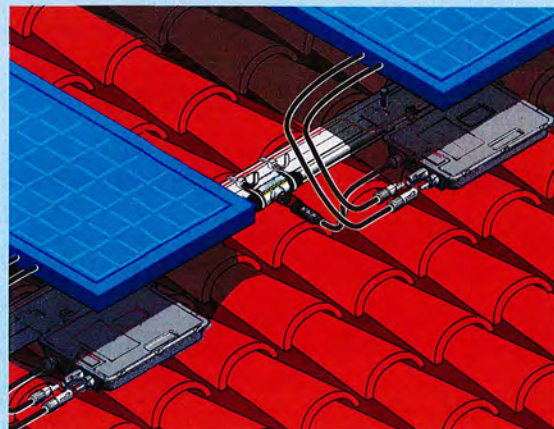
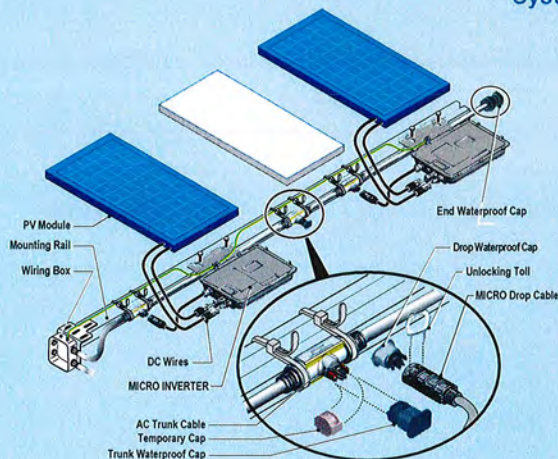
Block diagram of MICRO-0.25/0.3/0.3HV-I-OUTD



MICRO inverter system installation:

- The ABB MICRO inverter offers ease of installation with AC trunk and drop cable configuration.
- The mounting bracket on the MICRO inverter ensures simple and durable mounting on commercially available racking solutions.
- AC cabling compatible with 60, 72 and 96 cell modules in both portrait and landscape orientation.
- Locking connectors and weatherproof accessories ensure long term reliable operation of the plant.

System installation



535-30 ARCHITECTURAL PROJECTIONS, SPECIAL STRUCTURES, MOBILE WIRELESS TOWERS AND SOLAR AND WIND ENERGY SYSTEMS

D. Conditional use permits for solar and wind energy systems.

(1) Installation and use of a "wind energy system" or a "solar energy system" shall be a conditional use in all districts. The Village Plan Commission may authorize the Planning and Development Department to issue a conditional use permit for solar or wind energy systems after review and a public hearing. Any restriction placed on a solar or wind energy system by the Plan Commission is subject to the limitations found in this section. The review and approval criteria set forth in this subsection shall apply to solar and wind energy systems.

(2) Definitions. As used in this subsection, the following terms shall have the meanings indicated:

A SOLAR ENERGY SYSTEM. Equipment which directly converts and then transfers or stores solar energy into usable forms of thermal or electrical energy.

A WIND ENERGY SYSTEM. Equipment and associated facilities that convert and then store or transfer energy from the wind into usable forms of energy.

(3) Authority to restrict systems limited.

(a) The Village Plan Commission shall review any proposed wind energy system and may approve the system if the applicant meets the owner requirements for a wind energy system as set forth in §§ PSC 128.10 through 128.19, Wis. Adm. Code, (current through Administrative Register, December 2014, No. 708) and as hereinafter amended, which are hereby incorporated by reference and made a part hereof as if fully set forth herein.

(b) The Village Plan Commission shall review any proposed solar or wind energy system and may only restrict the system if the restriction satisfies one of the following conditions:

[1] Serves to preserve or protect the public health or safety.

[2] Does not significantly increase the cost of the system or significantly decrease its efficiency.

[3] Allows for an alternative system of comparable cost and efficiency.

MEMORANDUM

July 8, 2016

To: Plan Commission
Cc: Village Manager Chris Swartz

From: Planning Director Ericka Lang

RE: Conditional Use for Solar Panel 3827 N. Prospect



Agenda Item #: Consideration of Solar Panel CUP

On July 6, 2016 the village received a conditional use application for installation of solar panels at residential property 3827 N. Prospect Ave. The owners are Beth and Michael Giacobassi and the applicant is Arch Electric Inc.

Panel Description

The application is for solar modules mounted on the west side of the house. The panels are 40" x 70" x 2.5"d. The number of panels is unknown; however, the area of the west side is 160 sqft.

Code

Per 535-30D, installation and use of solar energy systems are a conditional use in all districts. The full code is attached. It also says that your commission shall review the proposed system and may only restrict if one of the following conditions is satisfied:

- [1] Serves to preserve or protect the public health or safety.
- [2] Does not significantly increase the cost of the system or significantly decrease its efficiency.
- [3] Allows for an alternative system of comparable cost and efficiency.

The review and approval criteria in 535-30D apply to solar and wind energy systems.



APPLICATION FOR CONDITIONAL USE PERMIT

Village of Shorewood
Planning & Development Department
3930 N. Murray Avenue
Shorewood, WI 53211
Phone (414) 847-2640
Facsimile (414) 847-2648
www.villageofshorewood.org
PAD@villageofshorewood.org

Office Use Only	
General Fee \$125	Solar Energy Fee \$75
Permit No.	16-1117
Zoning District	R-6
CUP Reason	solar panels
Code Reference	535-30
Plan Comm. Meeting	7-27-16
Outcome	

CONDITIONAL USE APPLICATIONS ARE CONSIDERED BY THE PLAN COMMISSION. MEETINGS ARE THE 4TH TUESDAY EACH MONTH, AS NEEDED. APPLICATIONS ARE DUE 4 WEEKS BEFORE SCHEDULED MEETINGS AND ADDITIONAL MATERIALS AS IDENTIFIED BY THE PLANNING & DEVELOPMENT DEPARTMENT.

PROPERTY ADDRESS: 3827 N. PROSPECT AVE.

PROPERTY OWNER

Owner Name: BETH & MICHAEL GIACOBASSI

Owner Address:

Phone Number: 414-704-3613

3827 N. PROSPECT AVE.

Email: BETHGIACOBASSI@GMAILC.COM

APPLICANT/BUSINESS

Name: Jen Simons/ Arch Electric Inc.

Address:

Phone Number: 920-893-8388

W4499 Sumac Rd.

Email: jen@archelec.com

Plymouth, WI 53073

Check if prefer to receive Meeting Agenda by EMAIL:

PROPERTY OWNER

APPLICANT

BUSINESS INFORMATION

Name of Business Arch Electric Inc.

Max # Employees On-site 3

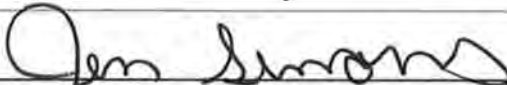
Is a survey attached? (if required)

Is a parking plan attached? (if required)

*Provide copy of business plan

What do you wish to do that will require a Conditional Use Permit?

Install a fixed roof mounted Solar PV System


SIGNATURE

6/22/16
DATE



3827 Prospect Solar Panels



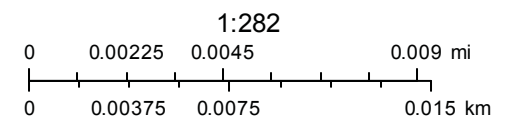
July 8, 2016

Address Numbers



Parcels

Streets



Milwaukee County Land Information Office

ABB micro inverter system MICRO-0.25/0.3/0.3HV-I-OUTD 0.25kW to 0.3kW



ABB's MICRO inverter enables individual panel output control when flexibility and modularity are required.

This ABB MICRO inverter enables individual panel output control.

Individual panel output control can reduce shading and mismatching effect. ABB's MICRO is the best alternative to the traditional string inverters that ABB is famous for. The individual panels can be installed in different orientations which reduce the efficiency losses in a variety of challenging conditions.

The Maximum Power Point Tracking (MPPT) algorithm maximizes energy and flexibility.

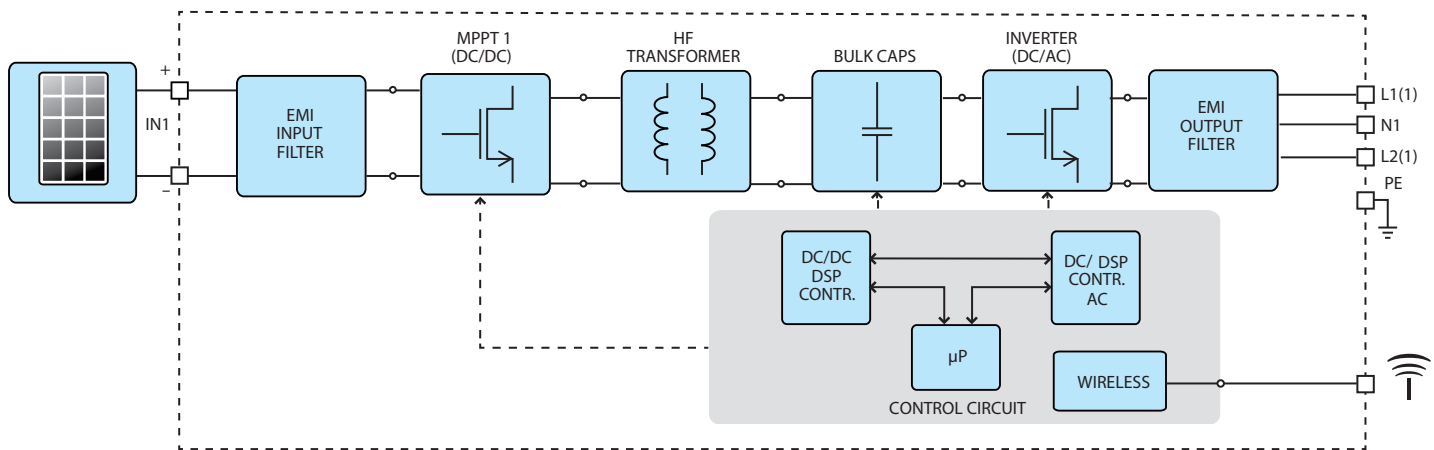
The proprietary MPPT algorithm works at the level of each solar panel in any light condition offering more energy output. This inverter has a maximum efficiency of 96.5%.

The electrolyte-free power converter further increases the life expectancy. The compatible and proprietary wireless communication hub, Concentrator Data Device (CDD), simplifies installation.

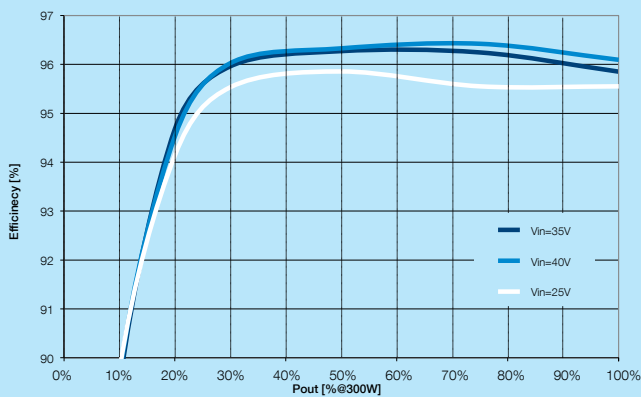
Highlights:

- The high speed and precise MPPT algorithm offers real time power tracking and improved energy harvesting.
- HF isolation to fit any application that requires the positive grounding of DC input terminals
- Reduced susceptibility to fault. In case of a component failure only the energy produced from one PV module will be lost.
- Outdoor enclosure for unrestricted use under any environmental conditions.

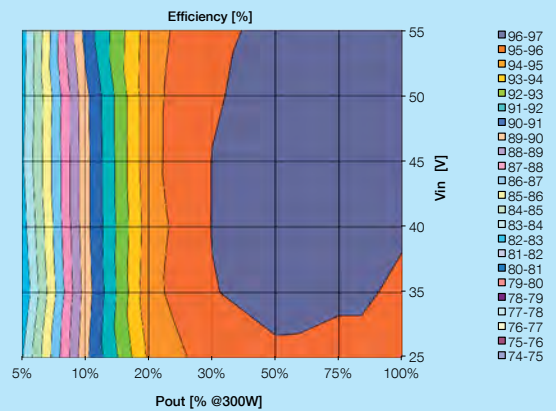
Block diagram of MICRO-0.25/0.3/0.3HV-I-OUTD



MICRO-0.3-I



MICRO-0.3-I



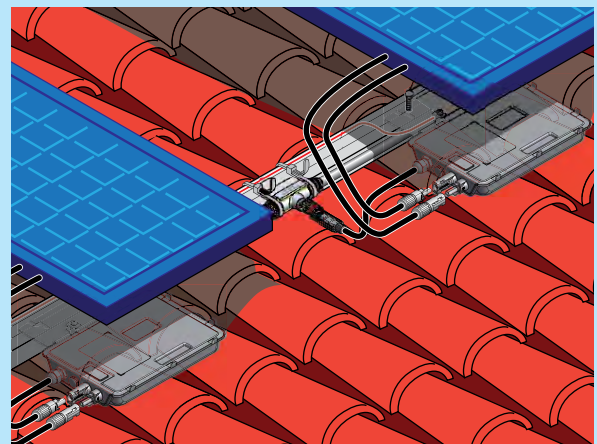
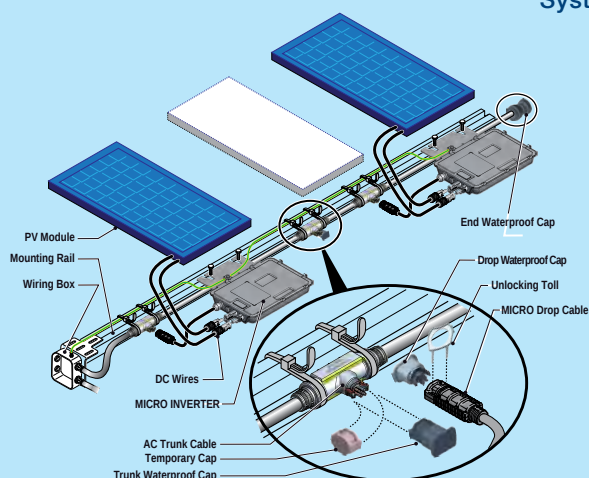
MICRO inverter system installation:

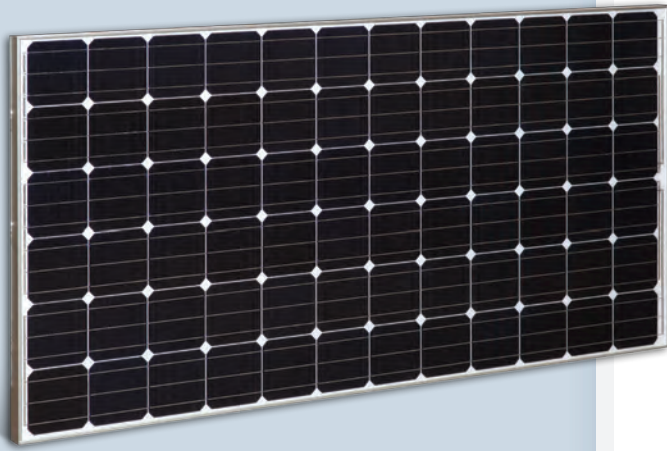
- The ABB MICRO inverter offers ease of installation with AC trunk and drop cable configuration.

- The mounting bracket on the MICRO inverter ensures simple and durable mounting on commercially available racking solutions.

- AC cabling compatible with 60, 72 and 96 cell modules in both portrait and landscape orientation.
- Locking connectors and weatherproof accessories ensure long term reliable operation of the plant.

System installation





SUNIVA OPTIMUS® SERIES MONOCRYSTALLINE SOLAR MODULES

OPT SERIES: OPT 72 CELL MODULES (SILVER FRAME)

ENGINEERING EXCELLENCE

- Built exclusively with **Suniva's premium ARTisun Select cells**, providing one of the highest power outputs per square meter at an affordable price
- **The leading US-born, US-operated crystalline silicon cell and module manufacturer**, spun out of Georgia Tech's University Center of Excellence in Photovoltaics; one of only two such research centers in the U.S.
- Suniva's state-of-the art manufacturing and module lab facilities feature the most advanced equipment and technology

QUALITY & RELIABILITY

- Suniva Optimus modules are manufactured and warranted to our specifications assuring consistent high performance and high quality.
- Rigorous in-house quality management tests beyond standard UL and IEC standards
- Performance longevity with advanced polymer backsheet
- UL1703 listed Type 2 PV module
- Passed the most stringent salt spray tests based on IEC 61701
- Passed enhanced stress tests¹ based on IEC 61215 conducted at Fraunhofer ISE²
- PAN files are independently validated

Optimus® modules are known for their superior quality and long-term reliability. These high-powered modules consist of Suniva's premium ARTisun® Select cell technology and are designed and manufactured in the U.S.A. and North America using our pioneering ion implantation technology. Suniva's high power-density Optimus modules provide excellent performance and value.

FEATURES

- Utilizes our premier American-made cell technology, ARTisun Select®
- Superior performance and reliability; enhanced stress tests conducted at Fraunhofer ISE
- Module families ranging from 325-340W
- Positive only power tolerance
- Marine grade aluminum frame with hard anodized coating
- Certified PID-free by PV Evolution Labs (PVEL)
- Made in North America
- Qualifies for Ex-Im Financing
- 1000V UL
- 25 year linear power warranty;
10 year product warranty

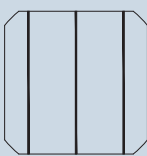
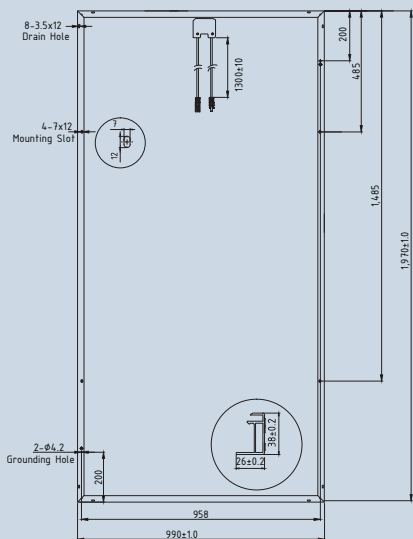


CERTIFICATIONS

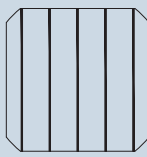


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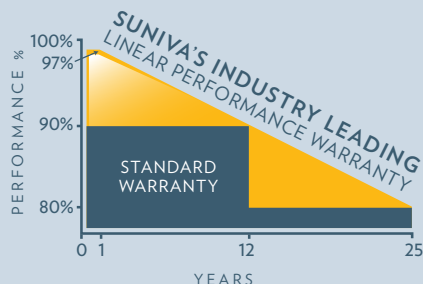
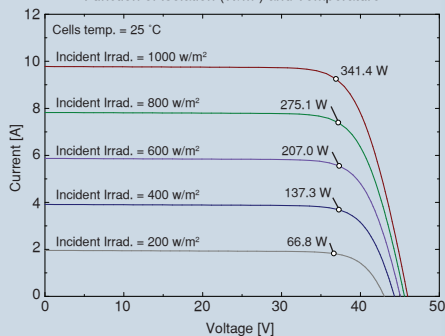
3 busbar cell



5 busbar cell

PV module: Suniva, OPT340-72-4-100

Current-Voltage (IV) as a
Function of Isolation (W/m²) and Temperature



PLEASE RECYCLE

AUGUST 19, 2015 (REV. 6) [SAMD_0051]

OPTIMUS SERIES: OPT 72 CELL MODULES

ELECTRICAL DATA (NOMINAL)

The rated power may only vary by -0/+10W and all other electrical parameters by $\pm 5\%$

Module Type	OPT325-72-4-100	OPT330-72-4-100	OPT335-72-4-100	OPT340-72-4-100
Power Classification (Pmax)	325 W	330 W	335 W	340 W
Module Efficiency (%)	16.66%	16.92%	17.18%	17.43%
Voltage at Max. Power Point (Vmp)	37.5 V	37.6 V	37.7 V	37.8 V
Current at Max. Power Point (Imp)	8.67 A	8.78 A	8.89 A	8.99 A
Open Circuit Voltage (Voc)	45.8 V	45.9 V	45.9 V	46.0 V
Short Circuit Current (Isc)	9.42 A	9.54 A	9.66 A	9.78 A

The electrical data apply to standard test conditions (STC): Irradiance of 1000 W/m² with AM 1.5 spectra at 25°C.

CHARACTERISTIC DATA

Type of Solar Cell	High-efficiency ARTisun Select cells, 3 and 5 busbar options available
Frame	Silver anodized aluminum alloy
Glass	Tempered (low-iron), anti-reflective coating
Junction Box	NEMA IP67 rated; 6 internal diodes
Cable & Connectors	12 AWG (4 mm ²) PV Wire with multiple connector options available; cable length 1300 mm

MECHANICALS

Cells / Module	72 (6 x 12)
Module Dimensions	1970 x 990 mm (77.6 x 39 in.)
Module Thickness (Depth)	38 mm (1.5 in.)
Approximate Weight	23 kg (50.7 lbs.)

TEMPERATURE COEFFICIENTS

Voltage	β , Voc (%/°C)	-0.335
Current	α , Isc (%/°C)	+0.047
Power	γ , Pmax (%/°C)	-0.420
NOCT Avg	(+/- 2 °C)	46.0

LIMITS

Max. System Voltage	1000 VDC for IEC, 1000 VDC for UL
Max Series Fuse Rating	15 Amps
Operating Module Temperature	-40°C to +85°C (-40°F to +185°F)
Storm Resistance/Static Load	Tested to IEC 61215 for loads of 2400 Pa (50 psf); hail and wind resistant

Suniva® reserves the right to change the data at any time. View manual at suniva.com.

¹UV 90 kWh, TC 400, DH 2000. ²Tests were conducted on module type OPT 60 silver frame.

Please read installation manual before installing or working with module.

HEADQUARTERS

Product	Modules per pallet:	Modules per full 53 ft. truck load, double stacked
OPT - 72 cell	22	660

5765 Peachtree Industrial Blvd.,
Norcross, Georgia 30092 USA
Tel: +1 404 477 2700

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**SM SOLAR
MOUNT**



UNIRAC®
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SOLARMOUNT defined the standard in solar racking. New enhancements are designed to get installers off the roof faster than ever before. Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

ELIMINATE THE GROUNDWIRE FROM YOUR SOLARMOUNT ARRAY
LOSE THE COPPER & LUGS
INTEGRATED GROUNDING POWERED BY: **[e] enphase**
E N E R G Y



UL2703
LISTED

**BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION**
CLASS A - TYPE 1, 2, 3 & 10 MODULES



**ROOF
MOUNT
SYSTEMS**

GET OFF THE ROOF FASTER THAN EVER BEFORE

.....
OPTIMIZED COMPONENTS • VERSATILITY • AVAILABILITY • DESIGN TOOLS

OPTIMIZED COMPONENTS

INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

VERSATILITY

ONE PRODUCT - MANY APPLICATIONS

Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low sloped or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

AVAILABILITY

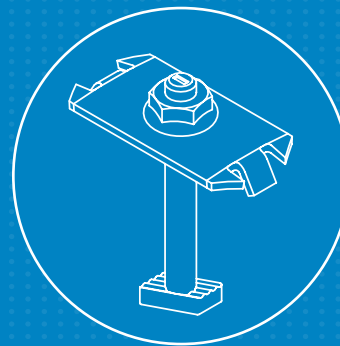
NATIONWIDE NETWORK

Unirac maintains the largest network of stocking distributors for our racking solutions. Our partners have distinguished their level of customer support, availability, and overall value, thereby providing the highest level of service to users of Unirac products. Count on our partners for fast and accurate delivery to meet your project objectives. Visit Unirac.com for a list of distributors.

AUTOMATED DESIGN TOOL

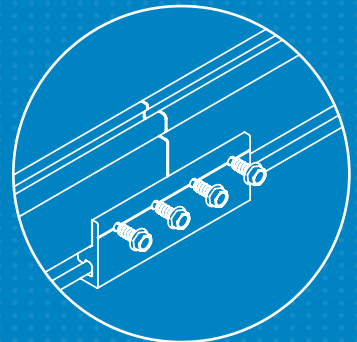
DESIGN PLATFORM AT YOUR SERVICE

Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers; there's no need to print results and send to a distributor, just click and share.



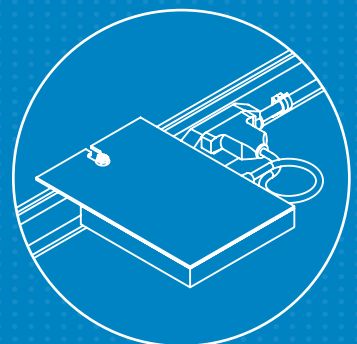
**INTEGRATED BONDING
MIDCLAMP**

**INTEGRATED BONDING
SPLICE BAR**



**INTEGRATED BONDING
L-FOOT w/ T-BOLT**

**INTEGRATED BONDING
MICROINVERTER MOUNT
w/ WIRE MANAGEMENT**



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**DESIGN
TOOLS**



**PERMIT
DOCUMENTATION**

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

As a Hilti Group Company, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a 10-year limited product warranty and a 5-year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

535-30 ARCHITECTURAL PROJECTIONS, SPECIAL STRUCTURES, MOBILE WIRELESS TOWERS AND SOLAR AND WIND ENERGY SYSTEMS

D. Conditional use permits for solar and wind energy systems.

[\(1\)](#) Installation and use of a "wind energy system" or a "solar energy system" shall be a conditional use in all districts. The Village Plan Commission may authorize the Planning and Development Department to issue a conditional use permit for solar or wind energy systems after review and a public hearing. Any restriction placed on a solar or wind energy system by the Plan Commission is subject to the limitations found in this section. The review and approval criteria set forth in this subsection shall apply to solar and wind energy systems.

[\(2\)](#) Definitions. As used in this subsection, the following terms shall have the meanings indicated:

A SOLAR ENERGY SYSTEM. Equipment which directly converts and then transfers or stores solar energy into usable forms of thermal or electrical energy.

A WIND ENERGY SYSTEM. Equipment and associated facilities that convert and then store or transfer energy from the wind into usable forms of energy.

[\(3\)](#) Authority to restrict systems limited.

[\(a\)](#) The Village Plan Commission shall review any proposed wind energy system and may approve the system if the applicant meets the owner requirements for a wind energy system as set forth in §§ PSC 128.10 through 128.19, Wis. Adm. Code, (current through Administrative Register, December 2014, No. 708) and as hereinafter amended, which are hereby incorporated by reference and made a part hereof as if fully set forth herein.

[\(b\)](#) The Village Plan Commission shall review any proposed solar or wind energy system and may only restrict the system if the restriction satisfies one of the following conditions:

[\[1\]](#) Serves to preserve or protect the public health or safety.

[\[2\]](#) Does not significantly increase the cost of the system or significantly decrease its efficiency.

[\[3\]](#) Allows for an alternative system of comparable cost and efficiency.

MEMORANDUM

July 11, 2016

To: Plan Commission
Cc: Village Manager Chris Swartz
Village Attorney Nathan Bayer
From: Planning Director Ericka Lang



RE: Conditional Use for Bank Drive-Through, 4060 N. Oakland

On July 7, 2016 the Village received a conditional use application for a bank drive-through at 4060 N. Oakland Avenue and a special exception application for parking.

Redevelopment Description

North Shore Bank may take ownership of commercial property 4060 N. Oakland Avenue, and is proposing to raze the existing building and construct a two-story bank. The building will front Oakland Avenue and Kenmore Place. The existing building currently has a lower level printing business (Shorewood Press) and a first floor hair salon (Robert Laurence). The building is not identified as a national or local historical landmark.

Site information:

Site Information		Zoning Review
Two-story building (2 nd floor mezzanine)		2-story min. Meets code
Lot size 8,475 SF (75FT x 113FT)		Min 4500 SQFT. Meets code
Building foot print 2,734 SF		
Building area, est. +3600 SF		
Zoning Setbacks:		
	Rear: requires 10 feet	Meets code 535-21A
	Front: 15-FT build-to line	Meets code 535-21A
	Interior side: zero setback	Meets code 535-21A
	Street side: 20-FT	See 535-21A(6)[c]. Setback 18.9' – 20'.
Zoned B-1: allows 100% commercial or mixed-use		Bank use permitted. 535-21A
9 on-site parking spaces (1 ADA)		Required 1 sp/300 SQFT plus 1 sp per every 3 employees. Required 14 spaces (assuming 2 for staff) per 535-47D. Does not meet code. 9 spaces = 64% on-site. Per 535-49B 25% on-site. Does not meet code.
Rear surface parking lot location		Meets code

2 bank drive-through lanes	Requires CUP per 535-27
Rear and south side 4-FT wood fence	Meets code 225-8
Landscaping	Required to screen lot. Design Review Board approval
Bicycle parking	Providing 2
Exterior lighting	1 rear pole sign, fully shielded; 2 rear building shielded sconces. Planner and Design Review Board approval
Garbage	No exterior garbage needed
Snow collection	Use 2 SE parking spaces
Right-of-Way planters	Requires design and Village Board approval.

Approvals

Your commission is reviewing the site plan, considering a conditional use application for a bank drive-through, considering a special exception for parking requirements and reviewing the traffic study.

- A. Site Plan.** Staff is seeking input for the proposed site plan and has completed a preliminary site plan review. Further site information is required before consideration by Shorewood's Design Review Board.

Staff worked with the architect to limit access points, place a door facing Oakland, bicycle parking, lot screening and landscaping.

All zoning dimensional requirements are met.

B. Conditional Use Application for Drive-Through & Traffic Study

Per Article V. Conditional Uses, 535-27 Commercial Uses. C. Drive-in or drive-through businesses other than restaurants in the B-1 through B-3 Districts.

Consideration of the conditional use application utilizes findings per **535-25C (1)- (7)**. One of those items is *(5) Adequate measures have been or will be taken to provide ingress and egress so designed as to minimize traffic congestion in the public streets.* A traffic study was completed in late February 2016 to address this item. The study reviews the Oakland/Kenmore Place and Oakland/Jarvis St intersections, observing vehicle, pedestrian and bicycle traffic. A reminder that the Metro Market and parking deck opened mid-February, less than two weeks prior to the traffic study.

The traffic study concluded that the levels of service (LOS) at Oakland Ave &

Kenmore Pl with the proposed development will have a LOS A (highest level) along Kenmore Pl and a LOS B (stable operation) along Oakland. The LOS for Oakland Av & Jarvis St intersection (south parking deck entry point for Metro Market) were lower; however, traffic was congested during the first couple weeks of the Metro Market opening and currently does not display the same levels of congestion.

A full copy of the traffic study completed by Traffic Analysis & Design, Inc is in your packet and a traffic engineer is invited to attend your meeting.

C. Special Exception for Parking

The redevelopment supplies nine (9) on-site parking stalls which includes one (1) handicap space. Based on the building area and number of staff on-site, the zoning code requires 14 parking spaces. Per 535-49, 25% of the parking spaces must be on-site and the remaining may be up to 400 feet from the building. North Shore Banks indicated they will reach out to the Bartlett parking structure owner about daytime permits for bank employees, which is between two – seven maximum number of employees (assuming on-site at one time).

Materials

- CUP application
- Special Exception application
- Site plan, elevation
- Survey
- Aerial photo
- Traffic study
- Existing building photos
- Project description
- Code:
 - 535-51 Special Exception
 - 535-25 CUP criteria
 - 535-27 CUP uses
 - 535-21 Commercial, mixed use districts
 - 535-47 & 49 parking



NORTH SHORE BANK

Corporate Office: 15700 W Bluemound Rd-Brookfield, WI 53005
262.785.1600 | northshorebank.com

May 9, 2016

Ericka Lang
Shorewood Planning Director
3930 N Murray Avenue
Shorewood, WI 53211

Subject: Proposed North Shore Bank Branch at 4060 N Oakland Avenue, Shorewood, WI 53211

Ms. Lang;

Please share the outline of the following applicable items with the Plan Commissioners:

1. Name of the Business and Address:

North Shore Bank
4060 North Oakland Avenue
Shorewood, WI 53211

2. Name of the Owner and Address:

North Shore Bank
15700 W Bluemound Rd
Brookfield WI 53005

3. Name of the Applicant (if different from owner):

David Kane, Vice President

4. Legal Description:

Lots 17 and 18, and the North 15 feet of Lot 19, in Block 6, in Oakwood subdivision, in the Southwest ¼ of Section 3, Township 7 North, Range 22 East, in the Village of Shorewood, Milwaukee County, Wisconsin.

5. Tax Key:

239-0645-000

6. Zoning of Property:

B1

7. Lot Size (depth/width area):

113 feet by 75 feet

8. Dimensions of all levels (floors) of building(s):

Mike? 2,840 sq ft?

9. Total floor area:
2,840 sq ft + ~ 900 SF 2ND FLR mezzanine per architect E2
10. Specific use of the entire property and buildings:
Building use is for conducting business of banking. Site use is for lobby, drive-up and interactive/video teller (ITM) service, and walk up ATM banking services.
11. Minimum and maximum number of employees:
Minimum: 2 persons
Maximum: 7 persons assuming max on-site E2
12. Days of operation:
Monday through Sunday
13. Hours of operation:
Lobby hours: M-F, 9:00am to 5:00pm, and Saturday, 9:00am to 1:00pm
Drive up/ITM hours: M-F, 8:00am to 7:00pm, Saturday, 8:00 am to 5:00pm, Sunday, 10:00am to 4:00pm
14. Signage (Type, wall, free-standing, monument, lighting, size, location, etc.):
Mike? Wall mounted signage.
15. What conditions have the State of Wisconsin or County imposed upon your use of the property, if any: None
16. Security fencing:
None
17. Do you feel there will be any problems such as noise, odors, glare, potential fire hazards, or smoke resulting from the proposed use?
No
18. Are you proposing food services?
No
19. Did the State of Wisconsin approve your interior building plans?
No
20. What provisions are you making for fire protection and human safety?
Fire extinguishers located within the building, Smoke/heat/security detectors monitored off site with closed circuit video surveillance.
21. What are your rules and regulations for the property?
No unauthorized use of the site by others or after hours, including parking. No weapons concealed per Wisconsin Statutes 943.13(1m) within Bank offices.
22. List the timetable of completion of the building construction and anticipated grand opening date:
Demolition to start: Spring 2017
Planned construction to start: Spring 2017
Anticipated grand opening: Fall 2017



23. Proposed on site security, measures:
Smoke/heat/security detectors monitored off site with closed circuit video surveillance, and GPS.
24. Anticipated maximum number of facility users and viewers at one time (including special events)?
25 persons.
25. Any other information you or the Plan Commission feels is pertinent?
The Bank is discussing the consolidation of other bank branches into this location.
26. Business plan:
Provide North Shore Bank customers in the local Shorewood area with lobby, drive-up and interactive/video teller (ITM) service, and walk up ATM banking services.
27. Entire grant application and count issued request for proposal:
None
28. Your name, signature, and date on the Plan of Operation Document:

BY: _____

Title: _____

Date: _____

David Kane, Vice President
North Shore Bank, FSB
15700 W Bluemound Rd
Brookfield, WI 53005
(P)262-787-6816
Email: dkane@northshorebank.com



Michael Peine Architects
4617 N. Idlewild, Whitefish Bay, WI 608-516-0531
www.michaelpeinearchitects.weebly.com

PROJECT DESCRIPTION:

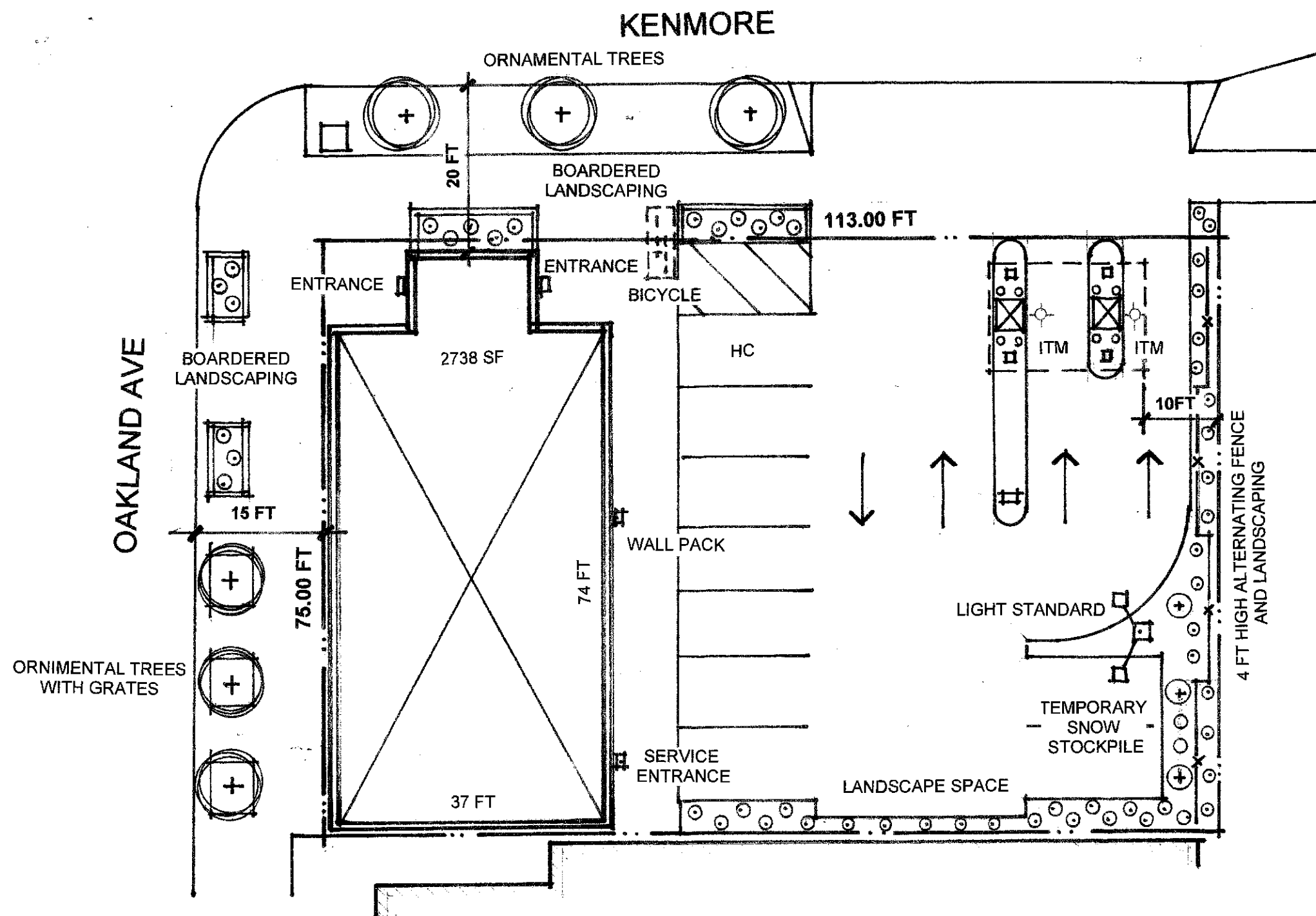
NORTH SHORE BANK PROPOSES TO CONSOLIDATE AND RELOCATE THEIR SHOREWOOD CUSTOMER SERVICE CENTERS TO THE SE CORNER OF KENMORE AND OAKLAND AVE.

THE FACILITY WILL FEATURE A 2734 SF, (2) STORY BUILDING ON A 75FT X 113FT (8475 SF) SITE WITH PARKING FOR (2) BICYCLES, (1) HANDICAPPED PARKING SPACE AND (8) STANDARD PARKING SPACES IN ADDITION TO (2) LANE DRIVE-UP ITM CANOPY SCREENED BY A 4 FT HIGH OPAQUE FENCE AND LANDSCAPING FOR THE RESIDENTIAL AREAS TO THE EAST.

PLANS FOR ADDITIONAL PARKING FOR EMPLOYEES INCLUDE LEASING SPACE IN THE NEW PARKING GARAGE ACROSS OAKLAND AVE.

WASTE AND RECYCLESABLE WILL BE TRANSPORTED OFF SITE BY CLEANING AND SHREDDING SERVICES.

SITE LIGHTING WILL BE PROVIDED BY A COMBINATION OF BUILDING WALL PACKS AND A SINGLE LIGHT STANDARD WITH SHIELDED HEADS DIRECTED AWAY FROM RESIDENTIAL AREAS.



NORTH



NORTH SHORE BANK BRANCH

ITM Drive-up

4060 OAKLAND - VILLAGE OF SHOREWOOD - WISCONSIN - 53211

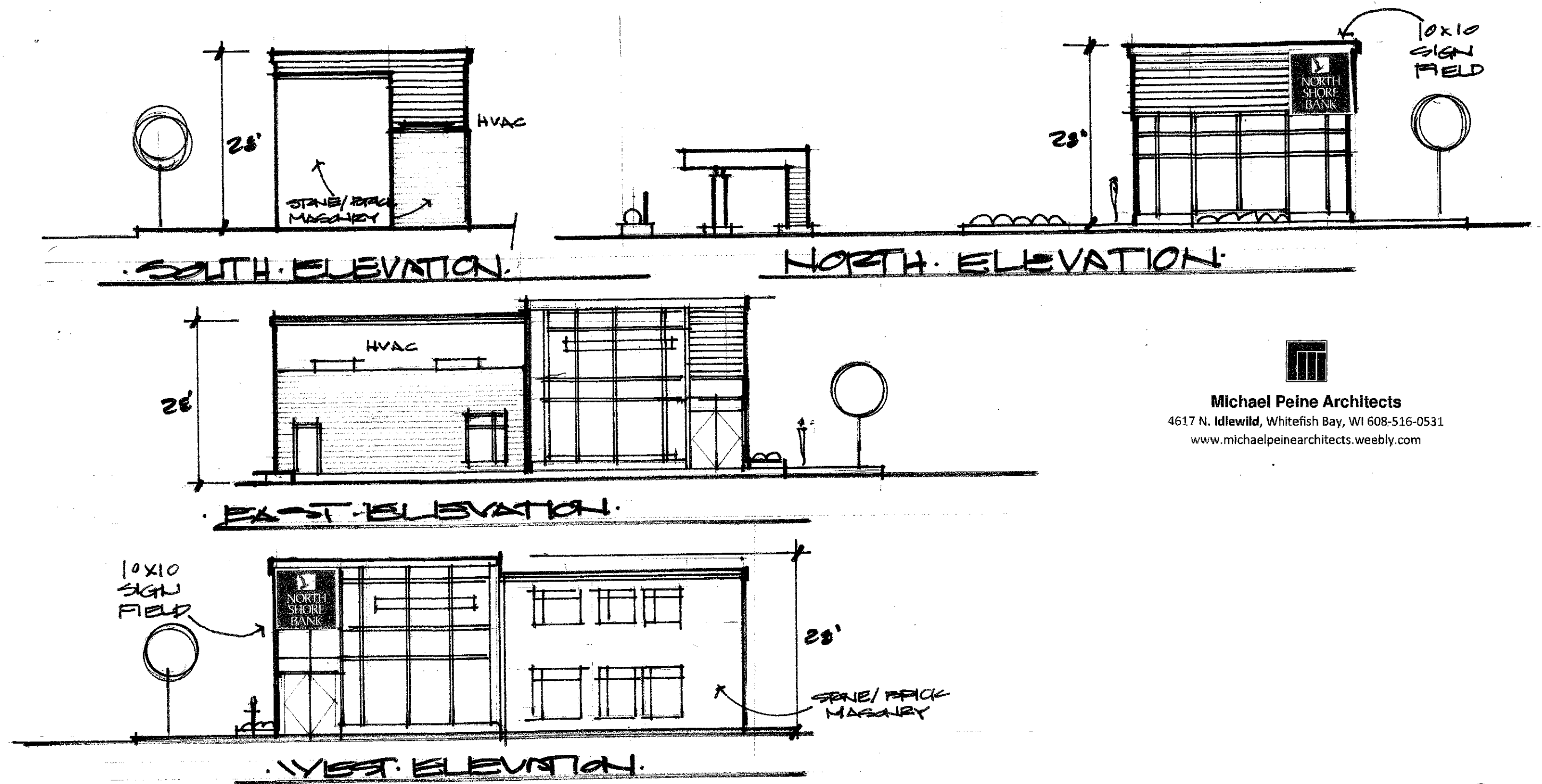
PROPOSED SITE PLAN

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

1 of 2



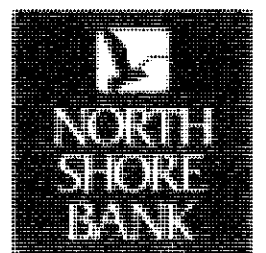
JULY 7TH, 2016



Michael Peine Architects
 4617 N. Idlewild, Whitefish Bay, WI 608-516-0531
www.michaelpinearchitects.weebly.com

2 of 2

NORTH SHORE BANK BRANCH
 ITM Drive-up
 4060 OAKLAND - VILLAGE OF SHOREWOOD - WISCONSIN - 53211
SCHEMATIC ELEVATIONS
 SCALE: 1/16"=1'-0"



JULY 7TH, 2016



Shorewood Press

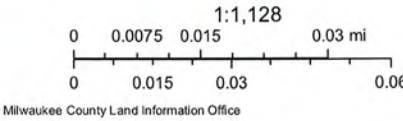


Shorewood Press

4060 Oakland



July 11, 2016
Streets



Zoning Code Sections:

535-21 Commercial Zoning District

535-25 Conditional Use findings

535-27 Conditional Uses

535-47 number of parking spaces required

535-49 parking spaces required on-site

535-51 special exception criteria

535 COMMERCIAL ZONING DISTRICT

Amended 2-21-1994 by Ord. No. 1678; 6-5-2006 by Ord. No. 1911; 10-23-2006 by Ord. No. 1917]

535-21 Commercial, mixed-use and river districts

A. B-1 Commercial Use District. The B-1 Commercial Use District is intended to provide the Village with a mix of retail, service, restaurant, office, and residential uses in a pedestrian-friendly, active shopping environment. Building massing, scale and appearance and the general character of this district should be oriented toward a "small town," "Main Street," pedestrian character. To encourage further retail development within the district, especially in the core blocks extending from the Capitol and Oakland intersection, first-floor commercial is required.

(1) Permitted uses.

(a) Principal use:

[1] Commercial use only on first floor (ground level).

[2] Commercial use or apartment use above first floor.

[3] Selling and storing only within the premises (within the building).

(b) The following uses are permitted provided that they shall be retail establishments and primarily selling and storing new merchandise, and except that the sale or display of firearms or ammunition suitable for use in a firearm is prohibited:

Permitted Retail Uses

Appliance stores
Bakeries employing not over 7 employees
Candy and ice cream shops
China, glassware and crockery stores
Clothing stores
Delicatessens
Department stores
Drugstores
Electronic stores
Florists
Food stores
Furniture stores
Gift stores
Hardware and home improvement stores
Hobby shops
Jewelry stores
Medical equipment stores
Music stores
Office supplies
Optical stores
Packaged beverage stores and wine shops
Paint stores
Pet shops
Photographic supply stores
Specialty grocery stores
Specialty retail stores
Supermarkets

(c) In addition to the uses permitted above, the following service-oriented uses shall also be permitted:

Service-Oriented Permitted Uses

Barbershops
 Beauty shops
 Business offices
 Caterers
 Clothing repair and tailoring
 Dance instruction studios
 Financial institutions
 Fine arts studios and galleries
 Furniture upholstery shops
 Newspaper offices
 Printing shops
 Private schools
 Professional offices
 Restaurants, other than carry-out, drive-in or drive-through
 Self-service and pickup laundry and dry-cleaning establishments employing not over 7 employees

(2) Uses prohibited.

(a) Buildings that are solely residential in use.

[1] Any land or lot on which there is located a residence of four families or fewer shall not be subdivided for business purposes.

[2] Any building used as a residence of four families or fewer shall not be added to, altered or converted for business purposes.

(b) Manufacturing, repairing, processing or storing of goods, wares, merchandise, machinery, equipment or materials, except such manufacturing, repairing, processing, or storing of said goods, wares, merchandise, machinery, equipment or materials as is customarily incidental to the principal use of the property that is conducted solely within the building and in such manner that is not in conflict with the requirements of Article [VIII](#) of this chapter.

(c) Vehicular sales, service and detailing.

(d) Gasoline service stations.

(e) Parking lots with total parking spaces in excess of 100 spaces, except as allowed in § [535-46A\(3\)](#).

[Added 10-20-2008 by Ord. No. 1944]

(3) Conditional uses: see Article [V](#).

[Amended 2-25-2008 by Ord. No. 1935]

(4) Building:

(a) Height, maximum: see Subsection [E](#), Building height overlay, of this section.

(b) Area: no minimum.

(5) Lot:

(a) Width, minimum: 40 feet.

(b) Area, minimum: 4,500 square feet.

(6) Setback:

- (a)** Front: build-to line of 15 feet from the street curbline, unless the lot line is at a distance greater than 15 feet from the curbline, then the build-to line shall be the lot line.

[Amended 2-25-2008 by Ord. No. 1935]

- (b)** Rear: minimum of 5 feet from rear lot line or alley; except that where the rear lot line is adjacent to a residential district, the setback is 10 feet. The Plan Commission may grant a special exception from the rear setback for underground parking garage entrances, not to exceed 15 feet in height, pursuant to the provisions of § [535-51](#); except that, in lieu of the criteria in § [535-51B](#), the Plan Commission shall consider the following criteria in an application for a special exception from the rear setback for an underground parking garage entrance:

[Amended 6-16-2008 by Ord. No. 1939]

- [1]** Safety concerns related to vehicular traffic.
- [2]** Distance of the entrance relative to the other property lines.
- [3]** Aesthetics of the entrance.
- [4]** Such other matters as the Plan Commission deems relevant and material.

(c) Side:

- [1]** Zero, unless applicable Building Code requirements for dwelling units require a greater distance and except that it shall be 10 feet for a lot that borders a single- or two-family residential district.
- [2]** Corner lots: a build-to line of 20 feet from the street curbline, except that the side yard setback on corner lots shall be reviewed by the Plan Commission to determine whether a twenty-foot build-to line or another corner lot side yard build-to line is appropriate due to parking considerations and the layout of the intersection, provided further that the corner lot side yard build-to line at the intersection of Capitol Drive and Oakland Avenue is 15 feet.

[Amended 2-25-2008 by Ord. No. 1935]

- (7)** Design guidelines. Central District Design Guidelines (see Subsection [G](#)) shall apply to construction of new buildings, the structural alteration of or additions to existing building, and any substantial modifications to the exterior of any buildings in this district.

B. B-2 Mixed-Use Residential District. The B-2 Mixed-Use Residential District is intended to provide opportunities for mixed-use development while encouraging residential development. The district allows buildings of exclusively residential use as well as mixed-use buildings with residential uses on upper floors and retail, office, service, or restaurant uses on the first floor. Buildings of exclusively commercial use are not permitted. This district will allow additional shopping opportunities while adding residents and vitality to the Village.

(1) Permitted uses:

- (a)** All uses permitted in the B-1 District.
- (b)** Multifamily residential use on all floors.
- (c)** Mixed-use building, commercial first floor only.

(2) Uses prohibited:

- (a)** Commercial use on all floors.
- (b)** One- and two-family dwellings.

- [1]** Any land or lot on which there is located a residence of four families or fewer shall not be subdivided for business purposes.

CONDITIONAL USE CRITERIA

535-25 CUP Review and Approval

The Village Plan Commission shall review the site, existing and proposed structures, architectural plans, neighboring uses, parking areas, driveway locations, highway access, traffic generation and circulation, drainage, sewerage and water systems, and the proposed operation.

A. Conditions, such as landscaping, architectural design, type of construction, construction commencement and completion dates, sureties, lighting, fencing, planting screens, operational control, hours of operation, improved traffic circulation, deed restrictions, highway access restrictions, increased yards, or parking requirements, may be required by the Village Plan Commission upon its finding that these are necessary to fulfill the purpose and intent of this chapter.

B. Compliance with all other provisions of this chapter, such as lot width and area, yards, height, parking, loading, traffic, highway access, and performance standards, shall be required of all conditional uses. Variances shall only be granted as provided in Article X.

C. No conditional use permit shall be authorized by the Plan Commission unless such Commission shall find that:

(1) The establishment, maintenance or operation of the conditional use will not be detrimental to or endanger the public health, safety, morals, comfort or general welfare.

(2) The conditional use will not be injurious to the use and enjoyment of other property in the immediate vicinity for the purposes already permitted nor substantially diminish or impair property values within the neighborhood.

(3) The establishment of the conditional use will not impede the normal and orderly development and improvement of the surrounding property for uses permitted in the district or have a negative impact on the diversity of the type of businesses located in the district.

[Amended 3-18-1991 by Ord. No. 1599]

(4) Adequate utilities, access roads, drainage and/or necessary facilities have been or are being provided.

(5) Adequate measures have been or will be taken to provide ingress and egress so designed as to minimize traffic congestion in the public streets.

(6) The conditional use shall, in all other respects, conform to the applicable regulations of the district in which it is located, except as such regulations may, in each instance, be modified by the Board of Trustees pursuant to the recommendations of the Plan Commission.

(7) The conditional use is in accordance with and subject to all other applicable laws and regulations.

D. In addition to the foregoing provisions of this section, special and specific criteria and requirements as set forth in this chapter shall be considered before a conditional use permit is issued. The provisions of § 535-22 and the provisions of §§ 535-26 through 535-28 of this article, when they specifically create the basis upon which a conditional use may be granted, shall supersede and take precedence over the provisions of §§ 535-23 through 535-25 of this article in case of conflict or duplication.

Village of Shorewood, WI
Monday, July 11, 2016

Chapter 535. Zoning

Article V. Conditional Uses

§ 535-27. Commercial uses.

[Amended 10-23-2006 by Ord. No. 1917]

The following commercial uses shall be conditional uses and may be permitted as specified:

- A. Animal hospitals in the B-3 District.
- B. Bookstores in the B-1, B-2, B-3 and B-5 Districts.
- C. Drive-in or drive-through businesses other than restaurants in the B-1 through B-3 Districts.
- D. Clinics in the B-1, B-2 and B-3 Districts.
- E. Clubs, lodges and other similar meeting places in the B-3 District.
- F. Funeral homes in the B-1, B-2, B-3 and B-5 Districts.
- G. Gasoline service stations in the B-3 District.
- H. Hotels and motels in the B-1 through B-3 Districts, subject to the provisions of Chapter **370** of the Village Code.
- I. Payday loan, currency exchange, or title loan businesses in the B-3 District, subject to all of the requirements of this chapter, including all of the provisions of § **535-25** and the following additional conditions:
 - (1) No other currency exchange, payday loan or title loan business is located within 1,500 feet of the proposed use.
 - (2) The proposed use will not be located within 150 feet of a single-family zoning district, a two-family residential zoning district or a School, Church and Public Building District.
 - (3) The proposed use will not be located within 50 feet of a Planned Development District, unless the Plan Commission specifically finds that the proposed use would be consistent with the uses in that Planned Development District and would not impede the normal and orderly development and improvement of the property in that Planned Development District.
 - (4) No currency exchange, payday loan, or title loan businesses may be open between the hours of 9:00 p.m. and 7:00 a.m.
- J. Resale shops in the B-3 District.
- K. Restaurants, carry-out, in the B-1 through B-3 Districts, subject to the provisions of Chapter **299** of the Village Code.
- L. Restaurants, drive-in or drive-through, in the B-3 District, subject to the provisions of Chapter **299** of the Village Code.
- M. Vehicular washing and repair stations and garages in the B-3 District.

Village of Shorewood, WI
Monday, July 11, 2016

Chapter 535. Zoning

Article IX. Off-Street Parking

§ 535-47. Schedule of requirements.

A. Dwelling and lodging uses.

[Amended 10-23-2006 by Ord. No. 1917]

- (1) Apartment hotels, hotels, motels and private clubs: one parking space per room or suite of rooms comprising a lodging unit, plus such additional spaces as may be required herein for affiliated uses, such as restaurant and bar facilities, meeting rooms and retail sales areas.
- (2) Multifamily dwelling units in B-1 through B-4 Districts: 1.75 parking spaces per dwelling unit.
 - (a) A minimum of 50% of parking in the B-4 District shall be underground or in an enclosed parking facility.
 - (b) All required parking for multifamily dwelling units, except guest parking, shall be provided in an approved garage, except in the B-4 District.
- (3) Multifamily dwelling units in all Residence Districts R-1 through R-10:
 - (a) Efficiency and one-bedroom units: one parking space per dwelling unit.
 - (b) Two-bedroom dwelling units: 1.25 parking spaces per dwelling unit.
 - (c) Three- or more bedroom units: 1 1/2 parking spaces per dwelling unit.
 - (d) In addition to the above requirements: one parking space per 10 units for guest parking and servicing the facility.
 - (e) All required parking for multifamily dwelling units, except guest parking, shall be provided in an approved garage.
- (4) One- and two-family dwellings:
 - (a) Single-family dwellings: there shall be a minimum of one parking space in an approved garage.
 - (b) Two-family dwellings: one parking space in an approved garage per dwelling unit.
 - (c) No vehicle except an automobile may be parked in the front setback or between adjacent residences when the parking area parallels an existing residence on the adjoining property. In addition, on corner lots, no vehicle except an automobile may be parked within the front setback of the property where located nor within the front setback of any adjacent property.

B. Schools, institutions, auditoriums and other places of assembly.

- (1) Auditoriums, gymnasiums, stadiums, grandstands, meeting halls, exhibition halls and said categories as accessory uses to schools, churches and other institutional establishments:
 - (a) One parking space for every five seats or for each 90 linear inches of seating space in the main auditorium or assembly hall.
 - (b) When such facilities for public assembly are accessory to a school, church or other institution, and when approved by the Planning and Development Department, the required number of parking spaces may be reduced by the number of spaces provided as herein required for the applicable school, church or other institution.
- (2) Churches: one parking space for every six seats or for each 108 linear inches of seating space.
- (3) Hospitals: one parking space for each four beds, plus one parking space for each staff or visiting doctor, plus one parking space for each four employees.
- (4) Libraries, museums, art galleries and aquariums: one parking space for every 500 square feet of floor area.
- (5) Nursing homes: one parking space for every six beds, plus one parking space for every four employees, based on

the maximum number of employees present at any one period during the day or night on the premises.

(6) Schools.

- (a) Colleges, universities, junior colleges, high schools and other institutions for higher learning: one parking space for every seven students, based upon the maximum number of students that can be accommodated in accordance with designed capacity, and one space for each faculty member or other employee.
- (b) Junior high schools, elementary schools and nursery schools: one parking space for each faculty member or other employee.

- C. Recreational uses, commercial or noncommercial: one parking space for every four persons as per the designed capacity of the facility, plus one parking space for each employee.
- D. Business district uses: one parking space per 250 square feet of floor area for retail or office uses not specifically listed below.

[Amended 10-23-2006 by Ord. No. 1917^[1]]

- (1) Automobile service stations: one parking space for each island of gasoline pumps, plus three parking spaces for each service stall.
- (2) Banks and savings and loan associations: one parking space for every 300 square feet of floor area, plus one parking space for every three employees.
- (3) Beauty parlors: one parking space for every 100 square feet of floor area.
- (4) Public utilities or public service buildings containing machinery and equipment: one parking space for every employee present at any one time (minimum of three spaces) plus adequate loading and unloading space.
- (5) Funeral homes: one parking space for every 100 square feet of floor area.
- (6) Medical and dental offices: four spaces per doctor or dentist, plus one space per each employee at the time the greatest number of employees are present.
- (7) Restaurants: 20 parking spaces per 1,000 square feet of floor area for sit-down restaurants.
- (8) Other uses. Parking spaces for other permitted uses that are not retail or office or not listed herein shall be provided in accordance with the requirements of the use most similar to the use proposed, to be determined by the Planning and Zoning Administrator or his designee.

[1] *Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).*

§ 535-49. General requirements for all parking areas.

- A. All parking spaces shall be directly accessible to driveways, alleys or streets without passing through other parking spaces. Driveways, truck loading spaces and other required work and open spaces shall not be considered as parking spaces.

[Amended 10-23-2006 by Ord. No. 1917]

- B. In the Business Districts B-1 through B-4 at least 25% and in all other districts at least 75% of all parking facilities or spaces required hereunder shall be located on the same premises as the building to which assigned and shall either be owned by the person, firm or corporation required to provide such parking facilities or spaces pursuant to this article or such person, firm or corporation shall have use of such parking facilities or spaces during normal business hours and for so long a period as the use exists for which the parking spaces or facilities are required. In the Business Districts B-1 through B-4 no more than 75% and in all other districts no more than 25% of the parking facilities or spaces required herein shall be located off of the premises of the building to which assigned and in no case more than 400 feet from said building. More than one person, firm, or corporation may share a parking facility or space required hereunder, but in no event shall the total number of spaces available be less than the total number required under this article for each person, firm, or corporation sharing such facility. Further, in those cases where the person, firm, or corporation required to provide parking facilities or spaces must lease or rent them in order to comply with the parking code provisions, no building or occupancy permit shall be issued until a copy of a written agreement to lease said required facilities or spaces is filed with the Village; said agreement shall be kept in full force and effect for so long as said use and occupancy shall continue.

[Amended 10-23-2006 by Ord. No. 1917]

- C. All parking facilities, lots and spaces, and driveways serving the same, shall be hard surfaced, having a good and sufficient subbase with a concrete or asphaltic concrete overlay or asphaltic penetrating coat thereon, free of dust, loose stones or gravel; said facilities, lots or spaces shall be adequately drained, subject to the approval of the Building Inspector.

- (1) R-1 through R-6 Districts. All residential parking spaces and driveways shall have a good and sufficient subbase with overlay composed of concrete, asphalt, brick or stone pavers thereon; such spaces and driveways shall be adequately drained subject to the approval of the Building Inspector.

[Added 6-18-2007 by Ord. No. 1931]

- D. There shall be sufficient space and sight distance provided at all times to permit safe and ready access to each parking space and to the public highway; the premises shall be provided with a minimum number of entrances and exits, the width of which shall be in accordance with accepted design standards; that which is included under this subsection shall be subject to the approval of the Building Inspector.
- E. In the business districts, where illumination from streetlights to adjacent parking facilities, lots or spaces is no less than one footcandle power, no additional illumination of the premises will be required. Where such illumination is not available, a minimum illumination of one footcandle power of such premises shall be provided, installed and maintained in a manner so as not to reflect or glare onto adjoining streets or premises. When night parking is permitted on such premises, the same shall at all times be adequately lighted as herein required.
- F. Parking facilities shall provide marked parking spaces no less than nine feet wide and 18 feet in length.
[Amended 10-23-2006 by Ord. No. 1917]
- G. Parking lots shall conform to the following additional requirements and regulations:
- (1) To prevent the extension of any part of the parked vehicle into or onto any required setback, side yard, adjacent premises or public way, an adequate and approved wheel stop or bumper shall be provided for each space. It shall be a violation of this article if any vehicle is not parked within the lines of a marked parking space or if parked in more than one marked space. Excepted from the parking space dimensions set forth herein shall be spaces located in the parking lots not governed by the use requirements of § **535-47** of this article. In such cases, market considerations shall control the size of parking spaces in parking lots as determined by the Planning and Development Department of the Village but subject to approval of the Village Board.
 - (2) The premises shall be screened from any public street upon which it abuts or from any adjoining residential property, except for openings for ingress and egress, by a decorative wall or fence, or a substantial growth of shrubbery, or a berm; provided, however, that the height of said screening shall be approximately 42 inches, but in no event more than 48 inches, provided, further, that any wall or fence constructed hereunder shall be of a natural or manufactured material which shall be compatible with adjacent or adjoining structures, so that such wall or fence will not adversely affect the aesthetic quality or character of the area. Such screening as required hereunder shall all be subject to the approval of the Building Inspector. Where a solidly constructed decorative wall or fence is provided along the interior lot line, the minimum setback for the parking area shall be five feet from said lot line. That fence shall be located a minimum of one foot from said lot line.
[Amended 10-23-2006 by Ord. No. 1917]
- H. Other requirements.
- (1) Parking on a lot is prohibited, except on approved driveways or approved parking spaces.
 - (2) Parking of vehicles other than automobiles is prohibited, except in the rear yard of a lot.
 - (3) Outdoor parking spaces other than approved driveways shall not be constructed in the front yard or side yard of a lot; provided, however, that on corner lots outdoor parking spaces may be constructed in a side yard of a lot.
 - (4) Parking spaces to accommodate more than one motor vehicle outside of a garage on a single-family lot in the R-1 through R-6 Residential Districts are prohibited. Parking spaces for up to two motor vehicles may be permitted in the R-6 Residential District on lots with a two-family dwelling. Outside parking spaces in the R-1 through R-6 Residential Districts shall only be permitted if they are in addition to the required parking in an approved garage.
[Amended 4-19-2004 by Ord. No. 1965]
 - (5) Parking spaces adjacent to the public way or to another residential lot shall be screened as provided in Subsection **G(2)** of this section. Screening of parking spaces located in the rear yard of a lot by means of a decorative wall or fence or a substantial growth of shrubbery or a berm shall be no less than four feet in height nor more than six feet in height.
 - (6) Parking in the public way is prohibited, except upon the public highway where permitted.
- I. It shall be unlawful for any person to park any vehicle at any time on any land of which he is not the owner, without the owner's permission.
- J. The parking of mobile homes or any other vehicles in the Village of Shorewood while the same are being used or occupied as living quarters by any person or persons is expressly prohibited.
- K. The parking of mobile homes or other vehicles unless legally licensed under Wisconsin Statutes on any land in the Village of Shorewood shall be prohibited except on licensed used car lots, as provided for in Chapter **506**, Article **I** of this Code.
- L. The parking facilities, lots or spaces required pursuant to this article shall be provided and maintained so long as the use exists for which the same is designed.
- M. Such use for which parking facilities, lots or spaces are provided shall not be changed to any use requiring more parking space unless additional parking space is provided as required herein.
- N. The control of abandoned and inoperable motor vehicles shall be subject to the provisions of Article **IX** of Chapter **500** of the Village Code.

CHAPTER 535 ZONING
Article IX Off-Street Parking

535-51. Special exceptions.

[Amended 10-23-2006 by Ord. No. 1917]

- A. The Plan Commission, upon application as required herein, may grant a special exception to the provisions and requirements of this article.
- B. Prior to granting a special exception, the Plan Commission shall consider all of the following as applicable:
 - (1) The effect the granting of the exception will have on adjacent parking and traffic conditions.
 - (2) The effect the granting of the exception will have on the appearance and character of the applicant's property, adjacent property and neighboring property.
 - (3) The effect the granting of the exception will have on the property values of the applicant's property, adjacent property and neighboring property.
 - (4) Whether the granting of the exception will serve a public or desirable or useful purpose.
 - (5) Whether the spirit and intent of the requirements of this article are being carried out.
 - (6) Recommendations of any boards or committees to which the Plan Commission refers the application for advice.
 - (7) Intensity of use, deviation from typical use classifications, access to transit, and physical constraints to meeting parking requirements.
 - (8) If senior housing is proposed, the number of employees on site, the type of senior housing, the parking needs of the residents, if any, and the ratios from the Institute of Transportation Engineers parking generation report ratios for senior housing should be reviewed.
 - (9) Historical conditions and whether additional parking requirements for new or expanded use may be satisfied with incremental increase commensurate with new or expanded use.
 - (10) Evidence that actual parking demands may be less than code requirements.
 - (11) Availability of shared parking, including satisfactory documentation of shared parking to satisfy the parking demand.
 - (12) Alternative transportation that has been reasonably shown to reduce the need for parking.
 - (13) Such other matters as the Plan Commission deems relevant and material.
- C. Application for a special exception permit may be obtained from the Planning and Zoning Administrator upon the payment of a fee as provided by the Village Fee Schedule, which shall not be refundable. Editor's Note: Amended at time of adoption of Code (see Ch. 1, General Provisions, Art. I).
- D. The Plan Commission shall either approve or disapprove the application for a special exception hereunder, in accordance with the provisions of this article, shall specify the requirement or requirements that will be expected from the application and shall find that the special exception is not inconsistent with the applicable provisions herein.
- E. The Plan Commission's decision may be appealed to the Board of Appeals in accordance with the provisions of §§ 535-56 and 535-57. The Board of Appeals, after a hearing, may affirm, reverse or remand with recommendations any order, requirement, decision or determination of the Plan Commission made under this section. The Board of Appeals shall decide all appeals under this subsection within 30 days after final hearing and shall transmit a signed copy of the Board's decision to the appellant and to the Planning and Development Department

North Shore Bank

Traffic Impact Study

Village of Shorewood
Milwaukee County, Wisconsin

April 28, 2016

TRAFFIC IMPACT STUDY FOR:

NORTH SHORE BANK
SHOREWOOD, WISCONSIN

April 28, 2016



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- Exhibit 3.....Existing Transportation Detail
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- Exhibit 5.....Trip Distribution
- Exhibit 6A.....On-Site Development Traffic Assignment – North Shore Bank
- Exhibit 6BOff-Site Development Traffic Assignment – Oakland at Olive Commercial/
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CHAPTER 1 – PROPOSED DEVELOPMENT

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

The North Shore Bank is proposing to construct a bank with two interactive teller machines (ITMs) in the southeast corner of the Oakland Avenue/Kenmore Place intersection in Shorewood, Wisconsin. The new bank will be constructed in place of the existing commercial building on that corner.

This traffic impact analysis (TIA) report was prepared to evaluate existing and buildout weekday evening and Saturday midday peak hour traffic operations at intersections surrounding the site to determine what improvements, if any, need to be implemented to accommodate the projected traffic volumes. The TIA report includes existing traffic volume counts, future development volume estimations for both the on-site North Shore Bank and off-site Oakland at Olive developments, and future geometric and traffic control needs for acceptable and safe traffic operations at full buildout of the proposed development.

PART B – DEVELOPMENT DESCRIPTION

B1. On-Site Development: North Shore Bank

The North Shore Bank is proposed to include a small office building and two drive-through ITMs. Access to the bank will be a one location on Kenmore Place.

B2. Off-Site Development: Oakland at Olive Retail/Residential Development

The Oakland at Olive retail/residential development is proposed to include about 15,000 square feet of retail space on the ground floor, and 96 luxury apartments units on upper floors. Parking for the apartment units only will be provided in a rear parking area which will have access points at Olive Street and at the new parking structure entrance drive across from Wood Place. Parking for the retail space can be accommodated by either on-street parking spaces or in the adjacent parking structure.

PART C - STUDY AREA

The study area includes three intersections along Oakland Avenue plus the proposed bank driveway to Kenmore Place. The study roadways are discussed below:

Oakland Avenue is a two-lane north/south undivided Minor Arterial with a 25-mph speed limit within the study area. From Glendale Avenue to Capitol Drive, Oakland Avenue is primarily fronted by commercial buildings. Within the study area, Oakland Avenue has sidewalks and on-street parking. According to WisDOT data, Oakland Avenue had a 2013 annual average daily traffic (AADT) volume of 12,700 vehicles per day (vpd) south of Kenmore Place.

Jarvis Street and Kenmore Place are two-lane undivided east/west Local roadways with sidewalks and on-street parking. These roadways are primarily fronted by single-family residential houses.

The existing transportation detail for the study intersections and roadways are shown on Exhibit 3. The transportation detail shows the existing geometrics, traffic control, speed limits, generalized land use areas, and the spacing between intersections.

CHAPTER 2 – EXISTING AND PROJECTED TRAFFIC

PART A – DATA COLLECTION

A1. Turning Movement Counts

TADI collected weekday evening and Saturday midday turning movement counts at the study intersections in late February 2016 (the Metro Market held their grand opening in mid-February 2016). Traffic counts were collected from 4:00 p.m. to 6:00 p.m. on a weekday and from 11:00 a.m. to 1:00 p.m. on a Saturday. Based on the traffic volume data collected, the weekday evening (PM) peak hour was determined to occur from 5:00 p.m. to 6:00 p.m. and the Saturday midday (Saturday) peak hour was determined to occur from 11:30 a.m. to 12:30 p.m.

The year 2016 existing peak hour turning movement volumes were seasonally adjusted to an average month using the February Urban Arterial factor of 1.073. The seasonal adjustment factor was applied to all turning movements at the study intersections with the exception of turning volumes to and from the parking structure driveway. After adjustments, the traffic volumes were balanced between intersections and are shown as the Year 2016 Traffic Volumes on Exhibit 4. The existing traffic count data for the study is included in Appendix A1.

A2. Field Observations

During the traffic counting periods, field staff observed several operational and safety issues at the study intersections along Oakland Avenue. These issues are noted below:

Oakland Avenue & Jarvis Street/Parking Structure Driveway

- During peak periods, there was a continuous queue of about 6-8 vehicles on northbound Oakland Avenue as vehicles were waiting to make a left-turn into the parking structure. This queue would have frequently blocked turns into or out of Jarvis Street. Some of these queues are due to left turning traffic exiting the parking structure, which block the turning path of the northbound left turning traffic entering the parking structure.
- The northbound left-turns into the parking structure were frequently delayed by southbound right-turns turning into the parking structure, although traffic counts showed only 30-35 vehicles per hour (vph) making a southbound right-turn versus the 105-135 vph making a northbound left-turn into the parking structure.
- The high-volume of pedestrian activity on Saturday delayed turns into and out of the parking structure. During the peak hour on Saturday, 93 pedestrians and bicyclists crossed the parking structure driveway and 183 pedestrians and bicyclists crossed Oakland Avenue at Jarvis Street, just south of the parking structure driveway. Field staff noted that the brick crosswalks did not provide enough of a contrast in pavement (primarily due to the salty pavement/brick pattern) or visual alert to motorists for safe pedestrian crossing in that area.
- During peak traffic times, cars were reported to bypass the northbound Oakland Avenue queues from the parking structure driveway by edging around the queued vehicles in the through lane and the parked vehicles on the east side of Oakland Avenue.
- On southbound Oakland Avenue, there is an indented pavement area across the parking structure driveway that vehicles are using as a pick-up/drop-off lane. These vehicles

were reported to stop directly in front of the parking structure driveway, blocking all traffic from entering or exiting and adding to the delays and backups on Oakland Avenue.

Oakland Avenue & Kenmore Place

- Some pedestrian traffic crossed against the pedestrian lights and some did not use the crosswalks at all.
- The on-street parking along both sides of Kenmore Place created situations where vehicles heading east on Kenmore Place from Oakland Avenue would not enter the approach if a westbound vehicle was already on that section of the roadway. Eastbound entering traffic would wait prior to entering, would wait until the approach cleared before turning. In general, traffic backups and queues at the intersection are relatively low, so this situation did not affect traffic operations on Oakland Avenue.
- During the Saturday peak hour, the southbound traffic queues from the Oakland Avenue/Capital Drive intersection backed up through Kenmore Place, temporarily blocking turning movements to/from Kenmore Place.

PART B – NEW DEVELOPMENT TRAFFIC

B1. Trip Generation

On-Site Trip Generation: North Shore Bank

The number of trips expected to be generated by the proposed North Shore Bank was also based on average trip rates published in the *ITE Trip Generation Manual, 9th Edition*. The trip generation table for the proposed bank is shown in Table 1.

Table 1: North Shore Bank Trip Generation Table

Land Use	ITE Code	Proposed Size	Weekday Daily	PM Peak			SAT Peak		
				In	Out	Total	In	Out	Total
Drive-through Bank	912	2 Lanes	280 (139.25)	30 (49%)	35 (51%)	65 (33.24)	30 (49%)	30 (51%)	60 (28.78)
Total New Trips			280	30	35	65	30	30	60

As shown, the proposed North Shore Bank is expected to generate about 280 daily trips with 65 occurring during the weekday evening (PM) peak hour and 60 occurring during the Saturday midday peak hour.

Off-Site Trip Generation: Oakland at Olive Retail/Residential Development

The number of trips expected to be generated by the Oakland at Olive development was based on average trip rates published in the *ITE Trip Generation Manual, 9th Edition*. About 20 percent of the development trips are expected to be linked with other retail developments along Oakland Avenue. The trip generation table for the proposed Oakland at Olive retail/residential development is shown in Table 2.

Table 2: Oakland at Olive Development Trip Generation Table

Land Use	ITE Code	Proposed Size	Weekday Daily	PM Peak			SAT Peak		
				In	Out	Total	In	Out	Total
Shopping Center	820	15,000 SF	640 (42.70)	25 (48%)	30 (52%)	55 (3.71)	35 (52%)	35 (48%)	70 (4.82)
Mid-Rise Apartment	223	96 Units	640 (6.65)	20 (58%)	15 (42%)	35 (0.39)	25 (54%)	25 (46%)	50 (0.52)
Total New Trips			1,280	45	45	90	60	60	120
<i>Minus Linked Trips (820) 20%</i>			<i>-130</i>	<i>-5</i>	<i>-5</i>	<i>-10</i>	<i>-5</i>	<i>-5</i>	<i>-10</i>
Total Trips			1,150	40	40	80	55	55	110

Notes:

Trip rates taken from ITE Trip Generation Manual, 9th Edition.

No daily or Saturday trip rates are available for LU#223. The trip rates for LU#220 (Apartment) were used in their place for this

As shown, the proposed Oakland at Olive retail/residential development is expected to generate about 1,150 daily trips with 80 occurring during the weekday evening (PM) peak hour and 110 occurring during the Saturday midday peak hour.

B2. Trip Distribution/Traffic Assignment

The on-site and off-site trip distribution percentages used in this report are listed below and also shown on Exhibit 5.

On-Site Trip Generation: North Shore Bank

The distribution of the new trips to and from the proposed North Shore Bank was based on the existing traffic patterns of the surrounding street system. For this study, the distribution of the new bank trips was assumed to be:

- 40% to/from the north on Oakland Avenue
- 45% to/from the south on Oakland Avenue
- 10% to/from the west on Kenmore Place
- 5% to/from the east on Kenmore Place

The new North Shore Bank trips were assigned to the study intersections based on the above trip distribution. These site new trips are shown on Exhibit 6A.

Off-Site Trip Generation: Oakland at Olive Retail/Residential Development

The distribution of the new trips to and from the Oakland at Olive retail/residential development was based on the development's trip distribution presented in the March 20, 2014 *Oakland at Olive Retail/Residential Development Traffic Impact Study*. In that study, the distribution of the new Oakland at Olive development trips was assumed to be:

- 44% to/from the north on Oakland Avenue
- 44% to/from the south on Oakland Avenue
- 4% to/from the west on Olive Street
- 5% to/from the east on Olive Street
- 3% to/from the east on Wood Place

The new Oakland at Olive development trips were assigned to the study intersections based on the above trip distribution. These site new trips are shown on Exhibit 6B.

B3. Build Traffic Volumes

The Build traffic turning movement volumes were determined by adding the On-Site Development Traffic Assignment – North Shore Bank (Exhibit 6A) and the Off-Site Development Traffic Assignment – Oakland at Olive Retail/Residential Development (Exhibit 6B) to the Year 2016 Existing Traffic Volumes (Exhibit 4). The Year 2016 Build Traffic Volumes for the proposed developments are show on Exhibit 7.

CHAPTER 3 – INTERSECTION OPERATIONAL ANALYSIS

PART A – ANALYSIS METHODOLOGY

The study area intersections were analyzed based on the procedures set forth in the *2010 Highway Capacity Manual* (HCM) using the Synchro 8 software. Intersection operation is defined by “level of service”. Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A’, to very poor, represented by LOS ‘F’. For this study, LOS D or better was considered acceptable operations for each study intersection. Descriptions of the various levels of service are as follows:

PART B – DESCRIPTION OF LEVEL OF SERVICE

Descriptions of the various levels of service are as follows:

LOS A is the highest level of service that can be achieved. Under this condition, intersection approaches appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation. At signalized intersections, average delays are less than 10 seconds. At unsignalized intersections, average delays are less than 10 seconds.

LOS B represents stable operation. At signalized intersections, average vehicle delays are 10 to 20 seconds. At unsignalized intersections, average delays are 10 to 15 seconds.

LOS C still represents stable operation, but periodic backups of a few vehicles may develop behind turning vehicles. Most drivers begin to feel restricted, but not objectionably so. At signalized intersections, average vehicle delays are 20 to 35 seconds. At unsignalized intersections, average delays are 15 to 25 seconds.

LOS D represents increasing traffic restrictions as the intersection approaches instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but periodic clearance of long lines occurs, thus preventing excessive backups. At signalized intersections, average vehicle delays are 35 to 55 seconds. At unsignalized intersections, average delays are 25 to 35 seconds.

LOS E represents the capacity of the intersection. At signalized intersections, average vehicle delays are 55 to 80 seconds. At unsignalized intersections, average delays are 35 to 50 seconds.

LOS F represents jammed conditions where the intersection is over capacity and acceptable gaps for unsignalized intersections in the mainline traffic flow are minimal. At signalized intersections, average vehicle delays exceed 80 seconds. At unsignalized intersections, average delays exceed 50 seconds.

PART C – EXISTING TRAFFIC ANALYSIS

The peak hour LOS table for the Year 2016 Existing Traffic Volumes (existing parking system, travel patterns, and no additional development traffic), existing pedestrian volumes, existing roadway geometrics, and existing traffic control is shown in Table 3. The Synchro input/output files for the Year 2016 Existing traffic analyses are located in Appendix B.

**Table 3. Year 2016 Existing Traffic Level of Service
Existing Transportation System**

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Oakland Avenue & Parking Structure Driveway	1-Way Stop	PM	C	-	C	-	-	-	A	A	-	-	A	A
		SAT	C	-	C	-	-	-	A	A	-	-	A	A
Oakland Avenue & Jarvis Street	1-Way Stop	PM	-	-	-	C	-	C	-	A	A	A	A	-
		SAT	-	-	-	D	-	D	-	A	A	A	A	-
Oakland Avenue & Kenmore Place	Traffic Signal	PM	B	B	B	B	B	B	A	A	A	A	A	A
		SAT	B	B	B	B	B	B	A	A	A	A	A	A

As shown, the Synchro traffic model reports that all traffic movements at the study intersections operate acceptably during the peak hours with the Year 2016 Existing vehicular and pedestrian traffic volumes. This traffic model does not fully replicate the field-reported conflicts between turning vehicles, drop-off/pick-up operations, and pedestrian crossing and flow past the parking structure driveway. The model shows that there is capacity to accommodate the turning movements counted actually turning at the driveways, but not without delays and safety issues noted previously.

PART D – BUILD TRAFFIC ANALYSIS

The peak hour LOS table for the Year 2016 Build Traffic Volumes (with construction of the Oakland at Olive retail/residential development and the North Shore Bank), existing geometrics, and existing traffic control is shown in Table 4. The Synchro input files and SimTraffic output files for the Year 2016 Build traffic analyses are located in Appendix C.

**Table 4. Year 2016 Build Traffic Level of Service
Existing Transportation System**

Intersection	Traffic Control	Peak Hour	Level of Service per Movement by Approach											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Oakland Avenue & Parking Structure Driveway	1-Way Stop	PM	D	-	D	-	-	-	A	A	-	-	A	A
		SAT	C	-	C	-	-	-	A	A	-	-	A	A
Oakland Avenue & Jarvis Street	1-Way Stop	PM	-	-	-	C	-	C	-	A	A	A	A	-
		SAT	-	-	-	D	-	D	-	A	A	A	A	-
Oakland Avenue & Kenmore Place	Traffic Signal	PM	B	B	B	B	B	B	A	A	A	A	A	A
		SAT	B	B	B	B	B	B	A	A	A	A	A	A
Kenmore Place & Bank Driveway	1-Way Stop	PM	-	A	A	A	A	-	A	-	A	-	-	-
		SAT	-	A	A	A	A	-	A	-	A	-	-	-

As shown, all study intersections, including the parking structure access driveways to Oakland Avenue are expected to continue to operate acceptably at LOS D or better during the peak hours with buildout of the Metro Market and apartment/retail development and the proposed North Shore Bank.

The 95th percentile traffic queues expected with the development buildout are shown on Exhibit 8.

CHAPTER 4 – CONCLUSIONS & RECOMMENDATIONS

PART A – RECOMMENDATIONS

Although the Synchro traffic model indicates that all traffic movements at the study intersections operate acceptably with the buildout of the site and off-site development traffic, field observations of existing conditions show that there are some operational and safety issues that could be reduced with additional improvements along Oakland Avenue. These improvements are shown on Exhibit 9 and listed below:

- Construct the North Shore Bank driveway to Kenmore Place with a single exit and entry lane from the parking area, and two exit lanes from the ITM lanes. No turn lanes are recommended on Kenmore Place.
- Improve the visibility and safety of the pedestrian crossings at the Oakland Avenue/Jarvis Street intersection with additional lighting, pavement striping, and/or pedestrian crosswalk signing.
- Reduce the traffic backups through the Jarvis Street intersection by installing “Do Not Block Intersection” signs for both northbound and southbound traffic on Oakland Avenue.
- On southbound Oakland Avenue, there is an indented pavement area across the parking structure driveway that vehicles are using as a pick-up/drop-off lane. This lane should be striped and signed for a right turn only lane. If it is desired that some of this area be used for pick-up/drop-off, then the pavement should be striped for these spaces, but then also signed and marked to not allow on-street parking/drop-offs within 50 to 75 feet of the parking structure driveway to allow adequate sight distance and maneuverability for southbound right-turning traffic.
- Consider removing some on-street parking spaces along the east side of Oakland Avenue in order to stripe in a left-turn lane for northbound traffic turning into the parking structure driveway.
- Consider restricting access for traffic exiting the parking structure to right-out only movements. Left turns exiting the parking structure driveway tend to block the northbound left turning vehicles from their turning path into the parking structure, contributing to backups for the northbound left turning traffic. This potential improvement will require additional study as the exiting left turns prohibited at this location would then alternately use the parking structure driveway opposite Wood Street.

PART B – CONCLUSION

With the recommended improvements listed above, existing operational and safety issues are expected to improve along Oakland Avenue. The proposed North Shore Bank development traffic volumes and driveway access to Kenmore Place are expected to operate acceptably with low delays and traffic queues during the peak hours.

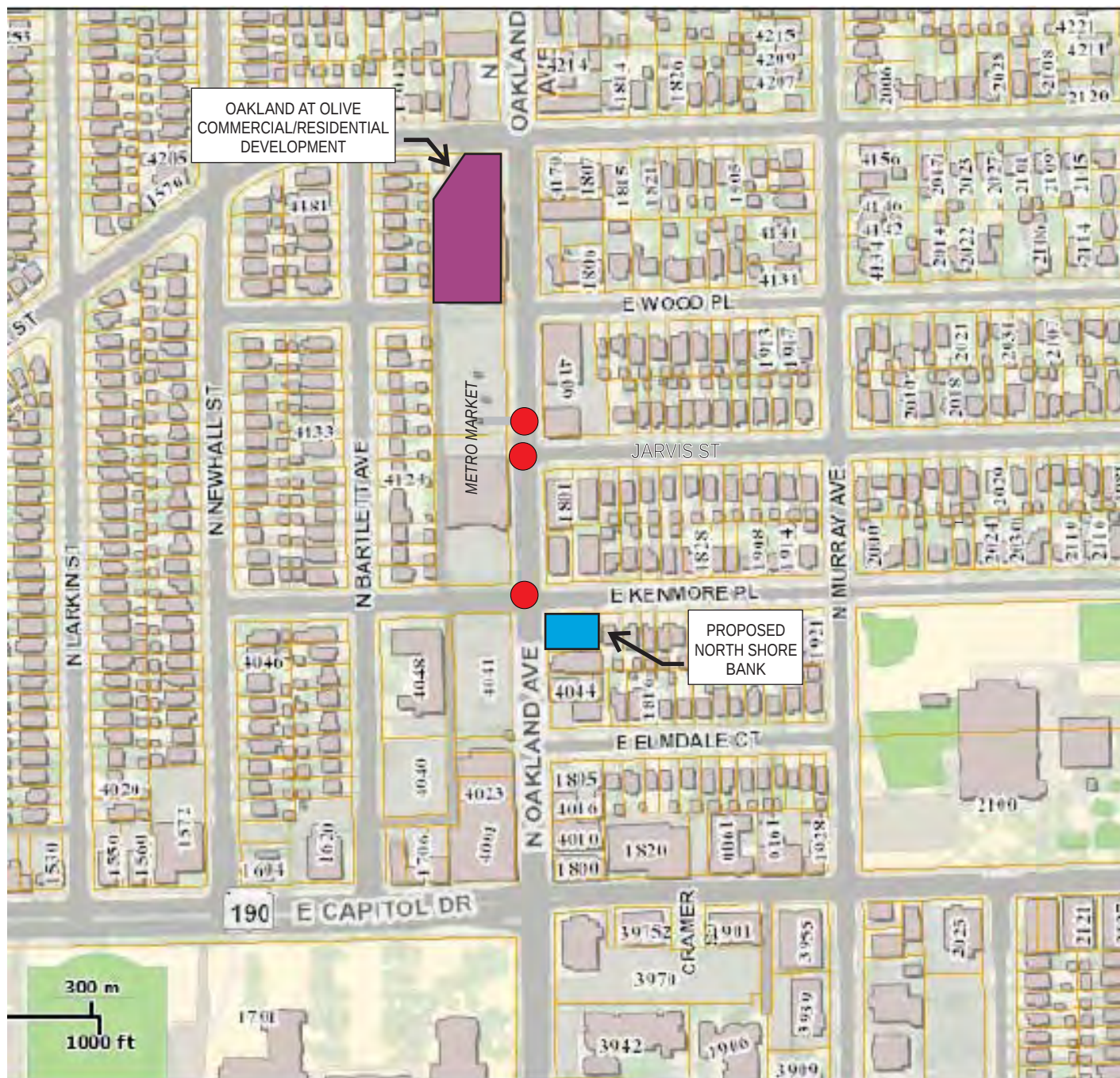


Image Source: Village of Shorewood GIS Mapping

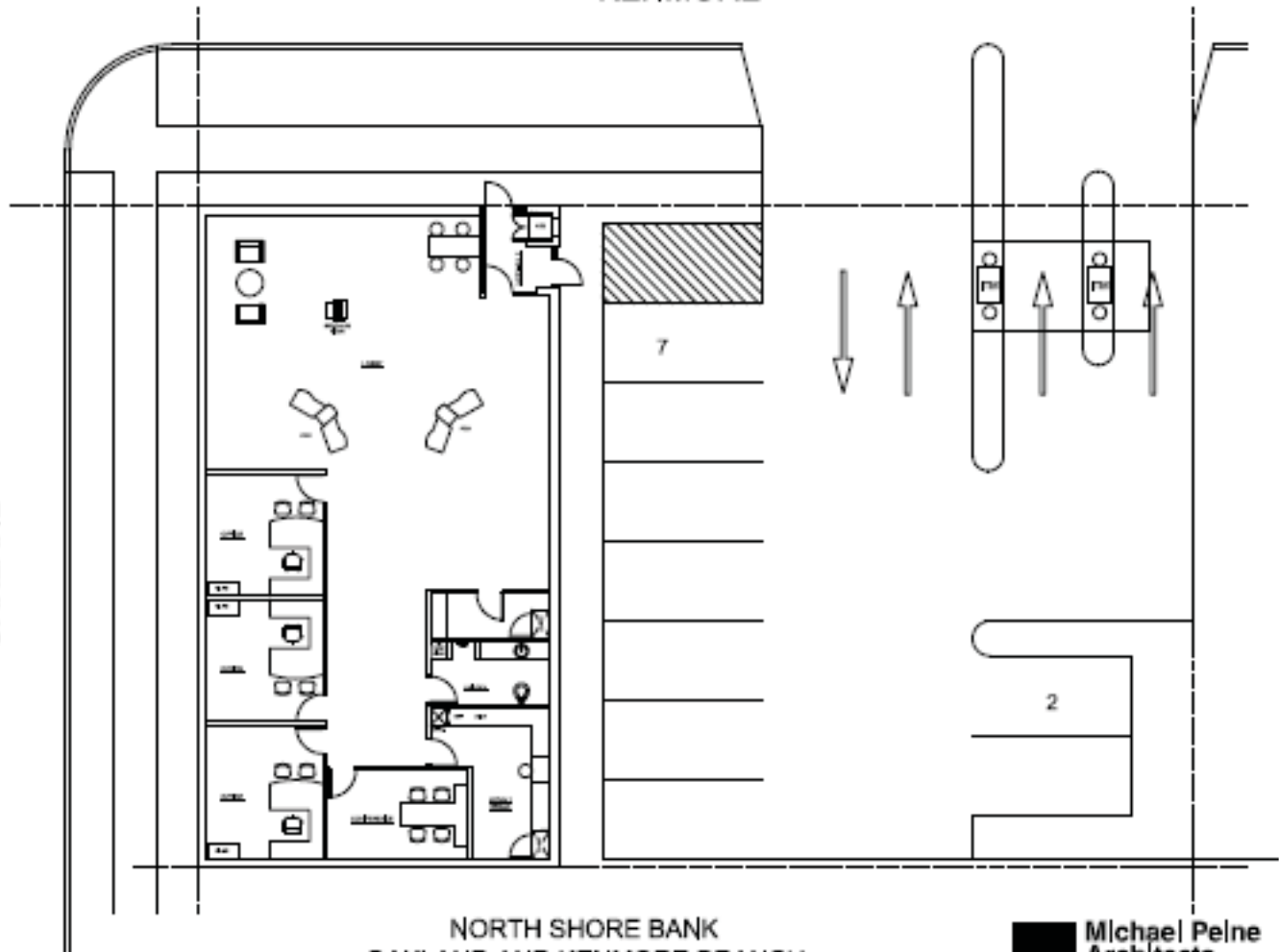
LEGEND

- Study Area Intersection or Driveway
- Proposed Development
- Off-site Development (Under Construction)



OAKLAND

KENMORE



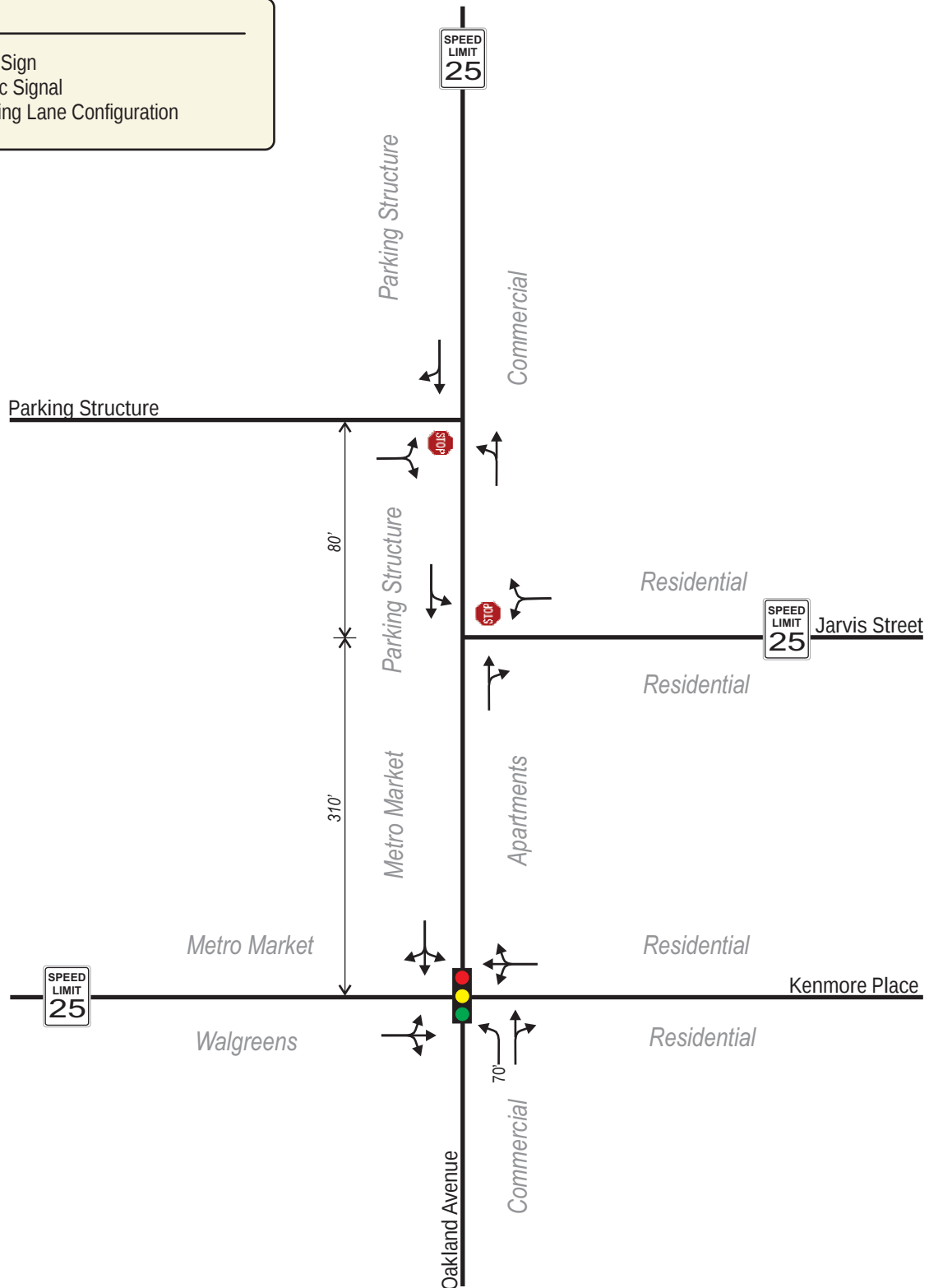
NORTH SHORE BANK
OAKLAND AND KENMORE BRANCH
2847 NET SQ FT OPTION

Michael Peine Architects
Commercial • Industrial
Design/Build • Planning
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Shorewood, WI 53081
www.michaelpeine.com

December 16, 2015

LEGEND

-  Stop Sign
-  Traffic Signal
-  Existing Lane Configuration



XX	PM Peak Hour Volumes (5:00-6:00 PM)
(XX)	SAT Peak Hour Volumes (11:45 AM-12:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)
X,XXX	2013 Annual Average Daily Traffic (AADT)

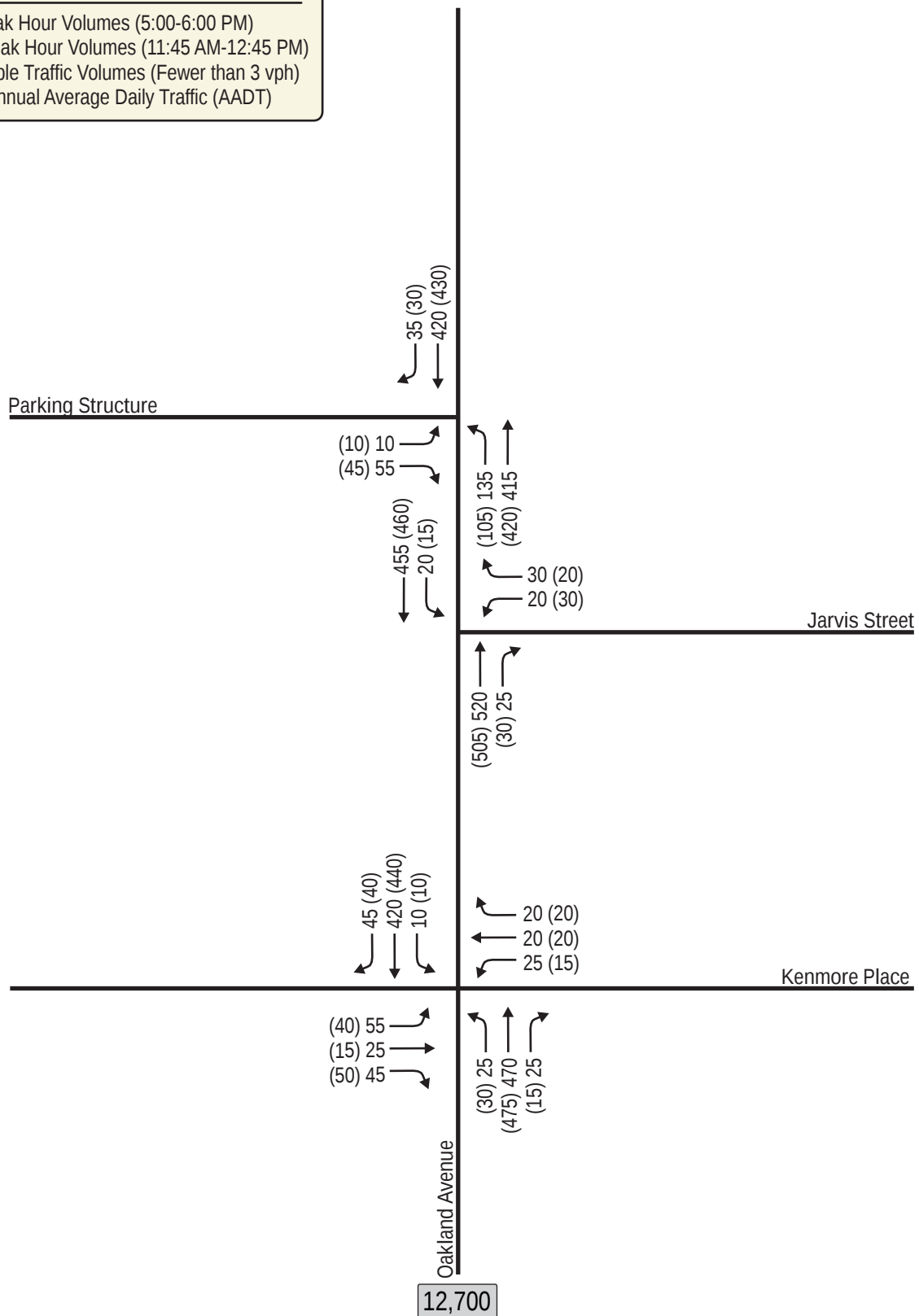
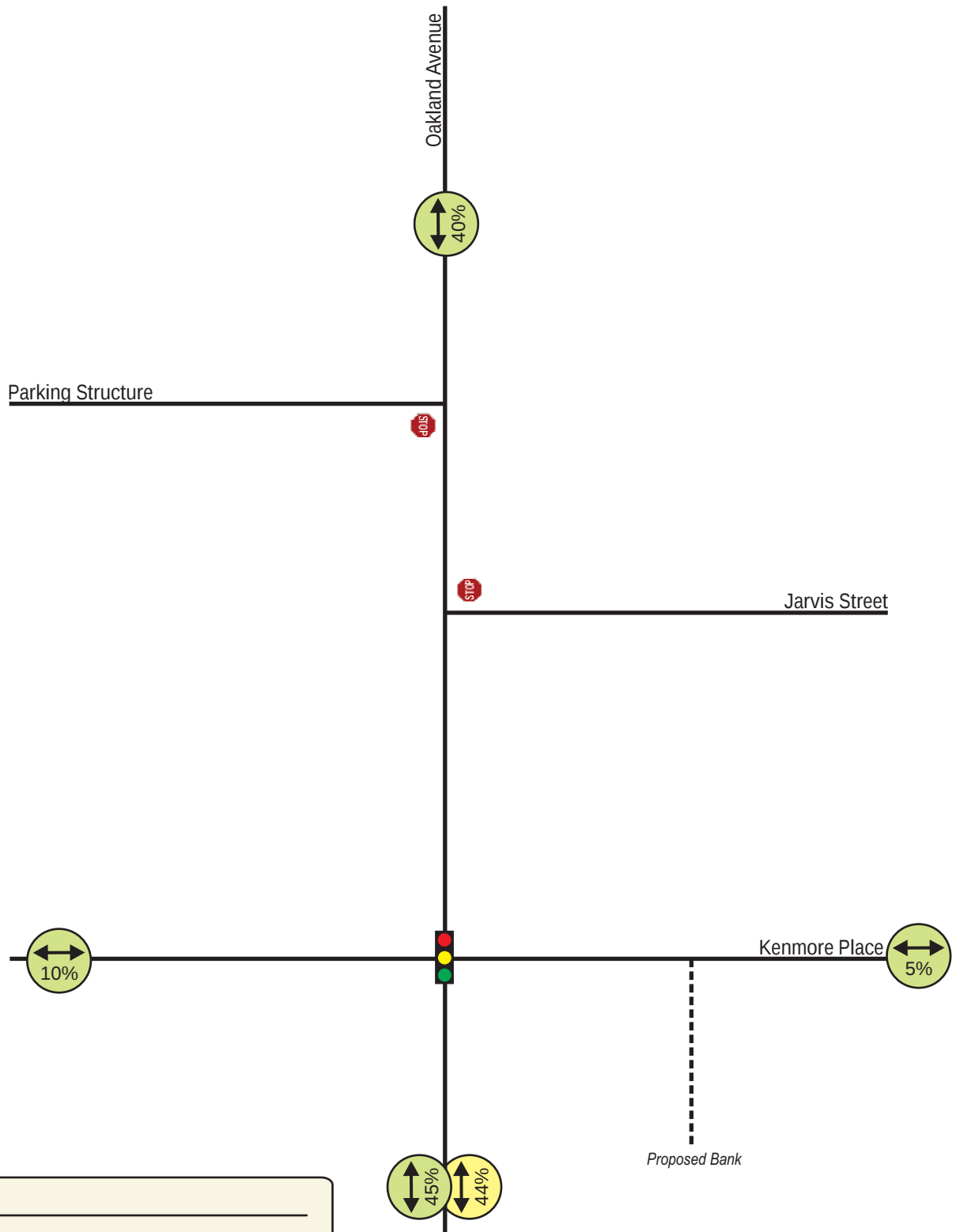


EXHIBIT 4

**YEAR 2016 EXISTING TRAFFIC VOLUMES
(SEASONALLY ADJUSTED AND BALANCED)**

SHOREWOOD, WISCONSIN



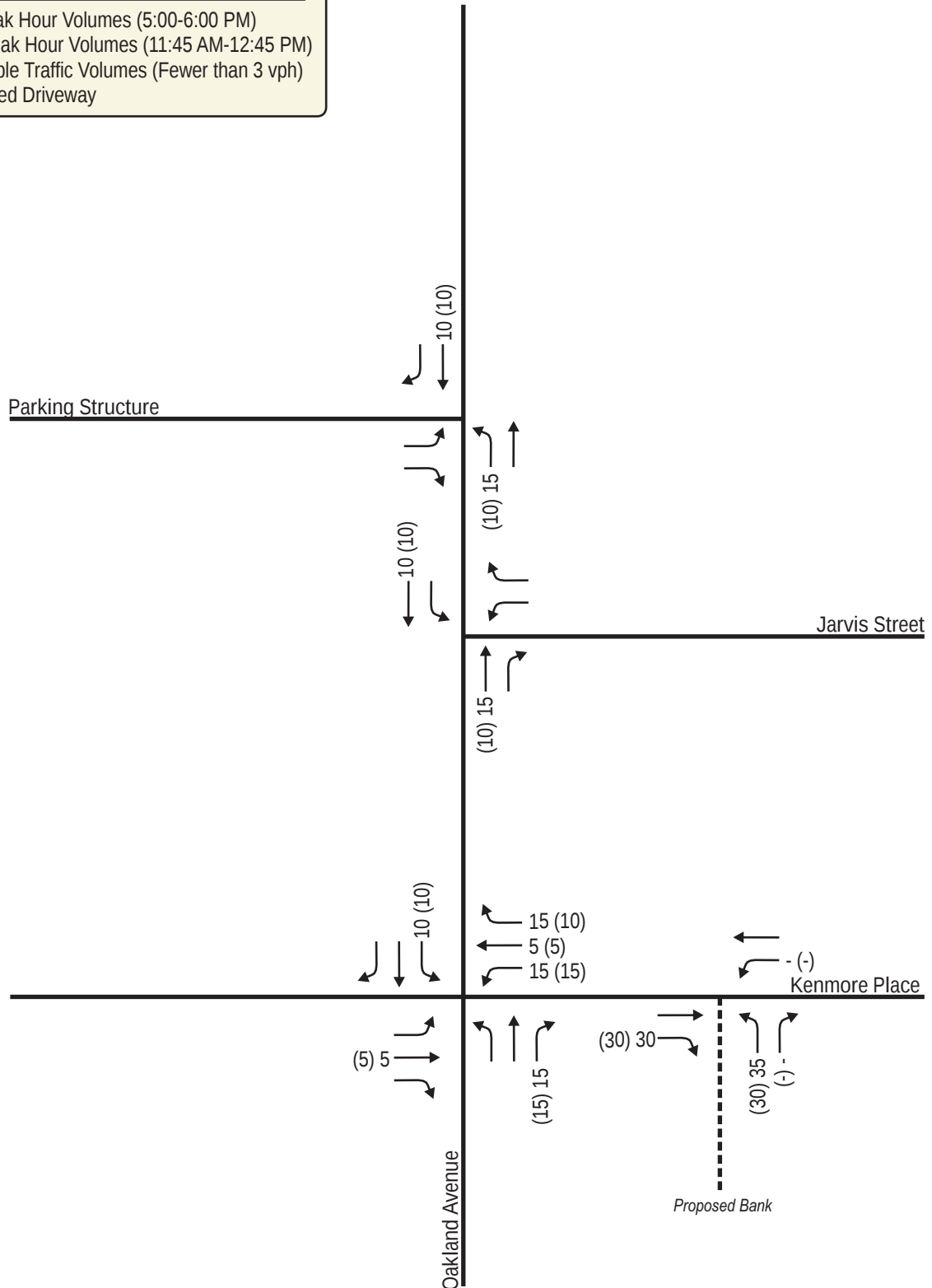
LEGEND



On-Site Development Trip Distribution Percentage
Off-Site Development Trip Distribution Percentage

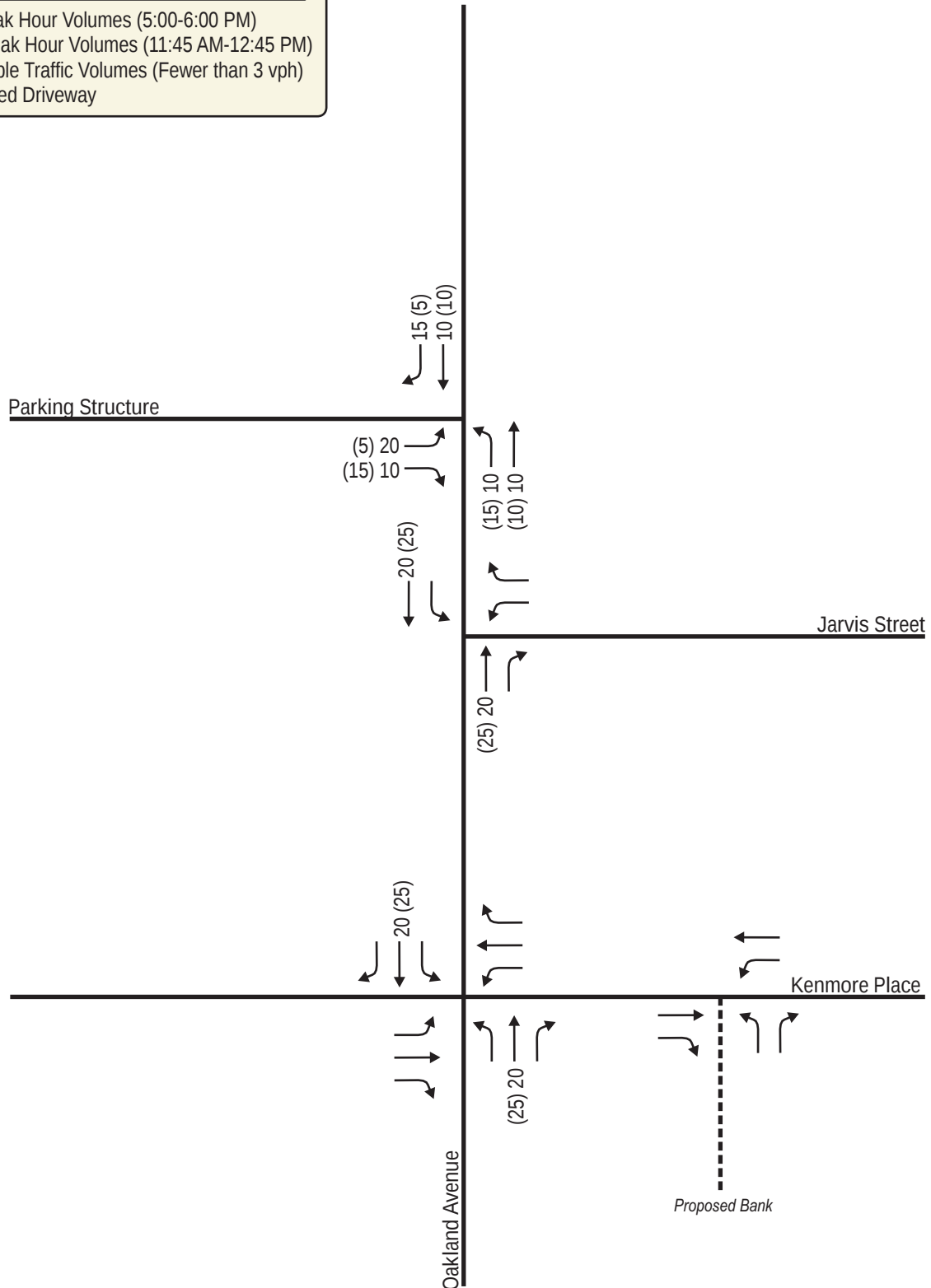
LEGEND

- XX PM Peak Hour Volumes (5:00-6:00 PM)
- (XX) SAT Peak Hour Volumes (11:45 AM-12:45 PM)
- Negligible Traffic Volumes (Fewer than 3 vph)
- Proposed Driveway



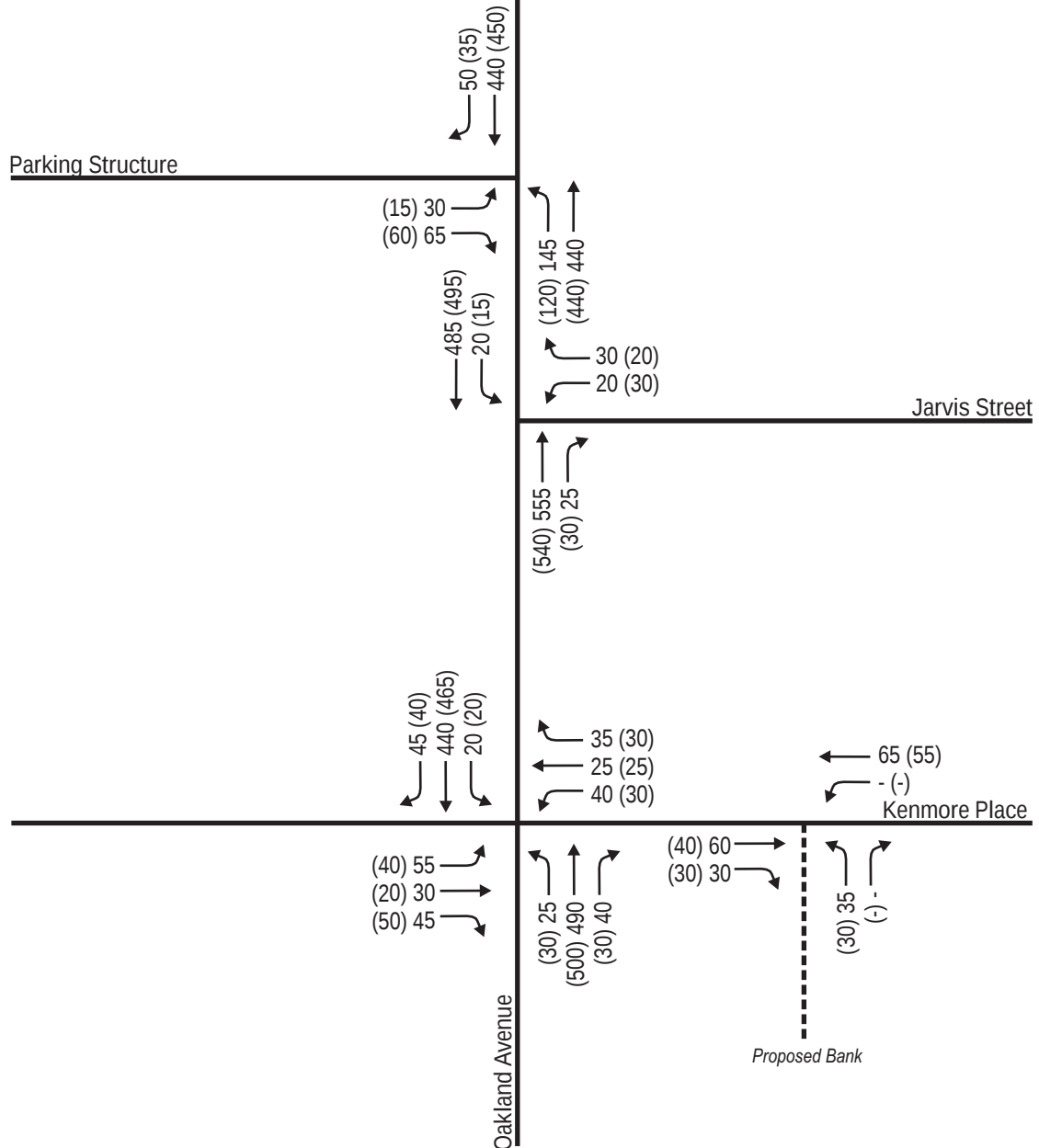
LEGEND

- XX PM Peak Hour Volumes (5:00-6:00 PM)
- (XX) SAT Peak Hour Volumes (11:45 AM-12:45 PM)
- Negligible Traffic Volumes (Fewer than 3 vph)
- Proposed Driveway



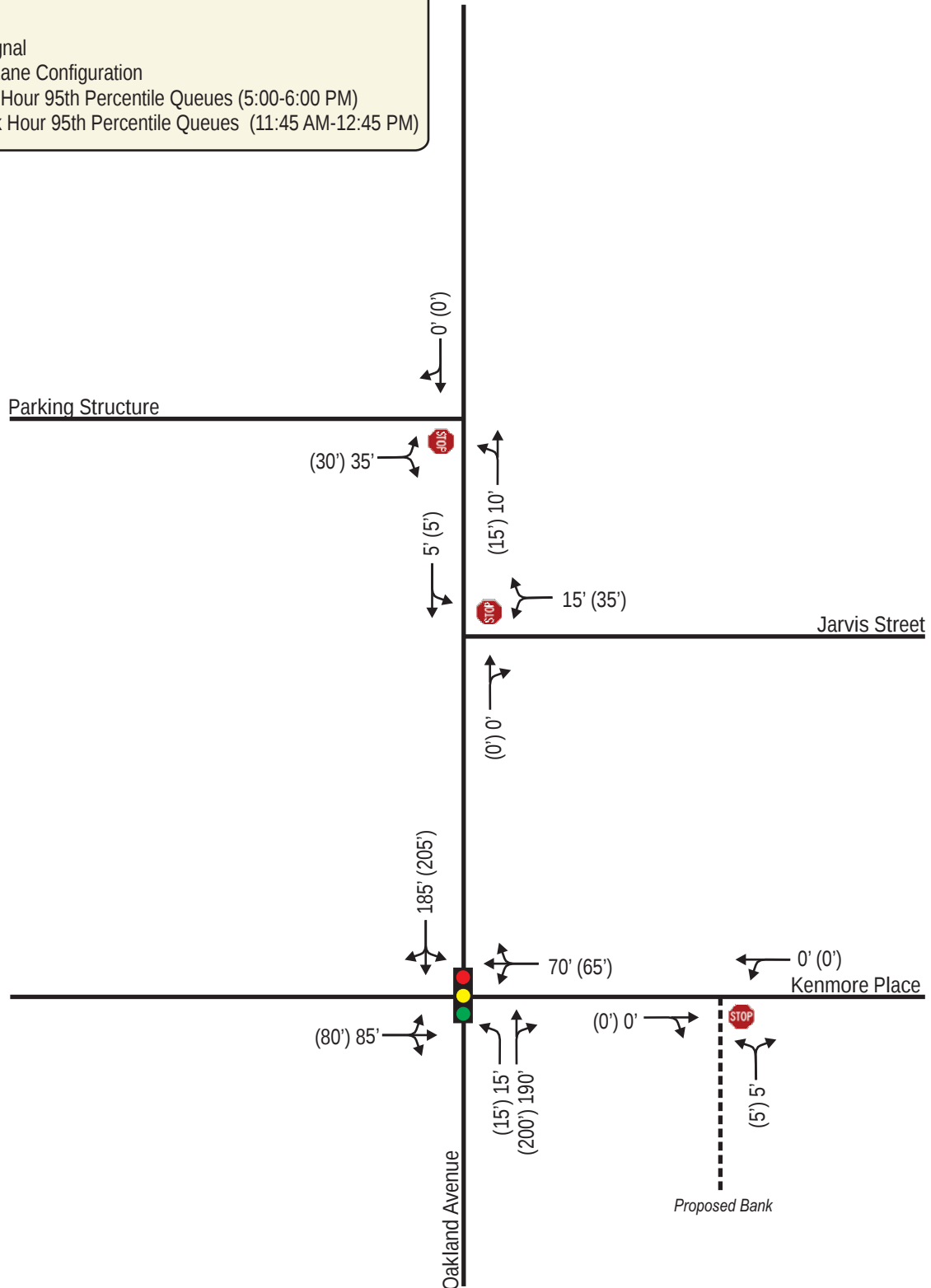
LEGEND

- XX PM Peak Hour Volumes (5:00-6:00 PM)
- (XX) SAT Peak Hour Volumes (11:45 AM-12:45 PM)
- Negligible Traffic Volumes (Fewer than 3 vph)
- Proposed Driveway



LEGEND

-  Stop Sign
-  Traffic Signal
-  Existing Lane Configuration
- XX PM Peak Hour 95th Percentile Queues (5:00-6:00 PM)
- (XX) SAT Peak Hour 95th Percentile Queues (11:45 AM-12:45 PM)



LEGEND

-  Stop Sign
-  Existing Lane Configuration
-  Recommended Lane Configuration

Clearly define use of indented pavement area on southbound Oakland Avenue. Sign this lane as pick-up/drop-off, right-turn only, or parking to indicate the expected use. If it is a pick-up/drop-off area, add signing to restrict activity within 50-75 feet of the parking structure driveway.

Parking Structure



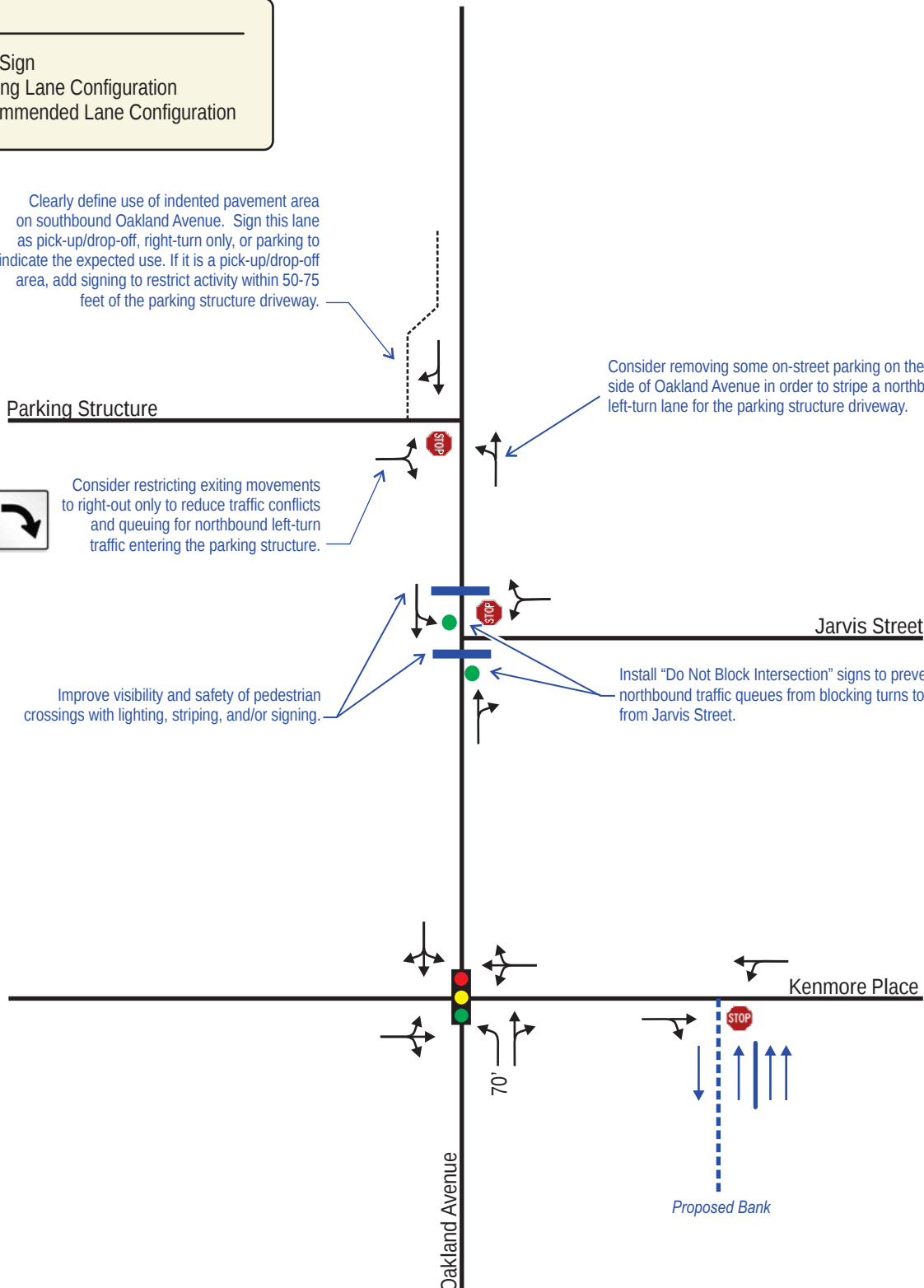
Consider restricting exiting movements to right-out only to reduce traffic conflicts and queuing for northbound left-turn traffic entering the parking structure.

Improve visibility and safety of pedestrian crossings with lighting, striping, and/or signing.

Consider removing some on-street parking on the east side of Oakland Avenue in order to stripe a northbound left-turn lane for the parking structure driveway.



Install "Do Not Block Intersection" signs to prevent northbound traffic queues from blocking turns to/from Jarvis Street.



Lanes, Volumes, Timings
300: Oakland Avenue & Kenmore Place

2016 Background
SAT Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		16.9			15.4		7.0	11.8			12.3	
Queue Length 50th (ft)		23			11		5	100			102	
Queue Length 95th (ft)		72			42		15	174			178	
Internal Link Dist (ft)		221			50			270			230	
Turn Bay Length (ft)							70					
Base Capacity (vph)		572			627		689	1693			1642	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.20			0.10		0.05	0.32			0.33	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 50.1

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Splits and Phases: 300: Oakland Avenue & Kenmore Place

 ø2	 ø4
50 s	25 s
 ø6	 ø8
50 s	25 s

HCM 2010 Signalized Intersection Summary

300: Oakland Avenue & Kenmore Place

2016 Background
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	15	50	15	20	20	30	475	15	10	440	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.94	0.95		0.94	0.98		0.92	0.98		0.92
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1881	1900	1881	1881	1900	1900	1881	1900
Adj Flow Rate, veh/h	44	16	55	16	22	22	33	522	16	11	484	44
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	206	92	188	156	197	156	569	994	30	74	914	82
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.55	0.55	0.55	0.55	0.55	0.55
Sat Flow, veh/h	429	344	709	270	743	586	860	1810	55	11	1665	149
Grp Volume(v), veh/h	115	0	0	60	0	0	33	0	538	539	0	0
Grp Sat Flow(s),veh/h/ln	1482	0	0	1598	0	0	860	0	1866	1826	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.0	0.0	0.0	1.4	0.0	0.0	1.3	0.0	9.9	10.1	0.0	0.0
Prop In Lane	0.38		0.48	0.27		0.37	1.00		0.03	0.02		0.08
Lane Grp Cap(c), veh/h	486	0	0	509	0	0	569	0	1024	1070	0	0
V/C Ratio(X)	0.24	0.00	0.00	0.12	0.00	0.00	0.06	0.00	0.53	0.50	0.00	0.00
Avail Cap(c_a), veh/h	636	0	0	670	0	0	814	0	1555	1582	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.6	0.0	0.0	15.1	0.0	0.0	5.8	0.0	7.7	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.9	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	0.7	0.0	0.0	0.2	0.0	5.2	5.3	0.0	0.0
LnGrp Delay(d),s/veh	16.2	0.0	0.0	15.3	0.0	0.0	5.9	0.0	8.6	8.6	0.0	0.0
LnGrp LOS	B			B			A		A	A		
Approach Vol, veh/h	115			60			571			539		
Approach Delay, s/veh	16.2			15.3			8.4			8.6		
Approach LOS	B			B			A			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	34.6			19.3			34.6			19.3		
Change Period (Y+Rc), s	5.0			5.0			5.0			5.0		
Max Green Setting (Gmax), s	45.0			20.0			45.0			20.0		
Max Q Clear Time (g_c+l1), s	11.9			5.0			12.1			3.4		
Green Ext Time (p_c), s	17.6			1.5			17.5			1.6		
Intersection Summary												
HCM 2010 Ctrl Delay	9.5											
HCM 2010 LOS	A											

APPENDIX C

YEAR 2016 BUILD TRAFFIC ANALYSIS

Lanes, Volumes, Timings
100: Oakland Avenue & Pkg Dwy

2016 Build
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	30	65	145	440	440	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	100		100			
Link Speed (mph)	25			25	25	
Link Distance (ft)	196			80	195	
Travel Time (s)	5.3			2.2	5.3	
Confl. Peds. (#/hr)		67	7			7
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)				0	0	
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	97	0	0	597	500	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	3.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	30	65	145	440	440	50
Conflicting Peds, #/hr	0	67	7	0	0	7
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	31	66	148	449	449	51
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1286	548	567	0	-	0
Stage 1	541	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	182	538	1010	-	-	-
Stage 1	585	-	-	-	-	-
Stage 2	471	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	130	505	1004	-	-	-
Mov Cap-2 Maneuver	130	-	-	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	358	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	26.3	2.3		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1004	-	264	-	-	
HCM Lane V/C Ratio	0.147	-	0.367	-	-	
HCM Control Delay (s)	9.2	0	26.3	-	-	
HCM Lane LOS	A	A	D	-	-	
HCM 95th %tile Q(veh)	0.5	-	1.6	-	-	

Lanes, Volumes, Timings
200: Oakland Avenue & Jarvis Street

2016 Build
PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	30	555	25	20	485
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	100				100	
Link Speed (mph)	25		25			25
Link Distance (ft)	421		310			80
Travel Time (s)	11.5		8.5			2.2
Confl. Peds. (#/hr)	6	67		34	34	
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)			0			0
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	592	0	0	515
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR		NBT	NBR	SBL SBT
Vol, veh/h	20	30		555	25	20 485
Conflicting Peds, #/hr	6	67		0	34	34 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	98	98		98	98	98 98
Heavy Vehicles, %	1	1		1	1	1 1
Mvmt Flow	20	31		566	26	20 495
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1182	680		0	0	659 0
Stage 1	646	-		-	-	- -
Stage 2	536	-		-	-	- -
Critical Hdwy	6.41	6.21		-	-	4.11 -
Critical Hdwy Stg 1	5.41	-		-	-	- -
Critical Hdwy Stg 2	5.41	-		-	-	- -
Follow-up Hdwy	3.509	3.309		-	-	2.209 -
Pot Cap-1 Maneuver	211	453		-	-	934 -
Stage 1	524	-		-	-	- -
Stage 2	589	-		-	-	- -
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	188	416		-	-	908 -
Mov Cap-2 Maneuver	188	-		-	-	- -
Stage 1	495	-		-	-	- -
Stage 2	555	-		-	-	- -
Approach	WB			NB	SB	
HCM Control Delay, s	20.7			0	0.4	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	280	908	-	
HCM Lane V/C Ratio	-	-	0.182	0.022	-	
HCM Control Delay (s)	-	-	20.7	9.1	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-	

Lanes, Volumes, Timings
300: Oakland Avenue & Kenmore Place

2016 Build
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	30	45	40	25	35	25	490	40	20	440	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	70		0	0		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		301			130			350			310	
Travel Time (s)		8.2			3.5			9.5			8.5	
Confl. Peds. (#/hr)	36		25	24		36	89		65	65		89
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	135	0	0	104	0	26	552	0	0	526	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		50.0	50.0		50.0	50.0	
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0		50.0	50.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	20.0	20.0		20.0	20.0		45.0	45.0		45.0	45.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Gap (s)	0.2	0.2		0.2	0.2		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Ped	Ped		Ped	Ped		Ped	Ped		Ped	Ped	
Walk Time (s)	4.0	4.0		4.0	4.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
v/c Ratio		0.31			0.24		0.07	0.61			0.60	
Control Delay		18.0			17.0		6.9	12.3			12.3	
Queue Delay		0.0			0.0		0.0	0.0			0.0	

Lanes, Volumes, Timings
300: Oakland Avenue & Kenmore Place

2016 Build
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		18.0			17.0		6.9	12.3			12.3	
Queue Length 50th (ft)		27			20		4	104			99	
Queue Length 95th (ft)		86			68		13	192			185	
Internal Link Dist (ft)		221			50			270			230	
Turn Bay Length (ft)							70					
Base Capacity (vph)		563			570		692	1646			1586	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.24			0.18		0.04	0.34			0.33	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 51.2

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Splits and Phases: 300: Oakland Avenue & Kenmore Place

 ø2	 ø4
50 s	25 s
 ø6	 ø8
50 s	25 s

HCM 2010 Signalized Intersection Summary

300: Oakland Avenue & Kenmore Place

2016 Build
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	55	30	45	40	25	35	25	490	40	20	440	45
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.93	0.95		0.93	0.98		0.92	0.98		0.92
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1900	1881	1900	1881	1881	1900	1900	1881	1900
Adj Flow Rate, veh/h	57	31	47	42	26	36	26	510	42	21	458	47
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	229	129	141	222	140	142	578	932	77	84	883	88
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.55	0.55	0.55	0.55	0.55	0.55
Sat Flow, veh/h	503	478	524	480	518	529	877	1702	140	29	1611	161
Grp Volume(v), veh/h	135	0	0	104	0	0	26	0	552	526	0	0
Grp Sat Flow(s),veh/h/ln	1506	0	0	1527	0	0	877	0	1842	1801	0	0
Q Serve(g_s), s	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.5	0.0	0.0	2.6	0.0	0.0	1.0	0.0	10.6	9.9	0.0	0.0
Prop In Lane	0.42		0.35	0.40		0.35	1.00		0.08	0.04		0.09
Lane Grp Cap(c), veh/h	499	0	0	504	0	0	578	0	1009	1055	0	0
V/C Ratio(X)	0.27	0.00	0.00	0.21	0.00	0.00	0.04	0.00	0.55	0.50	0.00	0.00
Avail Cap(c_a), veh/h	638	0	0	643	0	0	818	0	1513	1534	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.9	0.0	0.0	15.6	0.0	0.0	5.8	0.0	8.0	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.4	0.0	0.0	0.1	0.0	1.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	1.3	0.0	0.0	0.2	0.0	5.5	5.2	0.0	0.0
LnGrp Delay(d),s/veh	16.5	0.0	0.0	16.0	0.0	0.0	5.9	0.0	9.0	8.6	0.0	0.0
LnGrp LOS	B			B			A		A	A		
Approach Vol, veh/h	135				104		578				526	
Approach Delay, s/veh	16.5				16.0		8.8				8.6	
Approach LOS	B				B		A				A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	35.0		19.8		35.0		19.8					
Change Period (Y+Rc), s	5.0		5.0		5.0		5.0					
Max Green Setting (Gmax), s	45.0		20.0		45.0		20.0					
Max Q Clear Time (g_c+l1), s	12.6		5.5		11.9		4.6					
Green Ext Time (p_c), s	17.4		2.1		17.6		2.2					
Intersection Summary												
HCM 2010 Ctrl Delay			10.1									
HCM 2010 LOS			B									

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	60	30	1	65	35	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	130			299	159	
Travel Time (s)	3.5			8.2	4.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)	0			0		
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	0	0	69	37	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	60	30	1	65	35	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	62	31	1	68	36	1
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	94	0	148	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	70	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1506	-	846	985
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	955	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1506	-	845	985
Mov Cap-2 Maneuver	-	-	-	-	845	-
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	954	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		9.4	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	848	-	-	1506	-	
HCM Lane V/C Ratio	0.044	-	-	0.001	-	
HCM Control Delay (s)	9.4	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Lanes, Volumes, Timings
100: Oakland Avenue & Pkg Dwy

2016 Build
SAT Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	15	60	120	440	450	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	100		100			
Link Speed (mph)	25			25	25	
Link Distance (ft)	196			80	195	
Travel Time (s)	5.3			2.2	5.3	
Confl. Peds. (#/hr)		13	93			93
Confl. Bikes (#/hr)						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)				0	0	
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	0	0	602	522	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	15	60	120	440	450	35
Conflicting Peds, #/hr	0	13	93	0	0	93
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	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	2	2
Mvmt Flow	16	65	129	473	484	38

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1247	609	535 0
Stage 1	516	-	- -
Stage 2	731	-	- -
Critical Hdwy	6.41	6.21	4.11 -
Critical Hdwy Stg 1	5.41	-	- -
Critical Hdwy Stg 2	5.41	-	- -
Follow-up Hdwy	3.509	3.309	2.209 -
Pot Cap-1 Maneuver	192	497	1038 -
Stage 1	601	-	- -
Stage 2	478	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	153	454	958 -
Mov Cap-2 Maneuver	153	-	- -
Stage 1	594	-	- -
Stage 2	386	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	19.6	2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	958	-	326	-	-
HCM Lane V/C Ratio	0.135	-	0.247	-	-
HCM Control Delay (s)	9.3	0	19.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.5	-	1	-	-

Lanes, Volumes, Timings
200: Oakland Avenue & Jarvis Street

2016 Build
SAT Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	30	20	540	30	15	495
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	100				100	
Link Speed (mph)	25		25			25
Link Distance (ft)	421		310			80
Travel Time (s)	11.5		8.5			2.2
Confl. Peds. (#/hr)	170	13		44	44	
Confl. Bikes (#/hr)						
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)			0			0
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	0	613	0	0	548
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	20	540	30	15	495
Conflicting Peds, #/hr	170	13	0	44	44	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	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	2	2
Mvmt Flow	32	22	581	32	16	532
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1332	811	0	0	783	0
Stage 1	767	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.12	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.218	-
Pot Cap-1 Maneuver	171	381	-	-	835	-
Stage 1	460	-	-	-	-	-
Stage 2	571	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	137	315	-	-	804	-
Mov Cap-2 Maneuver	137	-	-	-	-	-
Stage 1	395	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	34		0		0.3	
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 177	804	-		
HCM Lane V/C Ratio	-	- 0.304	0.02	-		
HCM Control Delay (s)	-	- 34	9.6	0		
HCM Lane LOS	-	- D	A	A		
HCM 95th %tile Q(veh)	-	- 1.2	0.1	-		

Lanes, Volumes, Timings
300: Oakland Avenue & Kenmore Place

2016 Build
SAT Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	20	50	30	25	30	30	500	30	20	465	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	70		0	0		0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		301			130			350			310	
Travel Time (s)		8.2			3.5			9.5			8.5	
Confl. Peds. (#/hr)	36		25	24		36	89		65	65		89
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	121	0	0	93	0	33	582	0	0	577	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		50.0	50.0		50.0	50.0	
Total Split (s)	25.0	25.0		25.0	25.0		50.0	50.0		50.0	50.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	20.0	20.0		20.0	20.0		45.0	45.0		45.0	45.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Gap (s)	0.2	0.2		0.2	0.2		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Ped	Ped		Ped	Ped		Ped	Ped		Ped	Ped	
Walk Time (s)	4.0	4.0		4.0	4.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	10.0	10.0		10.0	10.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
v/c Ratio		0.28			0.21		0.09	0.62			0.64	
Control Delay		18.5			17.5		6.9	12.4			13.0	
Queue Delay		0.0			0.0		0.0	0.0			0.0	

Lanes, Volumes, Timings
300: Oakland Avenue & Kenmore Place

2016 Build
SAT Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		18.5			17.5		6.9	12.4			13.0	
Queue Length 50th (ft)		26			19		5	112			113	
Queue Length 95th (ft)		82			65		16	202			205	
Internal Link Dist (ft)		221			50			270			230	
Turn Bay Length (ft)							70					
Base Capacity (vph)		556			578		642	1626			1566	
Starvation Cap Reductn		0			0		0	0			0	
Spillback Cap Reductn		0			0		0	0			0	
Storage Cap Reductn		0			0		0	0			0	
Reduced v/c Ratio		0.22			0.16		0.05	0.36			0.37	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 52.2

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Splits and Phases: 300: Oakland Avenue & Kenmore Place

 ø2	 ø4
50 s	25 s
 ø6	 ø8
50 s	25 s

HCM 2010 Signalized Intersection Summary
300: Oakland Avenue & Kenmore Place

2016 Build
SAT Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	20	50	30	25	30	30	500	30	20	465	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.93	0.95		0.93	0.98		0.92	0.98		0.92
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1881	1900	1881	1881	1900	1900	1881	1900
Adj Flow Rate, veh/h	44	22	55	33	27	33	33	549	33	22	511	44
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	191	106	176	190	153	141	557	987	59	82	927	78
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.56	0.56	0.56	0.56	0.56	0.56
Sat Flow, veh/h	404	410	678	401	592	546	842	1747	105	28	1641	138
Grp Volume(v), veh/h	121	0	0	93	0	0	33	0	582	577	0	0
Grp Sat Flow(s),veh/h/ln	1492	0	0	1539	0	0	842	0	1852	1807	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.3	0.0	0.0	2.4	0.0	0.0	1.4	0.0	11.3	11.3	0.0	0.0
Prop In Lane	0.36		0.45	0.35		0.35	1.00		0.06	0.04		0.08
Lane Grp Cap(c), veh/h	473	0	0	484	0	0	557	0	1046	1086	0	0
V/C Ratio(X)	0.26	0.00	0.00	0.19	0.00	0.00	0.06	0.00	0.56	0.53	0.00	0.00
Avail Cap(c_a), veh/h	607	0	0	623	0	0	749	0	1469	1487	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.8	0.0	0.0	16.5	0.0	0.0	5.7	0.0	7.8	7.8	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.4	0.0	0.0	0.1	0.0	1.0	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	1.2	0.0	0.0	0.3	0.0	5.9	5.9	0.0	0.0
LnGrp Delay(d),s/veh	17.4	0.0	0.0	16.9	0.0	0.0	5.8	0.0	8.8	8.7	0.0	0.0
LnGrp LOS	B			B			A		A	A		
Approach Vol, veh/h		121			93			615			577	
Approach Delay, s/veh		17.4			16.9			8.7			8.7	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		37.1		19.7		37.1		19.7				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		45.0		20.0		45.0		20.0				
Max Q Clear Time (g_c+l1), s		13.3		5.3		13.3		4.4				
Green Ext Time (p_c), s		18.7		1.9		18.8		2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			10.0									
HCM 2010 LOS			A									

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	40	30	1	55	30	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	130			299	159	
Travel Time (s)	3.5			8.2	4.3	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)	0			0		
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	0	61	34	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	40	30	1	55	30	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	1	1	1	1
Mvmt Flow	44	33	1	60	33	1
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	77	0	123	60
Stage 1	-	-	-	-	60	-
Stage 2	-	-	-	-	63	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1528	-	875	1008
Stage 1	-	-	-	-	965	-
Stage 2	-	-	-	-	962	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1528	-	874	1008
Mov Cap-2 Maneuver	-	-	-	-	874	-
Stage 1	-	-	-	-	965	-
Stage 2	-	-	-	-	961	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		9.3	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	878	-	-	1528	-	
HCM Lane V/C Ratio	0.039	-	-	0.001	-	
HCM Control Delay (s)	9.3	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	