



## Brightmoor Christian Church Building and Parking Lot Expansion JSP15-07

### Brightmoor Christian Church: Building and Parking Lot Expansion JSP15-07

Public hearing at the request of Brightmoor Christian Church for Special Land Use Permit, Preliminary Site Plan and Stormwater Management Plan approval. The subject property is located on the north side of Thirteen Mile, west of M-5 in Section 1. The 40-acre Church property at 40800 Thirteen Mile Road is zoned RA, Residential Acreage. The applicant is proposing to expand the existing Church building to include a new worship space, church offices, parking and associated site improvements.

### Required Action

Approve/deny the Special Land Use Permit, Preliminary Site Plan and Stormwater Management Plan

REVIEW	RESULT	DATE	COMMENTS
Planning	Approval recommended	02-25-15	<ul style="list-style-type: none"> <li>• <b>Planning Commission findings regarding the height of the proposed building in relation to surrounding land uses.</b></li> </ul> Items to be addressed on the final site plan submittal
Engineering	Approval recommended	02-26-15	<ul style="list-style-type: none"> <li>• Items to be addressed on the final site plan submittal</li> </ul>
Traffic	Approval recommended	02-12-15	<ul style="list-style-type: none"> <li>• Items to be addressed on the final site plan submittal</li> </ul>
Landscaping	Approval recommended	02-25-15	<ul style="list-style-type: none"> <li>• Items to be addressed on the final site plan submittal</li> <li>• <b>Planning Commission waiver required to reduce the minimum required standards for Interior Parking lot landscaping. Sec. 5.5.3.C</b></li> </ul>
Wetlands	Not Applicable		
Woodlands	Not Applicable		
Facade	Approval Recommended	02-24-15	
Fire	Approval recommended	02-06-15	<ul style="list-style-type: none"> <li>• Items to be addressed on the final site plan submittal</li> </ul>

## Motion sheet

### Approval – Special Land Use Permit

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to **approve** the Special Land Use permit based on the following findings:

- a. Relative to other feasible uses of the site:
  - **The proposed use will not cause any detrimental impact on existing thoroughfares** *(based on the findings of the Traffic Impact Study);*
  - **The proposed use will not cause any detrimental impact on the capabilities of public services and facilities** *(given the size of the new use, and that they are not adding any additional demand than anticipated);*
  - **The proposed use is compatible with the natural features and characteristics of the land** *(because the plan does not impact any existing natural features);*
  - **The proposed use is compatible with adjacent uses of land** *(given there is no change in existing use and the Planning Commission finds that the increased height will be compatible with, and will not have a material negative impact upon, existing and planned uses located on adjacent and surrounding properties, taking into consideration the size and configuration of the site and the proposed building(s), the size and nature of the improvements on the adjacent and surrounding properties, the aesthetic quality of the proposed building(s), including design, exterior materials, and landscaping, and any other relevant aspects of the site or proposed building(s);*
  - **The proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use** *(given there is no change in existing use);*
  - **The proposed use will promote the use of land in a socially and economically desirable manner;**
  - **The proposed use is (1) listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and (2) is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located;**
- b. The findings of compliance with Ordinance standards in the staff review letter and the conditions and the items listed in that letter being addressed; and
- c. *(additional comments here if any)*

*(This motion is made because the plan is otherwise in compliance with Article 3, Article 4 Article 5 and Article 6 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

**-AND-**

**Approval – Preliminary Site Plan**

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to **approve** the Preliminary Site Plan based on and subject to the following:

- a. The findings of compliance with Ordinance standards as listed in Section 4.10.5 to allow a building up to 65 feet in height on sites exceeding 30 acres.
- b. Landscape waiver to permit the reduction in minimum requirements for Interior Parking Lot Landscape Calculations as listed in Section 5.5.3.C by 17 trees due to plenty of existing and proposed landscape on site, which is hereby granted;
- c. The applicant will work with the City’s Landscape Architect to determine the location for replacing the 58 existing trees that will be removed for this construction;
- d. The findings of compliance with Ordinance standards in the staff review letter and the conditions and the items listed in that letter being addressed; and
- e. *(additional conditions here if any).*

*(This motion is made because the plan is otherwise in compliance with Article 3, Article 4 Article 5 and Article 6 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

**-AND-**

**Approval – Stormwater Management Plan**

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to **approve** the Stormwater Management Plan, based on and subject to:

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

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

**-OR-**

**Denial – Special Land Use Permit**

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to **deny** the Special Land Use permit for the following reasons...*(because it is not in compliance with the Ordinance.)*

**-AND-**

**Denial – Preliminary Site Plan**

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to **deny** the Preliminary Site Plan, *for the following reasons... (because the plan is not in compliance with Article 3, Article 4 Article 5 and Article 6 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

**-AND-**

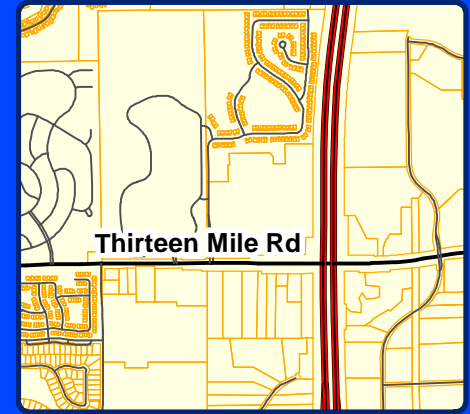
**Denial – Stormwater Management Plan**

In the matter of Brightmoor Christian Church: Building and Parking Lot Expansion, JSP15-07, motion to deny the Stormwater Management Plan...*(because the plan is not in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.)*

MAPS  
Location  
Zoning  
Future Landuse  
Natural Features

# JSP 15-07 Brightmoor Christian Church: Building and Parking Lot Expansion

Location



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

Map Author: Sri Komaragiri  
Date: 03/16/2015  
Project: Brightmoor Christian Church  
Version #: 1

Amended By:  
Date:  
Department:

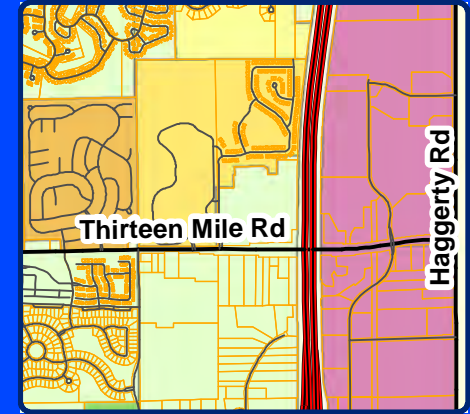
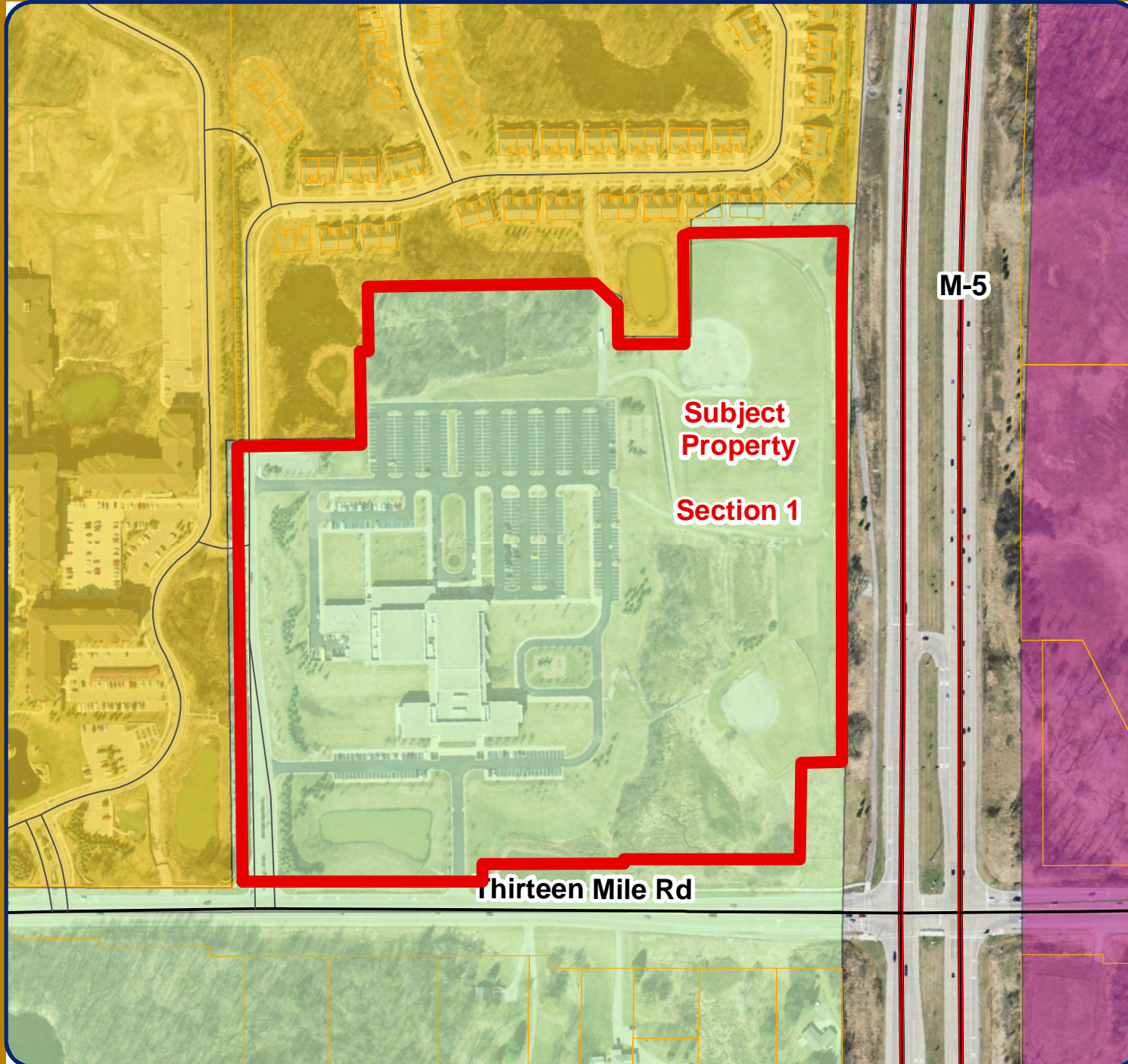
### MAP INTERPRETATION NOTICE

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



Haggerty Corridor Corporate Park Condo Phase 1

# JSP 15-07 Brightmoor Christian Church: Building and Parking Lot Expansion

## Zoning



### Legend

-  R-A: Residential Acreage
-  R-2: One-Family Residential
-  RM-1: Low-Density Multiple Family
-  MH: Mobile Home District
-  OST: Office Service Technology



### City of Novi

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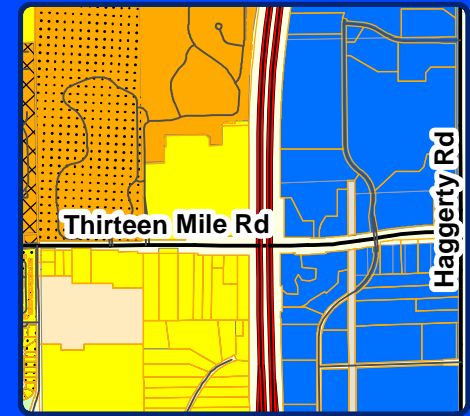
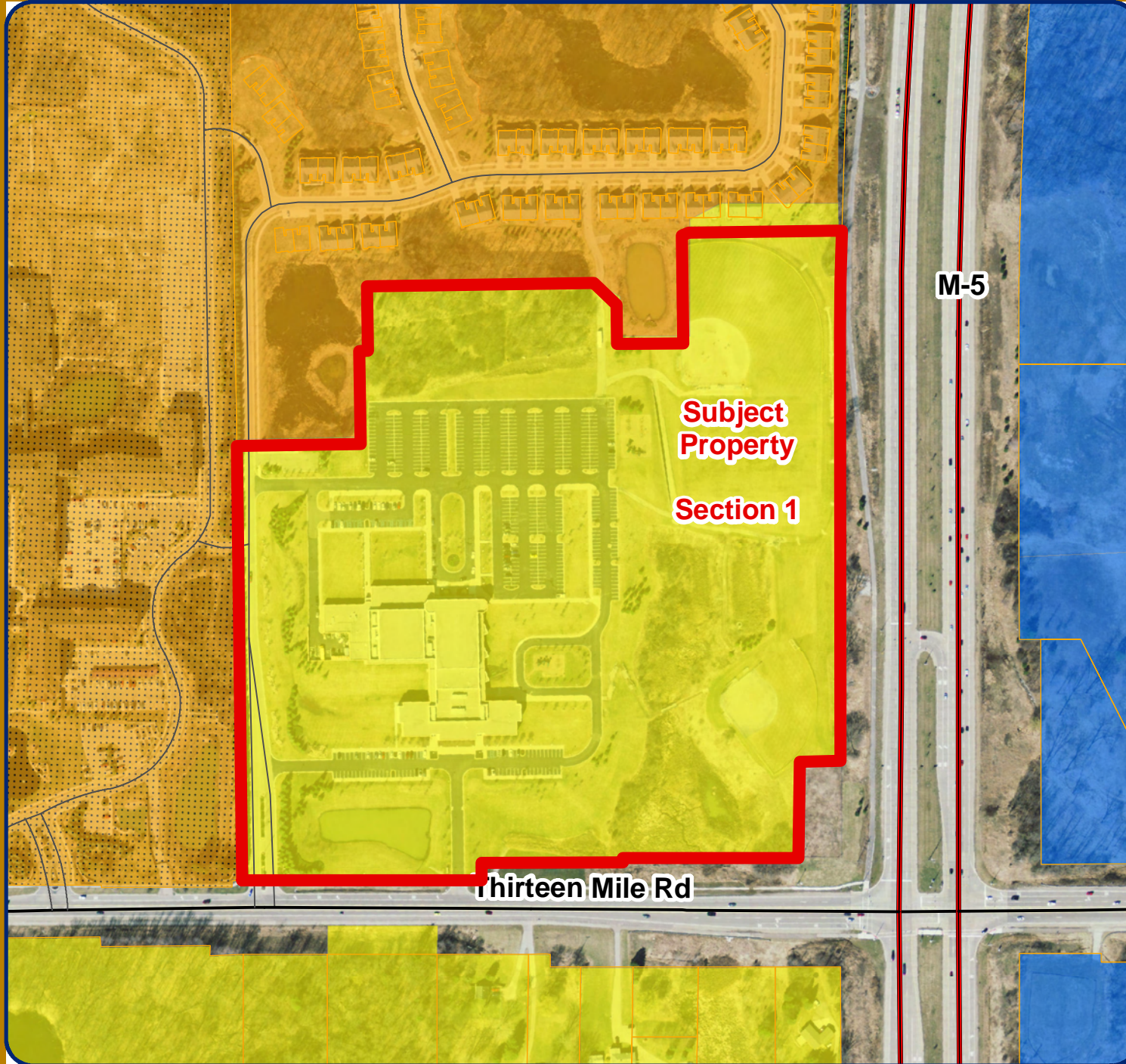
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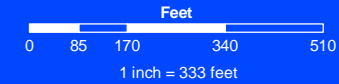
# JSP 15-07 Brightmoor Christian Church: Building and Parking Lot Expansion

Landuse



### Legend

SINGLE FAMILY	MOBILE HOME PARK
PUD	OFFICE RES DEV TECH
MULTIPLE FAMILY	EDUCATIONAL FACILITY
PD1	PRIVATE PARK
	UTILITY



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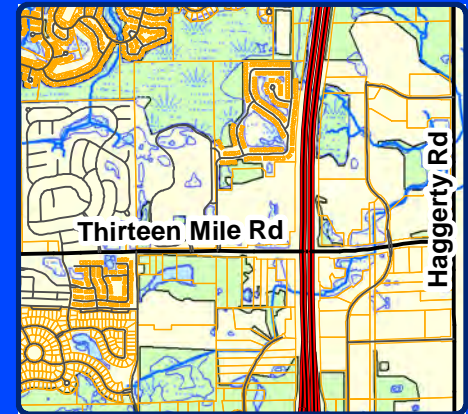
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# JSP 15-07 Brightmoor Christian Church: Building and Parking Lot Expansion

## Natural Features



### Legend

- Wetlands
- Woodlands
- Pond
- Waterways



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## Site Plan

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



## Planning Review



## PLAN REVIEW CENTER REPORT

February 25, 2015

### Planning Review

Brightmoor Christian Church Expansion

JSP15-07

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#### Petitioner

Brightmoor Christian Church

#### Review Type

Special Land Use Request and Preliminary Site Plan Review (Amended Page 2 on 03-19-15)

#### Property Characteristics

- Site Location: 40800 W. Thirteen Mile Road (north side of Thirteen Mile, just west of M-5)
- Site School District: Walled Lake Consolidated Schools
- Site Zoning: RA, Residential Acreage
- Adjoining Zoning: North: RM-1, Low Density Multiple Family; South (across Thirteen Mile): RA; East (across M-5): OST, Office Service Technology; West: RM-1
- Site Use(s): Brightmoor Christian Church
- Adjoining Uses: North: Lenox Park residential condominiums; South (across Thirteen Mile): Single family, vacant; East (across M-5): Vacant; West: Fox run retirement living
- Site Size: 40.1 acres
- Plan Date: January 21, 2015

#### Project Summary

The applicant is proposing to expand the existing Church building to the north with a worship space with auditorium style seating that seats 2,100 people along with accessory uses such as office and additional parking.

#### Project History:

Brightmoor Church is an approved special land use in the RA zoning district. On November 4, 1998, the Planning Commission approved the Special Land Use (following a public hearing), the Preliminary Site Plan with a proposed conservation easement for wetland and wetland mitigation near the southeast part of the development. The development included the Brightmoor Christian Church and school complex along with associated surface parking and drainage facilities.

On June 27, 2012, the Planning Commission approved the expansion of the Special Land Use (following a public hearing), the Preliminary Site Plan, the Woodlands permit, and the Stormwater Management Plan. The development included expansion of the existing parking lot on the north side of the Brightmoor Christian Church site, resulting in a net increase of 365 parking spaces and a total of 918 spaces. No new buildings or building expansions were proposed at that time.

On January 26, 2015, the City Council has approved Zoning Ordinance Text Amendment 18.273 to amend the City of Novi Zoning Ordinance at Article 4.0, Use Standards, Section 4.10, Places of Worship, in order to allow additional height for places of worship, under certain conditions, as detailed in the Planning Review Chart.

## **PLANNING COMMISSION FINDINGS:**

### **Special Land Use Considerations**

Expansion of a special land use requires a public hearing and special land use approval from the Planning Commission, along with preliminary site plan approval. The proposal also requires approval the stormwater management plan. **Section 6.1.2.C of the Zoning Ordinance outlines specific factors the Planning Commission shall consider in the review of any Special Land Use:**

- i. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service.
- ii. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area.
- iii. Whether, relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats.
- iv. Whether, relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood.
- v. Whether, relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use.
- vi. Whether, relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner.
- vii. Whether, relative to other feasible uses of the site, the proposed use is
  - a. listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and
  - b. Is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.

### **Additional Height Considerations (Amended on 03-19-15)**

A Zoning Ordinance Text Amendment 18.273 was approved on January 26, 2015 to amend the City of Novi Zoning Ordinance at Article 4.0, Use Standards, Section 4.1 0, Places of Worship, in order to allow additional height for places of worship under certain conditions. **Section 4.10.5. of the Zoning Ordinance outlines specific factors the Planning Commission shall consider in the review of this proposed additional height** (Page 2 of the Planning Review Chart addresses these factors).

Maximum building height shall be as provided in Article 24, provided that, on sites exceeding thirty (30) acres, buildings may be constructed up to sixty-five (65) feet in height if:

- a. the minimum front, side, and rear yard building setbacks are increased by one and one-half (1.5) feet for every one (1) foot of building height in excess of thirty-five (35) feet;
- b. the site abuts a freeway or a Major Arterial road;
- c. the Planning Commission finds that the increased height will be compatible with, and will not have a material negative impact upon, existing and planned uses located on adjacent and surrounding properties, taking into consideration the size and configuration of the site and the proposed building(s), the size and nature of the improvements on the adjacent and surrounding properties, the aesthetic quality of the proposed building(s), including design, exterior materials, and landscaping, and any other relevant aspects of the site or proposed building(s).

### Recommendation

**Approval of the Special Land Use Permit and Preliminary Site Plan is recommended.** The plan generally conforms to the requirements of the Zoning Ordinance; however, there are landscape, engineering and traffic related items to be addressed on the next Site Plan Submittal. In its review and approval, the Planning Commission will need to consider the standards for Special Land Use consideration of Section 6.1.2.C. as listed above

### Ordinance Requirements

This project was reviewed for conformance with the Zoning Ordinance with respect to Article 3.0 (Zoning Districts), Article 4.0(Use Standards), Article 5.0(Site Standards) and any other applicable provisions of the Zoning Ordinance. Please see the attached charts for information pertaining to ordinance requirements and additional minor comments to be addressed. Items in **bold** may require a Planning Commission waiver. All other items should be addressed in the response letter prior to the Planning Commission meeting unless otherwise noted.

1. Noise Impact Statement: **A noise impact statement is required per Section 5.14.10.B.i. The Planning Commission has the authority to waive this requirement per Section 5.14.10.B.iii. The applicant should indicate in the response letter whether this statement will be provided.**
2. Community Impact Statement: **A community impact statement is required for a Special Land Use over 10 acres. The Planning Commission has the authority to waive this requirement. The applicant should indicate in the response letter whether this statement will be provided.**
3. Traffic Impact Study: **A traffic impact study is required for this project. The applicant has noted that the study is under progress and will submit prior to preliminary site plan approval. The applicant shall submit this study as soon as possible, and no later than March 13th in order to allow the complete matter to be considered by the Planning Commission at a public hearing as anticipated on March 25.**
4. Parking Count: Please provide additional information required with regards to accessory spaces as listed in the attached chart, with the response letter.
5. Bicycle Parking: According to *Sec. 5.16.1, for places of worship, a minimum of five (5) percent of required automobile spaces, minimum eight (8) spaces of bicycle parking is required. For 233 of automobile parking, 12 bicycle spaces are required. **Please provide bike rack details and bike rack lot layout plan according to the ordinance requirements. Refer to Sec. 5.16. - Bicycle parking facility requirements.***
6. Loading Spaces and Dumpster: No additional dumpsters or loading spaces are provided. Show the existing locations on the plan or clarify the absence.
7. Economic Impact Statement: Provide information on total cost of the proposed building and site improvements and number of anticipated jobs created (during construction and after building is occupied, if known) in the response letter.
8. Photometric Plan: The applicant has provided a photometric plan; please refer to chart for additional information required.
9. Other Reviews:
  - a. Engineering Review: Additional comments to be addressed during Final Site Plan.
  - b. Landscape Review: Additional comments to be addressed during Final Site Plan.
  - c. Wetland and Woodland Review: There are no impacts to wetlands and woodlands proposed with this expansion on site.
  - d. Traffic Review: Additional comments to be addressed during Final Site Plan. Traffic Impact study required prior to Planning Commission meeting.

- e. Facade Review: Sample board required prior to Planning Commission meeting.
- f. Fire Review: Additional comment to be addressed during Final Site Plan.

**Response Letter**

A letter from either the applicant or the applicant's representative addressing comments in this and other review letters is required prior to the Planning Commission submittal.

**Signage**

Exterior Signage is not regulated by the Planning Division or Planning Commission. Please contact Jeannie Niland (248.347.0438) for information regarding sign permits.

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.735.5607 or [skomaragiri@cityofnovi.org](mailto:skomaragiri@cityofnovi.org).



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Sri Ravali Komaragiri – Planner

**PLANNING REVIEW SUMMARY CHART**

**Review Date:** February 23, 2015 (Amended Page 2 on 03-19-2015)  
**Project Name:** JSP15 – 0007: Brightmoor Christian Church  
**Plan Date:** February 02, 2015  
**Prepared by:** Sri Komaragiri, Planner **E-mail:** skomaragiri@cityofnovi.org; **Phone:** (248) 735-5607

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

Item	Required Code	Proposed	Meets Code	Comments
<b>Zoning and Use Requirements</b>				
<b>Master Plan</b> <i>(adopted August 25, 2010)</i>	Single Family	Church	Yes	<u>November 4, 1998:</u> Special Land Use approved for Church and School <u>June 27, 2012:</u> Special Land Use approved for additional parking
<b>Area Study</b>	The site does not fall under any special category	NA	Yes	
<b>Zoning</b> <i>(Effective December 25, 2013)</i>	Residential Acreage (RA) Article 3	RA	Yes	
<b>Uses Permitted</b> (Sec 3.1.1.B & C)	Sec 3.1.1.B Principal Uses Permitted. Sec 3.1.1.C Special Land USEs	Places of Worship (Church)	Yes	<b>Special Land Use approval shall be required as this expansion was not shown on any previous plans</b>
<b>Use Standards: Places of Worship Sec 4.10</b>				
<b>Minimum Site Size</b> <i>(Sec 4.10.1)</i>	- 3 Acres -	40.15 Acres	Yes	
<b>Minimum Site Width</b> <i>(Sec 4.10.2)</i>	- (200) feet along front yard		Yes	
<b>Site Access</b> <i>(Sec 4.10.3)</i>	- All access to the site shall be onto a Major Arterial, Arterial or Minor Arterial road as shown on the City's Thoroughfare Plan	Site access is off of West 13 Mile Road	Yes	
<b>Minimum Building Setbacks</b> <i>(Sec 4.10.4)</i>	- Seventy-five (75) feet from all property lines.		Yes	<b>Label Building setbacks on plan</b>
<b>Parking in Front yard</b> <i>(Sec 4.10.5)</i>	- There shall be no parking in front yard,	-No additional parking is proposed in the front yard	Yes	<b>Label parking Setbacks on plan</b>



Item	Required Code	Proposed	Meets Code	Comments
	- nor closer than twenty (20) feet from any side or rear lot line, except in those instances, where the lot abuts a residential lot and in those instances, no closer than thirty-five (35) feet on any side or rear yard			
<b>Parking Lot Screening</b> (Sec 4.10.6)	- Screening of vehicular parking areas shall be in conformity with requirements at Sec 5.5.3			
<b>Noise Impact Statement</b> (Sec 4.10.7)	- A noise impact statement is required subject to the standards of Section 5.14.10.B			<b>Provide required noise impact statement</b>
<b>Approved Text Amendment for Increased Building Heights (Approved by City Council on January 26, 2015)</b>				
<b>Site Acreage</b>	- 30 Acres for building height upto 65 feet	40.15 Acres	<b>Yes</b>	
<b>Site Location</b>	- Abuts a limited access freeway or a Major Arterial road	Abuts M-5 Freeway	<b>Yes</b>	
<b>Planning Commission Finding</b>	- The proposed development is compatible with and does not have negative impact on surroundings.			<b><u>Planning Commission is required to make this finding to approve the additional height</u></b> (Amended 03-19-15)
<b>Building Setbacks</b>	- the minimum front, side, and rear yard building setbacks are increased by one and one-half (1.5) feet for every one (1) foot of building height in excess of thirty-five (35) feet;	For 30ft. of proposed additional height, all minimum setbacks are increased by 45ft.	<b>Yes</b>	See below for required and proposed setbacks
<b>Height, bulk, density and area limitations (Sec 3.1.1.E)</b>				
<b>Maximum % of Lot Area Covered</b> (By All Buildings)	25%			<b>Provide the maximum % of lot covered</b>
<b>Building Height</b> (Sec. 3.1.1.E)	35 feet or 2 ½ stories 65 feet (provide the conditions listed above are met)	65 feet	<b>Yes</b>	

Item	Required Code	Proposed	Meets Code	Comments
<b>Building Setbacks</b> (Sec 3.1.1.E)&				
Front @ Thirteen Mile Way	75 ft. +45 ft. =120 ft	293 ft.	Yes	
Side (3.6.2.C)	120 ft. (Same as front)	735+195=930 ft.	Yes	
Rear South	50 ft. + 45ft = 95ft.	490 ft.	Yes	
<b>Parking Setback</b> (Sec 3.1.1.E)Refer to applicable notes in Sec 3.6.2				
Front @ Providence Park Way	No Parking in Front Yard	Existing Parking in Front Yard	Yes	
Side East (3.6.2.B)	120 ft. (Same as front)	Approx. 530 ft.	Yes	
Side West	35ft. (lot abuts a residential district)	Approx. 135 ft.	Yes	
Rear South	35ft. (lot abuts a residential district)	35 ft.	Yes	
<b>Note To District Standards</b> (Sec 3.6.2)				
Area Requirements (Sec 3.6.2.A)	NA			
Parking Setbacks (Sec 3.6.2.B)	Refer to Sec 3.6.2 for more details	Minimum required setbacks are modified accordingly	Yes	
Building Setbacks (Sec 3.6.2.C)	Refer to Sec 3.6.2 for more details	Minimum required setbacks are modified accordingly	Yes	
Wetland/Watercourse Setback (Sec 3.6.2.M)	Refer to Sec 3.6.2 for more details	No Wetlands and Woodlands on Site	NA	
<b>Parking, Loading and Dumpster Requirements</b>				
<b>Number of Parking Spaces</b> Churches 5.2.12.B One (1) for each three (3) seats  Schools 5.2.12.B One (1) for each staff and One for every 4 students over driving age	For 2,100 Seats, a total of 700 spaces are required  1 Space per employee = 65 Spaces + 1 space for every 4 students over driving age = 13 Spaces; Total 78 Spaces Existing  <b>Total Required: 778 Spaces</b>	<b>Total Existing:</b> 918 (897 Regular; 21 Barrier free) <b>Parking Lost in Expansion:</b> 191 (175 Regular; 16 Barrier free) <b>New Spaces Proposed:</b> 233 (211 Regular; 22 Barrier free)  <b>TOTAL: 960 (934 Regular; 26 Barrier free)</b>	Yes	<b>Are the new office spaces proposed with the new addition?</b>  <b>How many Youth Worship Seats are proposed in Youth Worship area? What is the age range for the Youth Worship?</b>  <b>There are 182 additional spaces then required on site. However, staff wants to make that all accessory uses are accounted for.</b>
<b>Parking Space Dimensions and Maneuvering Lanes</b> (Sec.	- 90° Parking: 9 ft. x 19 ft. - 24 ft. two way drives - 9 ft. x 17 ft. parking spaces allowed along	90° Parking: 9 ft. x 17 ft. to 18.5ft. along 8 ft. wide interior sidewalks and landscape spaces.	Yes	

Item	Required Code	Proposed	Meets Code	Comments
5.3.2)	7 ft. wide interior sidewalks as long as detail indicates a 4" curb at these locations and along landscaping	-24 ft. to 28ft. driveway within parking aisles. 28ft. to 30 ft. wide access drive with no parking on either side.		
<b>Parking Space Dimensions and Maneuvering Lanes</b> (Sec. 5.3.2)	-			
<b>Parking stall located adjacent to a parking lot entrance</b> (public or private) (Sec. 5.3.13)	- shall not be located closer than twenty-five (25) feet from the street right-of-way (ROW) line, street easement or sidewalk, whichever is closer	NA	Yes	
<b>End Islands</b> (Sec. 5.3.12)	- End Islands with landscaping and raised curbs are required at the end of all parking bays that abut traffic circulation aisles. - The end islands shall generally be at least 8 feet wide, have an outside radius of 15 feet, and be constructed 3' shorter than the adjacent parking stall as illustrated in the Zoning Ordinance	End Islands are proposed	Yes	
<b>Barrier Free Spaces</b> <i>Barrier Free Code</i>	For 501 to 1000 Total Parking in lot, 2 % of total needs to be barrier free. 2% of 960 spaces=19 including 3 Van accessible	4 Van accessible and 22 regular barrier free (4 Existing) parking spaces	<b>Yes</b>	
<b>Barrier Free Space Dimensions</b> <i>Barrier Free Code</i>	- 8' wide with an 8' wide access aisle for van accessible spaces - 5' wide with a 5' wide access aisle for regular accessible spaces	Two types of accessible spaces are provided	Yes	
<b>Barrier Free Signs</b>	One sign for each accessible parking space.	All signs are proposed	Yes	
	-			

Item	Required Code	Proposed	Meets Code	Comments
<b>Barrier Free Signs</b> <i>Barrier Free Design Graphics Manual</i>				
<b>Minimum number of Bicycle Parking</b> <i>Sec. 5.16.1</i>	Five (5) percent of required automobile spaces, minimum eight (8) spaces= <b>12 bicycle spaces are required for 233 spaces</b>  Located along the building approach line & easily accessible from the building entrance	Bicycle parking not indicated	No	<b>Applicant should add the required bike parking as per the ordinance requirements.</b>
<b>Bicycle Parking General requirements</b> <i>Sec. 5.16</i>	<ul style="list-style-type: none"> <li>- No farther than 120 ft. from the entrance being served</li> <li>- When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations</li> <li>- Spaces to be paved and the bike rack shall be inverted "U" design</li> <li>- Shall be accessible via 6 ft. paved sidewalk</li> </ul>	No  No  No  No	No	<p><b>Note the location</b></p> <p><b>Bicycle spaces should be proposed in multiple locations</b></p> <p><b>Please provide the inverted "U" bike rack detail</b></p>
<b>Bicycle Parking Lot layout</b> <i>Sec 5.16.6</i>	Parking space width: 6 ft. One tier width: 10 ft. Two tier width: 16 ft. Maneuvering lane width: 4 ft. Parking space depth: 2 ft. single, 2 ½ ft. double		No	<b>Provide a plan detail of the bicycle parking as required</b>
<b>Loading Spaces</b> <i>Sec. 5.4.1</i>	Required on all premises where receipt or distribution of materials or merchandise occurs and shall be separate from parking areas	Loading Spaces are not proposed	NA	<b>Clarify with a note that the loading spaces are not required for the proposed use. If required, please show loading space on the plan.</b>

Item	Required Code	Proposed	Meets Code	Comments
<b>Dumpster</b> <i>Sec. 4.19.2.F</i>	<ul style="list-style-type: none"> <li>- Located in rear yard</li> <li>- Attached to the building or</li> <li>- No closer than 10 ft. from building if not attached</li> <li>- Not located in parking setback</li> <li>- If no setback, then it cannot be any closer than 10 ft. from property line.</li> <li>- Away from Barrier free Spaces</li> </ul>	No Dumpster is shown on the plans	No	<p><b>Is there an existing dumpster?</b></p> <p><b>Identify the dumpster location on plans</b></p>
<b>Dumpster Enclosure</b> <i>Sec. 21-145. (c)</i>	<ul style="list-style-type: none"> <li>- Screened from public view</li> <li>- A wall or fence 1 ft. higher than height of refuse bin</li> <li>- And no less than 5 ft. on three sides</li> <li>- Posts or bumpers to protect the screening</li> <li>- Hard surface pad.</li> <li>- Screening Materials: Masonry, wood or evergreen shrubbery</li> </ul>		No	<b>See above comment</b>
<b>Lighting and Other Equipment Requirements</b>				
<b>Exterior lighting</b> <i>Sec. 5.7</i>	Photometric plan and exterior lighting details needed at time of Final Site Plan submittal	A lighting plan is provided	Yes	
<b>Roof top equipment and wall mounted utility equipment</b> <i>Sec. 4.19.2.E.ii</i>	<ul style="list-style-type: none"> <li>- All roof top equipment must be screened and all wall mounted utility equipment must be enclosed and integrated into the design and color of the building</li> </ul>	Roof top equipment is not proposed	Yes	<b>Please clarify if there is any proposed rooftop equipment</b>
<b>Roof top appurtenances screening</b>	Roof top appurtenances shall be screened in accordance with applicable facade regulations, and shall not be visible from any street, road or adjacent property.	Roof top equipment is not proposed	Yes	<b>Please clarify if there is any proposed rooftop equipment</b>

Item	Required Code	Proposed	Meets Code	Comments
<b>Sidewalk Requirements</b>				
<b>Sidewalks</b> Article XII <i>Sec. 11-276(b)&amp;                      Sec. 11-279</i>  Town Center Area Study	- A 6' -10' wide sidewalk shall be constructed along all arterial and collector roads except in industrial districts - All pedestrian safety paths shall be concrete and four (4) inches thick except residential driveway crossings which shall be six (6) inches thick, and industrial/commercial driveway crossings which shall be eight (8) inches thick.		NA	
<b>Pedestrian Connectivity</b>	The Planning Commission shall consider the following factors in exercising its discretion over site plan approval Whether the traffic circulation features within the site and location of automobile parking areas are designed to assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	8 foot Sidewalks are proposed throughout the site for convenient and safe pedestrian access	Yes	<b>Consider connecting the front parking lot to rear parking lot via sidewalk</b>
<b>Building Code and other design standard Requirements</b>				
<b>Building Code</b>	Building exits must be connected to sidewalk system or parking lot.	All exits are connected to internal sidewalk	Yes	
<b>Design and Construction Standards Manual</b>	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).	Provided	Yes	

Item	Required Code	Proposed	Meets Code	Comments
<b>General layout and dimension of proposed physical improvements</b>	Location of all existing and proposed buildings, proposed building heights, building layouts, (floor area in square feet), location of proposed parking and parking layout, streets and drives, and indicate square footage of pavement area (indicate public or private).		Yes	
<b>Economic Impact</b>	<ul style="list-style-type: none"> <li>- Total cost of the proposed building &amp; site improvements</li> <li>- Number of anticipated jobs created (during construction &amp; after building is occupied, if known)</li> </ul>		No	<b>Provide the required information for Planning Commission</b>
<b>Development/ Business Sign</b>	Signage if proposed requires a permit.			<u>For sign permit information contact Jeannie Niland 248-347-0438.</u>

**LIGHTING REVIEW SUMMARY CHART**

**Review Date:** 11 February 2015

**Project Name:** JSP15 – 0007: Brightmoor Christian Church

**Plan Date:** February 02, 2015

**Prepared by:** Sri Komaragiri, Planner **E-mail:** skomaragiri@cityofnovi.org; **Phone:** (248) 735-5607

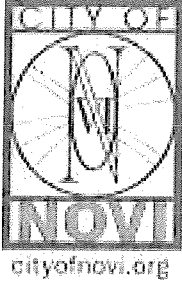
Items in **Bold** need to be addressed by the applicant before approval of the Preliminary Site Plan. Underlined items need to be addressed before approval of the Final Site Plan.

Item	Required Code	Proposed	Meets Code?	Comments
<b>Intent</b> (Sec. 5.7.1)	Establish appropriate minimum levels, prevent unnecessary glare, reduce spillover onto adjacent properties & reduce unnecessary transmission of light into the night sky	Yes	Yes	
<b>Lighting Plan</b> (Sec. 5.7.A.1)	Site plan showing location of all existing & proposed buildings, landscaping, streets, drives, parking areas & exterior lighting fixtures	Yes	Yes	
<b>Lighting Plan</b> (Sec. 5.7.A.2)	Specifications for all proposed & existing lighting fixtures: <ul style="list-style-type: none"> <li>▪ Photometric data</li> <li>▪ Fixture height</li> <li>▪ Mounting &amp; design</li> <li>▪ Glare control devices</li> <li>▪ Type &amp; color rendition of lamps</li> <li>▪ Hours of operation</li> </ul> Photometric plan illustrating all light sources that impact the subject site, including spill-over information from neighboring properties	<ul style="list-style-type: none"> <li>▪ Yes</li> <li>▪ No</li> <li>▪ Yes</li> <li>▪ Yes</li> <li>▪ Yes</li> <li>▪ No</li> </ul>	No	<b>Provide the hours of operation, fixture height on plan</b>
<b>Required Conditions</b> (Sec. 5.7.3.A)	Height not to exceed maximum height of zoning district (or 25 ft. where adjacent to residential districts or uses)	25 ft.	No	<b>Provide the maximum height of the fixtures</b>
<b>Required Conditions</b> (Sec. 5.7.3.B)	<ul style="list-style-type: none"> <li>▪ Electrical service to light fixtures shall be placed underground</li> <li>▪ Flashing light shall not be permitted</li> <li>▪ Only necessary lighting for security purposes &amp; limited operations shall be permitted after a site's hours</li> </ul>	Notes are added to the plan.	Yes	<b>Provide the hours of operation on plan</b>



Item	Required Code	Proposed	Meets Code?	Comments
	of operation			
<b>Required Conditions</b> (Sec. 5.7.3.E)	Average light level of the surface being lit to the lowest light of the surface being lit shall not exceed 4:1		No	<b>Provide the total ratio as required</b>
<b>Required Conditions</b> (Sec. 5.7.3.F)	Use of true color rendering lamps such as metal halide is preferred over high & low pressure sodium lamps	Yes	Yes	
<b>Min. Illumination</b> (Sec. 5.7.3.K)	<ul style="list-style-type: none"> <li>▪ Parking areas: 0.2 min</li> <li>▪ Loading &amp; unloading areas: 0.4 min</li> <li>▪ Walkways: 0.2 min</li> <li>▪ Building entrances, frequent use: 1.0 min</li> <li>▪ Building entrances, infrequent use: 0.2 min</li> </ul>	<ul style="list-style-type: none"> <li>▪ 0.2 min</li> <li>▪ 0.4 min</li> <li>▪ 0.2 min</li> <li>▪ 1.0 min</li> <li>▪ 0.2 min</li> </ul>	Yes	
<b>Max. Illumination adjacent to Non-Residential</b> (Sec. 5.7.3.K)	When site abuts a non-residential district, maximum illumination at the property line shall not exceed 1 foot candle		NA	
<b>Cut off Angles</b> (Sec. 5.7.3.L)	when adjacent to residential districts <ul style="list-style-type: none"> <li>▪ All cut off angles of fixtures must be 90°</li> <li>▪ maximum illumination at the property line shall not exceed 0.5 foot candle</li> </ul>		Yes	<b>Provide the Foot-candle values along property line on plan</b>

# Engineering Review



## PLAN REVIEW CENTER REPORT

02/26/2015

### Engineering Review

BRIGHTMOOR CHRISTIAN CHURCH  
JSP14-0077

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#### Applicant

BRIGHTMOOR CHRISTIAN CHURCH

#### Review Type

Preliminary Site Plan

#### Property Characteristics

- Site Location: N. of 13 Mile Rd. and W. of M-5
- Site Size: 40.15 acres
- Plan Date: 02/02/15

#### Project Summary

- Construction of a building expansion and associated parking. Site access would be provided from the existing site parking lot.
- Water service and 3 existing hydrants would be relocated to accommodate the proposed building addition. No new leads are being proposed.
- Storm water would be collected by a single storm sewer collection system and detained in the existing storm water detention facilities.

#### Recommendation

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

#### Comments:

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

**Additional Comments** (to be addressed prior to the Final Site Plan submittal):

General

1. The City standard detail sheets are not required for the Final Site Plan submittal. They will be required with the Stamping Set submittal. They can be found on the City website ([www.cityofnovi.org/DesignManual](http://www.cityofnovi.org/DesignManual)).
2. Provide a note stating the size of the disturbed area and the size of the building addition.
3. Provide a minimum of two ties to established section or quarter section corners.
4. Provide a note stating the distributed area for construction.
5. Revise the plan set to reference at least one city established benchmark. An interactive map of the City's established survey benchmarks can be found under the 'Map Gallery' tab on [www.cityofnovi.org](http://www.cityofnovi.org).
6. Provide a construction materials table on the Utility Plan listing the quantity and material type for each utility (water, sanitary and storm) being proposed.
7. Provide a note that compacted sand backfill shall be provided for all utilities within the influence of paved areas, and illustrate on the profiles.
8. Provide a traffic control sign table listing the quantities of each sign type proposed for the development. Provide a note along with the table stating all traffic signage will comply with the current MMUTCD standards.
9. Provide a note stating if dewatering is anticipated or encountered during construction a dewatering plan must be submitted to the Engineering Department for review.
10. Generally, all proposed trees shall remain outside utility easements. Where proposed trees are required within a utility easement, the trees shall maintain a minimum 5-foot horizontal separation distance from any existing or proposed utility. All utilities shall be shown on the landscape plan, or other appropriate sheet, to confirm the separation distance.

Water Main

11. Show existing and proposed water main easements.
12. Provide a profile for all proposed water main 8-inch and larger.
13. Three (3) sealed sets of revised utility plans along with the MDEQ permit application (1/07 rev.) for water main construction and the Streamlined Water Main Permit Checklist should be submitted to the Engineering Department for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets.

Storm Sewer

14. Label all inlet storm structures on the profiles. Inlets are only permitted in paved areas and when followed by a catch basin within 50 feet.
15. Label the 10-year HGL on the storm sewer profiles, and ensure the HGL remains at least 1-foot below the rim of each structure.

16. Provide a schedule listing the casting type and other relevant information for each proposed storm structure on the utility plan. Round castings shall be provided on all catch basins except curb inlet structures.
17. Provide a 0.1-foot drop in the downstream invert of all storm structures where a change in direction of 30 degrees or greater occurs.
18. Provide profiles for all proposed storm sewer.

#### Storm Water Management Plan

19. The Storm Water Management Plan for this development shall be designed in accordance with the Storm Water Ordinance and Chapter 5 of the new Engineering Design Manual.
20. The SWMP must detail the storm water system design, calculations, details, and maintenance as stated in the ordinance. The SWMP must address the discharge of storm water off-site, and evidence of its adequacy must be provided. This should be done by comparing pre- and post-development discharge rates and volumes. The area being used for this off-site discharge should be delineated and the ultimate location of discharge shown.
21. Provide supporting calculations for the runoff coefficient determination.
22. Provide details and calculations on the plan showing that the east basin will be enlarged to accommodate the proposed 10-year volume while maintaining a one-foot freeboard as discussed.

#### Paving & Grading

23. The proposed parking stalls along the east curb line are dimensioned at 18.5 feet with 6-inch curb. Parking stalls with a 6-inch curb must be a minimum of 19-feet long. The length can be reduced up to 17-feet with a 4-inch curb.

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

24. An itemized construction cost estimate must be submitted to the Community Development Department at the time of Final Site Plan submittal for the determination of plan review and construction inspection fees. This estimate should only include the civil site work and not any costs associated with construction of the building or any demolition work. **The cost estimate must be itemized** for each utility (water, sanitary, storm sewer), on-site paving, right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pretreatment structure and restoration).

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

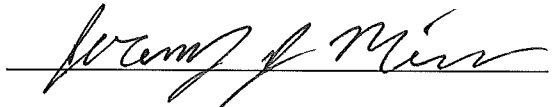
25. A draft copy of the maintenance agreement for the storm water facilities, as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department with the Final Site Plan. Once the form of the agreement is approved, this agreement must be approved by City Council and shall be recorded in the office of the Oakland County Register of Deeds.

26. A draft copy of the 20-foot wide easement for the water main to be constructed on the site must be submitted to the Community Development Department.

**The following must be addressed prior to construction:**

27. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development Department to setup a meeting (248-347-0430).
28. A City of Novi Grading Permit will be required prior to any grading on the site. This permit will be issued at the pre-construction meeting. Once determined, a grading permit fee must be paid to the City Treasurer's Office.
29. An NPDES permit must be obtained from the MDEQ because the site is over 5 acres in size. The MDEQ requires an approved plan to be submitted with the Notice of Coverage.
30. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department (248-347-0430) for forms and information.
31. A permit for water main construction must be obtained from the MDEQ. This permit application must be submitted through the City Engineer after the water main plans have been approved.
32. Construction Inspection Fees to be determined once the construction cost estimate is submitted must be paid prior to the pre-construction meeting.
33. An incomplete site work performance guarantee for this development will be calculated (equal to 1.5 times the amount required to complete the site improvements, excluding the storm water facilities) as specified in the Performance Guarantee Ordinance. This guarantee will be posted prior to TCO, at which time it may be reduced based on percentage of construction completed.

Please contact Jeremy Miller at (248) 735-5694 with any questions.



cc: Ben Croy, Engineering  
Brian Coburn, Engineering  
Sri Komaragiri, Community Development Department  
Michael Andrews, Water & Sewer Department

## Landscape Review



# PLAN REVIEW CENTER REPORT

February 25, 2015

## Landscape Review

Brightmoor Christian Church Expansion

JSP15-07

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### Petitioner

Brightmoor Christian Church

### Review Type

Special Land Use Request and Preliminary Site Plan Review

### Property Characteristics

- Site Location: 40800 W. Thirteen Mile Road
- Site School District: Walled Lake Consolidated Schools
- Site Zoning: RA, Residential Acreage
- Adjoining Zoning: North: RM-1, Low Density Multiple Family; South (across Thirteen Mile): RA; East (across M-5): OST, Office Service Technology; West: RM-1
- Site Use(s): Brightmoor Christian Church
- Adjoining Uses: North: Lenox Park residential condominiums; South (across Thirteen Mile): Single family, vacant; East (across M-5): Vacant; West: Fox run retirement living
- Site Size: 40.1 acres
- Plan Date: February 02, 2015

### Recommendation

Approval of the **Special Land Use Request and Preliminary Site Plan** is **recommended**. The plan generally conforms to the requirements of the Zoning Ordinance;

### Ordinance Requirements

This project was reviewed for conformance with the Zoning Ordinance with respect to Article 5- Site Standards, Sec. 5.5. - Landscape Standards, Landscape Design Manual (LDM) and any other applicable provisions of the Zoning Ordinance. Please see the attached charts for information pertaining to ordinance requirements and additional minor comments to be addressed. Items in **bold** may require a Planning Commission waiver. All other items should be addressed in the response letter prior to the Planning Commission meeting unless otherwise noted.

### Interior Parking Lot Landscape Calculations (Sec 5.5.3.C)

Applicant is asked to recalculate areas for all new parking spaces (a total of 233 spaces and related driveways identified in grey shade on plans, not the net increase of 42 spaces). Staff has contacted the applicant's landscape architect for further clarification. Please provide the required calculations as discussed for parking lot landscape area and call out the areas on the plan by square footage with the response letter prior to the Planning Commission meeting. **Based on the preliminary calculations staff prepared, the plans appear to be short 17 trees below the minimum required. A Planning Commission waiver would be required for not meeting the minimum requirements, and staff would support such waiver if the applicant chooses to request it, due to the abundance of trees planned and existing on site.**

### Planting Notations and Details (LDM)

Guying material as shown on the planting details should be revised to call for fabric ties only, not plastic or wire.



**Irrigation (LDM 2.s.)**

A fully automatic irrigation system and a method of draining is required with Final Site Plan

**Existing and proposed utilities(LDM 2.e.(4))**

Show existing and Proposed Fire Hydrants on landscape plan at the time of **Final Site Plan**.

**Soil type (LDM.2.r.)**

Provide Soil information on plans at the time of Final Site Plan.

**Collected or Transplanted trees (LDM 3.f)**

It is applicant's responsibility to work with City of Novi's Landscape Architect according to the following section

*LDM.3f. Collected or Transplanted Trees*

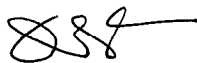
- (i) All collected trees shall be from on site and inspected by the City. Trees may be rejected for reasons of insect infestation, disease or standards set forth in this ordinance. Such plant material may be rejected either in full or in part.*
- (ii) All transplanted trees shall conform to standards set forth in Section 9.*
- (iii) The root ball of any transplanted tree shall measure 1 foot for each inch of trunk diameter measured 12" above the ground.*
- (iv) If trees are to be stored, they shall be burlapped and heeled in with mulch in a predetermined area approved by the City.*
- (v) The trees shall be provided with a working irrigation system approved by the City to ensure their viability during storage.*

**General Notes**

- a. All substitutions or deviations from the landscape plan must be approved by the city prior to installation.
- b. Maintain shrubs at max. 24" in height within lot.
- c. Stamping Set must provide an original signature.

*Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review is a summary and not intended to substitute for any Ordinance. For the landscape requirements, see the Zoning Ordinance landscape section on 5.5, Landscape Design Manual and the appropriate items in the applicable zoning classification*

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.735.5607 or [skomaragiri@cityofnovi.org](mailto:skomaragiri@cityofnovi.org).



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Sri Ravali Komaragiri – Planner

## LANDSCAPE REVIEW SUMMARY CHART

**Review Date:** 23 February 2015  
**Project Name:** JSP15 – 0007: Brightmoor Christian Church  
**Plan Date:** 02 February 2015  
**Prepared by:** Sri Komaragiri, Planner E-mail: skomaragiri@cityofnovi.org; Phone: (248) 735-5607

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

Item	Required	Proposed	Meets Code	Comments
<b>Landscape Plan Requirements (LDM (2))</b>				
<b>Landscape Plan</b> <i>(Sec 5.5.2)</i>	<ul style="list-style-type: none"> <li>▪ New commercial or residential developments</li> <li>▪ Addition to existing building greater than 25% increase in overall footage or 400 SF whichever is less.</li> </ul>	Yes	Yes	
<b>Owner/Developer Contact Information</b> <i>(LDM 2.a.)</i>	<ul style="list-style-type: none"> <li>▪ Name, address and telephone number of the owner and developer or association</li> </ul>	Yes	Yes	
<b>Landscape Architect contact information</b> <i>(LDM 2.b.)</i>	<ul style="list-style-type: none"> <li>▪ Name, Address and telephone number of RLA</li> </ul>	Yes	Yes	
<b>Survey information</b> <i>(LDM 2.c.)</i>	<ul style="list-style-type: none"> <li>▪ Legal description or boundary line survey</li> </ul>	Yes	Yes	
<b>Project Information</b> <i>(LDM 2.d.)</i>	<ul style="list-style-type: none"> <li>▪ Name and Address</li> </ul>	Yes	Yes	
<b>A landscape plan</b> <i>(LDM 2.e.)</i>	<ul style="list-style-type: none"> <li>▪ 1" -20' minimum with proper North. Variations from this scale can be approved by LA</li> <li>▪ Consistent Plans throughout set required</li> </ul>	1" =50'	No	<b>LA can approve this scale provided details are provided at a scale 1"-20' minimum for certain areas</b>
<b>Proposed topography. 2' contour minimum</b> <i>(LDM 2.e.(1))</i>	<ul style="list-style-type: none"> <li>▪ Provide proposed contours at 2' interval</li> </ul>	No	Yes	
<b>Existing plant material Existing woodlands or wetlands</b> <i>(LDM 2.e.(2))</i>	<ul style="list-style-type: none"> <li>▪ Show location type and size. Label to be saved or removed. Plan shall state if none exists.</li> </ul>	Yes	Yes	
<b>Existing and</b>	<ul style="list-style-type: none"> <li>▪ Existing and proposed</li> </ul>	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
<b>proposed improvements</b> (LDM 2.e.(4))	buildings, easements, parking spaces, vehicular use areas, and R.O.W			
<b>Existing and proposed utilities</b> (LDM 2.e.(4))	<ul style="list-style-type: none"> <li>Overhead and underground utilities, including hydrants</li> </ul>	No	No	<b>Show existing and Proposed Fire Hydrants on landscape plan.</b>
<b>Clear Zones</b> (LDM 2.e.(5))	<ul style="list-style-type: none"> <li>25 ft. corner clearance required. Refer to Sec 5.9</li> </ul>	NA	NA	No new exits are proposed
<b>Zoning</b> (LDM 2.f.)	<ul style="list-style-type: none"> <li>Include all adjacent zoning</li> </ul>	Yes	Yes	
<b>Sealed by LA.</b> (LDM 2.g.)	<ul style="list-style-type: none"> <li>Requires original signature</li> </ul>	Yes	No	<u>Requires original signature for final site plan approval</u>
<b>Plant List (LDM 2.h.) - Include all cost estimates</b>				
Quantities and sizes		Yes	Yes	
Root type		Yes	Yes	
Botanical and common names	<ul style="list-style-type: none"> <li>Refer to LDM suggested plant list</li> </ul>	Yes	Yes	
Type and amount of lawn		Yes	Yes	
<b>Planting Details/Info (LDM 2.i) - Utilize City of Novi Standard Details</b>				
Canopy Deciduous Tree	<ul style="list-style-type: none"> <li>Refer to LDM for detail drawings</li> </ul>	Yes	Yes	
Evergreen Tree		Yes	Yes	
Shrub		Yes	Yes	
Perennial/ Ground Cover		Yes	Yes	
<b>Cross-Section of Berms (LDM 2.j)</b>				
Slope, height and width	<ul style="list-style-type: none"> <li>Label contour lines</li> <li>Maximum 33%</li> <li>Min. 5 feet flat horizontal area</li> </ul>	NA	NA	
Type of Ground Cover		NA	NA	
Setbacks from Utilities	<ul style="list-style-type: none"> <li>Overhead utility lines and 15 ft. setback from edge of utility or 20 ft. setback from closest pole</li> </ul>	NA		
<b>Walls (LDM 2.k.) .Sec 2509.3.a.(6)</b>				
<b>Material, height and type of construction footing</b>	<ul style="list-style-type: none"> <li>Freestanding walls should have brick or stone exterior with masonry or concrete interior</li> </ul>	No	NA	

Item	Required	Proposed	Meets Code	Comments
<b>Walls greater than 3 ½ ft. should be designed and sealed by an Engineer</b>		No	NA	
<b>Landscape Notations – Utilize City of Novi Standard Notes</b>				
<b>Installation date</b> <i>(LDM 2.l.) Refer to Sec 2509.5</i>	<ul style="list-style-type: none"> <li>Provide intended date</li> </ul>	Yes	Yes	
<b>Maintenance &amp; Statement of intent</b> <i>(LDM 2.m.) &amp; Refer to sec 2509.6</i>	<ul style="list-style-type: none"> <li>Include statement of intent to install and guarantee all materials for 2 years.</li> <li>Include a minimum one cultivation in June, July and August for the 2-year warranty period.</li> </ul>	Yes	Yes	
<b>Plant source</b> <i>(LDM 2.n &amp; LDM 3.a.(2))</i>	<ul style="list-style-type: none"> <li>Shall be northern nursery grown, No.1 grade.</li> </ul>	Yes	Yes	
<b>Snow deposit</b> <i>(LDM.2.q.)</i>	<ul style="list-style-type: none"> <li>Show snow deposit areas on plan</li> </ul>	Yes	Yes	
<b>Soil type</b> <i>(LDM.2.r.)</i>	<ul style="list-style-type: none"> <li>As determined by Soils survey of Oakland county</li> </ul>	No	No	<b>Provide Soil Information as required</b>
<b>Irrigation plan</b> <i>(LDM 2.s.)</i>	<ul style="list-style-type: none"> <li>A fully automatic irrigation system and a method of draining is required with Final Site Plan</li> </ul>	Yes	No	<u>Irrigation Plan is required for Final site plan</u>
<b>Cost estimate</b> <i>(LDM 2.t.)</i>	<ul style="list-style-type: none"> <li>For all new plantings, mulch and sod as listed on the plan</li> </ul>	Yes	Yes	
<b>Other information</b> <i>(LDM 2.u)</i>	<ul style="list-style-type: none"> <li>Required by Planning Commission</li> </ul>	NA		
<b>Establishment period</b> <i>(5.5.5.D)</i>	<b>2 yr. Guarantee</b>	Yes	Yes	
<b>Approval of substitutions.</b> <i>(5.5.5.E)</i>	<ul style="list-style-type: none"> <li>City must approve any substitutions in writing prior to installation.</li> </ul>			<b>Please note as stated</b>
<b>Tree stakes and guys.</b>	<ul style="list-style-type: none"> <li>Wood stakes. Fabric guys.</li> </ul>	Yes	Yes	<b>All Guying material as shown on the planting details should be fabric ties only, not plastic or wire.</b>
<b>Parking Area Landscape Requirements LDM 1.c. &amp; Calculations (LDM 2.o.)</b>				
<b>General requirements</b> <i>(LDM 1.c)</i>	<ul style="list-style-type: none"> <li>Clear sight distance within parking islands</li> <li>No evergreen trees</li> </ul>	Yes	Yes	

Item	Required	Proposed	Meets Code	Comments
<b>Name, type and number of ground cover</b> (LDM 1.c.(5))	<ul style="list-style-type: none"> <li>As proposed on planting islands</li> </ul>	Yes	No	Provide details for each island at a larger scale
<b>General (Sec 5.5.3.C.ii)</b>				
<b>Parking lot Islands</b> (a, b. i)	<ul style="list-style-type: none"> <li>A minimum of 300 SF to qualify</li> <li>6" curbs</li> </ul>	Yes	No	Provide square footage of all islands on the plans
<b>Curbs and Parking stall reduction</b> (c)	<ul style="list-style-type: none"> <li>Parking stall can be reduced to 17' and the curb to 4" adjacent to a sidewalk of minimum 7 ft.</li> </ul>	NA	NA	Refer to Traffic Comments
<b>Plantings around Fire Hydrant</b> (d)	<ul style="list-style-type: none"> <li>No plantings with matured height greater than 12' within 10 ft. of fire hydrants</li> </ul>		No	Show existing and proposed Fire Hydrants on Landscape plan
<b>Landscaped area</b> (g)	<ul style="list-style-type: none"> <li>Areas not dedicated to parking use or driveways exceeding 100 sq. ft. shall be landscaped</li> </ul>	Yes	Yes	
<b>Max. 15 contiguous space limit</b> (i)		No	Yes	
<b>Parking Lot Landscape Calculations (Sec 5.5.3.C)</b>				
<b>Category 1: For OS-1, OS-2, OSC, OST, B-1, B-2, B-3, NCC, EXPO, FS, TC, TC-1, RC, Special Land Use or non-residential use in any R district (Sec 5.5.3.C.iii)</b>				
A = Total square footage of parking spaces not including access aisles x 10%	<ul style="list-style-type: none"> <li><math>A = x 10\% = sf</math></li> </ul>		No	Recalculate areas for all new parking spaces (a total of 233 spaces and related driveways identified in grey shade on plans). Staff has contacted the applicant's landscape architect for further clarification. Please provide additional information based on that discussion.
B = Total square footage of additional paved vehicular use areas (not including A) under 50,000 SF) x 5%	<ul style="list-style-type: none"> <li><math>B = x 5\% = sf</math></li> <li>Paved Vehicular access area includes loading areas</li> </ul>		No	
C= Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF) x 1 %	<ul style="list-style-type: none"> <li><math>C = x 1\% = sf</math></li> </ul>	NA		
<b>Category 2: For: I-1 and I-2 (Sec 5.5.3.C.iii)</b>				
A. = Total square footage of parking spaces not including access aisles x 7%	<ul style="list-style-type: none"> <li><math>A = 7\% x = SF</math></li> </ul>	NA		

Item	Required	Proposed	Meets Code	Comments
B = Total square footage of additional paved vehicular use areas (not including A) under 50,000 SF) x 2%	<ul style="list-style-type: none"> <li>▪ <math>B = 2\% \times = SF</math></li> </ul>	NA		
C= Total square footage of additional paved vehicular use areas (not including A or B) over 50,000 SF) x 0.5%	<ul style="list-style-type: none"> <li>▪ <math>C = 0.5\% \times = SF</math></li> </ul>	NA		
<b>All Categories</b>				
D = A+B or A+C Total square footage of landscaped islands	SF	Incorrect	No	
E = D/75 Number of canopy trees required	<ul style="list-style-type: none"> <li>▪ <math>/75= \text{Trees}</math></li> </ul>	35 Trees proposed	No	<b>A Planning Commission waiver would be required for not meeting the minimum requirements. Staff is more likely to support the waiver</b>
<b>Perimeter Green space</b>	<ul style="list-style-type: none"> <li>▪ 1 Canopy tree per 35 l.f ; =52 trees</li> <li>▪ Sub-canopy trees can be used under overhead utility lines.</li> </ul>	52 Trees proposed	Yes	
Parking land banked	<ul style="list-style-type: none"> <li>▪ NA</li> </ul>	NA		
<b>Plant Material Requirements (LDM 3)</b>				
<b>General Conditions</b> (LDM 3.a)	<ul style="list-style-type: none"> <li>▪ Plant materials shall not be planted within 4 ft. of property line</li> </ul>	Yes	Yes	
<b>Miss Dig Note</b> (800) 482-7171 (LDM.3.a.(8))	<ul style="list-style-type: none"> <li>▪ Show on all plan sheets</li> </ul>	Yes	Yes	
<b>Plant Materials &amp; Existing Plant Material</b> (LDM 3.b)		Yes	Yes	
<b>Landscape tree credit</b> (LDM3.b.(d))	<ul style="list-style-type: none"> <li>▪ Substitutions to landscape standards for preserved canopy trees outside woodlands/wetlands should be approved by LA. Refer to Landscape tree Credit Chart in LDM</li> </ul>	NA		

Item	Required	Proposed	Meets Code	Comments
<b>Plant Sizes for ROW, Woodland replacement and others</b> (LDM 3.c)	Canopy Deciduous shall be 3" and sub-canopy deciduous shall be 2.5" caliper. Refer to section for more details	NA	NA	
<b>Plant size credit</b> (LDM3.c.(2))	NA			
<b>Prohibited Plants</b> (LDM 3.d)		No	Yes	
<b>Recommended trees for planting under overhead utilities</b> (LDM 3.e)	<ul style="list-style-type: none"> <li>Label the distance from the overhead utilities</li> </ul>		NA	
<b>Collected or Transplanted trees</b> (LDM 3.f)	Refer to the Landscape Design Manual for further details	58 existing trees are proposed to be evaluated for feasibility to be transplanted	No	<b>It is applicant's responsibility to work with City of Novi's Landscape Architect to determine the feasibility of transplanted trees, preservation and replanting.</b>
<b>Nonliving Durable Material: Mulch</b> (LDM 4)	<ul style="list-style-type: none"> <li>Trees shall be mulched to 4" depth and shrubs, groundcovers to 3" depth</li> <li>Specify natural color, finely shredded hardwood bark mulch. Include in cost estimate.</li> <li>Refer to section for additional information</li> </ul>	Yes	Yes	
<b>Building Foundation Landscape Requirements (Sec 5.5.3.D)</b>				
<b>Interior site landscaping SF</b>	<ul style="list-style-type: none"> <li>Equals to entire perimeter of the building x 8 with a minimum width of 4 ft.</li> <li><b>988 If x 8ft = 7,904 SF</b></li> </ul>	16,214 SF	Yes	
<b>5.5.3.D.ii. All items from (b) to (e)</b>	<ul style="list-style-type: none"> <li>If visible from public street a minimum of 60% of the exterior building perimeter should be covered in green space</li> </ul>	Yes Partial visibility is achieved due to shrubs and grade change.	Yes	
<b>Berms and ROW Planting</b>				
All berms shall have a maximum slope of 33%. Gradual slopes are encouraged. Show 1ft. contours Berm should be located on lot line except in conflict with utilities. Berms should be constructed with 6" of top soil.				
<b>Residential Adjacent to Non-residential (Sec 5.5.3.A) &amp; (LDM 1.a)</b>				

Item	Required	Proposed	Meets Code	Comments
<b>Berm requirements</b> (Sec 5.5.A)	<ul style="list-style-type: none"> <li>Refer to Residential Adjacent to Non-residential berm requirements chart</li> </ul>		NA	
<b>Planting requirements</b> (LDM 1.a.)	<ul style="list-style-type: none"> <li>LDM Novi Street Tree List</li> </ul>	NA		
<b>Adjacent to Public Rights-of-Way (Sec 5.5.B) and (LDM 1.b)</b>				
<b>Berm requirements</b> (Sec 5.5.3.A.(5))	<ul style="list-style-type: none"> <li>Refer to ROW landscape screening requirements chart for corresponding requirements.</li> </ul>	Existing	NA	
<b>Planting requirements</b> (LDM 1.a.)	<ul style="list-style-type: none"> <li>LDM Novi Street Tree List</li> </ul>	No	NA	
<b>Street tree requirements</b> (Sec 5.5.3.B.ii)	<ul style="list-style-type: none"> <li>No street trees within 25 ft. clear vision triangle</li> </ul>	No	NA	
<b>ROW Landscape Screening Requirements Chart (Sec 5.5.3.B. ii)</b>				
<b>Greenbelt width</b> (2)(3) (5)	<ul style="list-style-type: none"> <li>Parking: 20 ft.</li> </ul>	Existing	NA	
Min. berm crest width	<ul style="list-style-type: none"> <li>Parking: 2 ft.</li> </ul>	Existing	NA	
Minimum berm height (9)	<ul style="list-style-type: none"> <li>Parking: 3 ft.</li> </ul>	Existing	NA	
3' wall	<ul style="list-style-type: none"> <li>(4)(7)</li> </ul>	NA		
<b>Canopy deciduous or large evergreen trees</b> (1) (10)	<ul style="list-style-type: none"> <li>Parking: 35 l.f.</li> <li>No Parking: 40;</li> </ul>	Existing	NA	
<b>Sub-canopy deciduous trees</b> (2)(10)	<ul style="list-style-type: none"> <li>Parking: 20 l.f</li> <li>No Parking: 25</li> </ul>	Existing	NA	
<b>Canopy deciduous trees in area between sidewalk and curb</b> (Novi Street Tree List)	<ul style="list-style-type: none"> <li>Parking: 35 l.f.</li> <li>No Parking: 45 l.f.</li> </ul>	Existing	NA	
<b>Non-Residential Sec 2509. e. (3)&amp; LDM 1.d (2)</b>				
Refer to Planting in ROW, building foundation landscape, parking lot landscaping and LDM				
<b>Interior Street to Industrial subdivision</b> (LDM 1.d.(2))	<ul style="list-style-type: none"> <li>1 canopy deciduous or 1 large evergreen per 35 l.f. along ROW</li> <li>No evergreen trees closer than 20 ft.</li> <li>3 sub canopy trees per 40 l.f. of total linear frontage</li> <li>Plant massing for 25%</li> </ul>	NA		



Item	Required	Proposed	Meets Code	Comments
	of ROW			
<b>Screening of outdoor storage, loading/unloading</b> <i>(2509.e. (3).b. (iv).)</i>		No	No	<b>Are there any existing or proposed loading areas?</b>
<b>Transformers/Utility boxes</b> <i>(LDM 1.e from 1 through 5)</i>	<ul style="list-style-type: none"> <li>▪ A minimum of 2ft. separation between box and the plants</li> <li>▪ Ground cover below 4" is allowed upto pad.</li> <li>▪ No plant materials within 8 ft. from the doors</li> </ul>	No	No	<b>Show existing or proposed (if any) Transformer locations on the plan</b>
<b>Detention/Retention Basin Planting requirements</b> <i>(Sec. 5.5.3.E.iv)</i>	<ul style="list-style-type: none"> <li>▪ Clusters shall cover 70-75% of the basin rim area</li> <li>▪ 10" to 14" tall grass along sides of basin</li> <li>▪ Refer to wetland for basin mix</li> </ul>	NA		

**NOTES:**

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

## Traffic Review



February 12, 2015

Barbara McBeth, AICP  
Deputy Director of Community Development  
City of Novi  
45175 W. 10 Mile Road  
Novi, MI 48375

**SUBJECT: Brightmoor Christian Church, Traffic Review for Preliminary Site Plan  
JSP15-0007**

Dear Ms. McBeth,

URS has completed our review of the preliminary site plan submitted for the above referenced development. Our comments are as follows:

**1. General Comments**

- a. The applicant, Hubbell, Roth and Clark, Inc., is proposing to expand the building and parking lot of the existing Brightmoor Christian Church located near the intersection of 13 Mile Road and Lenox Park Drive, just west of M-5.

**2. Potential Traffic Impacts**

- a. The applicant has stated that a traffic impact statement will be prepared and submitted prior to preliminary site plan approval. URS will review the traffic impact study once it is submitted.

**3. General Plan Comments** – The preliminary site plan is generally in compliance with City ordinance; however, the applicant should further review the following comments and adjust the plans as necessary:

- a. Provide additional dimensions indicating the widths of the pedestrian facilities throughout the site.
- b. Indicate where pedestrian ramps will be located throughout the site.
- c. Provide ramp details for any proposed pedestrian ramps throughout the site.
- d. Review the required turning radius for any trucks that will need access to the site and ensure that all maneuvers can be adequately completed.
- e. Provide signing information, including sign type and location(s).

**4. Internal Site Access and Operations** – The internal site access and operations is generally in compliance with City ordinances; however, the applicant should further review the following comments and adjust the plans as necessary:

- a. The parking spaces in the parking lot on the west side of the site are labeled with either 17' or 18.5 parking space depths.
  - i. Where the curb height is 6", as indicated on the grading sheet, the parking space depth should be 19'.
  - ii. There is a discrepancy between the grading sheet (C-5) and the typical sections and details sheet (C-8) regarding the curb height adjacent to parking spaces with a depth of 17'. The grading sheet



- indicates a 0.5' difference in grade, while the typical sections and details sheet has a note that indicates a 4" curb height where the parking spaces are 17' deep. This should be reviewed and updated to be consistent.
- b. The parking spaces along the perimeter of the east parking lot indicate parking stall depths of 18.5' and the grading sheet indicates a 0.5' difference in grade.
    - i. Where the curb height is 6", as indicated on the grading sheet, the parking space depth should be 19'.
    - ii. The parking space depths should be increased to 19' if the 6" curb is maintained or the parking space depths may be reduced to 17' if the curb height is reduced to 4".
  - c. The end island designs should be further reviewed for compliance, specifically addressing the comments below:
    - i. End islands should be 3' shorter than the adjacent parking spaces. Maneuvering lane dimensions indicate 24' between parking spaces and 28' between islands, thereby indicating a 2' difference on either side of the maneuvering lane.
    - ii. The outside radius of end islands should be 15'. Throughout the site there are several instances where the radius is less than 15'.

The preliminary site plan was reviewed to the level of detail provided and additional information may be required to complete the review of traffic-related elements. URS **recommends approval** of the plans with the condition that the applicant provides additional detail, revised plans and/or a narrative to address the aforementioned comments included in this letter.

Sincerely,

**URS Corporation Great Lakes**

A handwritten signature in blue ink, appearing to read "Matthew G. Klawon".

Matthew G. Klawon, PE  
Manager, Traffic Engineering and ITS Engineering Services

## Traffic Study Review Letter



March 20, 2015

Barbara McBeth, AICP  
Deputy Director of Community Development  
City of Novi  
45175 W. 10 Mile Road  
Novi, MI 48375

**SUBJECT: Brightmoor Christian Church, Traffic Study Review Letter  
JSP15-0007**

Dear Ms. McBeth,

URS has completed our review of the traffic study prepared by Hubbell, Roth and Clark, Inc. (HRC) that was submitted for the above referenced development. Our comments are as follows:

**1. General Comments**

- a. HRC conducted a traffic study to assess the impacts of the proposed Brightmoor Christian Church on the roadway network in the close vicinity.
- b. The study included the following roadways and intersections:
  - i. 13 Mile Road and Lenox Park Drive
  - ii. 13 Mile Road and the driveway into Brightmoor Christian Church
  - iii. Lenox Park Drive and the driveway into Brightmoor Christian Church
- c. The study was found to be acceptable with only minor comments, as can be seen in the attached document.

**2. Potential Traffic Impacts**

- a. The site is primarily expected to generate traffic during Wednesday evenings and on Sundays, when church services are scheduled.
- b. The traffic generated by the site affects traffic flow along 13 Mile Road and at the intersection of 13 Mile Road and Lenox Park Drive.
  - i. Traffic on 13 Mile Road operates at an acceptable level of service during all periods, as these movements are free flow.
  - ii. Traffic on the southbound Lenox Park Drive approach and southbound east driveway approach to 13 Mile Road can operate at unacceptable levels during peak periods. Both approaches are controlled with stop signs.
- c. HRC conducted a traffic signal warrant analysis for the 13 Mile Road and Lenox Park Drive intersection. Traffic volumes and conditions meet Warrant 3 – Peak Hour during Sunday.

**3. Conclusions and Recommendations** – HRC has provided the following conclusions and recommendations and URS supports them.

- a. The installation of a right-turn lane along westbound 13 Mile Road as



volumes during the Sunday peak hour meet the thresholds for requiring a full-width right-turn lane. HRC used MDOT standards for determining the necessity of a right-turn lane; however, review of City of Novi standards provide the same outcome.

- b. HRC recommends that the church consider adjusting the Sunday service times to alleviate overlapping ingress and egress traffic patterns. URS supports this recommendation as a means to reduce congestion.
- c. While volumes and conditions met Traffic Signal Warrant 3 – Peak Hour, HRC does not recommend installing a traffic signal at this time, but rather conducting further studies in the future to assess actual conditions. We are in agreement with HRC's recommendations to their client.

The traffic study was reviewed to the level of detail URS **recommends approval** with the condition that the applicant reviews the comments provided in the attached document and updates as necessary.

Sincerely,

**URS Corporation Great Lakes**

A handwritten signature in blue ink, appearing to read "Matthew G. Klawon".

Matthew G. Klawon, PE  
Manager, Traffic Engineering and ITS Engineering Services

## Façade Review





February 24, 2015

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

Re: **FACADE ORDINANCE - Preliminary Site Plan**  
**Brightmoor Christian Church , PSP15-0017**  
 Façade Region: 1, Zoning District: RA

Dear Ms. McBeth;

The following is the Façade Review for Preliminary Site Plan Approval of the above referenced project based on the drawings prepared by Progressive A/E, dated 2/22/15. The percentages of materials proposed for each façade are as shown below. Materials that are in violation of the Ordinance, if any, are shown on bold.

	East (front)	North	West	South	Façade Ordinance Section 2520 Maximum (Minimum)
Brick	80%	80%	90%	NA	100% (30% Min)
Flat Metal Panels	14%	14%	8%	NA	50%
Laminated Panels	6%	6%	2%	NA	25%

This project consists of a significant addition to an existing structure. In this case the addition is approximately equal to the existing buildings footprint; therefor this application is treated as a separate structure with respect to the Façade Ordinance. As shown above it appears that all facades are in full compliance with the Façade Ordinance. However, a sample board was not provided at the time of this review. It is assumed the brick will substantially match that of the existing building. The material identified as “Laminated Panels” should also be clarified via the sample board. Said sample board should be provided not less than 5 days prior to the Planning Commission meeting.

**Recommendation** – The proposed addition consists of a highly articulated design that will add significantly to the architectural interest of the existing building when viewed from M-5 connector. It is our recommendation that the application is in full compliance with Zoning Ordinance Section 5.15, the Façade Ordinance, contingent on submission of the aforementioned sample board.

## Notes to the Applicant:

1. It should be noted that any roof top equipment must be screened from view from all on-site and off-site vantage points using compliant materials consistent with the building design.

2. Inspections – The Façade Ordinance requires inspection(s) for all projects. Materials displayed on the approved sample board will be compared to materials delivered to the site. It is the applicant’s responsibility to request the inspection of each façade material at the appropriate time. Inspections may be requested using the Novi Building Department’s Online Inspection Portal with the following link. Please click on “Click here to Request an Inspection” under “Contractors”, then click “Façade”.

<http://www.cityofnovi.org/Services/CommDev/OnlineInspectionPortal.asp>.

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

Sincerely,  
DRN & Associates, Architects PC

A handwritten signature in black ink, appearing to read "Douglas R. Necci". The signature is fluid and cursive, written over the printed name below.

Douglas R. Necci, AIA

## Fire Review



February 6, 2015

TO: Barbara McBeth- Deputy Director of Community Development  
Kristen Kapelanski- Plan Review Center  
Sri Komaragiri- Plan Review Center

**CITY COUNCIL**

**Mayor**  
Bob Gatt

**Mayor Pro Tem**  
Dave Staudt

Gwen Markham

Andrew Mutch

Doreen Poupard

Wayne Wrobel

Laura Marie Casey

**City Manager**  
Pete Auger

**Director of Public Safety  
Chief of Police**  
David E. Molloy

**Director of EMS/Fire Operations**  
Jeffery R. Johnson

**Assistant Chief of Police**  
Victor C.M. Lauria

**Assistant Chief of Police**  
Jerrold S. Hart

RE: Brightmoor Church Expansion

PSP#14-0194

**PSP#15-0017**

**Project Description:** Parking and Building Expansion

**Comments:**

- 1) Maintain Hydrants and access to site and the FDC throughout project.

**Recommendation:**

**Approval**

Sincerely,

Joseph Shelton- Fire Marshal  
City of Novi – Fire Dept.

cc: file

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

cityofnovi.org

**Applicant Response Letter**



**PRINCIPALS**

George E. Hubbell  
Thomas E. Biehl  
Walter H. Alix  
Keith D. McCormack  
Nancy M.D. Faught  
Daniel W. Mitchell  
Jesse B. VanDeCreek  
Roland N. Alix

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Kenneth A. Melchior  
Randal L. Ford  
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Dennis J. Benoit  
Robert F. DeFrain  
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**ASSOCIATES**

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Charles E. Hart  
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Bradley W. Shepler  
Karyn M. Stickel

**HUBBELL, ROTH & CLARK, INC.**

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EMAIL: info@hrc-engr.com

March 13, 2105

City of Novi  
45175 W. Ten Mile Road  
Sterling Heights, Michigan 48375

Attn: Sri Komaragiri, Planner

Re: Brightmoor Christian Church  
Response to Planning Review Dated 2-25-15 JSP15-07

HRC Job No. 20140319

Dear Ms. Komaragiri:

The following is a list of responses to the planning review letter dated 2-25-15;

**Petitioner**

Brightmoor Christian Church

**Review Type**

Special Land Use Request and Preliminary Site Plan Review

**Property Characteristics**

- Site Location: 40800 W. Thirteen Mile Road (north side of Thirteen Mile, just west of M- 5)
- Site School District: Walled Lake Consolidated Schools
- Site Zoning: RA, Residential Acreage
- Adjoining Zoning: North: RM-1, Low Density Multiple Family; South (across Thirteen Mile): RA; East (across M-5): OST, Office Service Technology; West: RM-1
- Site Use(s): Brightmoor Christian Church
- Adjoining Uses: North: Lenox Park residential condominiums; South (across Thirteen Mile): Single family, vacant; East (across M-5): Vacant; West: Fox run retirement living
- Site Size: 40.1 acres
- Plan Date: January 21, 2015

**Project Summary**

The applicant is proposing to expand the existing Church building to the north with a worship space with auditorium style seating that seats 2,100 people along with accessory uses such as office and additional parking.

**Project History:**

Brightmoor Church is an approved special land use in the RA zoning district. On November 4, 1998, the Planning Commission approved the Special Land Use (following a public hearing), the Preliminary Site Plan with a proposed conservation easement for wetland and wetland mitigation near the southeast part of the development. The development included the Brightmoor Christian Church and school complex along with associated surface parking and drainage facilities.

On June 27, 2012, the Planning Commission approved the expansion of the Special Land Use (following a public hearing), the Preliminary Site Plan, the Woodlands permit, and the Stormwater Management Plan. The development included expansion of the existing parking lot on the north side of the Brightmoor Christian Church site, resulting in a net increase of 365

parking spaces and a total of 918 spaces. No new buildings or building expansions were proposed at that time.

On January 26, 2015, the City Council has approved Zoning Ordinance Text Amendment 18.273 to amend the City of Novi Zoning Ordinance at Article 4.0, Use Standards, Section 4.10, Places of Worship, in order to allow additional height for places of worship, under certain conditions, as detailed in the Planning Review Chart.

### **Special Land Use Considerations**

Expansion of a special land use requires a public hearing and special land use approval from the Planning Commission, along with preliminary site plan approval. The proposal also requires approval the stormwater management plan. Section 6.1.2.C of the Zoning Ordinance outlines specific factors the Planning Commission shall consider in the review of any Special Land Use:

- i. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on existing thoroughfares in terms of overall volumes, capacity, safety, vehicular turning patterns, intersections, view obstructions, line of sight, ingress and egress, acceleration/deceleration lanes, off-street parking, off-street loading/unloading, travel times and thoroughfare level of service.
- ii. Whether, relative to other feasible uses of the site, the proposed use will cause any detrimental impact on the capabilities of public services and facilities, including water service, sanitary sewer service, storm water disposal and police and fire protection to service existing and planned uses in the area.
- iii. Whether, relative to other feasible uses of the site, the proposed use is compatible with the natural features and characteristics of the land, including existing woodlands, wetlands, watercourses and wildlife habitats.
- iv. Whether, relative to other feasible uses of the site, the proposed use is compatible with adjacent uses of land in terms of location, size, character, and impact on adjacent property or the surrounding neighborhood.
- v. Whether, relative to other feasible uses of the site, the proposed use is consistent with the goals, objectives and recommendations of the City's Master Plan for Land Use.
- vi. Whether, relative to other feasible uses of the site, the proposed use will promote the use of land in a socially and economically desirable manner.
- vii. Whether, relative to other feasible uses of the site, the proposed use is
  - a. listed among the provision of uses requiring special land use review as set forth in the various zoning districts of this Ordinance, and
  - b. Is in harmony with the purposes and conforms to the applicable site design regulations of the zoning district in which it is located.

### **Recommendation**

**Approval of the Special Land Use Permit and Preliminary Site Plan is recommended.** The plan generally conforms to the requirements of the Zoning Ordinance; however, there is landscape, engineering and traffic related items to be addressed on the next Site Plan Submittal. In its review and approval, the Planning Commission will need to consider the standards for Special Land Use consideration of Section 6.1.2.C. as listed above

### **Ordinance Requirements**

This project was reviewed for conformance with the Zoning Ordinance with respect to Article 3.0 (Zoning Districts), Article 4.0(Use Standards), Article 5.0(Site Standards) and any other applicable provisions of the Zoning Ordinance. Please see the attached charts for information

pertaining to ordinance requirements and additional minor comments to be addressed. Items in bold may require a Planning Commission waiver. All other items should be addressed in the response letter prior to the Planning Commission meeting unless otherwise noted.

1. **Noise Impact Statement:** A noise impact statement is required per Section 5.14.10.B.i. The Planning Commission has the authority to waive this requirement per Section 5.14.10.B.iii. The applicant should indicate in the response letter whether this statement will be provided.

*Response: Noise Impact Statement is attached that shows the City's noise levels for R-1 Zoning shall not exceed 55 decibels at nighttime and 60 decibels during the daylight measured 5 ½ feet from the property line or R.O.W.*

2. **Community Impact Statement:** A community impact statement is required for a Special Land Use over 10 acres. The Planning Commission has the authority to waive this requirement. The applicant should indicate in the response letter whether this statement will be provided.

*Response: Community Impact Statement is attached.*

3. **Traffic Impact Study:** A traffic impact study is required for this project. The applicant has noted that the study is under progress and will submit prior to preliminary site plan approval. The applicant shall submit this study as soon as possible and no later than March 13th in order to allow the complete matter to be considered by the Planning Commission at a public hearing as anticipated on March 25.

*Response: HRC has been discussing with AECOM, the City's traffic consultant on this project, and it was agreed this would be furnished to AECOM by March 18, 2015 for the March 25, 2015 Planning Commission Meeting.*

4. **Parking Count:** Please provide additional information required with regards to accessory spaces as listed in the attached chart, with the response letter.

*Response: The additional 182 spaces will cover the potential additional loads associated with a full worship service.*

*Our calculations have accounted for the following accessory uses:  
72 spaces based on the calculated occupant load of the worship platform.  
60 spaces based on the calculated occupant load of the Hub as concourse.  
50 spaces based on office, volunteer/child care, and choir rehearsal occupant load.  
All other potential loads are non-concurrent.*

*The Youth Worship space is planned to accommodate 300 people. It is intended for Junior High students. Driving Age (High School) students are expected to join the adult worship service.*

5. **Bicycle Parking:** According to Sec Sec. 5.16.1, for places of worship, a minimum of five (5) percent of required automobile spaces, minimum eight (8) spaces of bicycle parking is required. For 233 of automobile parking, 12 bicycle spaces are required. **Please provide bike rack details and bike rack lot layout plan according to the ordinance requirements. Refer to Sec. 5.16. - Bicycle parking facility**



**requirements.**

*Response: Bicycle parking will be added prior to Final Site Plan submission.*

6. Loading Spaces and Dumpster: No additional dumpsters or loading spaces are provided. Show the existing locations on the plan or clarify the absence.

*Response: No changes are proposed by this project. The dumpster location will be labeled prior to Final Site Plan submission.*

7. Economic Impact Statement: Provide information on total cost of the proposed building and site improvements and number of anticipated jobs created (during construction and after building is occupied, if known) in the response letter.

*Response: Approximately 75 construction jobs will be created over a period of 12-15 months, with an additional 10 permanent employees being added to the church staff upon completion.*

8. Photometric Plan: The applicant has provided a photometric plan; please refer to chart for additional information required.

*Response: An updated Photometric plan will be provided prior to Final Site Plan submission.*

9. Other Reviews:

- a. Engineering Review: Additional comments to be addressed during Final Site Plan.
- b. Landscape Review: Additional comments to be addressed during Final Site Plan.
- c. Wetland and Woodland Review: There are no impacts to wetlands and woodlands proposed with this expansion on site.
- d. Traffic Review: Additional comments to be addressed during Final Site Plan. Traffic Impact study required prior to Planning Commission meeting.
- e. Facade Review: Sample board required prior to Planning Commission meeting.
- f. Fire Review: Additional comment to be addressed during Final Site Plan.

*Response: Response Letters have been submitted for each of the above.*

**Response Letter**

A letter from either the applicant or the applicant's representative addressing comments in this and other review letters is required prior to the Planning Commission submittal.

**Signage**

Exterior Signage is not regulated by the Planning Division or Planning Commission. Please contact Jeannie Niland (248.347.0438) for information regarding sign permits.

**PLANNING REVIEW SUMMARY CHART**

**Review Date:** February 23, 2015  
**Project Name:** JSP15 – 0007: Brightmoor Christian Church  
**Plan Date:** February 02, 2015  
**Prepared by:** Sri Komaragiri, Planner **E-mail:** skomaragiri@cityofnovi.org; **Phone:** (248) 735-5607

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

Item	Required Code	Proposed	Meets Code	Comments
<b>Zoning and Use Requirements</b>				
<b>Master Plan</b> ( <i>adopted August 25, 2010</i> )	Single Family	Church	Yes	<u>November 4, 1998:</u> Special Land Use approved for Church and School <u>June 27, 2012:</u> Special Land Use approved for additional parking
<b>Area Study</b>	The site does not fall under any special category	NA	Yes	
<b>Zoning</b> ( <i>Effective December 25, 2013</i> )	Residential Acreage (RA) Article 3	RA	Yes	
<b>Uses Permitted</b> (Sec 3.1.1.B & C)	Sec 3.1.1.B Principal Uses Permitted. Sec 3.1.1.C Special Land Uses	Places of Worship (Church)	Yes	<b>Special Land Use approval shall be required as this expansion was not shown on any previous plans</b>
<b>Use Standards: Places of Worship Sec 4.10</b>				
<b>Minimum Site Size</b> ( <i>Sec 4.10.1</i> )	- 3 Acres	40.15 Acres	Yes	
<b>Minimum Site Width</b> ( <i>Sec 4.10.2</i> )	- (200) feet along front yard		Yes	
<b>Site Access</b> ( <i>Sec 4.10.3</i> )	- All access to the site shall be onto a Major Arterial, Arterial or Minor Arterial road as shown on the City's Thoroughfare Plan	Site access is off of West 13 Mile Road	Yes	
<b>Minimum Building Setbacks</b> ( <i>Sec 4.10.4</i> )	- Seventy-five (75) feet from all property lines.		Yes	<b>Label Building setbacks on plan</b>

<b>Parking in Front yard (Sec 4.10.5)</b>	- There shall be no parking in front yard, - nor closer than twenty (20) feet from any side or rear lot line, except in those instances, where the lot abuts a residential lot and in those instances, no closer than thirty-five (35) feet on any side or rear yard	-No additional parking is proposed in the front yard	Yes	<b>Label parking Setbacks on plan</b>
<b>Parking Lot Screening (Sec 4.10.6)</b>	- Screening of vehicular parking areas shall be in conformity with requirements at Sec 5.5.3			
<b>Noise Impact Statement (Sec 4.10.7)</b>	- A noise impact statement is required subject to the standards of Section 5.14.10.B			<b>Provide required noise impact statement</b>  <b>Attached.</b>
<b>Approved Text Amendment for Increased Building Heights (Approved by City Council on</b>				
<b>Site Acreage</b>	- 30 Acres for building height up to 65 feet	40.15 Acres	<b>Yes</b>	
<b>Site Location</b>	- Abuts a limited access freeway or a Major Arterial road	Abuts M-5 Freeway	<b>Yes</b>	
<b>Planning Commission Finding</b>	- The proposed development is compatible with and does not have negative impact on surroundings.			

<b>Building Setbacks</b>	- the minimum front, side, and rear yard building setbacks are increased by one and one-half (1.5) feet for every one (1) foot of building height in excess of thirty-five (35) feet;	For 30ft. of proposed additional height, all minimum setbacks are increased by 45ft.	<b>Yes</b>	See below for required and proposed setbacks
<b>Height, bulk, density and area limitations (Sec 3.1.1.E)</b>				
<b>Maximum % of Lot Area Covered (By All Buildings)</b>	25%			<b>Provide the maximum % of lot covered 8.24 % coverage, 144, 268 sft. or 3.31 acres</b>
<b>Building Height (Sec. 3.1.1.E)</b>	35 feet or 2 ½ stories 65 feet (provide the conditions listed above are met)	65 feet	Yes	
<b>Building Setbacks (Sec 3.1.1.E)&amp;</b>				
Front @ Thirteen Mile Way	75 ft. +45 ft. =120 ft	293 ft.	Yes	
Side (3.6.2.C)	120 ft. (Same as front)	735+195=930 ft.	Yes	
Rear South	50 ft. + 45ft = 95ft.	490 ft.	Yes	
<b>Parking Setback (Sec 3.1.1.E)Refer to applicable notes in Sec 3.6.2</b>				
Front @ Providence Park Way	No Parking in Front Yard	Existing Parking in Front Yard	Yes	
Side East (3.6.2.B)	120 ft. (Same as front)	Approx. 530 ft.	Yes	
Side West	35ft. (lot abuts a residential district)	Approx. 135 ft.	Yes	
Rear South	35ft. (lot abuts a residential district)	35 ft.	Yes	
<b>Note To District Standards (Sec 3.6.2)</b>				
Area Requirements (Sec 3.6.2.A)	NA			

Parking Setbacks ( <i>Sec 3.6.2.B</i> )	Refer to Sec 3.6.2 for more details	Minimum required setbacks are modified accordingly	Yes	
Building Setbacks ( <i>Sec 3.6.2.C</i> )	Refer to Sec 3.6.2 for more details	Minimum required setbacks are modified accordingly	Yes	
Wetland/Watercourse Setback ( <i>Sec 3.6.2.M</i> )	Refer to Sec 3.6.2 for more details	No Wetlands and Woodlands on Site	NA	
<b>Parking, Loading and Dumpster Requirements</b>				
<b>Number of Parking Spaces Churches</b> <i>5.2.12.B</i> One (1) for each three (3) seats  <b>Schools</b> <i>5.2.12.B</i> One (1) for each staff and One for every 4 students over driving age	For 2,100 Seats, a total of 700 spaces are required  1 Space per employee = 65 Spaces + 1 space for every 4 students over driving age = 13 Spaces; Total 78 Spaces Existing  <b>Total Required: 778 Spaces</b>	<b>Total Existing:</b> 918 (897 Regular; 21 Barrier free) <b>Parking Lost in Expansion:</b> 191 (175 Regular; 16 Barrier free) <b>New Spaces Proposed:</b> 233 (211 Regular; 22 Barrier free)  <b>TOTAL: 960 (934 Regular; 26 Barrier free)</b>	Yes	<b>Are the new office spaces proposed with the new addition?</b>  <b>How many Youth Worship Seats are proposed in Youth Worship area? What is the age range for the Youth Worship?</b>  <b>There are 182 additional spaces then required on site. However, staff wants to make that all accessory uses are accounted for.</b>
<b>Parking Space Dimensions and Maneuvering Lanes</b> <i>(Sec. 5.3.2)</i>	- 90° Parking: 9 ft. x 19 ft. - 24 ft. two way drives - 9 ft. x 17 ft. parking spaces allowed along 7 ft. wide interior sidewalks as long as detail indicates a 4" curb at these locations and along landscaping	90° Parking: 9 ft. x 17 ft. to 18.5ft. along 8 ft. wide interior sidewalks and landscape spaces. -24 ft. to 28ft. driveway within parking aisles. 28ft. to 30 ft. wide access drive with no parking on either side.	Yes	

<b>Parking Space Dimensions and Maneuvering Lanes (Sec. 5.3.2)</b>	-			
<b>Parking stall located adjacent to a parking lot entrance (public or private) (Sec. 5.3.13)</b>	- shall not be located closer than twenty-five (25) feet from the street right-of-way (ROW) line, street easement or sidewalk, whichever is closer	NA	Yes	
<b>End Islands (Sec. 5.3.12)</b>	<ul style="list-style-type: none"> <li>- End Islands with landscaping and raised curbs are required at the end of all parking bays that abut traffic circulation aisles.</li> <li>- The end islands shall generally be at least 8 feet wide, have an outside radius of 15 feet, and be constructed 3' shorter than the adjacent parking stall as illustrated in the Zoning Ordinance</li> </ul>	End Islands are proposed	Yes	
<b>Barrier Free Spaces Barrier Free Code</b>	For 501 to 1000 Total Parking in lot, 2 % of total needs to be barrier free. 2% of 960 spaces=19 including 3 Van accessible	4 Van accessible and 22 regular barrier free (4 Existing) parking spaces	Yes	

<b>Barrier Free Space Dimensions Barrier Free Code</b>	- 8' wide with an 8' wide access aisle for van accessible spaces - 5' wide with a 5' wide access aisle for regular accessible spaces	Two types of accessible spaces are provided	Yes	
<b>Barrier Free Signs</b>	One sign for each accessible parking space.	All signs are proposed	Yes	
<b>Barrier Free Signs Barrier Free Design Graphics Manual</b>				
<b>Minimum number of Bicycle Parking Sec. 5.16.1</b>	Five (5) percent of required automobile spaces, minimum eight (8) spaces= 12 bicycle spaces are required for 233 spaces  Located along the building approach line & easily accessible from the building entrance	Bicycle parking not indicated	No	Applicant should add the required bike parking as per the ordinance requirements. <b>Will be added prior to Final Site Plan submission.</b>

<b>Bicycle Parking General requirements Sec. 5.16</b>	<ul style="list-style-type: none"> <li>- No farther than 120 ft. from the entrance being served</li> <li>- When 4 or more spaces are required for a building with multiple entrances, the spaces shall be provided in multiple locations</li> <li>- Spaces to be paved and the bike rack shall be inverted "U" design</li> <li>- Shall be accessible via 6 ft. paved sidewalk</li> </ul>	No No  No No	No	Note the location  Bicycle spaces should be proposed in multiple locations  Please provide the inverted "U" bike rack detail <b>Will be added to Final Site Plan submission.</b>
<b>Bicycle Parking Lot layout Sec 5.16.6</b>	Parking space width: 6 ft. One tier width: 10 ft. Two tier width: 16 ft. Maneuvering lane width: 4 ft. Parking space depth: 2 ft. single, 2 ½ ft. double		No	Provide a plan detail of the bicycle parking as required <b>Will be added to Final Site Plan submission.</b>
<b>Loading Spaces Sec. 5.4.1</b>	Required on all premises where receipt or distribution of materials or merchandise occurs and shall be separate from parking areas	Loading Spaces are not proposed	NA	Clarify with a note that the loading spaces are not required for the proposed use. If required, please show loading space on the plan. <b>No revisions proposed from what exist.</b>



<b>Dumpster</b> <b>Sec. 4.19.2.F</b>	<ul style="list-style-type: none"> <li>- Located in rear yard</li> <li>- Attached to the building or</li> <li>- No closer than 10 ft. from building if not attached</li> <li>- Not located in parking setback</li> <li>- If no setback, then it cannot be any closer than 10 ft, from property line.</li> <li>- Away from Barrier free Spaces</li> </ul>	No Dumpster is shown on the plans	No	Is there an existing dumpster?  Identify the dumpster location on plans <b>Dumpster location has been labeled and will not change.</b>
<b>Dumpster Enclosure</b> <b>Sec. 21-145. (c)</b>	<ul style="list-style-type: none"> <li>- Screened from public view</li> <li>- A wall or fence 1 ft. higher than height of refuse bin</li> <li>- And no less than 5 ft. on three sides</li> <li>- Posts or bumpers to protect the screening</li> <li>- Hard surface pad.</li> <li>- Screening Materials: Masonry, wood or evergreen shrubbery</li> </ul>		No	See above comment
<b>Lighting and Other Equipment Requirements</b>				
<b>Exterior lighting</b> <b>Sec. 5.7</b>	Photometric plan and exterior lighting details needed at time of Final Site Plan submittal	A lighting plan is provided	Yes	

<b>Roof top equipment and wall mounted utility equipment</b> <i>Sec. 4.19.2.E.ii</i>	- All roof top equipment must be screened and all wall mounted utility equipment must be enclosed and integrated into the design and color of the building	Roof top equipment is not proposed	Yes	<b>Please clarify if there is any proposed rooftop equipment</b> <b>Plan with distances attached to Noise Study letter.</b>
<b>Roof top appurtenances screening</b>	Roof top appurtenances shall be screened in accordance with applicable facade regulations, and shall not be visible from any street, road or adjacent property.	Roof top equipment is not proposed	Yes	<b>Please clarify if there is any proposed rooftop equipment</b> <b>Plan with distances attached to Noise Study letter.</b>
<b>Sidewalk Requirements</b>				
<b>Sidewalks</b> Article XII <i>Sec. 11-276(b) &amp; Sec. 11-279</i>  Town Center Area Study	- A 6' -10' wide sidewalk shall be constructed along all arterial and collector roads except in industrial districts  - All pedestrian safety paths shall be concrete and four (4) inches thick except residential driveway crossings which shall be six (6) inches thick, and industrial/commercial driveway crossings which shall be eight (8) inches thick.		NA	

<b>Pedestrian Connectivity</b>	The Planning Commission shall consider the following factors in exercising its discretion over site plan approval Whether the traffic circulation features within the site and location of automobile parking areas are designed to assure safety and convenience of both vehicular and pedestrian traffic both within the site and in relation to access streets	8 foot Sidewalks are proposed throughout the site for convenient and safe pedestrian access	Yes	<b>Consider connecting the front parking lot to rear parking lot via sidewalk</b> <b>Added on east side of addition</b>
<b>Building Code and other design standard Requirements</b>				
<b>Building Code</b>	Building exits must be connected to sidewalk system or parking lot.	All exits are connected to internal sidewalk	Yes	
<b>Design and Construction Standards Manual</b>	Land description, Sidwell number (metes and bounds for acreage parcel, lot number(s), Liber, and page for subdivisions).	Provided	Yes	
<b>General layout and dimension of proposed physical improvements</b>	Location of all existing and proposed buildings, proposed building heights, building layouts, (floor area in square feet), location of proposed parking and parking layout, streets and drives, and indicate square footage of pavement area (indicate public or private).		Yes	

<b>Economic Impact</b>	<ul style="list-style-type: none"> <li>- Total cost of the proposed building &amp; site improvements</li> <li>- Number of anticipated jobs created (during construction &amp; after building is occupied, if known)</li> </ul>		No	Provide the required information for Planning Commission <b>See George Auch letter attached.</b>
<b>Development/ Business Sign</b>	Signage if proposed requires a permit.			For sign permit information contact Jeannie Niland 248-347-0438.

**LIGHTING REVIEW SUMMARY CHART**

**Review Date:** 11 February 2015  
**Project Name:** JSP15 – 0007: Brightmoor Christian Church  
**Plan Date:** February 02, 2015  
**Prepared by:** Sri Komaragiri, Planner **E-mail:** skomaragiri@cityofnovi.org; **Phone:** (248) 735-5607

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

Item	Required Code	Proposed	Meets Code?	Comments
<b>Intent</b> (Sec. 5.7.1)	Establish appropriate minimum levels, prevent unnecessary glare, reduce spillover onto adjacent properties & reduce unnecessary transmission of light into the night sky	Yes	Yes	
<b>Lighting Plan</b> (Sec. 5.7.A.1)	Site plan showing location of all existing & proposed buildings, landscaping, streets, drives, parking areas & exterior lighting fixtures	Yes	Yes	


<b>Lighting Plan</b> <i>(Sec. 5.7.A.2)</i>	Specifications for all proposed & existing lighting fixtures: <ul style="list-style-type: none"> <li>▪ Photometric data</li> <li>▪ Fixture height</li> <li>▪ Mounting &amp; design</li> <li>▪ Glare control devices</li> <li>▪ Type &amp; color rendition of lamps</li> <li>▪ Hours of operation</li> </ul> Photometric plan illustrating all light sources that impact the subject site, including spill-over information from neighboring properties	<ul style="list-style-type: none"> <li>▪ Yes</li> <li>▪ No</li> <li>▪ Yes</li> <li>▪ Yes</li> <li>▪ Yes</li> <li>▪ No</li> </ul>	No	<b>Provide the hours of operation, fixture height on plan</b> <b>Will be added prior to Final Site Plan submission—hours dusk to 11:00 p.m. with nighttime levels at +/- 25% of full operations.</b>
<b>Required Conditions</b> <i>(Sec. 5.7.3.A)</i>	Height not to exceed maximum height of zoning district (or 25 ft. where adjacent to residential districts or uses	25 ft.	No	<b>Provide the maximum height of the fixtures</b> <b>Will be provided prior to Final Site Plan submission</b>
<b>Required Conditions</b> <i>(Sec. 5.7.3.B)</i>	<ul style="list-style-type: none"> <li>▪ Electrical service to light fixtures shall be placed underground</li> <li>▪ Flashing light shall not be permitted</li> <li>▪ Only necessary lighting for security purposes &amp; limited operations shall be permitted after a site's hours</li> </ul>	Notes are added to the plan.	Yes	<b>Provide the hours of operation on plan</b> <b>Will be provided prior to Final Site Plan submission</b>
<b>Required Conditions</b> <i>(Sec. 5.7.3.E)</i>	Average light level of the surface being lit to the lowest light of the surface being lit shall not exceed 4:1		No	<b>Provide the total ratio as required</b> <b>Will be provided prior to Final Site Plan submission</b>
<b>Required Conditions</b> <i>(Sec. 5.7.3.F)</i>	Use of true color rendering lamps such as metal halide is preferred over high & low pressure sodium lamps		Yes	

<b>Min. Illumination</b> <i>(Sec. 5.7.3.k)</i>	<ul style="list-style-type: none"> <li>▪ Parking areas: 0.2 min</li> <li>▪ Loading &amp; unloading areas: 0.4 min</li> <li>▪ Walkways: 0.2 min</li> <li>▪ Building entrances, frequent use: 1.0 min</li> <li>▪ Building entrances, infrequent use: 0.2 min</li> </ul>	<ul style="list-style-type: none"> <li>▪ 0.2 min</li> <li>▪ 0.4 min</li> <li>▪ 0.2 min</li> <li>▪ 1.0 min</li> <li>▪ 0.2 min</li> </ul>	Yes	
<b>Max. Illumination adjacent to Non-Residential</b> <i>(Sec. 5.7.3.K)</i>	When site abuts a non-residential district, maximum illumination at the property line shall not exceed 1 foot candle		NA	
<b>Cut off Angles</b> <i>(Sec. 5.7.3.L)</i>	when adjacent to residential districts <ul style="list-style-type: none"> <li>▪ All cut off angles of fixtures must be 90°</li> <li>▪ maximum illumination at the property line shall not exceed 0.5 foot candle</li> </ul>		Yes	<b>Provide the Foot-candle values along property line on plan</b> <b>Will be provided prior to Final Site Plan submission</b>

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Gary J. Tressel  
 Senior Associate

GJT/nf  
 pc: HRC; File

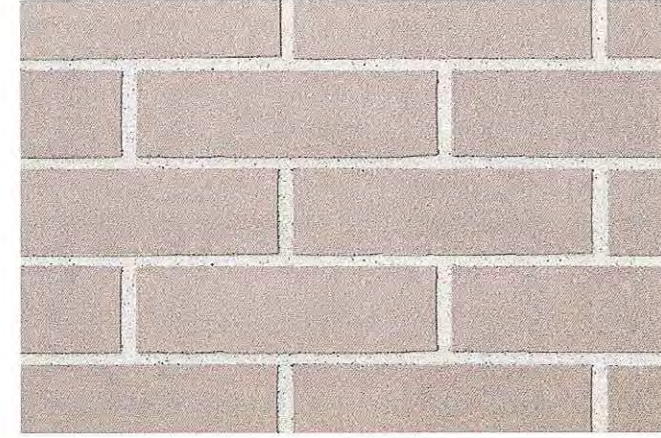
Brick "A" to match existing main field  
Belden Pago Velour A, Utility



Brick "B" as a field with brick "A" as accent  
Belden 671 Velour A, Utility



Brick "C" on Worship Center Body  
Belden 661 Velour A, Utility



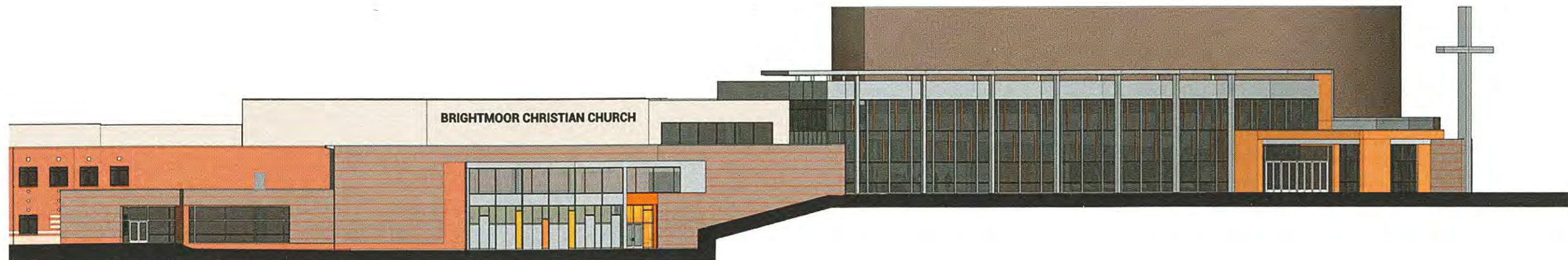
Flat Metal Panel,  
Metl Span, Silver Metallic



Laminated Panel,  
Trespa Meteon, NW06/ST



Vision Glass  
Sungard SuperNeutral 54





**PRINCIPALS**

George E. Hubbell  
Thomas E. Biehl  
Walter H. Alix  
Keith D. McCormack  
Nancy M. D. Faught  
Daniel W. Mitchell  
Jesse B. VanDeCreek  
Roland N. Alix

**SENIOR ASSOCIATES**

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Randal L. Ford  
William R. Davis  
Dennis J. Benoit  
Robert F. DeFrain  
Thomas D. LaCross

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Charles E. Hart  
Colleen L. Hill-Stramsak  
Bradley W. Shepler  
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March 13, 2015

City of Novi  
45175 W. Ten Mile Road  
Novi, Michigan 48375

Attn: Jeremy Miller

Re: Brightmoor Christian Church  
Response to Engineering Review JSPI-0077 Dated February 26, 2015  
for Preliminary Site Plan Submittal

HRC Job No. 20140319

Dear Mr. Miller:

Please see our responses to your engineering review letter dated 2-26-15 as follows:

**Recommendation**

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

**Comments:**

The Preliminary Site Plan meets the general requirements of Chapter 11, the Storm Water Management Ordinance and the Engineering Design Manual with the following items to be addressed at the time of the Final Site plan submitted (further engineering detail will be required at the time of the final site plan submittal):

**Additional Comments (to be addressed prior to the Final Site Plan Submittal):**

**General**

1. The City standard detail sheets are not required for the Final Site Plan submittal. They will be required with the Stamping Set submittal. They can be found on the City website ([www.cityofnovi.org/DesignManual](http://www.cityofnovi.org/DesignManual)).

***Response: Standard detail sheets will be attached to the Final Site Plan submittal.***

2. Provide a note stating the size of the disturbed area and size of the building addition.

***Response: A note stating the size of the disturbed areas and size of building addition will be added to the Final Site Plan.***

3. Provide a minimum of two ties to established section or quarter section corners.

***Response: Please see contract drawing C-03 Existing Topography for two ties.***

4. Provide a note stating the disturbed area for construction.

***Response: Area of disturbance will be noted on the Final Site Plan.***



5. Revise the plan set to reference at least one city established benchmark. An interactive map of the City's established survey benchmarks can be found under the 'Map of Gallery' tab on [www.cityofnovi.org](http://www.cityofnovi.org)

***Response: Please see Contract Drawing C-03 Existing Topography for existing datums on City survey benchmarks.***

6. Provide a construction materials table on the Utility Plan listing the quantity and material type for each utility (water, sanitary and storm) being proposed.

***Response: This information will be provided as part of the Final Site Plan.***

7. Provide a note that compacted sand backfill shall be provided for all utilities within the influence of paved areas, and illustrate on the profiles.

***Response: These notes will be added as part of the Final Site Plan approval.***

8. Provide a traffic control sign table listing the quantities of each sign type proposed for the development. Provide a note along with the table stating all traffic signage will comply with the current MMUTCD standards.

***Response: The traffic control sign table listing the quantities of each type of sign for the proposed development will be added as a part of the Final Site Plan approval.***

9. Provide a note stating if dewatering is anticipated or encountered during construction a dewatering plan must be submitted to the Engineering Department for review.

***Response: A note will be added to the Final Site Plan indicating if dewatering is anticipated, prior to beginning dewatering a plan will be submitted to the engineering department for review prior to beginning dewatering.***

10. Generally, all proposed easements shall remain outside utility easements. Where proposed trees are required within a utility easement, the trees shall maintain a minimum 5-foot horizontal separation distance from any existing or proposed utility. All utilities shall be shown on the landscape plan, or other appropriate sheet, to confirm the separation distance.

***Response: All proposed easements have been shown on the landscape plans along with any proposed easements for City's review, the issue of 5 foot horizontal clearance will be resolved prior to final submission of site plan approval.***

### Water Main

11. Show existing and proposed water main easements.

***Response: Existing and proposed watermain easements are shown on Contract Drawing C-07.***

12. Provide a profile for all proposed water main 8-inch and larger.

***Response: A profile will be prepared for the watermain relocation on the north side of the proposed expansion.***

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

***Response: Three (3) sets of sealed plans will be submitted to with a checklist for their review and processing of the permit.***

### Storm Sewer

14. Label all inlet storm structures on the profiles. Inlets are only permitted in paved areas and when followed by a catch basin within 50 feet.

***Response: The inlet storm structures and profiles will be provided as part of the Final Site Plan approval. HRC will review that inlets only occur within paved areas and must have a catch basin within 50 feet.***

15. Label the 10-year HGL on the storm sewer profiles, and ensure the HGL remains at least 1-foot below the rim of the structure.

***Response: The ten year hydraulic grade line will be indicated on all storm profiles to ensure that it maintains at least 1 foot below the rim of the structures.***

16. Provide a schedule listing the casting type and other relevant information for each proposed storm structure on the utility plan. Round castings shall be provided on all catch basins except curb inlet structures.

***Response: A schedule will be added for the casting types and other relevant information on the proposed storm sewers. Round castings shall be provided at all catch basins except curb inlets as a part of the Final Site Plan submission.***

17. Provide a 0.1-foot drop in the downstream invert of all storm structures where a change in direction of 30 degrees or greater occurs.

***Response: 0.1 foot drop on the downstream inverts will be provided within the design of the storm system.***

18. Provide profiles for all proposed storm sewer.

***Response: Profiles will be provided for all proposed storm sewer as a part of the Final Site Plan submission.***

#### Storm Water Management Plan

19. The Storm Water Management plan for this development shall be designed in accordance with the Storm Water Ordinance and Chapter 5 of the new Engineering Design Manual.

***Response: Stormwater Management Plan for the development shall be designed in accordance with the Stormwater Ordinance Chapter 5 of the new Engineering Design Standards for a ten year storm water event as a part of Final Site Plan submission.***

20. The SWMP must detail the storm water design, calculations, details, and maintenance as stated in the ordinance. The SWMP must address the discharge of storm water off-site, and evidence of its adequacy must be provided. This should be done by comparing pre- and post-development discharge rates and volumes. The area being used for this off-site discharge should be delineated and the ultimate location of the discharge shown.

***Response: The SWMP shall be provided as a part of the Final Site Plan submission.***

21. Provide supporting calculations for the runoff coefficient determination.

***Response: Calculations for runoff coefficients will be submitted for review for the City as part of the Final Site Plan submission.***

22. Provide details and calculations on the plan showing that the east basin will be enlarged to accommodate the proposed 10-year volume while maintaining a one-foot freeboard as discussed.

***Response: HRC will provide details and calculations on the plan that show that the east basin will be enlarged to accommodate the ten year volume while maintaining one-foot freeboard.***

### Paving and Grading

23. The proposed parking stalls along the east curb line are dimensioned at 18.5 feet with the 6-inch curb. Parking stalls with a 6-inch curb must be a minimum of 19-feet long. The length can be reduced up to 17-feet with a 4-inch curb.

***Response: Proposed parking stalls along the east curb line are dimensioned at 18 ½ feet with 6 inch curb. HRC will either adjust the curb height to be 4 inches (as it is less than 19 feet) or will increase the length of the space to be 19 feet to allow the 6 inch curb as a part of final site plan submission.***

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

24. An itemized construction cost estimate must be submitted to the Community Development Department at the time of Final Site Plan submittal for the determination of plan review and construction inspection fees. This estimate should only include the civil site work and not any costs associated with construction of the building or any demolition work. ***The cost estimate must be itemized*** for each utility (water, sanitary, storm sewer), on-site paving, right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pretreatment structure and restoration).

***Response: An itemized cost estimate will be provided as a part of Final Site Plan.***

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

25. A draft copy of the maintenance agreement for the storm water facilities, as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department with the Final Site Plan. Once the form of the agreement is approved, this agreement must be approved by City Council and shall be recorded in the office of the Oakland County register of Deeds.

***Response: A draft of the Maintenance Agreement for the Stormwater Facilities will be provided as a part of Final Site Plan.***

26. A draft copy of the 20-foot wide easement for the water main to be constructed on the site must be submitted to the Community Development Department.

***Response: A draft copy of the watermain easement that will be relocated on the site will be provided to the Community Development Department for their review and input.***

**The following must be addressed prior to construction:**

27. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development to setup a meeting (248-347-0430).

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

28. A City of Novi Grading Permit will be required prior to any grading on the site. This permit will be issued at the pre-construction meeting. Once determined, a grading permit fee must be paid to the City Treasurer's Office.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

29. An NPDES permit must be obtained for the MDEQ because the site is over 5 acres in size. The MDEQ requires an approved plan to be submitted with the Notice of Coverage.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

30. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department (248-347-0430) for forms and information.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

31. A permit for water main construction must be obtained from the MDEQ. This permit application must be submitted through the City Engineer after the water main plans have been approved.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

32. Construction Inspection Fees to be determined once the construction cost estimate is submitted must be paid prior to the pre-construction meeting.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

33. An incomplete site work performance guarantee for this development will be calculated (equal to 1.5 times the amount required to complete the site improvements, excluding the storm water facilities) as specified in the Performance Guarantee Ordinance. This guarantee will be posted prior to TCO, at which time it may be reduced based on percentage of construction

Jeremy Miller  
March 13, 2015  
HRC Job Number 20140314  
Page 7 of 7

completed.

***Response: Requirement is understood and will be complied with at the appropriate time and prior to construction.***

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Gary J. Tressel  
Senior Associate

GJT/nf  
Attachment  
Enclosure

pc: City of Novi; Ben Croy, Brian Coburn, Sri Komaragiri, Michael Andrews  
HRC; File



March 6, 2015

Ms. Sri Komaragiri  
Ms. Barbara McBeth  
Planning and Community Development  
City of Novi  
45175 W. Ten Mile Road  
Novi, MI 48375

**RE: Response to Landscape Architectural Preliminary Site Plan Approval Review  
JSP 15-07**

Dear Ms. Komaragiri:

The comments provided in your review letter dated February 25, 2015 have been addressed as follows. Revisions to our plans will appear on the resubmitted final site plan documents.

**1. Interior Parking Lot Landscape Calculations:**

- a. We will revise our landscape calculations to reflect the new parking space total of 233 spaces.
- b. We will add square footages to all parking lot islands that have been counted toward the interior parking lot landscape requirements.
- c. We request a waiver from the planning commission for the 17 additional trees that result from the revised parking lot calculations. As discussed, we have provided 13 additional trees in the lower youth area and are hopeful that the planning commission will consider these additional trees in their deliberations.

**2. Planting Notations and Details**

- a. We will revise the tree planting detail to include fabric ties only.

**3. Irrigation Plan:**

- a. We will provide an irrigation plan and cost estimate.

**4. Existing and Proposed Utilities:**

- a. We will show existing and proposed fire hydrants.

**5. Soil Type:**

- a. We will show soil information on our plans. This also is shown on the civil engineers plans.

**6. Collected or Transplanted Trees:**

- a. We have determined that transplanting the existing trees is not economically feasible. We will provide 58 new 7 foot (minimum height) evergreens that will be field located on the

Page 2

Mr. Sri Komaragiri

Ms. Barbara McBeth

northern berm to enhance the buffer between the church property and the adjacent residential community.

**7. General Notes:**

- a. We will provide an original seal and signature on the final site plan submittal and adhere to the other stated requirements.

If we can provide you any additional information, or answer any questions, please do not hesitate to call.

Sincerely,  
RUSSELL DESIGN, INC.

A handwritten signature in black ink that reads "MARC R. RUSSELL" with a long, sweeping horizontal line extending to the right.

Marc R. Russell, ASLA  
Principal





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March 13, 2015

City of Novi  
45175 W. 10 Mile Road  
Novi, Michigan 48375

Attn: Barbara McBeth, Deputy Director of Community Development

Re: Brightmoor Christian Church  
Preliminary Site Plan JSP15-0007  
Response to Traffic Review dated 2-12-15

HRC Job No. 20140319

Dear Ms. McBeth:

The following are our responses to the Preliminary Site Plan traffic review dated February 12, 2015:

**1. General Comments**

- a. The applicant, Hubbell, Roth and Clark, Inc., is proposing to expand the building and parking lot of the existing Brightmoor Christian Church located near the intersection of 13 Mile Road and Lenox Park Drive, just west of M-5.

**Response:**

**2. Potential Traffic Impacts**

- a. The applicant has stated that a traffic impact statement will be prepared and submitted prior to preliminary site plan approval. URS will review the traffic impact study once it is submitted.

**Response: The Traffic Impact Study will be submitted prior to COB, Wednesday, March 18, 2015 for review by URS/AECOM.**

**3. General Plan Comments** – The preliminary site plan is generally in compliance with City ordinance; however, the applicant should further review the following comments and adjust the plans as necessary:

- a. Provide additional dimensions indicating the widths of the pedestrian facilities throughout the site.

**Response: The dimensions shall be provided as a part of the Final Site Plan submission.**

- b. Indicate where pedestrian ramps will be located throughout the site.

**Response: Pedestrian ramps shall be labeled as a part of the Final Site Plan submission.**

- c. Provide ramp details for any proposed pedestrian ramps throughout the site.

**Response: Ramp details shall be provided as a part of the Final Site Plan submission.**

- d. Review the required turning radius for any trucks that will need access to the site and ensure that all maneuvers can be adequately completed.

***Response: Turning radii shall be provided as a part of the Final Site Plan submission.***

- e. Provide signing information, including sign type and location(s).

***Response: The traffic control sign table listing the quantities of each type of sign for the proposed development will be added as a part of the Final Site Plan approval.***

- 4. **Internal Site Access and Operations** – The internal site access and operations is generally in compliance with City ordinances; however, the applicant should further review the following comments and adjust the plans as necessary:

- a. The parking spaces in the parking lot on the west side of the site are labeled with either 17' or 18.5 parking space depths.
  - i. Where the curb height is 6", as indicated on the grading sheet, the parking space depth should be 19'.

***Response: Parking space depth will be addressed as a part of the Final Site Plan submission.***

- ii. There is a discrepancy between the grading sheet (C-5) and the typical sections and details sheet (C-8) regarding the curb height adjacent to parking spaces with a depth of 17'. The grading sheet indicates a 0.5' difference in grade, while the typical sections and details sheet has a note that indicates a 4" curb height where the parking spaces are 17' deep. This should be reviewed and updated to be consistent.

***Response: Discrepancies will be addressed as a part of the Final Site Plan submission.***

- b. The parking spaces along the perimeter of the east parking lot indicate parking stall depths of 18.5' and the grading sheet indicates a 0.5' difference in grade.
  - i. Where the curb height is 6", as indicated on the grading sheet, the parking space depth should be 19'.

***Response: Parking space depth will be addressed as a part of the Final Site Plan submission.***

- ii. The parking space depths should be increased to 19' if the 6" curb is maintained or the parking space depths may be reduced to 17' if the curb height is reduced to 4".

***Response: Parking space depths will be addressed as a part of the Final Site Plan submission.***

- C. The end island designs should be further reviewed for compliance, specifically addressing the comments below:
- i. End islands should be 3' shorter than the adjacent parking spaces. Maneuvering lane dimensions indicate 24' between parking spaces and 28' between islands, thereby indicating a 2' difference on either side of the maneuvering lane.

***Response: End island designs will be addressed as a part of the Final Site Plan submission.***

- ii. The outside radius of end islands should be 15'. Throughout the site there are several instances where the radius is less than 15'.

***Response: End island designs will be addressed as a part of the Final Site Plan submission.***

The preliminary site plan was reviewed to the level of detail provided and additional information may be required to complete the review of traffic-related elements. URS **recommends approval** of the plans with the condition that the applicant provides additional detail, revised plans and/or a narrative to address the aforementioned comments included in this letter.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Colleen Hill-Stramsak, P.E., PTOE  
Associate

CHS/nef

pc: URS; Matthew G. Klawon  
HRC; File



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March 13, 2015

City of Novi  
45175 W. Ten Mile Road  
Novi, Michigan 48375

Attn: Barbara McBeth, Deputy Director of Community Development

Re: Brightmoor Christian Church Expansion HRC Job No. 20140319  
Preliminary Site Plan PSP#14-0194 & PSP#15-0017  
Response to Fire Department Review Letter dated 2-6-15

Dear Ms. McBeth:

The following is a list of responses to your review letter dated 2-6-15;

**Project Description:** Parking and Building Expansion

**Comments:** Maintain Hydrants and access to site and the FDC throughout the project.

**Recommendation:** Approval

*Response: HRC and Brightmoor Christian Church will work with the Fire Department to ensure hydrants are maintained to the greatest extent possible and that access to the site will be coordinated with the Fire Department throughout construction. The current FDC which is located on the south side of the building will remain in service at all times and available to the Fire Department in the event of an emergency.*

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Gary J. Tressel  
Senior Associate

GJT/nf

pc: City of Novi; Joseph Marshal, Barbara McBeth, Kristen Kapelanski, Sri Komaragiri  
HRC; File

## Noise Impact Statement



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March 13, 2015

City of Novi  
45175 W. Ten Mile Road  
Novi, Michigan 48375

Attn: Sri Komaragiri, Planner

Re: Noise Analysis Letter  
Brightmoor Christian Church  
Preliminary Site Plan Approval

HRC Job No. 20140319

Dear Ms. Komaragiri:

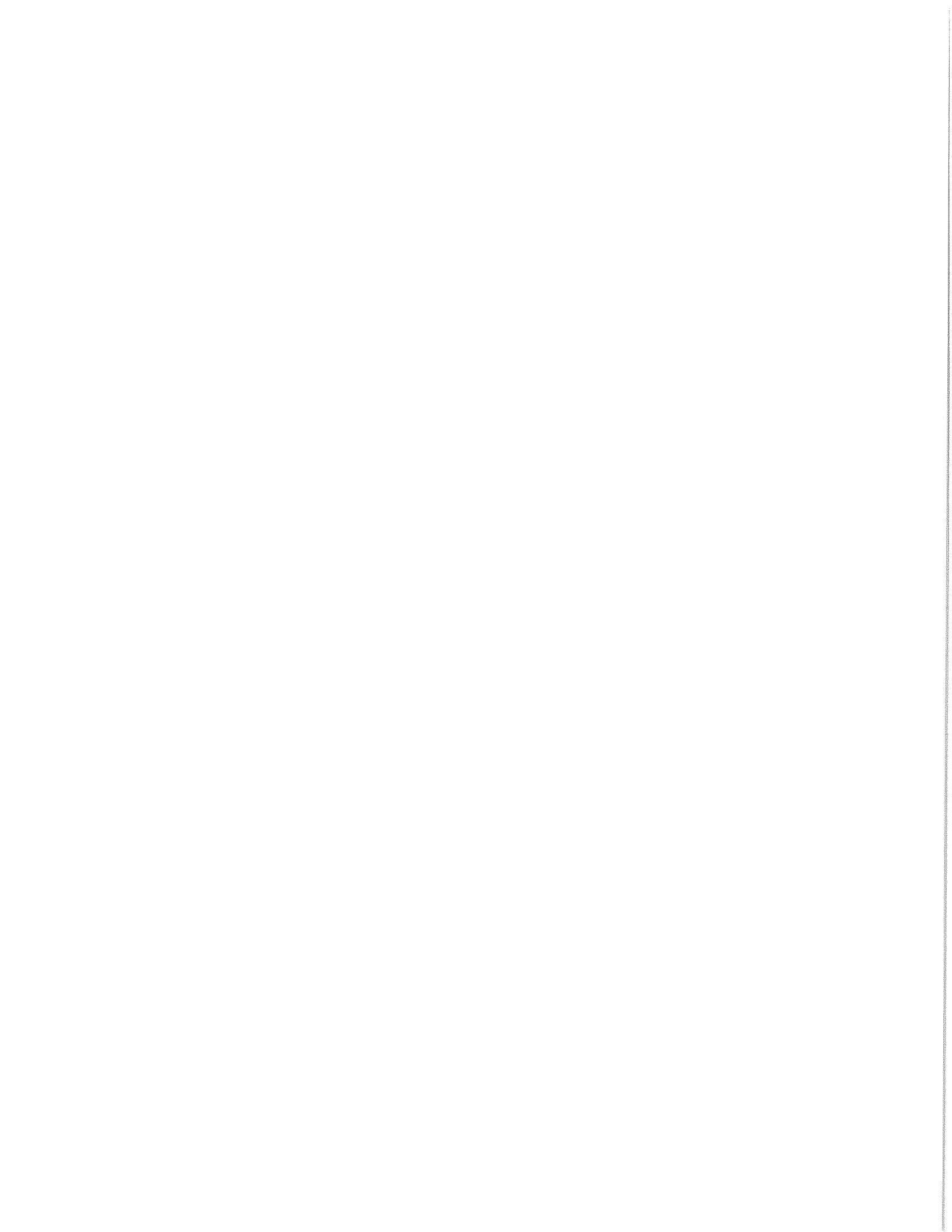
In accordance with your review letter for the subject project, Hubbell, Roth & Clark, Inc. (HRC) has obtained the catalog cuts from Progressive AE Architects as it pertains to the roof top units and the generator that would be built on the west side of the property.

HRC has also reviewed the Ordinance section of your Development Guidelines under Section 5.1410 where we see that within the current R1 zoning that the nighttime hour's allowable decibel readings are 55 and the daytime hours decibel readings cannot exceed 60 at the property lines. We have also attached a map to show where the noise generating equipment will be on the project as it relates to the associated property lines.

On the westerly side the minimum dimension from the generator to the west property line will be a minimum of 291 feet and the roof top units will be a minimum of 313 feet. On the south side these roof top units will be a minimum of 572 feet from the Thirteen Mile Road right-of-way. On the east side the roof top units will be a minimum of 806 feet from the M-5 freeway and on the north side the measurement to the property line will be for the adjacent Lenox Park Condominiums will be a minimum of 588 feet from the roof top unit.

The roof top units height above finished floor do vary as noted on the Architectural plans and will be provided with screening due to City ordinances for roof top units. It should also be noted that the generator (while on the west side and only 291 feet from the west property line) is the closest noise generating unit. The generator will have a 6 foot high masonry wall between the west side of the generator and the west property line to absorb and redirect the noise impacts while in operation.

Upon your review of the attached information, should you have any questions or wish to discuss further detail, HRC would be happy to assemble a discussion with Progressive AE, Brightmoor Christian Church and HRC to resolve any open issues you may have regarding the noise levels. HRC has attached a catalog cuts for the



Sri Komaragiri  
March 13, 2015  
HRC Job Number 20140319  
Page 2 of 2

appropriate units as well for your review and consideration.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Gary J. Tressel  
Senior Associate

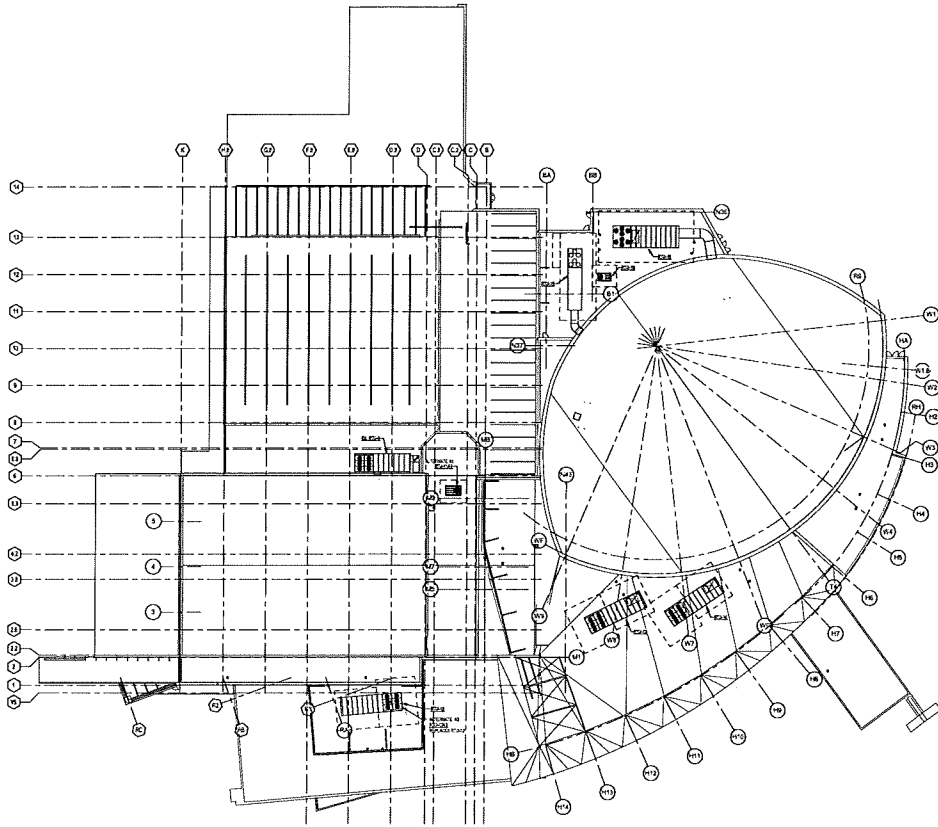
GJT/nf

Attachment

pc: Brightmoor Christian Church; Gary Jonna, Norm Frechette  
Progressive AE Architects; Seth Horton, Andy Hopkins  
CGP Architects; Evan Caruso  
HRC; Tom Biehl, Matt Slicker, File

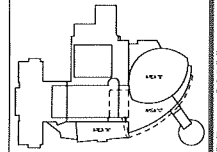






ROOF OVERALL MECHANICAL PLAN

KEY PLAN



Brightmoor Christian Church

RTU Outdoor Sound Power Levels

RTU-10:

Table 131. Outdoor sound power level - dB (ref. 10 - 12 W)

Tons	Unit Model Number	Octave Center Frequency								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
3	T/YSC036E	79	85	79	79	77	71	67	58	81
4	T/YSC048E	82	84	83	80	76	72	66	58	82
5	T/YSC060E	85	82	81	81	77	72	67	61	82
6	T/YSC072F	91	95	90	87	84	79	75	68	89
7½	T/YSC090F	91	95	90	87	84	79	75	68	89
7½	T/YSC092F	92	96	92	89	85	80	76	69	91
8½	T/YSC102F	91	95	90	87	84	79	75	68	89
10	T/YSC120F	91	86	90	86	82	78	73	67	88
3	T/YHC036E	79	85	79	79	77	71	67	58	81
4	T/YHC048E	80	86	84	85	83	79	73	67	87
4	T/YHC048F	80	86	84	85	83	79	73	67	87
5	T/YHC060E	80	86	84	85	83	79	73	67	87
5	T/YHC060F	80	86	84	85	83	79	73	67	87
6	T/YHC072E,F	91	95	90	87	84	79	75	68	89
7½	T/YHC092F	91	86	90	86	82	78	73	67	88
8½	T/YHC102F	83	85	85	86	84	78	74	70	88
10	T/YHC120E	89	87	91	85	80	77	73	66	87

Note: Tests follow AR1270-95.

## RTU-11A1 (Alternate A1)

The following is the Voyager II Outdoor Sound Power Levels. The Outdoor Sound Tests were conducted in accordance with ARI 370-86.

Units were tested at 400 CFM/Ton at an average of 1.75" total static.

**NOTE:** The sound provided per ARI270 is sound power, and thus there is no distance associated with it.

**Note:** All measurements are made in a reverberation chamber. For outdoor sound, the unit is placed in the chamber, supply and return are ducted out of the chamber. Sound measured is mainly due to the condenser fan and the compressors.

12.5 & 15 TON YC/TC/WC		17.5 - 25 TON YC/TC/WC	
OUTDOOR SOUND POWER LEVELS**		OUTDOOR SOUND POWER LEVELS**	
Octave Band (Hertz)	Power levels(dB)	Octave Band (Hertz)	Power levels(dB)
63 Hz	90.5	63 Hz	98.0
125 Hz	96.5	125 Hz	95.0
250 Hz	91.5	250 Hz	93.5
500 Hz	91.0	500 Hz	91.0
1000 Hz	88.5	1000 Hz	88.5
2000 Hz	82.0	2000 Hz	84.5
4000 Hz	76.5	4000 Hz	79.5
8000 Hz	70.5	8000 Hz	73.0
A-WEIGHTED dBA	93.0	A-WEIGHTED dBA	94.0
A-WEIGHTED bels	9.2	A-WEIGHTED bels	9.4

\*\*SOUND POWER LEVELS db re 10-12 Watts

RTU-15:

**Table 1 – 20-55 Ton Large Commercial Packaged Rooftops – Sound Power Ratings  
S\*FC-C20 THROUGH S\*FC-C55 60 Hz MODELS**

**Table 1:**

Octave Band (Hz)	Octave Band Sound Power Levels, dB re 1 pW						
	20 ton	25 ton	30 ton	40 ton	50 ton	55 ton	
63		100	100	100	102	102	102
125		99	99	99	101	101	101
250		97	97	97	99	99	99
500		95	95	95	97	97	97
1000		92	92	92	94	94	94
2000		89	89	89	91	91	91
4000		85	85	85	87	87	87
8000		78	78	78	80	80	80
A-Weighted		97	97	97	99	99	99

**Table 3 – 20-55 Ton Large Commercial Packaged Rooftops – Sound Pressure  
Levels S\*FC-C20 THROUGH S\*FC-C55 60 Hz MODELS**

**Table 3:**

Octave Band (Hz)	Octave Band Sound Pressure Levels, dB re 20 µPa at 10 meters Condensing Section End of Unit						
	20 ton	25 ton	30 ton	40 ton	50 ton	55 ton	
63		72	72	72	74	74	74
125		69	69	69	71	71	71
250		64	64	64	66	66	66
500		66	66	66	68	68	68
1000		64	64	64	66	66	66
2000		60	60	60	62	62	62
4000		55	55	55	57	57	57
8000		48	48	48	50	50	50
A-Weighted		68	68	68	70	70	70

RTU-12, RTU-12A3 (Alternate A3), RTU-13, RTU-14, RTU-16:

**Table 2 – 60-130 Ton Large Commercial Packaged Rooftops – Sound Power Ratings S\*FC-C60 THROUGH S\*GC-D Hz MODELS**

**Table 2**

Octave Band (Hz)	Octave Band Sound Power Levels, dB re 1 pW						
	60 ton	70/75 ton	90 ton	105 ton	115 ton	130 ton	
63	102	102	103	104	105	106	
125	101	98	100	101	102	103	
250	99	98	103	104	105	106	
500	97	98	101	102	103	104	
1000	94	98	97	98	99	100	
2000	91	92	96	97	98	99	
4000	87	88	85	91	92	93	
8000	80	81	78	86	87	88	
A-Weighted	99	102	103	104	105	106	

**Table 4 – 60-130 Ton Large Commercial Packaged Rooftops – Sound Pressure Levels S\*FC-C60 THROUGH S\*GC-D13 60 Hz MODELS**

**Table 4:**

Octave Band (Hz)	Octave Band Sound Pressure Levels, dB re 20 µPa at 10 meters Condensing Section End of Unit						
	60 ton	70/75 ton	90 ton	105 ton	115 ton	130 ton	
63	74	79	75	76	77	78	
125	71	74	72	73	74	75	
250	66	68	75	76	77	78	
500	68	68	73	74	75	76	
1000	66	68	69	70	71	72	
2000	62	63	68	69	70	71	
4000	57	58	62	63	64	65	
8000	50	49	57	58	59	60	
A-Weighted	70	72	75	76	77	78	



**TRANE™**

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## **Engineering Bulletin**

Library	Product Literature
Product Section	UNITARY
Product	Rooftop Air Conditioners
Model	383 & 393
Literature Type	Engineering Bulletin
Sequence	108
Date	October 1994
File No.	PL-UN-RT-000-EB-108-1094
Supersedes	New

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Ordering No. **RT-EB-108**

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### **OUTDOOR SOUND**

#### **MORE "SOUND" ADVICE FROM TRANE LARGE COMMERCIAL PACKAGED ROOFTOP INSTALLATIONS**

**20 – 60 TON SCROLL COMPRESSOR ROOFTOPS**

**70 – 130 TON MODEL R SEMI-HERMETIC COMPRESSOR ROOFTOPS**

Wise planning and coordination during the design phases of a new construction project will often minimize, if not eliminate, the need for auxiliary sound attenuation.

The information in this bulletin should be utilized by the Trane sales engineer to guide the mechanical designer in laying out a "sound job". The bulletin is written with the assumption that the reader has a fundamental working knowledge of acoustics. This bulletin contains the following information:

- Lot line outdoor sound level considerations and recommended practices.
- Special application considerations and sound attenuation methods.
- Equipment sound power and sound pressure data (for use in the design phase of a project)

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## Lot Line Standards and Unit Location

Outdoor HVAC equipment must be located to prevent objectionable noise levels at adjacent property lines or building structures. When choosing a location for large rooftop equipment consider the following recommended practices. Also, refer to engineering bulletin RT-EB-80 for detailed recommendations on minimizing indoor sound levels.

### Ground Level Mounted Equipment

- 1) Equipment should be located next to an unoccupied space such as a storage room, mechanical room, switch gear / electrical room...etc. or other typically unoccupied space. **Never locate the equipment near occupied, sound sensitive areas of the building or near window glass.** Also, do not locate the equipment adjacent to other building walls or large objects which may reflect the sound back to a sound sensitive receiver.
- 2) Seal all piping and electrical conduit penetrations in the building envelope with an approved fire-safe sealant. Utilize insulated, dielectrically compatible sleeves at wall penetrations to properly support the piping and provide some vibration dampening. Provide flexible couplings and vibration isolators for the hot water circulating pump, when hot water heating models are utilized, to prevent the transmission of regenerated sound throughout the building.
- 3) Install the unit on a pad isolated from the building or, install the unit with proper vibration isolation underneath to prevent machine vibrations from being transmitted to the structure of the building.

### Roof Mounted Equipment

- 1) Do not install the unit on beams or structure at mid-span of a column grid. Install the unit over direct support rigid enough to minimize beam deflection and vibratory motion of the roof structure. Also, when selecting the location of equipment, consider the importance of location with regard to indoor sound. Avoid locating the equipment directly above a sound sensitive space (as outlined in RT-EB-80).
- 2) Seal all piping and electrical conduit penetrations with a fire safe sealant / material after routing it through insulated piping sleeves / pitch pockets.
- 3) Install the unit upon an inertia base or concrete pad structure with vibration isolation chosen to match the characteristics of the roof structure. **BEWARE OF LIGHTWEIGHT ROOF STRUCTURES** which are difficult, if not impossible, to isolate from vibration!

An additional concern for the designer will be the resulting noise level at adjacent property lines. When commercial equipment is installed near a residential lot line there is likely to be a noise problem. In this misapplication, **the problem is not the equipment but rather locating the equipment too close to a quiet zone!** Typical maximum lot line dBA levels are shown in the Table on the following page. The reader is cautioned that

## Lot Line Standards and Unit Location

The values shown in the Table are typical of major cities in the U.S. **Always check the criteria and local requirements before selecting equipment locations.**

### Typical Maximum Lot Line Sound Levels

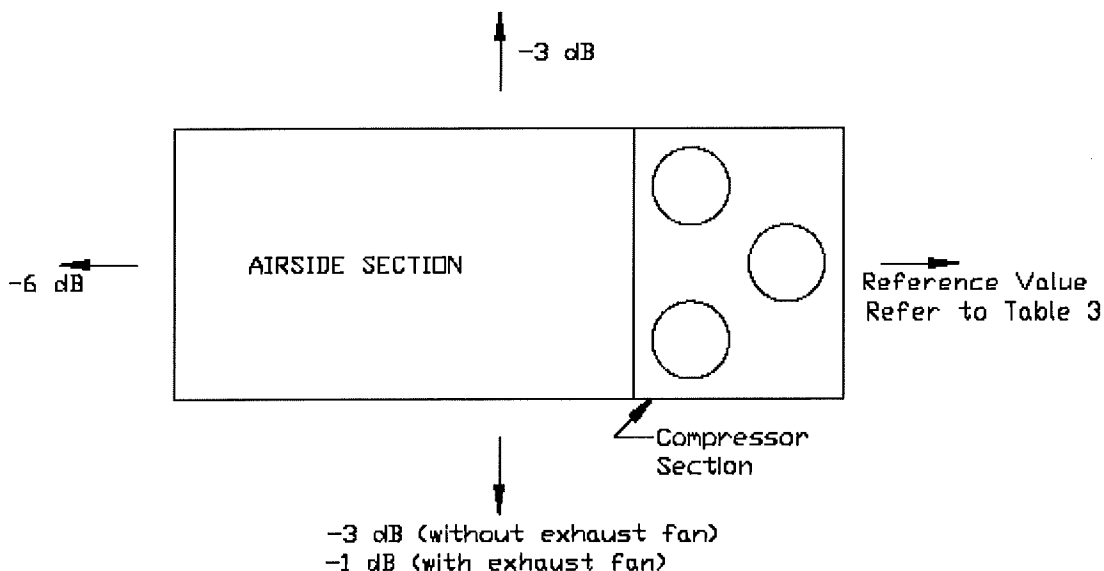
	Day	Night
Residential	50-55 dBA	45 dBA
Commercial	60-65 dBA	55-60 dBA
Industrial	65-70 dBA	65-70 dBA

The bottom line - follow the recommended practices contained in this bulletin and be aware of the sound requirements that must be met at the adjoining lot lines. As the old adage goes "an ounce of prevention is worth a pound of cure." **Sound attenuation after the fact is usually a very expensive proposition.** Plan and investigate up front! Use the information available from Trane to engineer a "sound" job!

## Unit Orientation

The sound emanated from 20 – 130 ton commercial rooftops is directional in nature allowing the installing contractor / engineer to position the unit to minimize potential noise problems. Notice that the end of the unit opposite the compressors is significantly more quiet than the other sides of the unit. In order to minimize noise infringement upon a quiet zone, orient the unit so that the end opposite the compressors faces the sound sensitive area. With the unit oriented in this manner it is estimated that the following reductions in sound pressure levels (dB re 20  $\mu$ Pa) can be expected at 10 meters from the unit (see Figures 1 through 3 below).

Figure 1 – Orientation of the 20 – 30 Ton Large Commercial Rooftop Unit to Minimize Noise Infringement Upon a Quiet Zone



## Lot Line Standards and Unit Location

Figure 2 – Orientation of the 40 – 60 Ton Large Commercial Rooftop Unit to Minimize Noise Infringement Upon a Quiet Zone

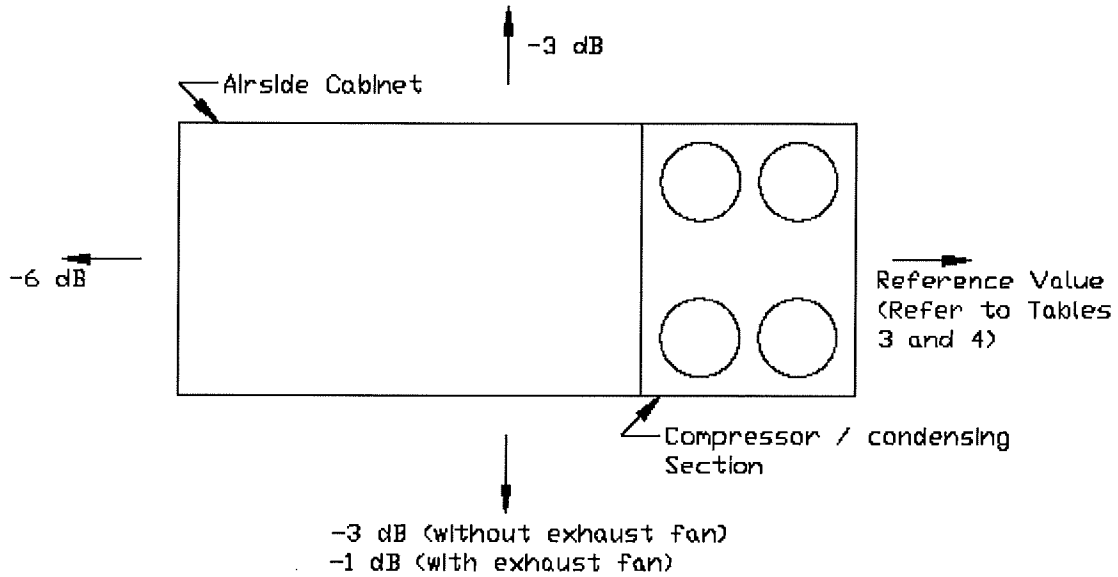
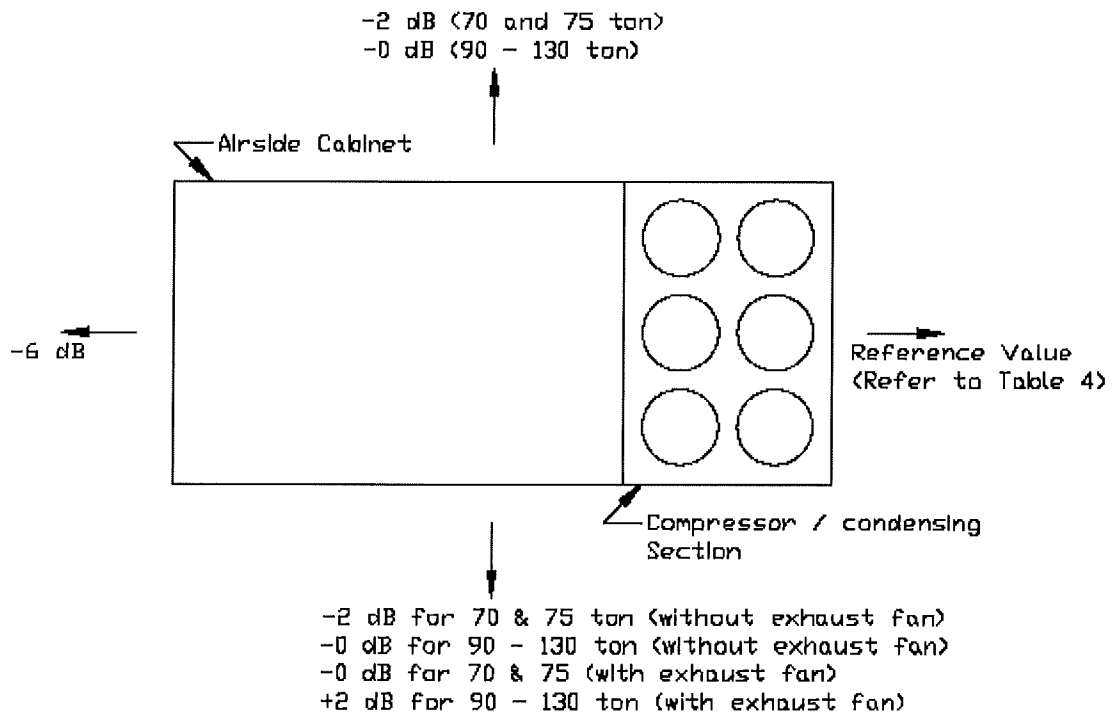


Figure 3 – Orientation of the 70 – 130 Ton Large Commercial Rooftop Unit to Minimize Noise Infringement Upon a Quiet Zone



## Distance Factor

The distance between a source of sound and the receiver of sound plays an important role in minimizing the potential for noise problems. Figures 4 and 5 below give the reductions in sound pressure (dBA) that can be expected based upon increasing the distance of the receiver from the large commercial rooftop. Figure 4 should be utilized for 20 – 60 ton IntelliPak rooftops. Figure 5 should be used for 70 – 130 ton IntelliPak rooftops. The rooftops have been treated as line sources. The dBA reductions shown are to be applied to the sound pressure levels shown in Tables 3 and 4. As we will see in the next section of this bulletin, the Trane Acoustics Program (TAP) may also be used to quickly and conveniently determine distance correction for a large commercial rooftop unit.

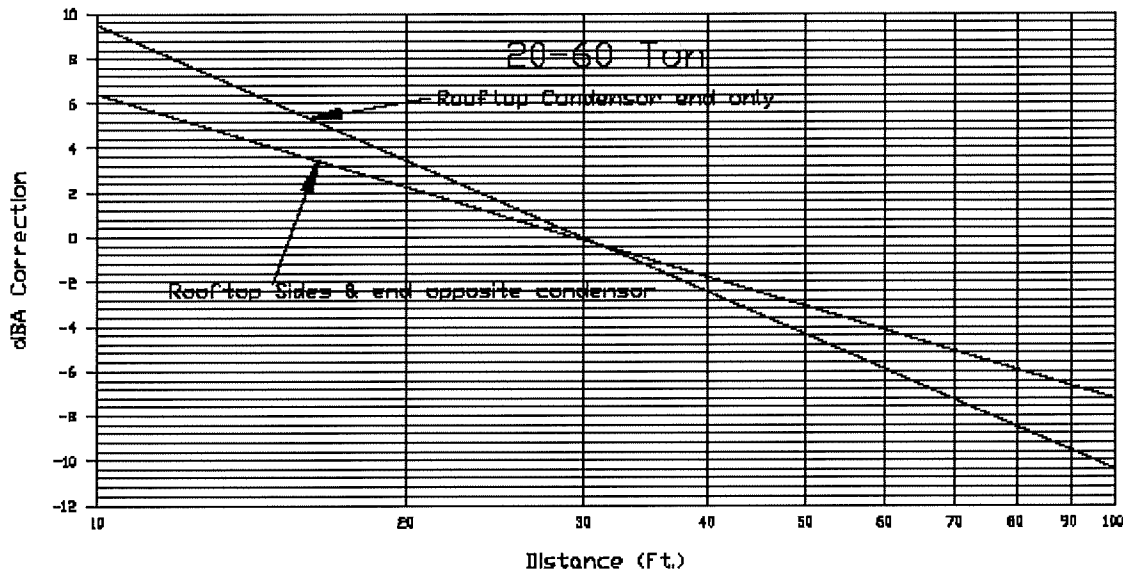


Figure 4 – Semi-log Plot of Sound Attenuation Due to Distance of Sound Source (IntelliPak Rooftop) from a Receiver

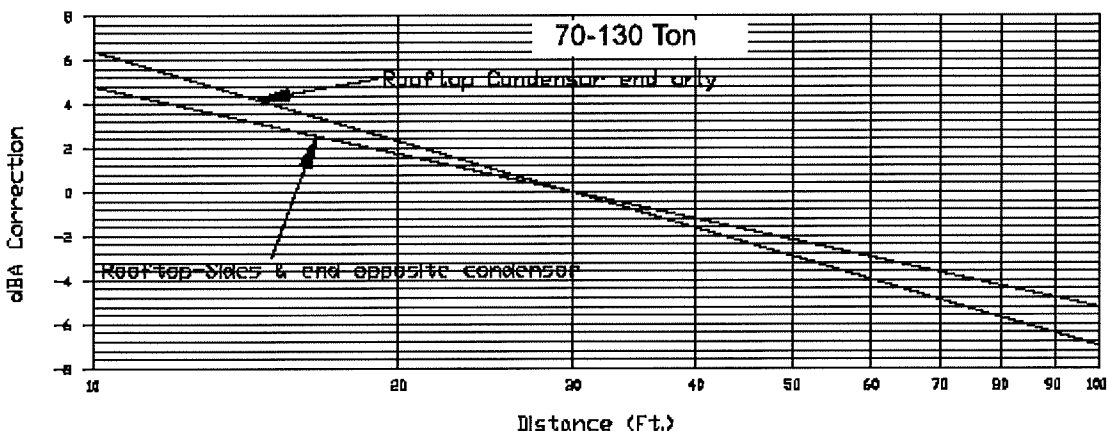


Figure 5 – Semi-log Plot of Sound Attenuation Due to Distance Of Sound Source (IntelliPak Rooftop) from Receiver

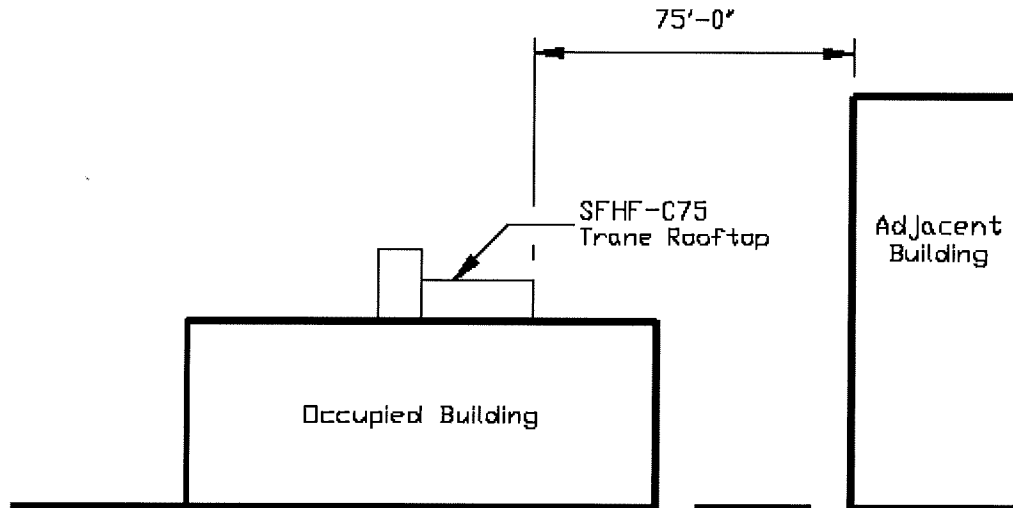
## Barrier Walls

Acoustical barrier walls may be utilized to effectively intercept the direct sound path from a source to a receiver. The Trane Acoustics Program (TAP), available from the Trane Customer Direct Service (CDS) Network, provides a convenient method for calculating the sound pressure at an adjoining lot line (with or without barriers employed). It prompts the user for the information required (rooftop sound power must be known) to make the calculation and displays the end result in dBA.

The **TAP** is a powerful program capable of modeling a wide variety of indoor and outdoor acoustical applications. Complete information on how to run the program can be found in the publication DSN-IPT-2. Performing an outdoor distance correction is a small part of the capabilities of the program. An example of a typical outdoor distance calculation is shown below.

In this example, a SFHF-C75 (75 ton) gas-electric packaged rooftop is located on the roof of a building 75 feet from the adjoining building as shown in Figure 6 below.

**Figure 6 – Outdoor Sound Pressure Level at an Adjoining Lot Line (No Acoustical Barrier Employed)**



The **TAP** analysis consists of two lines. The first line is the sound power of the large commercial rooftop and the second line is the outdoor distance correction. The sample output is shown in Figure 7 below.

**Figure 7 – Example of TAP Program Output**

PROJECT NAME: ROOFTOP SOUND EB EXAMPLE  
 PROJECT NUMBER: RTEBEXAM  
 ANALYSIS TITLE: SOUND AT LOT LINE WITH NO BARRIER  
 DATE: 2/3/94

DESCRIPTION	1/1 OCT BAND CENTER FREQ						
	63	125	250	500	1K	2K	4K
1 75 TON S*FC ROOFTOP SOUND POWER	102	98	98	98	98	92	88
2 OUTDOOR DISTANCE CORRECTION	-35	-35	-35	-35	-35	-35	-35
SUM WITH NOISE REDUCTION VALUES	67	63	63	63	63	57	53

NC: NC = 62      RC: RC = 61(N)      DBA: 66 DBA

The program can be run a second time to determine the effect of adding a 9 foot barrier or parapet wall 6 feet from the large commercial rooftop, located between the large rooftop and the adjacent building. The results are shown in Figure 8 below.

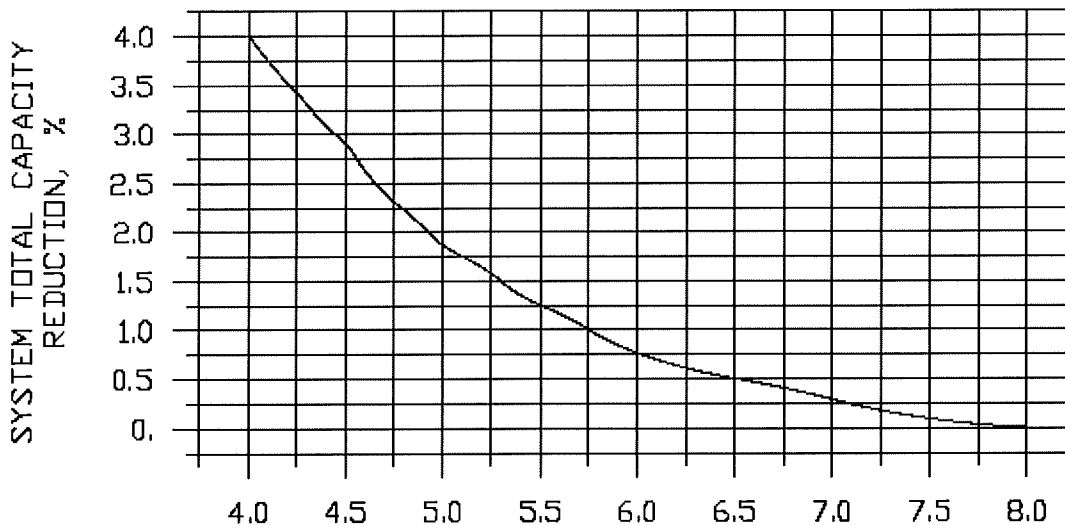
**Figure 8 – Example of TAP Program Output (Acoustical Barrier Wall Employed)**

PROJECT NAME: ROOFTOP SOUND EB EXAMPLE  
 PROJECT NUMBER: RTEBEXAM  
 ANALYSIS TITLE: SOUND AT LOT LINE WITH 9 FT BARRIER 6FT FROM UNIT  
 DATE: 2 / 3 / 94

DESCRIPTION	1/1 OCT BAND CENTER FREQ						
	63	125	250	500	1K	2K	4K
1 75 TON S*FC ROOFTOP SOUND POWER	102	98	98	98	98	92	88
2 OUTDOOR DISTANCE PLUS BARRIER CORRECTION	-43	-45	-47	-49	-51	-54	-57
SUM WITH NOISE REDUCTION VALUES	59	53	51	49	47	38	31
NC: NC = 46	RC: RC = 45(N)		DBA: 51 DBA				

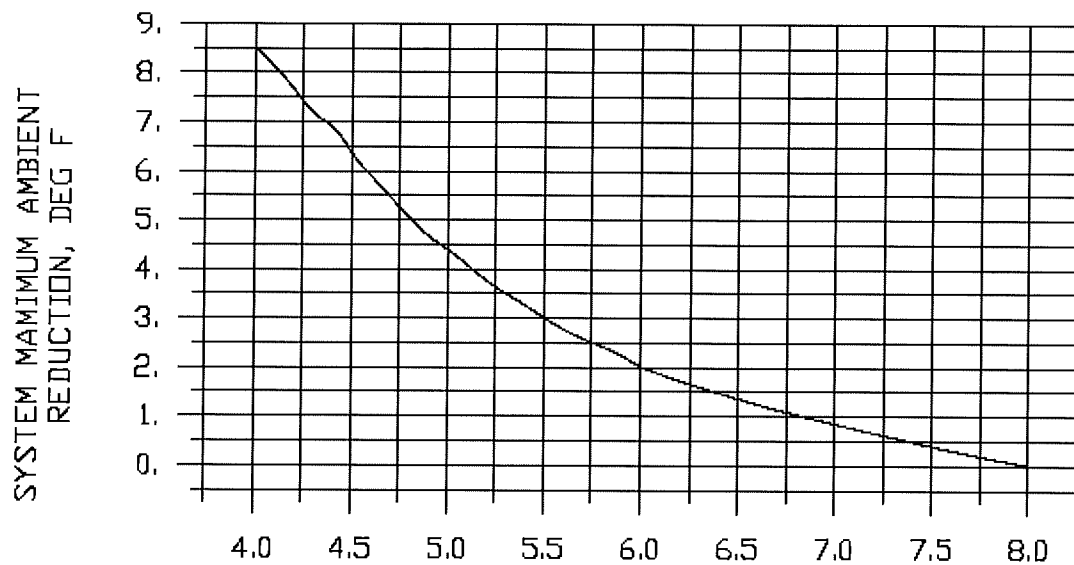
A word of caution! When barrier walls are applied, adequate clearance must be provided to insure servicing of components and permit unrestricted condenser air flow. Encroaching upon recommended catalogued clearances will cause a reduction in unit performance. Also, if the barrier wall is significantly higher than the unit (more than 2 – 3 feet higher in elevation than the condenser fan outlet), warm air recirculation off the condenser fan discharge may occur causing increased operating head pressure and reduced capacity / improper operation. Figures 9 and 10 below provide the capacity, and maximum operating ambient reductions, that result when the large rooftop is encroached upon by a building or barrier wall.

**Figure 9 - % Total Capacity Reduction Due to Encroachment Upon condenser Air Inlet Clearance**



Air inlet clearance ft. from wall (wall height = unit height) or ft. between units (multiply by 2)

**Figure 10 – Maximum Operating Ambient Reduction Due to Encroachment Upon Condenser Air Inlet Clearance**



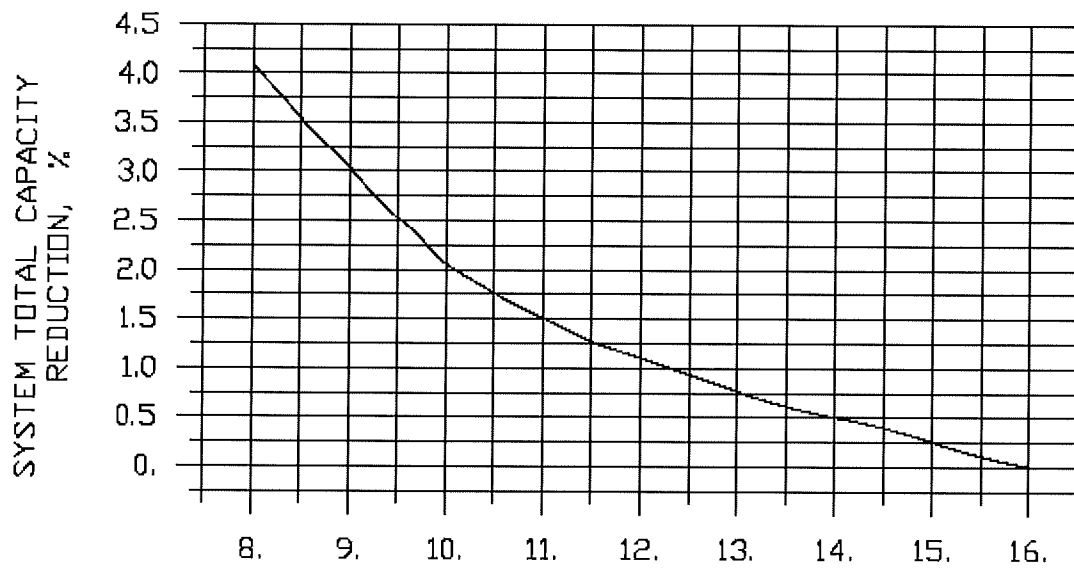
Air inlet clearance ft. from wall (wall height = unit height) or ft. between units (multiply by 2)

For a barrier of greater height than the unit, **the factory should be always consulted since performance may be adversely affected.**

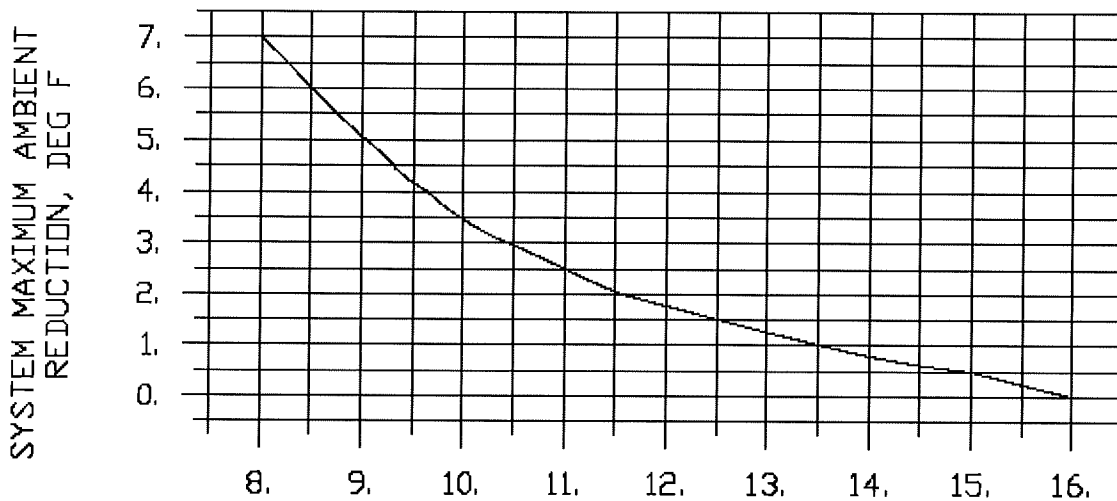
### **Barrier Wall Enclosures**

An acoustical enclosure constructed of barrier walls made of 1/2" exterior grade plywood can give a substantial reduction in sound (up to 10 dBA). Solid walls constructed of brick, block or more robust materials are even more desirable and will give better attenuation. In addition, there are also prefabricated interlocking metal frame barriers available to form sound absorption enclosures. However, it is very important that the barrier walls constructed do not encroach upon the rooftop unit any more than the clearance requirements outlined in the product catalog. **To do so will result in restricted condenser air flow, loss of capacity and/or improper operation** See Figures 11 and 12 following). The barrier wall heights should be at least 2 feet minimum above the top of the unit condensing section but not more than 1 1/2 times the height of the unit condensing section (as measured from the bottom of base rail to top of cabinet) when the barrier walls form an enclosure **(exceeding this height will result in excessive recirculation of the discharged condenser air causing loss of capacity and/or improper operation)**. Also, provisions must be made, on units with powered exhaust, to provide sufficient clearance for exhaust air to properly discharge, clear of the unit, avoiding recirculation into the units outside air intake. Use of louvered or perforated screen walls with significant amounts of free area opening are not recommended for sound sensitive jobs. For best results a three sided barrier wall enclosure is recommended as shown in Figure 13 following. Finally, an attenuating enclosure provided must be self supporting (independent of the rooftop unit) and be properly supported by the roof structure it is mounted upon.

**Figure 11 – Capacity Reduction Due to Discharge Condenser Air Recirculation in a Pit Installation**



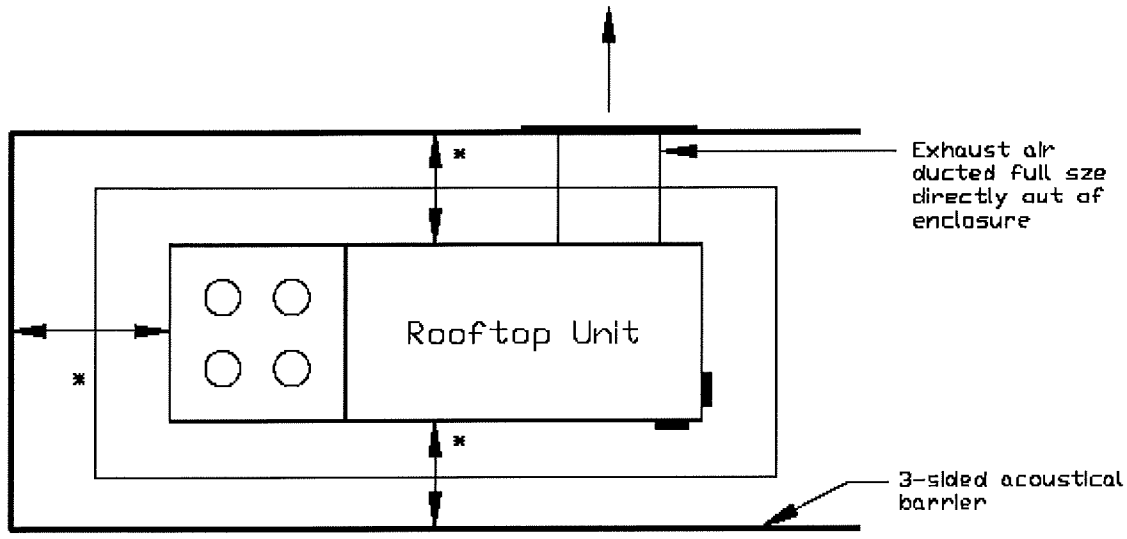
**Figure 12 – Maximum Ambient Operating Reduction Due to Discharge Condenser Air Recirculation in a Pit Installation**



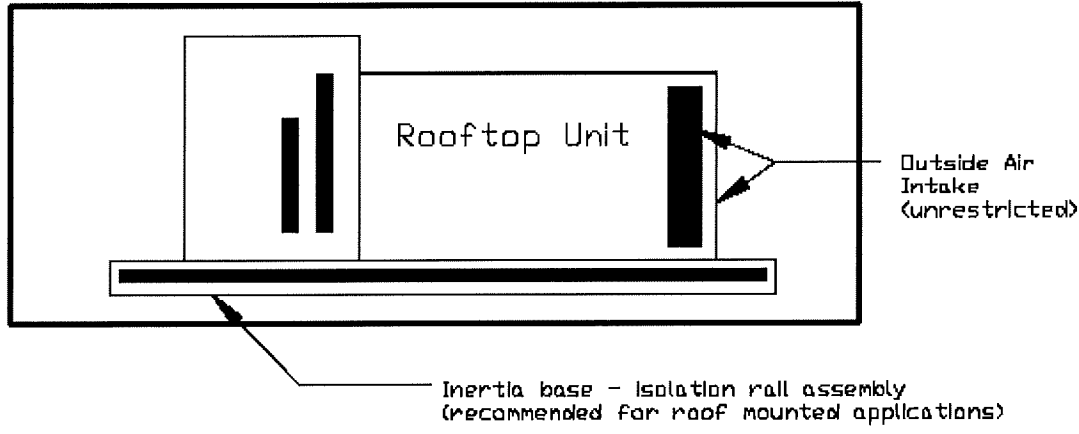
CONDENSER AIR INLET CLEARANCE  
FT. FROM PIT WALL  
(Pit height = 1.5 times unit height)



**Figure 13 – Suggested Acoustical Barrier Wall Arrangement For Maximum Sound Attenuation**



Plan View



Side View

Notes: \* Recommended minimum clearance of 8' -0" is required for 20 – 75 ton sizes.  
 Recommended minimum clearance of 11' -0" is required for 90 – 130 ton sizes.

**Acoustical Fan Discharge Stacks / Silencers**

Acoustical fan stacks are generally not recommended as a method of sound attenuation for the following reasons:

- Fan silencers, or stacks, typically impose substantial pressure drops on the propeller type condenser fans. The added pressure drop imposed on each condenser fan, if it exceeds 0.20", will cause reduced air flow, decreasing unit capacity and efficiency. Because restricted air flow increases the operating head pressure of the machine, nuisance tripping may result at high outdoor ambient temperatures.
- Fan failure may result causing serious injury or death. The propeller type fans utilized have not been designed, or tested, to determine their performance at the higher static pressures imposed by obstructions or devices such as fan silencers.

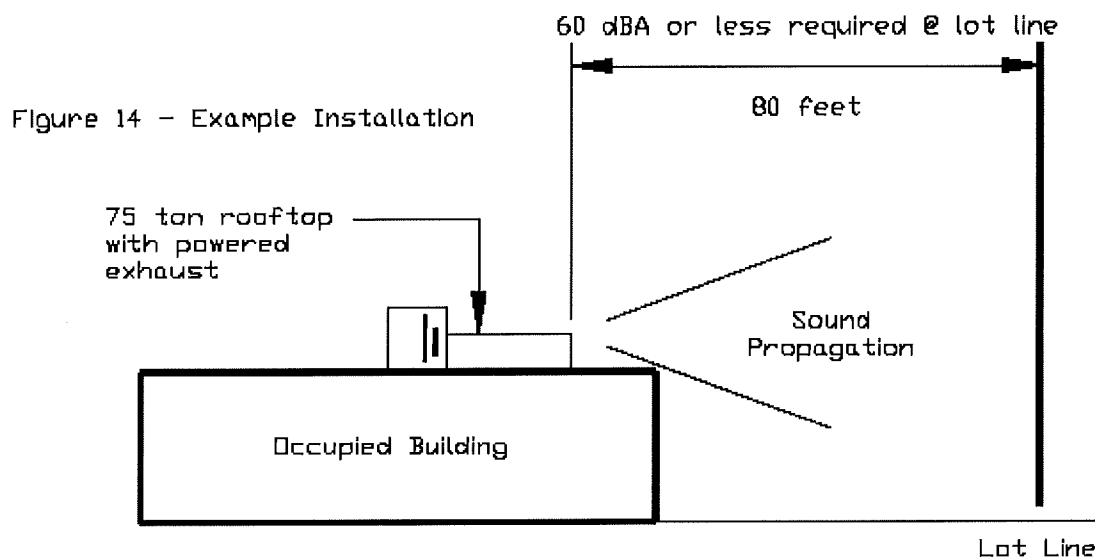
- Fan silencers will only attenuate the higher frequency components of condenser fan noise. Fan silencers do not attenuate the lower frequency compressor sound which is often the dominant noise source.
- The unit cabinet is not designed to support the weight of, or laterally stabilize, fan discharge stacks.

### Compressor Blanket Wraps

Compressor blanket wraps, or acoustical enclosures, are available from several manufacturers to provide additional sound attenuation of the low frequency sounds generated by compressors. The effectiveness of the wrap depends upon the type and manufacturer used (assuming that it is properly installed) and the type of compressor involved. For scroll and conventional reciprocating compressors, manufacturers will typically quote noise reductions, for the compressor only, on the order of 3 to 6 dBA. In order to determine more precisely how much attenuation can be expected from compressor wraps the manufacturer of the wrap should be consulted with the specifics of the application involved. The reader is cautioned that, depending on the type of wrap or acoustical enclosure applied, the performance of the machine may be affected. Acoustical wraps or enclosures used must not block condenser air flow across the coil face area! Also, the reader is cautioned to keep in mind that compressor wraps attenuate compressor noise only. Overall unit sound may or may not be significantly reduced depending upon the level and character of noise generated by other noise producing sources on the unit such as condenser fans, exhaust fans...etc.

### Example Problem

Consider Figure 14. An example is given to demonstrate how to use the preceding information to minimize the potential for noise problems to occur when sound sensitive applications are involved.



An estimation of sound pressure level at the lot line is made as follows:

72 dBA – From Table 4 “**Large Rooftop Sound Pressure Levels**” @ 10m., dB re 20  $\mu$ P,  
60 Hz, 75 Ton Unit

-6 dBA – Estimated deduct because of unit orientation – end opposite the compressors facing the receiver (See Figure 3)

-6 dBA – Due to the distance factor @ 80 ft. from lot line (See Figure 5)  
60 dBA – Total estimated Sound Pressure Level at the Lot Line

Since this meets the lot line sound requirement no further action is required. Had additional attenuation been needed we could have installed a barrier wall / parapet wall to form an acoustic attenuating barrier or surrounded the unit with a 3-sided acoustical enclosure (as outlined previously). The resulting reduction in sound pressure levels could be determined from modeling the application on the TAP program, or by calculating the barrier insertion losses from methods outlined in the **ASHRAE Applications Handbook**.

### **Test Procedures Used to Develop Sound Data**

#### Scroll Compressor Rooftops (20 – 60 Nominal Tons)

Testing for the scroll compressor rooftops was conducted in accordance with **ARI 370 “Sound Rating of Large Outdoor Refrigeration and Air-Conditioning Equipment.”** The “free field” technique qualified per ANSI S1.34 1980 was implemented using the American National Standard “Engineering Methods for the Determination of Sound Power Levels of Noise Sources for Essentially Free-Field Conditions Over a Reflecting Plane”. The results of these tests were used to calculate the sound power data in Table 1. Sound pressure data, for scroll compressor rooftops, is found in Tables 3 and 4 on the following page (the data in Tables 3 and 4 are valid at 10 meters from the unit in a free field).

#### Model R Compressor Rooftops (70 – 130 Nominal Tons)

Testing for model R compressor rooftops was conducted in accordance with **ARI 370**. The “free field” technique qualified per ANSI S1.34 1980 was implemented using the American National Standard “Engineering Methods for the Determination of Sound Power Levels of Noise Sources for Essentially Free-Field Conditions Over a Reflecting Plane”. The data listed in Table 2 is given in sound power and Table 4 in sound pressure levels (Table 4 is valid at 10 meters from the unit in a free field).

Since each rooftop installation is different, all sound pressure data is given for free field acoustic radiation. Consequently, actual sound pressure levels at an installation may differ from published values. These differences can be attributed to the acoustic properties of the particular installation surroundings. Refer to the Trane applications manual FND-AM-5 (6/86) “**Acoustics in Air-Conditioning**” for an in-depth discussion of basic acoustic properties.

## Sound Power and Sound Pressure Data for IntelliPak Large Rooftops

**Table 1 – 20-55 Ton Large Commercial Packaged Rooftops – Sound Power Ratings  
S\*FC-C20 THROUGH S\*FC-C55 60 Hz MODELS**

**Table 1:**

Octave Band (Hz)	Octave Band Sound Power Levels, dB re 1 pW						
	20 ton	25 ton	30 ton	40 ton	50 ton	55 ton	
63		100	100	100	102	102	102
125		99	99	99	101	101	101
250		97	97	97	99	99	99
500		95	95	95	97	97	97
1000		92	92	92	94	94	94
2000		89	89	89	91	91	91
4000		85	85	85	87	87	87
8000		78	78	78	80	80	80
A-Weighted		97	97	97	99	99	99

**Table 2 – 60-130 Ton Large Commercial Packaged Rooftops – Sound Power Ratings S\*FC-C60 THROUGH S\*GC-D Hz MODELS**

**Table 2**

Octave Band (Hz)	Octave Band Sound Power Levels, dB re 1 pW						
	60 ton	70/75 ton	90 ton	105 ton	115 ton	130 ton	
63		102	102	103	104	105	106
125		101	98	100	101	102	103
250		99	98	103	104	105	106
500		97	98	101	102	103	104
1000		94	98	97	98	99	100
2000		91	92	96	97	98	99
4000		87	88	85	91	92	93
8000		80	81	78	86	87	88
A-Weighted		99	102	103	104	105	106

**Table 3 – 20-55 Ton Large Commercial Packaged Rooftops – Sound Pressure Levels S\*FC-C20 THROUGH S\*FC-C55 60 Hz MODELS**

**Table 3:**

Octave Band (Hz)	Octave Band Sound Pressure Levels, dB re 20 $\mu$ Pa at 10 meters Condensing Section End of Unit						
	20 ton	25 ton	30 ton	40 ton	50 ton	55 ton	
63		72	72	72	74	74	74
125		69	69	69	71	71	71
250		64	64	64	66	66	66
500		66	66	66	68	68	68
1000		64	64	64	66	66	66
2000		60	60	60	62	62	62
4000		55	55	55	57	57	57
8000		48	48	48	50	50	50
A-Weighted		68	68	68	70	70	70

**Table 4 – 60-130 Ton Large Commercial Packaged Rooftops – Sound Pressure Levels S\*FC-C60 THROUGH S\*GC-D13 60 Hz MODELS**

**Table 4:**

Octave Band (Hz)	Octave Band Sound Pressure Levels, dB re 20 $\mu$ Pa at 10 meters Condensing Section End of Unit						
	60 ton	70/75 ton	90 ton	105 ton	115 ton	130 ton	
63		74	79	75	76	77	78
125		71	74	72	73	74	75
250		66	68	75	76	77	78
500		68	68	73	74	75	76
1000		66	68	69	70	71	72
2000		62	63	68	69	70	71
4000		57	58	62	63	64	65
8000		50	49	57	58	59	60
A-Weighted		70	72	75	76	77	78

## References / Suggested Reading

- ASHRAE. 1991. **ASHRAE Handbook – 1991 HVAC Applications**, chapter 42. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (Revised every four years)
- Schaffer, Mark E., 1991. “**A Practical Guide to Noise and Vibration Control For HVAC Systems.**” Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
- The Trane Company. 1986. **Acoustics in Air Conditioning Application Manual** FND-AM-5. LaCrosse, WI: The Trane Company.

# GENERAC® | INDUSTRIAL POWER

## SG100

## 9.0L

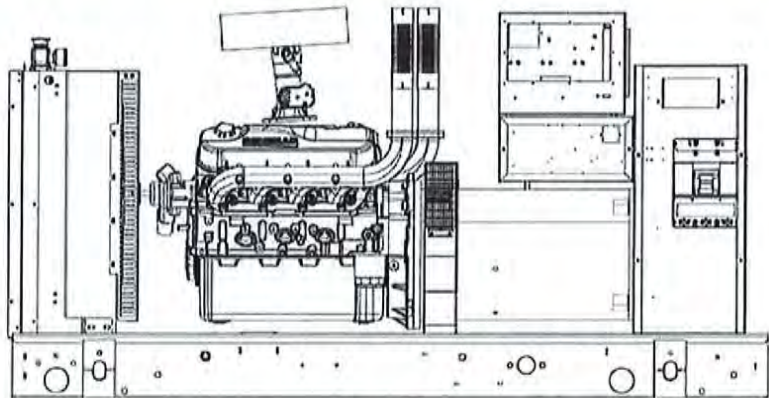
### Industrial Spark-Ignited Generator Set

EPA Certified Stationary Emergency

SG100 100 kW

Standby Power Rating  
100 kW 125 kVA 60 Hz

Prime Power Rating\*  
90 kW 113 kVA 60 Hz



\*EPA Certified Prime ratings are not available in the U.S. or its Territories

Image used for illustration purposes only

## Codes and Standards

Generac products are designed to the following standards:



UL2200, UL508, UL142, UL498



NFPA70, 99, 110, 37



NEC700, 701, 702, 708



ISO9001, 8528, 3046, 7637, Pluses #2b, 4



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41

American National Standards Institute



osHPD

IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

## Powering Ahead

For over 50 years, Generac has led the industry with innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac's gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial application under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

## SG100

### Standard Features

#### ENGINE SYSTEM

##### General

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel flexible exhaust connection
- Critical Exhaust Silencer
- Factory Filled Oil
- Radiator duct adapter (open set only)

##### Fuel System

- Primary and Secondary Fuel Shutoff
- Flexible Fuel Line - NPT Connection

##### Cooling System

- Closed Coolant Recovery System
- UV/Ozone resistant hoses
- Factory-installed Radiator
- Radiator drain extension
- 50/50 Ethylene glycol antifreeze

##### Engine Electrical System

- Battery charging alternator
- Battery Cables
- Battery Tray
- Solenoid activated starter motor
- Rubber-booted engine electrical connections

#### ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H insulation material
- 2/3 Pitch
- Skewed Stator
- Brushless Excitation
- Sealed Bearings
- Amortisseur winding
- Full load capacity alternator

#### GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of circuits - high/low voltage
- Separation of circuits - multiple breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby rated Units)
- 1 Year Warranty (Prime rated units)
- Silencer mounted in the discharge hood (enclosed only)

#### ENCLOSURE (if selected)

- Rust-proof fasteners with nylon washers to protect finish
- High performance sound-absorbing material
- Gasketed doors
- Stamped air-intake louvers
- Air discharge hoods for radiator-upward pointing
- Stainless steel lift off door hinges
- Stainless steel lockable handles
- Rhino Coat™ - Textured polyester powder coat

#### CONTROL SYSTEM



##### Control Panel

- Digital H Control Panel - Dual 4x20 Display
- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable PLC RS-232/485
- All-Phase Sensing DVR
- Full System Status
- Utility Monitoring
- Low Fuel Pressure Indication
- 2-Wire Start Compatible
- Power Output (kW)
- Power Factor
- kW Hours, Total & Last Run

- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus protocol
- Predictive Maintenance algorithm
- Sealed Boards
- Password parameter adjustment protection

- Single point ground
- 15 channel data logging
- 0.2 msec high speed data logging
- Alarm information automatically comes up on the display

##### Alarms

- Oil Pressure (Pre-programmable Low Pressure Shutdown)
- Coolant Temperature (Pre-programmed High Temp Shutdown)
- Coolant Level (Pre-programmed Low Level Shutdown)
- Low Fuel Pressure Alarm
- Engine Speed (Pre-programmed Over speed Shutdown)
- Battery Voltage Warning
- Alarms & warnings time and date stamped
- Alarms & warnings for transient and steady state conditions
- Snap shots of key operation parameters during alarms & warnings
- Alarms and warnings spelled out (no alarm codes)



## SG100

### Configurable Options

#### ENGINE SYSTEM

- General
- Engine Block Heater
- Oil Heater
- Air Filter Restriction Indicator
- Stone Guard (Open Set Only)

#### Engine Electrical System

- 10A UL battery charger
- 2.5A UL battery charger
- Battery Warmer

#### ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater
- Tropical coating
- Permanent Magnet Excitation

#### GENERATOR SET

- Gen-Link Communications Software (English Only)
- Extended Factory Testing (3 Phase Only)
- IBC Seismic Certification
- 8 Position Load Center
- 2 Year Extended Warranty
- 5 Year Warranty
- 5 Year Extended Warranty

#### CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

#### ENCLOSURE

- Standard Enclosure
- Level 1 Sound Attenuation
- Level 2 Sound Attenuation
- Steel Enclosure
- Aluminum Enclosure
- 150 MPH Wind Kit
- 12 VDC Enclosure Lighting Kit
- 120 VAC Enclosure Lighting Kit
- AC/DC Enclosure Lighting Kit
- Door Alarm Switch

#### CONTROL SYSTEM

- 21-Light Remote Annunciator
- Remote Relay Panel (8 or 16)
- Oil Temperature Sender with Indication Alarm

- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)

- Remote Communication - Modem
- Remote Communication - Ethernet
- 10A Run Relay
- Ground fault indication and protection functions

### Engineered Options

#### ENGINE SYSTEM

- Coolant heater ball valves
- Fluid containment pans

#### ALTERNATOR SYSTEM

- 3rd Breaker Systems

#### GENERATOR SET

- Special Testing
- Battery Box

#### ENCLOSURE

- Motorized Dampers
- Enclosure Ambient Heaters

#### CONTROL SYSTEM

- Spare inputs (x4) / outputs (x4) - H Panel Only
- Battery Disconnect Switch

### Rating Definitions

**Standby** – Applicable for a varying emergency load for the duration of a utility power outage with no overload capability.

**Prime** – Applicable for supplying power to a varying load in lieu of utility for an unlimited amount of running time. A 10% overload capacity is available for 1 out of every 12 hours. The Prime Power option is only available on International applications.

Power ratings in accordance with ISO 8528-1, Second Edition dated 2005-06-01, definitions for Prime Power (PRP) and Emergency Standby Power (ESP).

## SG100

## application and engineering data

### ENGINE SPECIFICATIONS

#### General

Make	Generac
Cylinder #	8
Type	V
Displacement - L (Cu In)	8.9L (540)
Bore - mm (In)	114.31 (4.5)
Stroke - mm (In)	107.15 (4.25)
Compression Ratio	10.5:1
Intake Air Method	Naturally Aspirated
Number of Main Bearings	5
Connecting Rods	Forged
Cylinder Head	Cast Iron
Cylinder Liners	No
Ignition	High Energy
Pistons	Aluminum Alloy
Crankshaft	Steel
Lifter Type	Hydraulic Roller
Intake Valve Material	Steel Alloy
Exhaust Valve Material	Stainless Steel
Hardened Valve Seats	Yes

#### Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	+/- 0.25%

#### Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full-flow spin-on cartridge
Crankcase Capacity - L (qts)	8.5 (8.0)

#### Cooling System

Cooling System Type	Pressurized Closed
Water Pump Flow - gpm (lpm)	26 (98)
Fan Type	Pusher
Fan Speed (rpm)	2330
Fan Diameter mm (In)	558 (22)
Coolant Heater Wattage	1500
Coolant Heater Standard Voltage	120 V

#### Fuel System

Fuel Type	Natural Gas, Propane Vapor
Carburetor	Down Draft
Secondary Fuel Regulator	Standard
Fuel Shut Off Solenoid	Standard
Operating Fuel Pressure	11" - 14" H2O

#### Engine Electrical System

System Voltage	12 VDC
Battery Charging Alternator	Standard
Battery Size	See Battery Index 016197OSBY
Battery Voltage	12 VDC
Ground Polarity	Negative

### ALTERNATOR SPECIFICATIONS

Standard Model	390 mm
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	< 50
Standard Excitation	Brushless
Bearings	Sealed Ball
Coupling	Direct Drive
Prototype Short Circuit Test	Yes

Voltage Regulator Type	Full Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	+/- 0.25%

# SG100

# operating data

## POWER RATINGS

	Natural Gas		Propane Vapor	
	100 kW	Amps: 417	100 kW	Amps: 417
Single-Phase 120/240 VAC @1.0pf	100 kW	Amps: 347	100 kW	Amps: 347
Three-Phase 120/208 VAC @0.8pf	100 kW	Amps: 301	100 kW	Amps: 301
Three-Phase 120/240 VAC @0.8pf	100 kW	Amps: 150	100 kW	Amps: 150
Three-Phase 277/480 VAC @0.8pf	100 kW	Amps: 120	100 kW	Amps: 120
Three-Phase 346/600 VAC @0.8pf				

## STARTING CAPABILITIES (sKVA)

		sKVA vs. Voltage Dip											
		480VAC						208/240VAC					
Alternator	kW	10%	15%	20%	25%	30%	35%	10%	15%	20%	25%	30%	35%
Standard	100	79	118	157	197	236	275	59	89	118	148	177	206
Upsize 1	130	116	174	232	290	348	406	87	131	174	218	261	305

## FUEL CONSUMPTION RATES\*

Natural Gas – ft <sup>3</sup> /hr (m <sup>3</sup> /hr)		Propane Vapor – ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	
Percent Load	Standby	Percent Load	Standby
25%	391 (11.1)	25%	157.4 (4.5)
50%	669 (19.0)	50%	269.9 (7.6)
75%	904 (25.6)	75%	364.4 (10.3)
100%	1116 (31.6)	100%	449.8 (12.7)

\*Fuel supply installation must accommodate fuel consumption rates at 100% load.

## COOLING

		Standby
Air Flow (inlet air combustion and radiator)	ft <sup>3</sup> /min (m <sup>3</sup> /min)	5797 (164.2)
Coolant Flow per Minute	gpm (lpm)	26 (98)
Coolant System Capacity	gal (L)	6.0 (22.7)
Heat Rejection to Coolant	BTU/hr	390,000
Max. Operating Air Temp on Radiator	°F (°C)	122 (50)
Maximum Radiator Backpressure	in H <sub>2</sub> O	0.5

## COMBUSTION AIR REQUIREMENTS

Flow at Rated Power	Standby
cfm (m <sup>3</sup> /min)	282 (7.9)

## ENGINE

		Standby
Rated Engine Speed	rpm	1800
Horsepower at Rated kW**	hp	149
Piston Speed	ft/min (m/min)	1275 (389)
BMEP	psi	125

\*\* Refer to "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

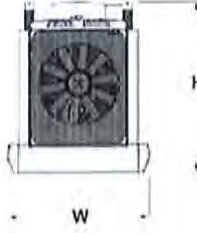
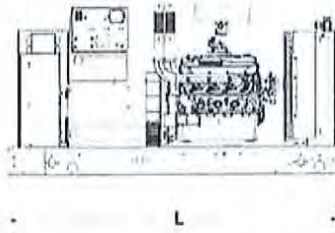
## EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m <sup>3</sup> /min)	866 (24.5)
Maximum Recommended Back Pressure	inHg	1.5
Exhaust Temp (Rated Output)	°F (°C)	1230 (666)
Exhaust Outlet Size (Open Set)	in	2.5" I.D. Flex x 2 (No Muffler)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions. Please consult a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528 and DIN6271 standards.

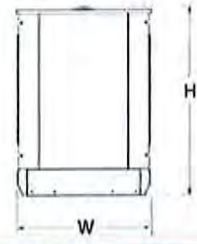
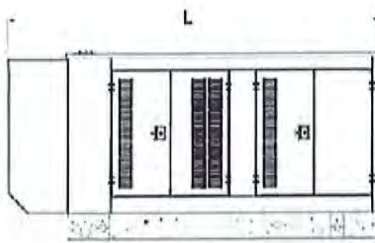
**SG100**

**dimensions, weights, and sound levels**



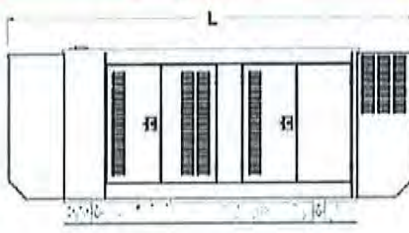
**OPEN SET (Includes Exhaust Flex)**

L x W x H in (mm)	94.2 (2394) x 40 (1016) x 47.5 (1206)
Weight lbs (kg)	2064 (936.2)
Sound Level (dBA*)	83.8



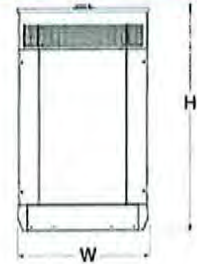
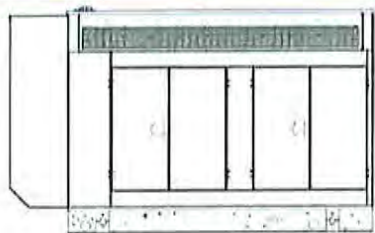
**STANDARD ENCLOSURE**

L x W x H in (mm)	111.79 (2839.5) x 40.46 (1027.8) x 56.18 (1427)
Weight lbs (kg)	Steel: 2708 (1228) Aluminum: 2413 (1094)
Sound Level (dBA*)	79.7



**LEVEL 1 ACOUSTIC ENCLOSURE**

L x W x H in (mm)	129.42 (3287.2) x 40.46 (1027.8) x 56.18 (1427)
Weight lbs (kg)	Steel: 2798 (1269.2) Aluminum: 2355 (1068)
Sound Level (dBA*)	75.3



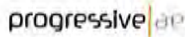
**LEVEL 2 ACOUSTIC ENCLOSURE**

L x W x H in (mm)	111.81 (2840) x 40.46 (1027.8) x 68.61 (1742.8)
Weight lbs (kg)	Steel: 3022 (1370.8) Aluminum: 2431 (1103)
Sound Level (dBA*)	70.8

\*All measurements are approximate and for estimation purposes only. Sound levels measured at 23 ft (7 m) and does not account for ambient site conditions.

<b>YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER</b>

Specification characteristics may change without notice. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.



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 Grand Rapids, MI 49503  
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 616.301.1488 FAX  
 www.progressive-dp.com

**Sanitary Sewer and Water Service Calculations**

Brightmoor Church (Existing + New) - A/E #71980001									
FIXTURE	FIXTURE QUANTITY	C.W. F.U.	TOTAL C.W. F.U.	H.W. F.U.	TOTAL H.W. F.U.	COMBINATION H.C.W. F.U.	TOTAL COMBINED H.C.W. F.U.	D.F.U.	TOTAL D.F.U.
Existing Shower	18	3.00	54.00	3.00	54.00	4.00	72	2.00	36.00
New Shower	3	3.00	9.00	3.00	9.00	4.00	12	2.00	6.00
Existing Drinking Fountain/EWC	4	0.25	1.00	0.00	0.00	0.25	1	0.50	2.00
New Drinking Fountain/EWC	3	0.25	0.75	0.00	0.00	0.25	0.75	0.50	1.50
Existing Sink	28	1.00	28.00	1.00	28.00	1.40	39.2	2.00	56.00
New Sink	7	1.00	7.00	1.00	7.00	1.40	9.8	2.00	14.00
Existing Public Lavatory	58	1.50	84.00	1.50	84.00	2.00	112	1.00	56.00
New Public Lavatory	32	1.50	48.00	1.50	48.00	2.00	64	1.00	32.00
Existing Mop Basin	4	2.25	9.00	2.25	9.00	3.00	12	2.00	8.00
New Mop Basin	4	2.25	9.00	2.25	9.00	3.00	12	2.00	8.00
Existing 3/4" Flush Valve-Urinal	13	5.00	65.00	0.00	0.00	5.00	65	2.00	26.00
New 3/4" Flush Valve-Urinal	10	5.00	50.00	0.00	0.00	5.00	50	2.00	20.00
Existing Public Flush Valve-Water Closet	59	10.00	590.00	0.00	0.00	10.00	590	4.00	236.00
New Public Flush Valve-Water Closet	40	10.00	400.00	0.00	0.00	10.00	400	4.00	160.00
3" Floor Drain/Sink	0	0	0	0	0	0	0	2.00	0.00
<b>TOTAL:</b>			<b>1,354.75</b>		<b>248.00</b>		<b>1439.75</b>		<b>661.50</b>

Existing Total Combined H.C.W. F.U.	891.20	Minimum water service size per 2012 MPC 205 G.P.M.- 4" for a velocity of less than 10 F.P.S.
Existing Total D.F.U.	420.00	2012 MPC required minimum sanitary sewer size: 6" @ 1/8"/1'-0" Slope.
New Total Combined H.C.W. F.U.	1,439.75	Minimum water service size per 2012 MPC 143 G.P.M.- 2.1/2" for a velocity of less than 10 F.P.S.
New Total D.F.U.	241.50	2012 MPC required minimum sanitary sewer size: 4" @ 1/8"/1'-0" Slope.
Total Combined H.C.W. F.U.	1439.75	Minimum water service size per 2012 MPC 269 G.P.M.- 4" for a velocity of less than 10 F.P.S.
Total D.F.U.	661.50	2012 MPC required minimum sanitary sewer size: 6" @ 1/8"/1'-0" Slope (very close to requiring an 8" if combined).

- ii. Where background sound levels exceed the sound level limits in Table 5.14.10.A.ii, below, a violation shall be deemed to exist if the complained for activity exceeds the background sound levels by six (6) decibels.

5.14.10.A.ii Weighted Sound Level Limit Decibels			
Receiving Zoning Districts			
R-1, R-2, R-3, R-4, RT, RA, RM-1, RM-2, MH		NCC, B-1, B-2, B-3, EXPO, EXO, OS-1, OSC, TC, TC-1, RC, FS, C, I-1, I-2, P-1, PSLR	
Night Time Hours Decibels	Day Time Hours Decibels	Night Time Hours Decibels	Day Time Hours Decibels
55	60	70	75

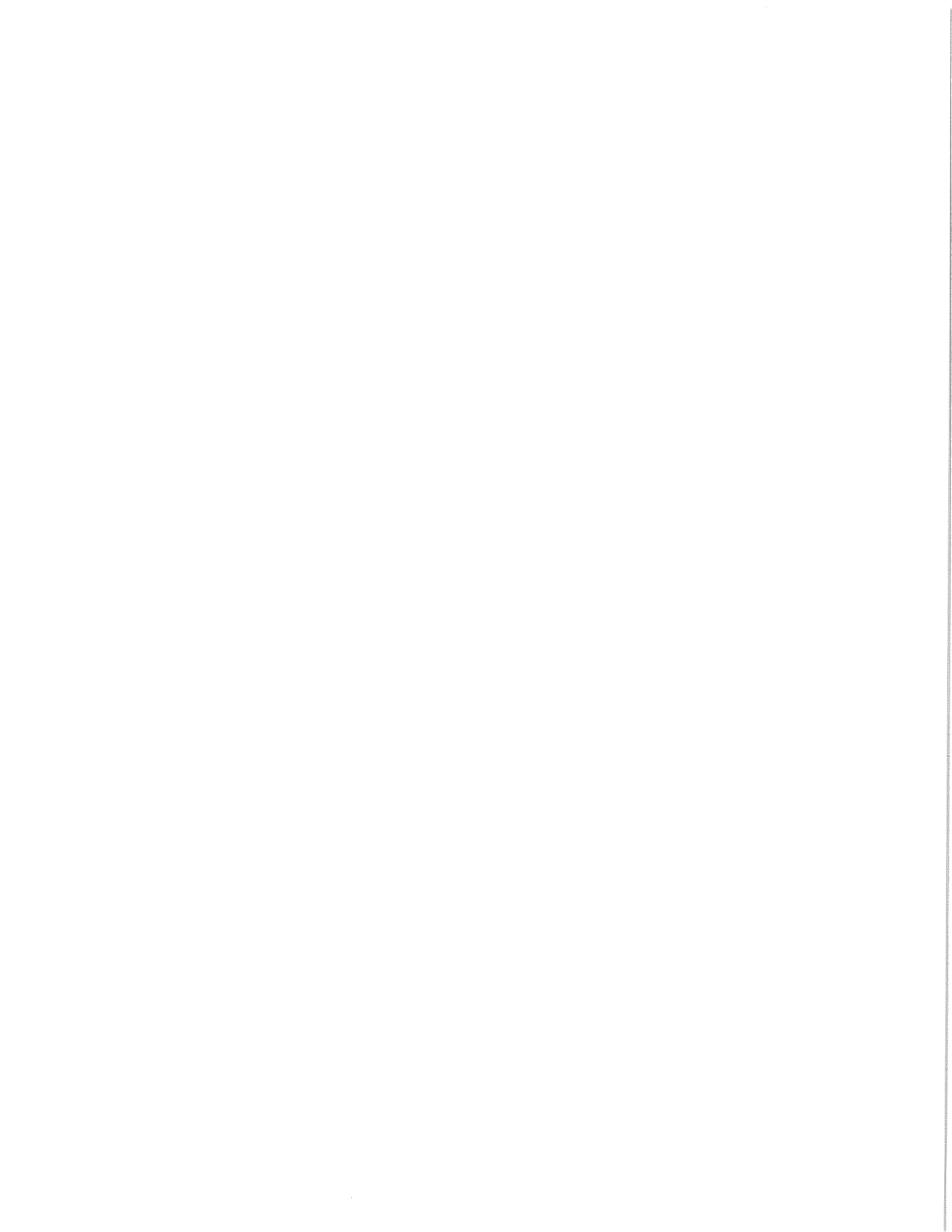
- iii. The measurement of sound level shall be made at a height of five (5) feet (+ or -), at a horizontal distance of five and one half (5.5) feet (+ or -) from a lot line or right-of-way line on any lot or right-of-way other than that on which the sound source or sources being measured is located.

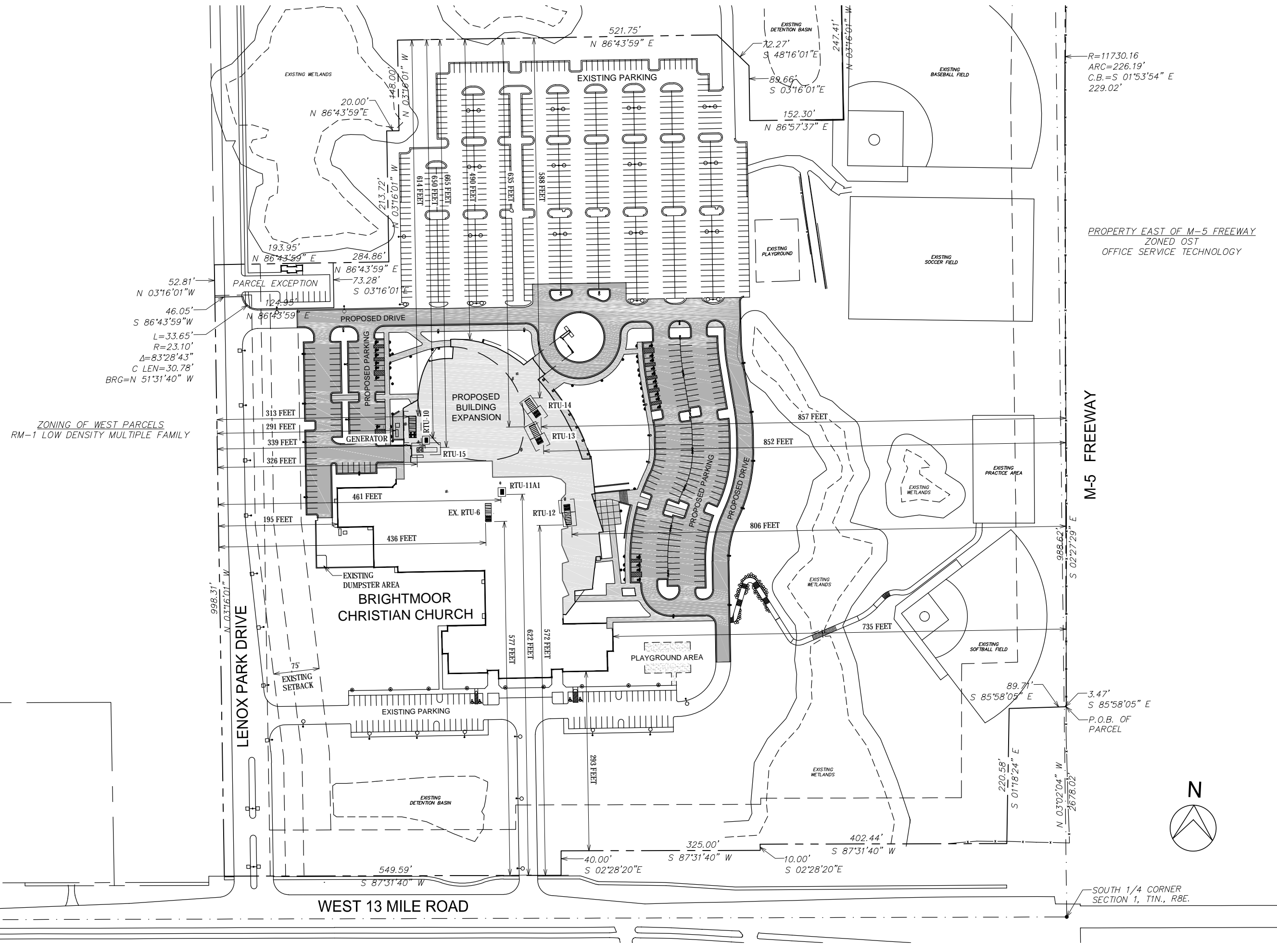
The sound level meter shall be a Type I or Type II instrument, adjusted to measure dB(A) sound levels using fast meter response. The instrument calibration shall be verified before use. A wind screen shall be used and no measurement shall be made when the wind speed is in excess of twelve (12) miles per hour.

- iv. No person shall sound or permit the sounding of any exterior burglar or fire alarm, or motor vehicle alarm unless such alarm is automatically terminated within sixty (60) minutes of activation.
- v. No person shall idle a motor vehicle, or unnecessarily race the motor of a motor vehicle in a manner which would annoy or disturb a reasonable person or normal sensitivity.
- vi. Nothing in this subsection shall be interpreted as preempting or otherwise eliminating those provisions of [Chapter 22 of the Novi Code of Ordinances](#) pertaining to construction activities and noise.

- B. Special land use approvals. Where required by this ordinance, the applicant shall submit a noise impact statement or noise analysis as part of a special land use application. The noise impact statement or noise analysis shall demonstrate that the completed structure and all activities associated with the structure and land use will comply with the standards set forth in [Table 5.14.10.A.ii](#) at all times. The noise impact statement or noise analysis shall document the ability to comply with said standards, including all internal and external equipment which generates sound. The reports shall be prepared in accordance with the following standards:

- i. Noise Impact Statement. The Noise Impact Statement shall be prepared by a design professional and include a description of the proposed use as well as a description of how the proposed noise emissions, if any, will comply with [Section 5.14.10.A](#). The design professional shall be defined as the project architect or project engineer. All external and internal equipment that generates sound shall be noted and where available, manufacturer's specifications shall be provided. Hours of operation and any proposed soundproofing measures or other noise attenuation features (i.e. walls, berms, etc.) shall be noted. Based on the results of the Noise Impact Statement, a noise analysis may be required.
- ii. Noise Analysis. Where required, a Noise Analysis shall be prepared by a certified sound engineer qualified to evaluate noise emissions under maximum operating conditions. A noise analysis shall contain all information generally evaluated by a licensed professional for purposes of determining compliance with the noise limitations or attenuation requirements of this Section.
- iii. Waiver. The Planning Commission may, upon request of the applicant, waive the noise analysis and/or noise impact statement requirement upon a demonstration by the applicant that a practical difficulty exists, or that the proposed use clearly meets the standards of [Section 5.14.10.A](#).



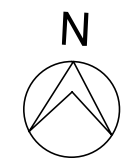


ZONING OF WEST PARCELS  
RM-1 LOW DENSITY MULTIPLE FAMILY

R=11730.16  
ARC=226.19'  
C.B.=S 01°53'54" E  
229.02'

PROPERTY EAST OF M-5 FREEWAY  
ZONED OST  
OFFICE SERVICE TECHNOLOGY

M-5 FREEWAY



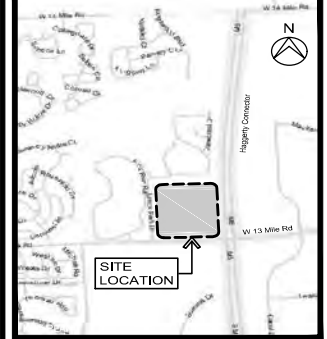
SOUTH 1/4 CORNER  
SECTION 1, T1N., R8E.

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DATE	ADDITIONS AND/OR REVISIONS
DESIGNED	
DRAWN	
CHECKED	
APPROVED	



**BRIGHTMOOR CHRISTIAN CHURCH  
BUILDING AND PARKING LOT  
EXPANSION**

40800 WEST 13 MILE ROAD  
NOVI, MI 48377

SOUTH-WEST QUARTER OF SECTION 1  
OAKLAND COUNTY MICHIGAN

**ROOF TOP UNIT  
LOCATIONS**

HRC JOB NO. 20140319	SCALE NO SCALE
DATE MARCH 2015	SHEET NO. OF



## Community Impact Statement

**COMMUNITY IMPACT STATEMENT  
BRIGHTMOOR CHRISTIAN CHURCH**

**Northwest Corner 13 Mile Road and M-5  
NOVI, MICHIGAN**

March 13, 2015

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10. Proposed Site Amenities (I.E. Sidewalks, Public Parks, Bicycle Paths Etc.)	Page 3

In accordance with Section 2 of the Community Impact Statement from the City of Novi's Community Development Department, this Impact Statement is being prepared for a Non-Residential Use, for the expansion of the Brightmoor Christian Church which consists of approximately 40 acres and requires a Special Land Use approval in order to allow for the expansion.

**1. Impact on Police and Fire Services**

**A. Expected Annual Number of Police Responses for the Proposed Development can be based on Statistics from Similar Developments.**

One or two responses are anticipated and have been experienced at this facility since it has been built.

**B. Expected Annual Number of Fire Responses for the Proposed Development.**

One or two per year since the Brightmoor Christian Church was built.

**2. Employment Opportunities**

**A. Anticipated Number of Employees including both Permanent and Construction Jobs.**

Brightmoor Christian Church anticipates adding approximately 2-4 permanent positions after the construction is complete. During the construction the George Auch Company anticipates approximately 58 construction jobs will be ongoing at various levels (261 individuals throughout project) over a period of approximately 16 months.

**3. City Performance Standards**

**A. Compliance with Section 2519**

*Response: The project will comply with Section 2519 as attached.*

**4. Utility Connections**

**A. Estimated Number of Sewer and Water Taps and Information on Peak Hour Demand, Minimum/Maximum Operating Pressures for the Water System.**

The George Auch Company has contacted the City regarding the number of additional REU's that will be required for the proposed expansion of the Church. They have been told that there will be 9.9 additional REU's required for the water and sewer taps.

As noted within the Progressive AE attached letter there is a water service calculation worksheet that identifies the peak hour demand. The letter also identifies that the minimum water system operating pressure is 45 PSIG and maximum water pressure is 80 PSIG.

**5. Surrounding Land Uses**

**A. Relationship to the Proposed Development with Surrounding Uses.**

Proposed development is an addition of a new worship gathering space and supporting children's areas onto the existing church. Drive access, site circulation, parking and outdoor activity fields surrounding the church will be utilized as they are today. Open spaces include soccer and football fields will be unchanged. Connectivity to the housing developments on the north and west will remain as they are today.

**6. Proposed Land Use**

**A. Description of Proposed Land Use.**

The proposed land use will not change from the way the land is used today. It aligns with the existing and planned use map for the City of Novi. The applicant is proposing to expand the existing church building to the north with a worship space with auditorium style seating's that will seat 2100 people along with accessory uses such as an office and additional parking. The facility will continue to support children and youth activities.

**7. Environmental Factors**

**Description of Environmental Factors and Impacts Addressing the Following:**

**A. Natural Features on the Site (E.G., Unusual Topography, Habitat Areas, Wetlands, Woodlands, Historic Trees etc.)**

No additional impacts will result as a result of the approval and construction of this project.

**B. Temporary and Permanent Impacts to Natural Features on the Site.**

No additional impacts will be experienced as a result of the construction of these projects.

**C. Manufactured Use or Storage of Hazardous Material or Toxic Waste on the Site including Environmental Protection Agency Requirements and the need for Pollution Incident Prevention plan (IPPP).**

The church does not have any materials that would be beyond normal cleaning fluids for floors and toilets on their site.

**D. Location Type Depth and Contents of any Existing or Proposed Underground Storage Tanks.**

No underground storage tanks exist or are proposed for this site.

**E. Environmental Use and or Contamination History for this Site IE Groundwater Contamination, Land Fill, Chemical Spills Etc.**

No environmental or contaminated history exists for this site.

**F. Potential Impacts of Existing Wildlife on Site.**

No additional impacts will be experienced by existing wildlife on the site as all areas are currently been developed and are just being redeveloped as a part of the proposed expansion.

**8. Social Impacts**

**Description of Social Impacts Addressing the Following:**

**A. Replacement or Relocation of any Existing Use or Occupants on the Site.**

No replacement or relocation of any uses or occupants are contemplated as a part of this development.

**9. Traffic Impacts**

**A. Traffic Impacts - Information can come from any Required Traffic Impact Study or Statistics or from other Similar Developments where a Study is Not Required.**

HRC is preparing a traffic impact study with a guidance of AECOM input as the City's traffic consultant. It is anticipated that the traffic study will be finalized approximately March 18, 2015.

**10. Proposed Site Amenities IE Walks, Public Parks, Bicycle Paths Etc.**

**A.** A sidewalk connection is proposed on the east side of the building connecting the new expansion areas to the south side of school, are proposed as a part of this project. All existing baseball fields and soccer fields will remain as they exist.

**B. Increases in the Permanent Population of the City as a result of the Proposed Development, Specific Numbers be included in the Statistics from Similar Developments can be used.**

No additional permanent population of the city will result as the project is implemented. The expansion is to respond to current needs of the church for the existing members.

#### 5.14 PERFORMANCE STANDARDS

No use otherwise allowed, shall be permitted within any district which does not conform to the following standards of use, occupancy, and operation, which standards are hereby established as the minimum requirements to be maintained within said area:

1. Smoke. It shall be unlawful for any person, firm or corporation to permit the emission of any smoke from any source whatever to a density greater than that density described as No. 1 on the Ringelmann Chart; provided that the following exceptions shall be permitted: Smoke, the shade or appearance of which is equal to but not darker than No. 2 of the Ringelmann Chart, for a period, or periods, aggregating four (4) minutes in any thirty (30) minutes.

Method of Measurement: For the purpose of grading the density of smoke, the Ringelmann Chart, as now published and used by the United States Bureau of Mines, which is hereby made a part of the Ordinance, shall be the standard. However, the Umbrascope readings of smoke densities may be used when correlated with Ringelmann's Chart.

2. Dust, Dirt and Fly Ash. No person, firm or corporation shall operate or cause to be operated, maintain or cause to be maintained, any process for any purpose, or furnace or combustion device for the burning of coal or other natural or synthetic fuels, without maintaining and operating, while using said process or furnace or combustion device, recognized and approved equipment, means, method, device or contrivance to reduce the quantity of gas-borne or air-borne solids of fumes emitted into the open air, which is operated in conjunction with said process, furnace or combustion device so that the quantity of gas-borne or air-borne solids shall not exceed 0.20 grains per cubic foot of the carrying medium at a temperature of five-hundred (500) degrees Fahrenheit.

Method of Measurement: For the purpose of determining the adequacy of such devices, these conditions are to be conformed to when the percentage of excess air in the stack does not exceed fifty (50) percent at full load. The foregoing requirement shall be measured by the A.S.M.E. Test Code for dust-separating apparatus. All other forms of dust and dirt shall be completely eliminated insofar as escape or emission into the open air is concerned. The Building Inspector [Official] may require such additional data as is deemed necessary to show that adequate and approved provisions for the prevention and elimination of dust and dirt have been made.

3. Odor. Offensive, noxious, or foul odors shall not be allowed to escape into the atmosphere in concentrations that are offensive, that produce a public nuisance or create a hazard to adjoining property, or would be otherwise detrimental to human, plant, or animal life. Michigan Environmental Protection & HAP (Hazardous Air Pollutant Standards) Agency Standard, Act 348, as amended.
4. Gases. The escape of or emission of any gas that may be injurious or destructive to life or property, or that is explosive, is prohibited. All uses shall maintain compliance with applicable state and federal regulations and statutes controlling the emission of gases or other substances into the atmosphere, including, but not limited to, Part 55 of 1994 PA 451, as amended, and 42 U.S.C. 7401, et seq.
5. Airborne Matter, General. In addition to 1. through 4. above, there shall not be discharged from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment or nuisance to the public or which endanger the comfort, repose, health or safety of persons or which cause injury or damage to business or property.
6. Glare and Radioactive Materials. Glare from any process (such as, or similar to, arc welding, or acetylene torch cutting) which emits harmful ultraviolet rays shall be performed in such a manner as not to be seen from any point beyond the property line and as not to create a public nuisance or hazard along lot lines. Radioactive materials, wastes and emissions, including electromagnetic radiation such as generated from an x-ray machine, shall not exceed levels established by Federal or State agencies with regulatory jurisdiction. No operation shall be conducted in a manner that emits, outside of any property line, levels of radiation that exceed the lowest concentration permitted for the general population. NESHAPS (National Emissions Standards for Hazardous Air Pollutants), NRPC 1993, Chapter 41, as amended.
7. Fire and Explosive Hazards
  - A. The storage, utilization or manufacture of materials or products ranging from incombustible to moderate burning, as determined by the Fire Chief, or his designee, is permitted, subject to compliance with all other performance standards above mentioned, and to the provisions of any other applicable City Code or Ordinance. The following shall define the ranges of burning:







- ii. Where background sound levels exceed the sound level limits in Table 5.14.10.A.ii, below, a violation shall be deemed to exist if the complained for activity exceeds the background sound levels by six (6) decibels.

5.14.10.A.ii Weighted Sound Level Limit Decibels			
Receiving Zoning Districts			
R-1, R-2, R-3, R-4, RT, RA, RM-1, RM-2, MH		NCC, B-1, B-2, B-3, EXPO, EXO, OS-1, OSC, TC, TC-1, RC, FS, C, I-1, I-2, P-1, PSLR	
Night Time Hours Decibels	Day Time Hours Decibels	Night Time Hours Decibels	Day Time Hours Decibels
55	60	70	75

- iii. The measurement of sound level shall be made at a height of five (5) feet (+ or -), at a horizontal distance of five and one half (5.5) feet (+ or -) from a lot line or right-of-way line on any lot or right-of-way other than that on which the sound source or sources being measured is located.

The sound level meter shall be a Type I or Type II instrument, adjusted to measure dB(A) sound levels using fast meter response. The instrument calibration shall be verified before use. A wind screen shall be used and no measurement shall be made when the wind speed is in excess of twelve (12) miles per hour.

- iv. No person shall sound or permit the sounding of any exterior burglar or fire alarm, or motor vehicle alarm unless such alarm is automatically terminated within sixty (60) minutes of activation.
- v. No person shall idle a motor vehicle, or unnecessarily race the motor of a motor vehicle in a manner which would annoy or disturb a reasonable person or normal sensitivity.
- vi. Nothing in this subsection shall be interpreted as preempting or otherwise eliminating those provisions of **Chapter 22 of the Novi Code of Ordinances** pertaining to construction activities and noise.

- B. Special land use approvals. Where required by this ordinance, the applicant shall submit a noise impact statement or noise analysis as part of a special land use application. The noise impact statement or noise analysis shall demonstrate that the completed structure and all activities associated with the structure and land use will comply with the standards set forth in **Table 5.14.10.A.ii** at all times. The noise impact statement or noise analysis shall document the ability to comply with said standards, including all internal and external equipment which generates sound. The reports shall be prepared in accordance with the following standards:

- i. Noise Impact Statement. The Noise Impact Statement shall be prepared by a design professional and include a description of the proposed use as well as a description of how the proposed noise emissions, if any, will comply with **Section 5.14.10.A**. The design professional shall be defined as the project architect or project engineer. All external and internal equipment that generates sound shall be noted and where available, manufacturer's specifications shall be provided. Hours of operation and any proposed soundproofing measures or other noise attenuation features (i.e. walls, berms, etc.) shall be noted. Based on the results of the Noise Impact Statement, a noise analysis may be required.
- ii. Noise Analysis. Where required, a Noise Analysis shall be prepared by a certified sound engineer qualified to evaluate noise emissions under maximum operating conditions. A noise analysis shall contain all information generally evaluated by a licensed professional for purposes of determining compliance with the noise limitations or attenuation requirements of this Section.
- iii. Waiver. The Planning Commission may, upon request of the applicant, waive the noise analysis and/or noise impact statement requirement upon a demonstration by the applicant that a practical difficulty exists, or that the proposed use clearly meets the standards of **Section 5.14.10.A**.



# Traffic Impact Study

**PRINCIPALS**

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March 18, 2015

Brightmoor Christian Church  
c/o Whitehall Real Estate Interests  
38525 13 Mile Road, Suite 250  
Novi, Michigan 48377

Attn: Norman Prechette, Administrative Pastor

Re: Brightmoor Christian Church Expansion  
Traffic Impact Study

HRC Job No. 20140319

Dear Pastor Prechette:

Hubbell, Roth & Clark, Inc. (HRC) has been retained by the Brightmoor Christian Church to prepare the Traffic Impact Study required by Novi's site plan review process for the expansion of the church's sanctuary from 1050 seats to 2100 seats. Service Times for Brightmoor Christian Church are Sundays at 9:15 AM and 11:15 AM and Wednesdays at 7:00 PM. HRC has undertaken the following tasks to complete this traffic study:

- Provide a description of the adjacent roadway system.
- Collect 24 hour counts at the following locations on Wednesday and Sunday:
  - Driveway to site from 13 Mile Road
  - Lenox Park Drive
  - 13 Mile Road
- Collect turning movement counts at the following locations on 13 Mile Road:
  - Driveway to site
  - Lenox Park Drive
- Determine the background traffic from future phases of Fox Run.
- Project background traffic in the study area.
- Estimate the trips to be generated by full occupancy of the site using the techniques in the Institute of Transportation Engineer's Trip Generation Manual.
- Distribute and assign the site generated trips to the adjacent roadway system.
- Conduct a traffic signal warrant analysis for Lenox Park Drive at 13 Mile using MDOT standard format.
- Conduct a capacity analysis for existing and site build out for the Wednesday PM and Sunday peak using Synchro 9 software on the adjacent roadway network using the techniques outlined in the Transportation Research Board Highway Capacity Manual.
- Review internal circulation (vehicle and pedestrian) of the drop off area and the parking lot.
- Geometric review of the drop off area at the main entrance.
- Determine road improvements necessary on the adjacent roadway system.
- Prepare a report with our findings and recommendations.

**Roadway Description**

Thirteen Mile Road is an urban minor arterial with a posted speed limit of 45 miles per hour (mph). Thirteen Mile Road is under the jurisdiction of the City of Novi. In front of the church site, 13 Mile Road has one westbound through lane, one eastbound

through lane, a center left turn lane, and a dedicated westbound right turn lane that runs from the main entrance to Fox Run to the east church drive. Lenox Park Drive is a local road with median at 13 Mile. The Lenox Park leg of the intersection has two inbound lanes and two outbound lanes. The intersection of 13 Mile Road and Lenox Park Drive is not signalized. The east driveway to the church site has one inbound and one outbound lane. The site plan is provided in Attachment A. Lenox Park Drive serves a residential complex with 158 townhouses north of the church site. During the weekday, the church campus is home to Franklin Road Christian School, a K-12 accredited school. The school hours are 8:00 AM to 3:00 PM. Enrollment is 300.

## Existing Traffic Volumes

### Turning Movement Counts

Turning movement counts were collected on Sunday, February 22, 2015 from 12:00 AM to 11:59 PM and on Wednesday, February 25, 2015 from 12:00 AM to 11:59 PM. Turning movement counts were taken at two locations: 13 Mile and Lenox Park Drive and 13 Mile and driveway to the church. Complete turning movement counts are provided in Attachment B.

### 24 Hour Counts

Twenty-four hour traffic counts were collected on Sunday, February 22, 2015 from 12:00 AM to 11:59 PM and on Wednesday, February 25, 2015 from 12:00 AM to 11:59 PM. The counts were taken at two 13 Mile intersections: Lenox Park Drive and the east church drive. The 24-hour counts are provided in Tables 1 – 3 below. The rose highlighted cells are the peak hour on Sunday and the green highlighted cells are the peak hour on Wednesday. The Sunday peak hour of the road is 10:45 – 11:45 AM.

**Table 1: 24 Hour Counts on 13 Mile Road**

Start Time	Sunday, 2/22/15			Wednesday, 2/25/15		
	EB	WB	Total	EB	WB	Total
0:00	38	75	113	15	38	53
1:00	23	34	57	14	20	34
2:00	17	32	49	8	13	21
3:00	20	21	41	13	10	23
4:00	12	16	28	43	15	58
5:00	22	13	35	127	27	154
6:00	49	53	102	312	149	461
7:00	87	71	158	729	329	1058
8:00	159	272	431	687	363	1050
9:00	272	373	645	376	217	593
10:00	239	292	531	220	173	393
11:00	311	529	840	233	322	555
12:00	228	331	559	262	298	560
13:00	282	287	569	265	265	530
14:00	296	319	615	262	380	642
15:00	272	306	578	336	521	857
16:00	222	275	497	351	621	972
17:00	253	278	531	372	889	1261

Start Time	Sunday, 2/22/15			Wednesday, 2/25/15		
	EB	WB	Total	EB	WB	Total
18:00	221	255	476	335	628	963
19:00	144	188	332	213	358	571
20:00	133	133	266	161	241	402
21:00	62	114	176	92	182	274
22:00	65	73	138	70	103	173
23:00	47	42	89	46	64	110
<b>Total</b>	<b>3474</b>	<b>4382</b>	<b>7856</b>	<b>5542</b>	<b>6226</b>	<b>11768</b>

**Table 2: 24 Hour Counts on Lenox Park Drive**

Start Time	Sunday, 2/22/15			Wednesday, 2/25/15		
	SB	NB	Total	SB	NB	Total
0:00	14	4	18	2	3	5
1:00	2	5	7	0	3	3
2:00	7	3	10	0	1	1
3:00	0	4	4	0	0	0
4:00	2	2	4	3	4	7
5:00	0	0	0	9	4	13
6:00	3	3	6	21	7	28
7:00	9	6	15	77	197	274
8:00	21	99	120	81	59	140
9:00	30	172	202	63	45	108
10:00	114	64	178	30	26	56
11:00	219	152	371	31	44	75
12:00	86	29	115	50	38	88
13:00	325	59	384	38	26	64
14:00	48	50	98	31	118	149
15:00	41	45	86	105	99	204
16:00	41	48	89	54	82	136
17:00	38	34	72	71	111	182
18:00	19	41	60	44	126	170
19:00	36	28	64	24	71	95
20:00	16	17	33	120	46	166
21:00	24	12	36	50	14	64
22:00	6	10	16	23	11	34
23:00	2	4	6	1	4	5
<b>Total</b>	<b>1103</b>	<b>891</b>	<b>1994</b>	<b>928</b>	<b>1139</b>	<b>2067</b>

**Table 3: 24 Hour Counts on Church Driveway**

Start Time	Sunday, 2/22/15			Wednesday, 2/25/15		
	SB	NB	Total	SB	NB	Total
0:00	8	0	8	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00	1	0	1	0	0	0
4:00	0	1	1	0	0	0

Start Time	Sunday, 2/22/15			Wednesday, 2/25/15		
	SB	NB	Total	SB	NB	Total
5:00	1	0	1	1	0	1
6:00	0	2	2	1	4	5
7:00	0	7	7	98	17	115
8:00	5	160	165	24	7	31
9:00	4	188	192	7	10	17
10:00	44	68	112	11	10	21
11:00	96	222	318	7	1	8
12:00	73	17	90	11	2	13
13:00	235	11	246	9	9	18
14:00	9	8	17	9	8	17
15:00	20	8	28	97	5	102
16:00	2	1	3	18	1	19
17:00	3	7	10	21	34	55
18:00	5	16	21	13	105	118
19:00	2	2	4	11	42	53
20:00	11	4	15	114	9	123
21:00	13	1	14	28	2	30
22:00	1	2	3	6	0	6
23:00	1	0	1	0	0	0
<b>Total</b>	<b>534</b>	<b>725</b>	<b>1259</b>	<b>486</b>	<b>266</b>	<b>752</b>

### Background Traffic

The construction schedule projects that the church addition will be ready for occupancy by mid-2016. Once the sanctuary with greater capacity is built, membership is expected to grow. HRC proposed to use a future date of early 2017 for the build-out date. HRC examined the traffic volume trends at adjacent intersections. Data from the Road Commission for Oakland County's traffic volume web site, <http://oakland.ms2soft.com/tcds/tsearch.asp?loc=Oakland&mod=>. The data revealed decreases in traffic volumes in the decade of the 2000's. Since 2010, traffic volumes are showing small increases. HRC recommends a growth rate of 2%/year for this study. This recommendation was approved by the City of Novi traffic consultant.

### Trip Generation

One of the most critical elements of a traffic study is estimating the amount of traffic to be generated by a proposed development. This is usually done by using trip generation rates or equations to provide an estimate of all future trips generated by a proposed development.

Rates are commonly expressed in trips per unit of development. For example, trips per dwelling unit are commonly used for residential developments, while trips per 1,000 square feet of gross floor area are used for offices and retail. Equations provide a direct estimate of trips based upon development units being multiplied in a mathematical relationship.

Trips are defined as a single or one directional movement with either the origin or destination of the trip inside the study site. Thus, a car entering and leaving a site would be recorded as generating two trips. Trip generation estimates are often the most critical factors in assessing impacts and needs of a proposed development.

There are several sources for trip generation rates and equations, which are based on data collected from locations in the United States and Canada. These are compilations of data that have been gathered over many years for various land uses. National data sources are starting points in estimating the amount of traffic that may be generated by a specific building or land use. Whenever possible, the National rates should be adjusted to reflect local or forecasted conditions. These National sources are not intended to be used without question, deviation or sound judgment. They often reflect what are supposed to be the average or typical conditions. Data collected from local sites may be more representative than National averages of other developments within the area.

The most widely used source of national trip generation data is the Trip Generation Manual, published by the Institute of Transportation Engineers (ITE). The information in this report is almost solely derived from suburban and urban sites. Data included in trip generation was obtained from actual driveway counts of vehicular traffic entering and exiting the site. The ninth edition contains more than 4,800 data sets from individual trip generation studies. The report also includes discussions on the application and use of trip generation rates and equations; descriptions of the characteristics of each land use; maximum/minimum average rates for weekdays, weekends and peak hours of the generator and adjacent street traffic; and additional statistical data regarding data variability.

HRC selected ITE Land Use Code 560 – *Church* as the most appropriate for this study. Table 4 shows the number of trips expected during the peak hour of the generator on a Sunday for the existing number of seats and the future number of seats.

**Table 4: Trip Generation for Brightmoor Christian Church**

ITE Land Use Code 560 - Church	Variable: # of Seats	Average Sunday Total Trips	Sunday Peak Hour of the Generator	
			IB 50%	OB 50%
Current	1050	1943	640	
			320	320
Future	2100	3885	1282	
			641	641

HRC compared the trip generation rates to the actual Sunday counts to see how valid the ITE rates were. Table 5 compares the peak hour of Brightmoor Christian Church to the ITE trip generation numbers.

**Table 5: Comparison of Trips Generated on a Sunday to Actual Counts**

Source	Sunday Peak Hour of the Generator	
	IB	OB
ITE Manual	640	
	320 – 50%	320 – 50%
Actual Count on 2/22/15	689	
	315 - 46%	374 – 54%

A portion of the traffic on Lenox Park Drive is from the Lenox Park residential development to the north of the church site. The number of trips expected to be generated by the 158 townhouse units is shown in Table 6. The summation of the trip generation for the church with the trip generation for Lenox Park is reasonably close to the actual count taken during the peak hour of the generator on Sunday.

**Table 6: Sunday Trip Generation for Lenox Park**

ITE Land Use Code	Variable: # of Dwelling Units	Average Sunday Total Trips	Sunday Peak Hour of the Generator	
			IB 49%	OB 51%
230 – Residential Condo/Townhouse	1380	789	82	
			40	42

HRC concluded that the ITE Trip Generation rate for the expanded church will be a reasonable prediction of future trips.

### Trip Distribution/Assignment

Traffic expected to be generated by a project must be distributed and assigned to the roadway system so that the impacts of the proposed project on roadway links and intersections within the study area can be analyzed. After an estimate of the total traffic into and out of the site has been made, that traffic must be distributed and assigned to the roadway system. The trip distribution step produces estimates of trip origins and destinations. The assignment step produces estimates of the amount of site traffic that will use certain access routes between their origin and destination.

The trips expected to be generated by the expansion were assigned to the road. Our methodology included using the directional split on 13 Mile Road for the two peak hours shown in Table 1.

- Sunday (10:45–11:45 AM) 37% of trips are EB and 63% of trips are WB
- Sunday (1:00-2:00 PM) 48% of trips are EB and 52% of trips are WB
- Wednesday (5:00-6:00 PM) 30% of trips are EB and 70% of trips are WB
- Wednesday (8:30-9:30 PM) 37% of trips are EB and 63% of trips are WB

The church’s site plan provides three access driveways – one directly from 13 Mile



Road and two from Lenox Park Drive. The majority of the parking is to the north and behind the church. Using the 24-hour counts, the following splits were observed at the driveway and Lenox Park Drive at 13 Mile Road. These splits were retained for the background and future scenarios.

- On **Sunday during peak hour of the road, 10:45-11:45 AM**
  - Church Driveway 31% outbound and 59% inbound trips
  - Lenox Park Drive 69% outbound and 41% inbound trips
- On **Sunday during peak hour of the generator, 1:00 – 2:00 PM**
  - Church Driveway 42% outbound and 16% inbound trips
  - Lenox Park Drive 58% outbound and 84% inbound trips
- On **Wednesday during the peak hour of the road, 5:00-6:00 PM**
  - Church Driveway 23% outbound and 23% inbound trips
  - Lenox Park Drive 77% outbound and 77% inbound trips
- On **Wednesday during the peak hour of the generator, 8:30-9:30 PM**
  - Church Driveway 45% outbound and 14% inbound trips
  - Lenox Park Drive 55% outbound and 86% inbound trips

The site plan for the church expansion proposes a large new parking lot on the east side of the church and a small new parking lot on the west side of the church. Due to this layout, HRC believes the split between the driveway and the Lenox Park Drive will remain the same.

Tables 7 - 10 show the turning movement volumes for existing, background, and future for four critical time periods. Table 7 is the Sunday peak hour of the road and Table 8 is the Sunday peak hour of the generator. Table 9 is the Wednesday peak hour of the road and Table 10 is the Wednesday peak hour of the generator.

**Table 7: Sunday Peak Hour of Road, 10:45 – 11:45 AM**

Intersection	Approach/ Movement	Existing 2015	Background 2017	Future 2017
<b>Lenox Park Drive &amp; 13 Mile</b>	WB TH	262	272	272
	WB RT	112	112	224
	EB LT	64	64	128
	EB TH	230	246	246
	SB LT	184	184	368
	SB RT	113	113	226
<b>Church Driveway &amp; 13 Mile</b>	WB TH	361	375	470
	WB RT	231	231	462
	EB LT	20	20	40
	EB TH	394	410	574
	SB LT	119	119	238
	SB RT	13	13	26

**Table 8: Sunday Peak Hour of Generator, 1:00 – 2:00 PM**

Intersection	Approach/ Movement	Existing 2015	Background 2017	Future 2017
<b>Lenox Park Drive &amp; 13 Mile</b>	WB TH	277	288	288
	WB RT	29	29	29
	EB LT	30	30	30
	EB TH	252	262	262
	SB LT	168	168	336
	SB RT	157	157	314
<b>Church Driveway &amp; 13 Mile</b>	WB TH	282	293	269
	WB RT	10	10	20
	EB LT	1	1	2
	EB TH	419	429	596
	SB LT	211	211	422
	SB RT	24	24	48

**Table 9: Wednesday PM Peak Hour of Road, 5:00 – 6:00 PM**

Intersection	Approach/ Movement	Existing 2015	Background 2017	Future 2017
<b>Lenox Park Drive &amp; 13 Mile</b>	WB TH	770	801	801
	WB RT	70	70	105
	EB LT	41	41	62
	EB TH	335	350	350
	SB LT	37	37	37
	SB RT	34	34	34
<b>Church Driveway &amp; 13 Mile</b>	WB TH	835	896	896
	WB RT	32	32	64
	EB LT	2	2	4
	EB TH	370	385	383
	SB LT	16	16	32
	SB RT	5	5	10

**Table 10: Wednesday PM Peak Hour of Generator, 8:30 – 9:30 PM**

Intersection	Approach/ Movement	Existing 2015	Background 2017	Future 2017
<b>Lenox Park Drive &amp; 13 Mile</b>	WB TH	194	202	202
	WB RT	18	18	18
	EB LT	7	7	7
	EB TH	117	125	125
	SB LT	90	90	180
	SB RT	62	62	124
<b>Church Driveway &amp; 13 Mile</b>	WB TH	209	217	214
	WB RT	4	4	8
	EB LT	0	0	0
	EB TH	207	215	305
	SB LT	123	123	246
	SB RT	3	3	6

### Capacity Analysis

HRC conducted a capacity analysis on the study intersections using Synchro 9 Software. The intersections were analyzed following the procedures for unsignalized intersections as outlined in the 2010 Highway Capacity Manual. Table 11 indicates the control delay criteria used for determining level of service (LOS) for un-signalized intersections.

**Table 11: Level of Service Criteria for Un-Signalized Intersections**

Level of Service	Control Delay per Vehicle (Seconds)
<b>A</b>	<10
<b>B</b>	>10 to ≤ 15
<b>C</b>	>15 to ≤ 25
<b>D</b>	>25 to ≤ 35
<b>E</b>	>35 to ≤ 50
<b>F</b>	>50

At an un-signalized intersection with stop control on the minor approach (two way stop controlled intersections), LOS “F” occurs when there are not enough gaps of suitable size to allow a minor-street demand to safely cross through traffic on the major street. This is typically evident from extremely long control delays experienced by minor street traffic and by queuing on the minor approaches. LOS “F” may also appear in the form of drivers on the minor street selecting smaller than usual gaps. In such cases, safety may be a problem, and some disruption to the major traffic stream may result. Note that LOS “F” may not always result in long queues but in adjustments to normal gap acceptance behavior, for example a left turning vehicle using a shorter than normal gap in traffic to complete the left turn.

At two way stop controlled intersections, the critical movement, often the minor-street

left turn, may control the overall performance of the intersection. The lower threshold for LOS “F” is set at 50 seconds of delay per vehicle as shown in Table 11. In some cases, the delay equations will predict delays greater than 50 seconds for minor-street movements under very low-volume conditions on the minor street (less than 25 vehicles per hour). A LOS “F” threshold is reached with a movement capacity of approximately 85 vehicles per hour or less.

The capacity analysis at the existing driveway and Lenox Park Drive during the Sunday and Wednesday peak hours of the road and generator is provided in Tables 12 - 15. The Sunday analyses are shown in Tables 12 – 13 and the Wednesday analyses are shown in Tables 14-15. Synchro reports are provided in Attachment C.

**Table 12: Capacity Analysis--Sunday Peak Hour of Road (10:45-11:45 AM)**

Intersection	Approach	Existing (2015)		Background (2017)		Future (2017)	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
Lenox Park Drive & 13 Mile	EB Left	A	8.6	A	8.6	A	9.5
	WB Right	A	0.0	A	0.0	A	0.0
	SB Left	F	71.6	F	86.0	F	816.7
	SB Right	B	12.1	B	12.3	C	16.8
Church Drive & 13 Mile	EB Left	A	9.7	A	9.7	B	12.6
	WB Right	A	0.0	A	0.0	A	0.0
	SB LT/RT	F	107.1	F	127.9	F	Error

**Table 13: Capacity Analysis--Sunday Peak Hour of Generator (1-2 PM)**

Intersection	Approach	Existing (2015)		Background (2017)		Future (2017)	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
Lenox Park Drive & 13 Mile	EB Left	A	8.1	A	8.1	A	8.1
	WB Right	A	0.0	A	0.0	A	0.0
	SB Left	E	38.7	E	42.5	F	312.9
	SB Right	B	13.5	B	13.7	D	31.2
Church Drive & 13 Mile	EB Left	A	7.9	A	7.9	A	7.9
	WB Right	A	0.0	A	0.0	A	0.0
	SB LT/RT	F	246.0	F	268.4	F	Error

**Table 14: Capacity Analysis--Wednesday Peak Hour of Road (5-6 PM)**

Intersection	Approach	Existing (2015)		Background (2017)		Future (2017)	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
Lenox Park Drive & 13 Mile	EB Left	B	10.5	B	10.7	B	11.1
	WB Right	A	0.0	A	0.0	A	0.0
	SB Left	E	39.7	E	43.8	F	50.8
	SB Right	C	17.1	C	17.8	C	17.8
Church Drive & 13 Mile	EB Left	B	10.1	B	10.2	B	10.5
	WB Right	A	0.0	A	0.0	A	0.0
	SB LT/RT	D	27.4	D	29.2	E	37.0

**Table 15: Capacity Analysis--Wednesday Peak Hour of Generator (8:30-9:30 PM)**

Intersection	Approach	Existing (2015)		Background (2017)		Future (2017)	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
Lenox Park Drive & 13 Mile	EB Left	A	7.8	A	7.9	A	7.9
	WB Right	A	0.0	A	0.0	A	0.0
	SB Left	B	13.3	B	13.6	C	18.6
	SB Right	B	10.4	B	10.4	B	11.5
Church Drive & 13 Mile	EB Left	A	0.0	A	0.0	A	0.0
	WB Right	A	0.0	A	0.0	A	0.0
	SB LT/RT	C	19.2	C	20.0	F	139.9

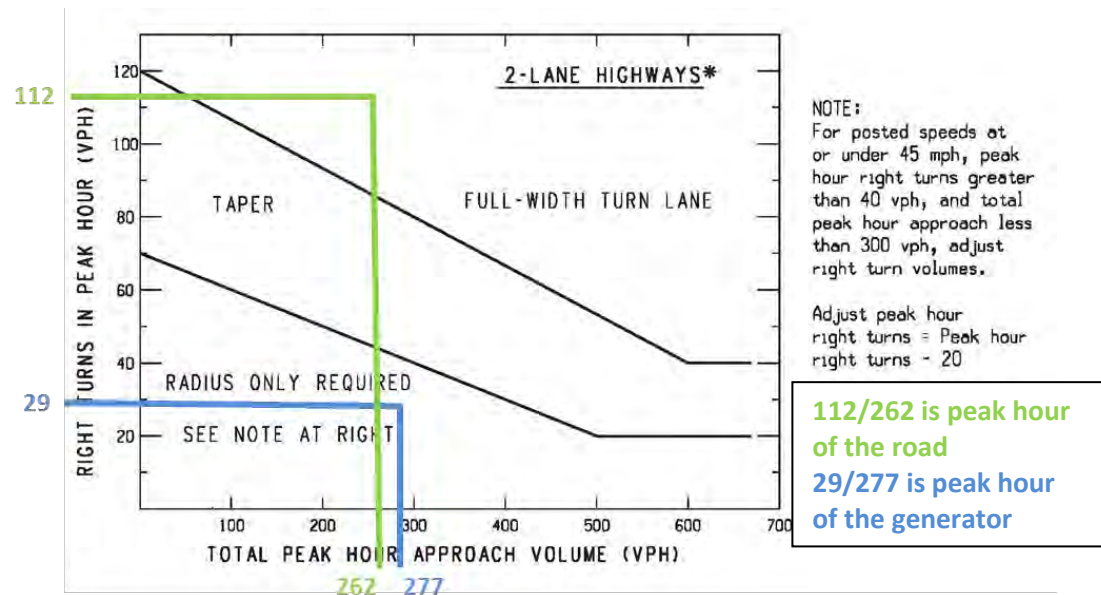
- In all analyses, the level of service for through traffic on 13 Mile Road is a LOS A as it is free flowing. The level of service for westbound right turns is also LOS A as right turns are free flowing. The level of service for eastbound left turns is either LOS A or LOS B.
- Under existing conditions, the left turns from Lenox Park Drive are a LOS E or LOS F except for Wednesday during the PM peak hour of the generator. The level of service worsens in the background and future and the delay increases substantially. On Sunday for both peak hours analyzed, the queues range from 900 to nearly 1300 feet.
- Under existing conditions, the right turns from Lenox Park Drive are a LOS B or LOS C. The level of service does not change except for the future scenario during the peak of the generator when the level of service is LOS D.
- Under existing conditions, the shared outbound driveway from the church has an unacceptable level of service on Sundays (LOS F) for both peaks analyzed. On Wednesday, the level of service is LOS C or LOS D. The background has little effect on level of service. In the future, the level of service is unacceptable in all scenarios at all peaks.

### Right Lane Warrant

A right lane taper currently exists on westbound 13 Mile Road at the east church drive. HRC analyzed the need for a right turn lane at this driveway using the guideline from

the Michigan Department of Transportation’s Traffic and Safety Note 604A. Based on the graphic for a two-lane highway with a posted speed of at or under 45 miles per hour, the right-turn volumes at the church driveway during the Sunday peak hour of the road met the guidelines for a full-width right turn lane.

Figure 1 compares the turning movement volumes during the peak hour of the road (light green data) and the peak hour of the generator (light blue data) on westbound 13 Mile Road on Sunday, February 22, 2015.



**Figure 1: Need for Right-Turn Lane on Sunday**

### Traffic Signal Warrant

Traffic control signals should not be installed unless one or more of the signal warrants in the Michigan Manual on Uniform Traffic Control Devices are met. Information obtained by means of engineering studies are compared with the requirements set forth in the warrants. If the requirements are not met, traffic signals should not be put in operation. When a traffic control signal is indicated as being warranted, it is presumed that the signal and all related traffic control devices and markings are installed according to the standards set forth in the Michigan Manual on Uniform Traffic Control Devices.

A traffic signal warrant analysis was performed for the intersection of 13 Mile Road and Lenox Park Drive, which is currently an unsignalized 3-leg intersection. An investigation of the need for traffic signal controls included, where applicable, an analysis of the factors contained in the following warrants:

Warrant 1 - Eight-Hour Vehicular Volume

Warrant 2 - Four-Hour Vehicular Volume

- Warrant 3 - Peak Hour
- Warrant 4 - Pedestrian Volume
- Warrant 5 - School Crossing
- Warrant 6 - Coordinated Signal System
- Warrant 7 - Crash Experience
- Warrant 8 - Roadway Network
- Warrant 9 - Intersection Near a Grade Crossing

The complete analysis is explained in detail in Attachments D and E. A summary of the traffic signal warrant analysis for the intersection by day is provided in Tables 16 and 17.

**Table 16: Traffic Signal Warrant Analysis Summary for Sunday**

Warrant		Exist Met	Back Met	Future Met
Warrant 1 - Eight-Hour Vehicular Volume	Condition A	No	No	No
	Condition B	No	No	No
	Combination of A & B	N/A	N/A	N/A
Warrant 2 - Four-Hour Vehicular Volume		No	No	No
Warrant 3 - Peak Hour		Yes	Yes	Yes
Warrant 4 - Pedestrian Volume		N/A	N/A	N/A
N/A Warrant 5 - School Crossing		N/A	N/A	N/A
Warrant 6 - Coordinated Signal System		N/A	N/A	N/A
Warrant 7 - Crash Experience		N/A	N/A	N/A
Warrant 8 - Roadway Network		N/A	N/A	N/A
Warrant 9 - Intersection Near a Grade Crossing		N/A	N/A	N/A

**Table 17: Traffic Signal Warrant Analysis Summary for Wednesday**

Warrant		Exist Met	Back Met	Future Met
Warrant 1 - Eight-Hour Vehicular Volume	Condition A	No	No	No
	Condition B	No	No	No
	Combination of A & B	N/A	N/A	N/A
Warrant 2 - Four-Hour Vehicular Volume		No	No	No
Warrant 3 - Peak Hour		No	No	No
Warrant 4 - Pedestrian Volume		N/A	N/A	N/A
Warrant 5 - School Crossing		N/A	N/A	N/A
Warrant 6 - Coordinated Signal System		N/A	N/A	N/A
Warrant 7 - Crash Experience		N/A	N/A	N/A
Warrant 8 - Roadway Network		N/A	N/A	N/A
Warrant 9 - Intersection Near a Grade Crossing		N/A	N/A	N/A

As shown in the tables, the peak hour warrant is met on Sunday. The installation of a

signal will reduce delay for the church and residential traffic but is not warranted at other times. A three year (2012-2014) review of crashes indicated that there were none at this intersection and that warrant was not applicable.

### **Review of Internal Circulation**

HRC reviewed internal circulation (vehicle and pedestrian) of the drop off area and the parking lot and found them to be acceptable. The new drop off circle will accommodate a school bus. The revised portion of the site plan separate vehicular and pedestrian traffic which improves safety for the pedestrians. All the handicapped accessible parking spaces are located in the new parking areas which are served by the new pathways.

### **Qualifications of the Preparer**

The preparer's resume is provided in Attachment F.

### **Summary and Recommendations**

The proposed expansion of Brightmoor Christian Church is not expected to adversely impact the operation of 13 Mile Road traffic when it is built and fully occupied in 2017. A right turn lane on eastbound 13 Mile Road is required for the church driveway because Sunday volumes meet the MDOT guidelines during the peak hour of the road.

HRC recommends that the church consider adjusting the Sunday service times so there is less congestion and delay at the Lenox Park Drive intersection with 13 Mile Road. HRC recommends that the church monitor the traffic situation and consider conducting a signal warrant analysis in the future.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Colleen Hill-Stramsak, P.E., PTOE  
Associate

CH-s/bjl

Attachments    A-Site Plan  
                          B-Turning Movement & 24 Hour Counts  
                          C-Synchro Reports  
                          D-Traffic Signal Warrant Analysis for Sunday  
                          E-Traffic Signal Warrant Analysis for Wednesday  
                          F-Resume of Preparer



Norman Prechette  
March 18, 2015  
HRC Job Number 20130319  
Page 15 of 15

pc: Whitehall Real Estate Interests; Gary Jonna  
HRC; Gary Tressel, matt Slicker, File





**Traffic Data Collection**

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Washington, Michigan, United States 48094

Ph. (586) 786-5407  
Reliable Traffic Data

Project: Brightmoor  
Christian Church Traffic  
Study  
Corridor: 13 Mile Road  
Weather: Cldy. Snow  
Flurries Temp. 10's  
Video VCU ID: SCU\_340

Count Name: 13 Mile &  
Lenox Park Sunday  
Site Code: TMC\_1 Sunday  
Start Date: 02/22/2015  
Page No: 1

Turning Movement Data

Start Time	Lenox Park Drive Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
12:00 AM	2	12	0	14	2	19	0	21	9	0	0	9	44
12:15 AM	0	0	0	0	0	25	0	25	11	0	0	11	36
12:30 AM	0	0	0	0	2	16	0	18	8	0	0	8	26
12:45 AM	0	0	0	0	0	12	0	12	10	0	0	10	22
Hourly Total	2	12	0	14	4	72	0	76	38	0	0	38	128
1:00 AM	0	2	0	2	2	8	0	10	6	0	0	6	18
1:15 AM	0	0	0	0	1	10	0	11	8	0	0	8	19
1:30 AM	0	0	0	0	1	6	0	7	3	0	0	3	10
1:45 AM	0	0	0	0	0	7	0	7	5	1	0	6	13
Hourly Total	0	2	0	2	4	31	0	35	22	1	0	23	60
2:00 AM	1	1	0	2	0	2	0	2	3	0	0	3	7
2:15 AM	0	0	0	0	2	10	0	12	4	0	0	4	16
2:30 AM	0	5	0	5	1	4	0	5	7	0	0	7	17
2:45 AM	0	0	0	0	0	10	0	10	3	0	0	3	13
Hourly Total	1	6	0	7	3	26	0	29	17	0	0	17	53
3:00 AM	0	0	0	0	2	4	0	6	5	0	0	5	11
3:15 AM	0	0	0	0	0	7	0	7	3	0	0	3	10
3:30 AM	0	0	0	0	2	6	0	8	9	0	0	9	17
3:45 AM	0	0	0	0	0	1	0	1	3	0	0	3	4
Hourly Total	0	0	0	0	4	18	0	22	20	0	0	20	42
4:00 AM	0	0	0	0	0	4	0	4	0	0	0	0	4
4:15 AM	0	0	0	0	1	7	0	8	6	0	0	6	14
4:30 AM	0	1	0	1	0	2	0	2	4	0	0	4	7
4:45 AM	1	0	0	1	0	1	0	1	1	1	0	2	4
Hourly Total	1	1	0	2	1	14	0	15	11	1	0	12	29
5:00 AM	0	0	0	0	0	2	0	2	9	0	0	9	11
5:15 AM	0	0	0	0	0	2	0	2	3	0	0	3	5
5:30 AM	0	0	0	0	0	5	0	5	4	0	0	4	9
5:45 AM	0	0	0	0	0	4	0	4	6	0	0	6	10
Hourly Total	0	0	0	0	0	13	0	13	22	0	0	22	35
6:00 AM	0	0	0	0	0	3	0	3	10	0	0	10	13
6:15 AM	0	0	0	0	1	7	0	8	12	0	0	12	20
6:30 AM	0	1	0	1	0	13	0	13	8	0	0	8	22
6:45 AM	0	2	0	2	0	29	0	29	17	2	0	19	50
Hourly Total	0	3	0	3	1	52	0	53	47	2	0	49	105
7:00 AM	1	1	0	2	2	13	0	15	17	1	0	18	35
7:15 AM	0	2	0	2	0	15	0	15	19	0	0	19	36
7:30 AM	1	1	0	2	1	13	0	14	23	0	0	23	39
7:45 AM	0	3	0	3	2	18	0	20	27	0	0	27	50
Hourly Total	2	7	0	9	5	59	0	64	86	1	0	87	160
8:00 AM	4	2	0	6	4	15	0	19	23	2	0	25	50
8:15 AM	1	1	0	2	8	14	0	22	33	6	0	39	63
8:30 AM	0	2	0	2	13	24	0	37	28	14	0	42	81
8:45 AM	3	8	0	11	37	21	0	58	38	15	0	53	122
Hourly Total	8	13	0	21	62	74	0	136	122	37	0	159	316
9:00 AM	2	7	0	9	59	17	0	76	49	37	0	86	171
9:15 AM	0	7	0	7	37	28	0	65	54	17	0	71	143
9:30 AM	2	7	0	9	10	14	0	24	56	5	0	61	94
9:45 AM	1	4	0	5	3	34	0	37	50	4	0	54	96
Hourly Total	5	25	0	30	109	93	0	202	209	63	0	272	504
10:00 AM	2	5	0	7	1	32	0	33	46	2	0	48	88
10:15 AM	0	5	0	5	7	34	0	41	63	3	0	66	112
10:30 AM	3	9	0	12	11	48	0	59	54	6	0	60	131
10:45 AM	43	47	0	90	23	81	0	104	54	11	0	65	259
Hourly Total	48	66	0	114	42	195	0	237	217	22	0	239	590
11:00 AM	46	85	0	131	52	68	0	120	59	29	0	88	339
11:15 AM	16	34	1	51	22	54	0	76	78	16	0	94	221
11:30 AM	8	18	2	28	15	59	0	74	55	8	0	63	165
11:45 AM	4	5	0	9	3	52	0	55	59	7	0	66	130

SUNDAY

LENOX PARK DR & 13 MILE

ATTACHMENT B

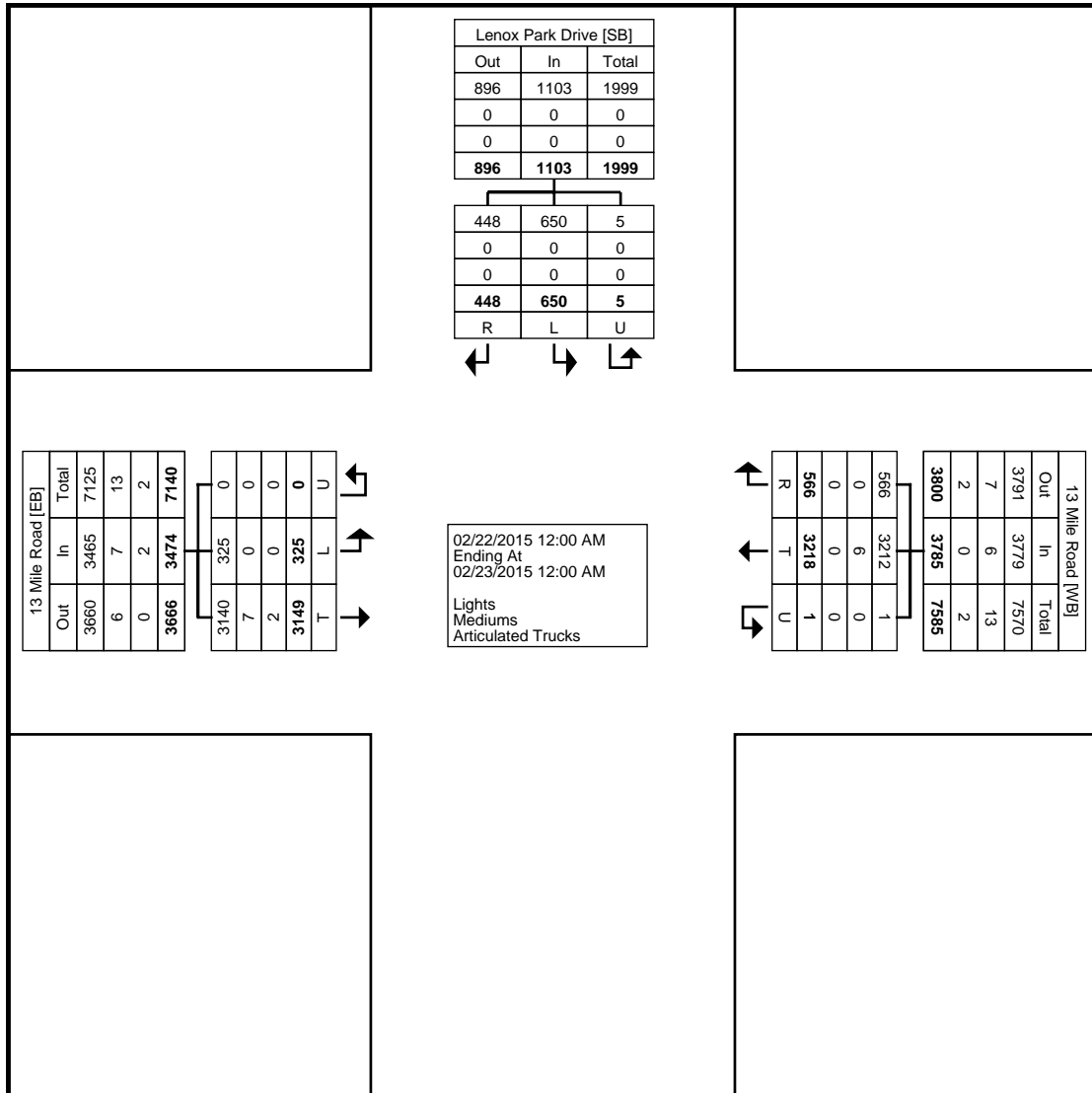
Hourly Total	74	142	3	219	92	233	0	325	251	60	0	311	855
12:00 PM	6	16	0	22	6	65	0	71	59	0	0	59	152
12:15 PM	21	16	0	37	3	98	0	101	51	4	0	55	193
12:30 PM	8	5	0	13	9	82	0	91	72	0	0	72	176
12:45 PM	5	9	0	14	6	62	0	68	41	1	0	42	124
Hourly Total	40	46	0	86	24	307	0	331	223	5	0	228	645
1:00 PM	79	76	1	156	8	75	0	83	56	6	0	62	301
1:15 PM	44	55	0	99	8	79	0	87	74	5	0	79	265
1:30 PM	21	20	0	41	5	51	0	56	59	6	0	65	162
1:45 PM	12	17	0	29	8	72	0	80	63	13	0	76	185
Hourly Total	156	168	1	325	29	277	0	306	252	30	0	282	913
2:00 PM	13	5	0	18	5	70	0	75	76	8	0	84	177
2:15 PM	4	6	0	10	9	58	0	67	65	2	0	67	144
2:30 PM	2	7	0	9	7	67	0	74	79	3	0	82	165
2:45 PM	4	7	0	11	12	78	0	90	59	4	0	63	164
Hourly Total	23	25	0	48	33	273	0	306	279	17	0	296	650
3:00 PM	9	11	0	20	7	64	0	71	58	4	0	62	153
3:15 PM	5	2	0	7	7	74	0	81	54	7	0	61	149
3:30 PM	4	8	0	12	5	81	0	86	87	2	0	89	187
3:45 PM	1	1	0	2	7	61	0	68	54	6	0	60	130
Hourly Total	19	22	0	41	26	280	0	306	253	19	0	272	619
4:00 PM	3	7	0	10	8	49	0	57	54	2	0	56	123
4:15 PM	3	2	0	5	11	62	0	73	57	2	0	59	137
4:30 PM	8	4	0	12	8	64	0	72	46	5	0	51	135
4:45 PM	5	9	0	14	9	58	0	67	53	3	0	56	137
Hourly Total	19	22	0	41	36	233	0	269	210	12	0	222	532
5:00 PM	5	11	0	16	5	73	0	78	64	4	0	68	162
5:15 PM	3	6	0	9	4	55	0	59	65	3	0	68	136
5:30 PM	1	5	0	6	8	61	0	69	58	5	0	63	138
5:45 PM	1	5	1	7	4	55	0	59	53	1	0	54	120
Hourly Total	10	27	1	38	21	244	0	265	240	13	0	253	556
6:00 PM	2	5	0	7	8	59	0	67	45	8	0	53	127
6:15 PM	2	3	0	5	4	53	0	57	50	3	0	53	115
6:30 PM	3	2	0	5	6	61	0	67	63	1	0	64	136
6:45 PM	0	2	0	2	3	49	0	52	43	8	0	51	105
Hourly Total	7	12	0	19	21	222	0	243	201	20	0	221	483
7:00 PM	8	5	0	13	8	44	0	52	40	2	0	42	107
7:15 PM	3	7	0	10	3	42	0	45	25	4	0	29	84
7:30 PM	5	5	0	10	3	37	0	40	36	3	0	39	89
7:45 PM	2	1	0	3	4	43	0	47	33	1	0	34	84
Hourly Total	18	18	0	36	18	166	0	184	134	10	0	144	364
8:00 PM	1	4	0	5	2	35	0	37	34	0	0	34	76
8:15 PM	3	0	0	3	0	31	0	31	33	0	0	33	67
8:30 PM	2	3	0	5	4	29	0	33	36	3	0	39	77
8:45 PM	0	3	0	3	4	32	0	36	23	4	0	27	66
Hourly Total	6	10	0	16	10	127	0	137	126	7	0	133	286
9:00 PM	2	6	0	8	6	32	0	38	15	1	0	16	62
9:15 PM	0	6	0	6	4	21	0	25	15	0	0	15	46
9:30 PM	2	5	0	7	0	28	1	29	15	0	0	15	51
9:45 PM	0	3	0	3	0	24	0	24	15	1	0	16	43
Hourly Total	4	20	0	24	10	105	1	116	60	2	0	62	202
10:00 PM	2	0	0	2	4	14	0	18	27	1	0	28	48
10:15 PM	1	1	0	2	0	18	0	18	17	1	0	18	38
10:30 PM	1	0	0	1	3	16	0	19	9	0	0	9	29
10:45 PM	0	1	0	1	1	16	0	17	10	0	0	10	28
Hourly Total	4	2	0	6	8	64	0	72	63	2	0	65	143
11:00 PM	1	0	0	1	0	11	0	11	14	0	0	14	26
11:15 PM	0	0	0	1	1	9	0	10	7	0	0	7	18
11:30 PM	0	0	0	0	1	10	0	11	21	0	0	21	32
11:45 PM	0	0	0	0	1	10	0	11	4	1	0	5	16
Hourly Total	1	1	0	2	3	40	0	43	46	1	0	47	92
Grand Total	448	650	5	1103	566	3218	1	3785	3149	325	0	3474	8362
Approach %	40.6	58.9	0.5	-	15.0	85.0	0.0	-	90.6	9.4	0.0	-	-
Total %	5.4	7.8	0.1	13.2	6.8	38.5	0.0	45.3	37.7	3.9	0.0	41.5	-
Lights	448	650	5	1103	566	3212	1	3779	3140	325	0	3465	8347
% Lights	100.0	100.0	100.0	100.0	100.0	99.8	100.0	99.8	99.7	100.0	-	99.7	99.8
Mediums	0	0	0	0	0	6	0	6	7	0	0	7	13
% Mediums	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.2	0.0	-	0.2	0.2
Articulated Trucks	0	0	0	0	0	0	0	0	2	0	0	2	2
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-	0.1	0.0



**Traffic Data Collection**  
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 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_340

Count Name: 13 Mile &  
 Lenox Park Sunday  
 Site Code: TMC\_1 Sunday  
 Start Date: 02/22/2015  
 Page No: 3



Turning Movement Data Plot



**Traffic Data Collection**

7504 Sawgrass Drive

www.tdccounts.com

Washington, Michigan, United States 48094

Ph. (586) 786-5407

Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_340

Count Name: 13 Mile &  
 Lenox Park Sunday  
 Site Code: TMC\_1 Sunday  
 Start Date: 02/22/2015  
 Page No: 4

Turning Movement Peak Hour Data (10:45 AM)

Start Time	Lenox Park Drive Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
10:45 AM	43	47	0	90	23	81	0	104	54	11	0	65	259
11:00 AM	46	85	0	131	52	68	0	120	59	29	0	88	339
11:15 AM	16	34	1	51	22	54	0	76	78	16	0	94	221
11:30 AM	8	18	2	28	15	59	0	74	55	8	0	63	165
Total	113	184	3	300	112	262	0	374	246	64	0	310	984
Approach %	37.7	61.3	1.0	-	29.9	70.1	0.0	-	79.4	20.6	0.0	-	-
Total %	11.5	18.7	0.3	30.5	11.4	26.6	0.0	38.0	25.0	6.5	0.0	31.5	-
PHF	0.614	0.541	0.375	0.573	0.538	0.809	0.000	0.779	0.788	0.552	0.000	0.824	0.726
Lights	113	184	3	300	112	260	0	372	243	64	0	307	979
% Lights	100.0	100.0	100.0	100.0	100.0	99.2	-	99.5	98.8	100.0	-	99.0	99.5
Mediums	0	0	0	0	0	2	0	2	3	0	0	3	5
% Mediums	0.0	0.0	0.0	0.0	0.0	0.8	-	0.5	1.2	0.0	-	1.0	0.5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0





**Traffic Data Collection**

7504 Sawgrass Drive

www.tdccounts.com

Washington, Michigan, United States 48094

Ph. (586) 786-5407

Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_340

Count Name: 13 Mile &  
 Lenox Park Sunday  
 Site Code: TMC\_1 Sunday  
 Start Date: 02/22/2015  
 Page No: 6

Turning Movement Peak Hour Data (1:00 PM)

Start Time	Lenox Park Drive Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
1:00 PM	79	76	1	156	8	75	0	83	56	6	0	62	301
1:15 PM	44	55	0	99	8	79	0	87	74	5	0	79	265
1:30 PM	21	20	0	41	5	51	0	56	59	6	0	65	162
1:45 PM	12	17	0	29	8	72	0	80	63	13	0	76	185
Total	156	168	1	325	29	277	0	306	252	30	0	282	913
Approach %	48.0	51.7	0.3	-	9.5	90.5	0.0	-	89.4	10.6	0.0	-	-
Total %	17.1	18.4	0.1	35.6	3.2	30.3	0.0	33.5	27.6	3.3	0.0	30.9	-
PHF	0.494	0.553	0.250	0.521	0.906	0.877	0.000	0.879	0.851	0.577	0.000	0.892	0.758
Lights	156	168	1	325	29	277	0	306	252	30	0	282	913
% Lights	100.0	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	-	100.0	100.0
Mediums	0	0	0	0	0	0	0	0	0	0	0	0	0
% Mediums	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0





**Traffic Data Collection****7504 Sawgrass Drive****www.tdccounts.com****Washington, Michigan, United States 48094****Ph. (586) 786-5407****Reliable Traffic Data**

Project: Brightmoor  
Christian Church Traffic  
Study  
Corridor: 13 Mile Road  
Weather: Cldy. Snow  
Flurries Temp. 10's  
Video VCU ID: SCU\_340

Count Name: 13 Mile &  
Lenox Park Sunday  
Site Code: TMC\_1 Sunday  
Start Date: 02/22/2015  
Page No: 8

***Comments: 24 hour intersection video turning movement count conducted during typical Sunday. Intersection peak hour reports provided for 12:00 AM - 12:00 PM & 12:00 PM - 12:00 AM. TMC was performed with Miovision video VCU recording cameras for Brightmoor Christian Church Traffic Study for Hubbell, Roth & Clark, Inc.***

***Non-signalized "T" intersection, video VCU camera was located at NE quadrant. Classification Summary Details &***

***Percentages: Three (3) Groupings:***

***1)Lights Includes: FHWA Classes 1-3 (Motorcycles, Cars, Light Goods Vehicles)***

***2)Mediums Includes: FHWA Class 4 (School Buses & Regional Transportation Metro Buses) Single-Unit Trucks: FHWA Classes 5-7 (2-4 Axle SU Medium Trucks)***

***3)Articulated Trucks Includes: FHWA Classes 8-12 (Heavy Trucks W/Single & Multi Unit Trailers)***



**Traffic Data Collection**  
 7504 Sawgrass Drive  
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 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 1

Turning Movement Data

Start Time	Lenox Park Drive Southbound				13 Mile Road. Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
12:00 AM	0	0	0	0	0	6	0	6	9	0	0	9	15
12:15 AM	0	0	0	0	1	12	0	13	2	0	0	2	15
12:30 AM	0	0	0	0	1	9	0	10	3	0	0	3	13
12:45 AM	1	1	0	2	1	11	0	12	1	0	0	1	15
Hourly Total	1	1	0	2	3	38	0	41	15	0	0	15	58
1:00 AM	0	0	0	0	1	10	0	11	1	0	0	1	12
1:15 AM	0	0	0	0	1	2	0	3	3	1	0	4	7
1:30 AM	0	0	0	0	0	2	0	2	5	0	0	5	7
1:45 AM	0	0	0	0	0	3	0	3	4	0	0	4	7
Hourly Total	0	0	0	0	2	17	0	19	13	1	0	14	33
2:00 AM	0	0	0	0	0	3	0	3	1	0	0	1	4
2:15 AM	0	0	0	0	0	3	0	3	1	0	0	1	4
2:30 AM	0	0	0	0	1	2	0	3	3	0	0	3	6
2:45 AM	0	0	0	0	0	5	0	5	3	0	0	3	8
Hourly Total	0	0	0	0	1	13	0	14	8	0	0	8	22
3:00 AM	0	0	0	0	0	2	0	2	4	0	0	4	6
3:15 AM	0	0	0	0	0	5	0	5	4	0	0	4	9
3:30 AM	0	0	0	0	0	2	0	2	3	0	0	3	5
3:45 AM	0	0	0	0	0	1	0	1	2	0	0	2	3
Hourly Total	0	0	0	0	0	10	0	10	13	0	0	13	23
4:00 AM	0	1	0	1	0	2	0	2	7	1	0	8	11
4:15 AM	1	0	0	1	1	3	0	4	9	0	0	9	14
4:30 AM	0	0	0	0	0	4	0	4	14	0	0	14	18
4:45 AM	1	0	0	1	0	4	0	4	10	2	0	12	17
Hourly Total	2	1	0	3	1	13	0	14	40	3	0	43	60
5:00 AM	1	0	1	2	0	1	0	1	20	3	0	23	26
5:15 AM	3	2	0	5	1	9	0	10	28	0	0	28	43
5:30 AM	0	2	0	2	0	7	0	7	29	0	0	29	38
5:45 AM	0	0	0	0	0	9	0	9	47	0	0	47	56
Hourly Total	4	4	1	9	1	26	0	27	124	3	0	127	163
6:00 AM	1	0	0	1	0	11	0	11	40	0	0	40	52
6:15 AM	0	5	0	5	3	28	0	31	61	0	0	61	97
6:30 AM	2	5	0	7	2	46	0	48	87	1	0	88	143
6:45 AM	1	7	0	8	0	58	0	58	122	1	0	123	189
Hourly Total	4	17	0	21	5	143	0	148	310	2	0	312	481
7:00 AM	1	12	1	14	2	38	0	40	134	5	0	139	193
7:15 AM	3	11	0	14	16	33	0	49	153	14	0	167	230
7:30 AM	6	13	0	19	43	62	0	105	189	14	0	203	327
7:45 AM	12	18	0	30	61	88	0	149	178	42	0	220	399
Hourly Total	22	54	1	77	122	221	0	343	654	75	0	729	1149
8:00 AM	3	14	0	17	14	76	0	90	173	6	0	179	286
8:15 AM	6	15	0	21	5	73	0	78	162	3	0	165	264
8:30 AM	3	19	0	22	4	86	0	90	163	12	0	175	287
8:45 AM	11	10	0	21	4	104	0	108	157	11	0	168	297
Hourly Total	23	58	0	81	27	339	0	366	655	32	0	687	1134
9:00 AM	7	11	0	18	5	55	0	60	126	14	0	140	218
9:15 AM	9	12	0	21	5	50	0	55	80	3	0	83	159
9:30 AM	7	9	0	16	3	46	0	49	82	6	0	88	153
9:45 AM	3	5	0	8	5	42	0	47	61	4	0	65	120
Hourly Total	26	37	0	63	18	193	0	211	349	27	0	376	650
10:00 AM	5	3	0	8	3	28	0	31	59	2	0	61	100
10:15 AM	8	3	0	11	4	51	0	55	54	5	0	59	125
10:30 AM	3	4	0	7	4	41	0	45	43	1	0	44	96
10:45 AM	2	2	0	4	7	41	0	48	56	0	0	56	108
Hourly Total	18	12	0	30	18	161	0	179	212	8	0	220	429
11:00 AM	3	5	0	8	3	42	0	45	47	5	0	52	105
11:15 AM	2	5	0	7	7	56	0	63	56	6	0	62	132
11:30 AM	3	4	0	7	13	74	0	87	61	3	0	64	158
11:45 AM	3	6	0	9	6	72	0	78	54	1	0	55	142

WEDNESDAY

LENOX PARK DR & 13 MILE

ATTACHMENT B

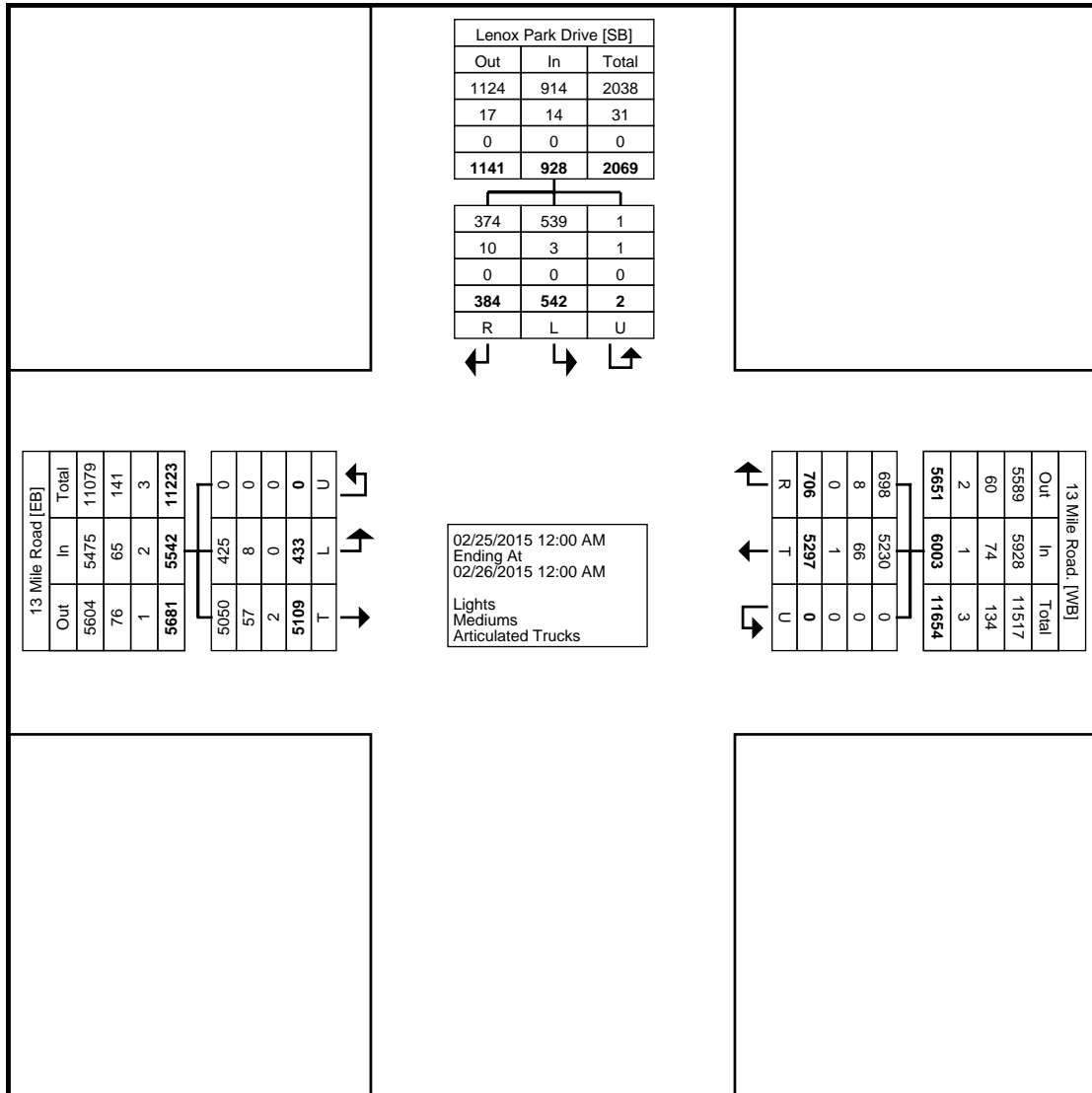
Hourly Total	11	20	0	31	29	244	0	273	218	15	0	233	537
12:00 PM	5	7	0	12	8	75	0	83	63	8	0	71	166
12:15 PM	3	11	0	14	4	78	0	82	61	3	0	64	160
12:30 PM	5	9	0	14	3	62	0	65	61	4	0	65	144
12:45 PM	5	5	0	10	4	60	0	64	58	4	0	62	136
Hourly Total	18	32	0	50	19	275	0	294	243	19	0	262	606
1:00 PM	5	12	0	17	1	60	0	61	71	1	0	72	150
1:15 PM	4	5	0	9	3	75	0	78	76	5	0	81	168
1:30 PM	4	3	0	7	4	46	0	50	58	0	0	58	115
1:45 PM	1	4	0	5	9	67	0	76	51	3	0	54	135
Hourly Total	14	24	0	38	17	248	0	265	256	9	0	265	568
2:00 PM	1	5	0	6	10	45	0	55	61	2	0	63	124
2:15 PM	6	5	0	11	10	65	0	75	52	9	0	61	147
2:30 PM	3	4	0	7	19	84	0	103	64	8	0	72	182
2:45 PM	1	6	0	7	46	99	0	145	52	14	0	66	218
Hourly Total	11	20	0	31	85	293	0	378	229	33	0	262	671
3:00 PM	14	6	0	20	39	111	0	150	73	8	0	81	251
3:15 PM	24	30	0	54	16	109	0	125	84	5	0	89	268
3:30 PM	9	8	0	17	4	122	0	126	82	8	0	90	233
3:45 PM	11	3	0	14	12	117	0	129	69	7	0	76	219
Hourly Total	58	47	0	105	71	459	0	530	308	28	0	336	971
4:00 PM	2	2	0	4	19	132	0	151	106	7	0	113	268
4:15 PM	11	11	0	22	11	115	0	126	73	13	0	86	234
4:30 PM	11	6	0	17	11	141	0	152	78	1	0	79	248
4:45 PM	6	5	0	11	12	180	0	192	65	8	0	73	276
Hourly Total	30	24	0	54	53	568	0	621	322	29	0	351	1026
5:00 PM	9	7	0	16	11	183	0	194	95	13	0	108	318
5:15 PM	9	13	0	22	20	203	0	223	78	4	0	82	327
5:30 PM	9	9	0	18	22	218	0	240	91	8	0	99	357
5:45 PM	7	8	0	15	17	166	0	183	67	16	0	83	281
Hourly Total	34	37	0	71	70	770	0	840	331	41	0	372	1283
6:00 PM	8	11	0	19	16	135	0	151	84	9	0	93	263
6:15 PM	5	6	0	11	15	129	0	144	76	13	0	89	244
6:30 PM	1	5	0	6	11	101	0	112	61	14	0	75	193
6:45 PM	7	1	0	8	24	92	0	116	54	24	0	78	202
Hourly Total	21	23	0	44	66	457	0	523	275	60	0	335	902
7:00 PM	3	7	0	10	22	103	0	125	67	9	0	76	211
7:15 PM	7	4	0	11	13	60	0	73	45	4	0	49	133
7:30 PM	1	1	0	2	3	63	0	66	40	10	0	50	118
7:45 PM	0	1	0	1	7	50	0	57	35	3	0	38	96
Hourly Total	11	13	0	24	45	276	0	321	187	26	0	213	558
8:00 PM	1	0	0	1	6	55	0	61	43	5	0	48	110
8:15 PM	1	3	0	4	10	53	0	63	35	8	0	43	110
8:30 PM	28	39	0	67	12	59	0	71	29	4	0	33	171
8:45 PM	18	30	0	48	0	40	0	40	36	1	0	37	125
Hourly Total	48	72	0	120	28	207	0	235	143	18	0	161	516
9:00 PM	12	13	0	25	3	48	0	51	28	1	0	29	105
9:15 PM	4	8	0	12	3	47	0	50	24	1	0	25	87
9:30 PM	4	4	0	8	4	34	0	38	12	0	0	12	58
9:45 PM	2	3	0	5	2	44	0	46	26	0	0	26	77
Hourly Total	22	28	0	50	12	173	0	185	90	2	0	92	327
10:00 PM	2	9	0	11	4	19	0	23	21	0	0	21	55
10:15 PM	2	6	0	8	1	27	0	28	18	2	0	20	56
10:30 PM	2	2	0	4	2	21	0	23	16	0	0	16	43
10:45 PM	0	0	0	0	2	25	0	27	13	0	0	13	40
Hourly Total	6	17	0	23	9	92	0	101	68	2	0	70	194
11:00 PM	0	0	0	0	1	17	0	18	7	0	0	7	25
11:15 PM	0	1	0	1	1	18	0	19	8	0	0	8	28
11:30 PM	0	0	0	0	1	16	0	17	23	0	0	23	40
11:45 PM	0	0	0	0	1	10	0	11	8	0	0	8	19
Hourly Total	0	1	0	1	4	61	0	65	46	0	0	46	112
Grand Total	384	542	2	928	706	5297	0	6003	5109	433	0	5542	12473
Approach %	41.4	58.4	0.2	-	11.8	88.2	0.0	-	92.2	7.8	0.0	-	-
Total %	3.1	4.3	0.0	7.4	5.7	42.5	0.0	48.1	41.0	3.5	0.0	44.4	-
Lights	374	539	1	914	698	5230	0	5928	5050	425	0	5475	12317
% Lights	97.4	99.4	50.0	98.5	98.9	98.7	-	98.8	98.8	98.2	-	98.8	98.7
Mediums	10	3	1	14	8	66	0	74	57	8	0	65	153
% Mediums	2.6	0.6	50.0	1.5	1.1	1.2	-	1.2	1.1	1.8	-	1.2	1.2
Articulated Trucks	0	0	0	0	0	1	0	1	2	0	0	2	3
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0



**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 3



Turning Movement Data Plot



**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

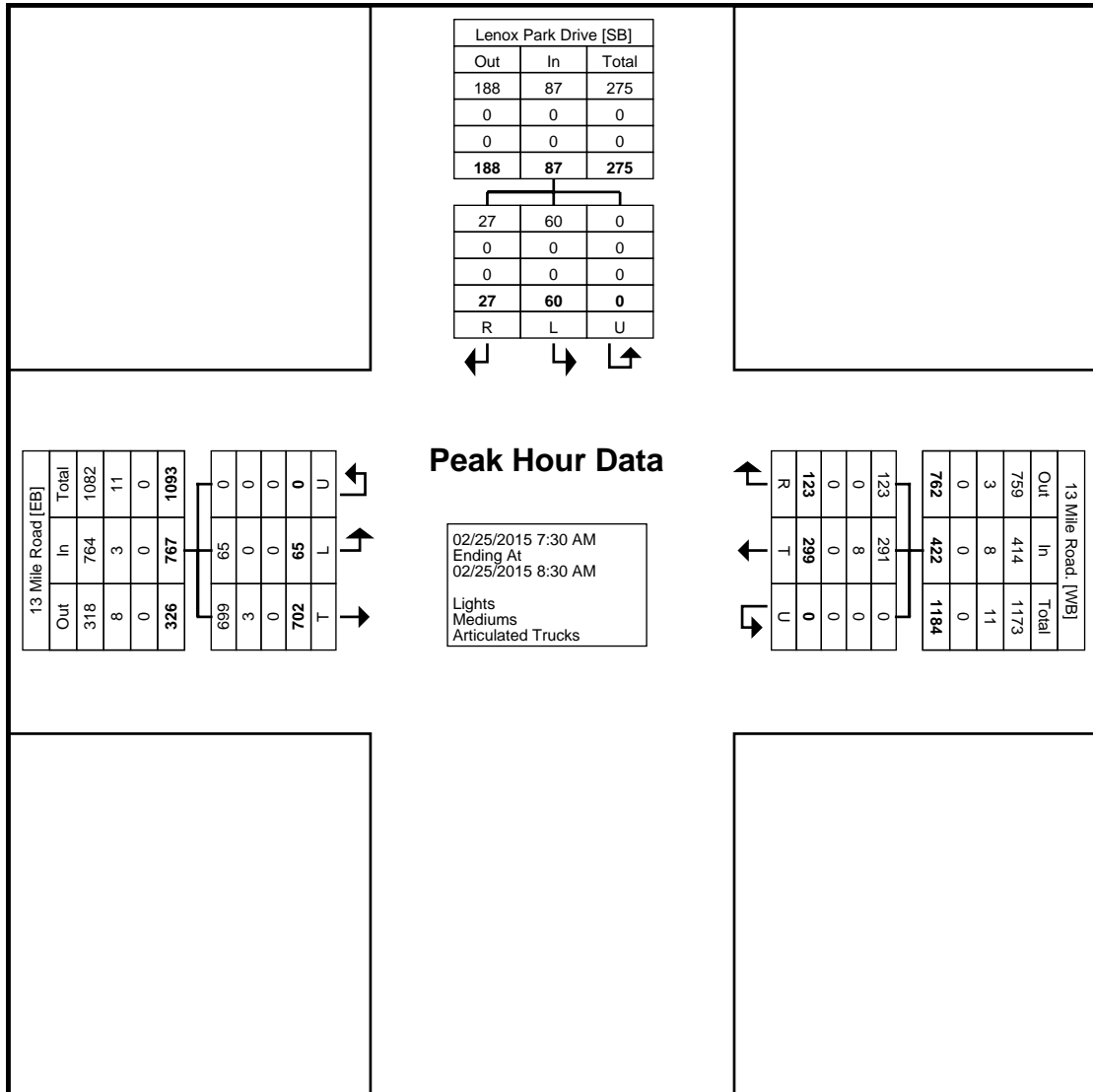
Start Time	Lenox Park Drive Southbound				13 Mile Road. Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
7:30 AM	6	13	0	19	43	62	0	105	189	14	0	203	327
7:45 AM	12	18	0	30	61	88	0	149	178	42	0	220	399
8:00 AM	3	14	0	17	14	76	0	90	173	6	0	179	286
8:15 AM	6	15	0	21	5	73	0	78	162	3	0	165	264
Total	27	60	0	87	123	299	0	422	702	65	0	767	1276
Approach %	31.0	69.0	0.0	-	29.1	70.9	0.0	-	91.5	8.5	0.0	-	-
Total %	2.1	4.7	0.0	6.8	9.6	23.4	0.0	33.1	55.0	5.1	0.0	60.1	-
PHF	0.563	0.833	0.000	0.725	0.504	0.849	0.000	0.708	0.929	0.387	0.000	0.872	0.799
Lights	27	60	0	87	123	291	0	414	699	65	0	764	1265
% Lights	100.0	100.0	-	100.0	100.0	97.3	-	98.1	99.6	100.0	-	99.6	99.1
Mediums	0	0	0	0	0	8	0	8	3	0	0	3	11
% Mediums	0.0	0.0	-	0.0	0.0	2.7	-	1.9	0.4	0.0	-	0.4	0.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0



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 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



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 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
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 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 6

Turning Movement Peak Hour Data (5:00 PM)

Start Time	Lenox Park Drive Southbound				13 Mile Road. Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
5:00 PM	9	7	0	16	11	183	0	194	95	13	0	108	318
5:15 PM	9	13	0	22	20	203	0	223	78	4	0	82	327
5:30 PM	9	9	0	18	22	218	0	240	91	8	0	99	357
5:45 PM	7	8	0	15	17	166	0	183	67	16	0	83	281
Total	34	37	0	71	70	770	0	840	331	41	0	372	1283
Approach %	47.9	52.1	0.0	-	8.3	91.7	0.0	-	89.0	11.0	0.0	-	-
Total %	2.7	2.9	0.0	5.5	5.5	60.0	0.0	65.5	25.8	3.2	0.0	29.0	-
PHF	0.944	0.712	0.000	0.807	0.795	0.883	0.000	0.875	0.871	0.641	0.000	0.861	0.898
Lights	33	37	0	70	69	768	0	837	327	41	0	368	1275
% Lights	97.1	100.0	-	98.6	98.6	99.7	-	99.6	98.8	100.0	-	98.9	99.4
Mediums	1	0	0	1	1	2	0	3	4	0	0	4	8
% Mediums	2.9	0.0	-	1.4	1.4	0.3	-	0.4	1.2	0.0	-	1.1	0.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

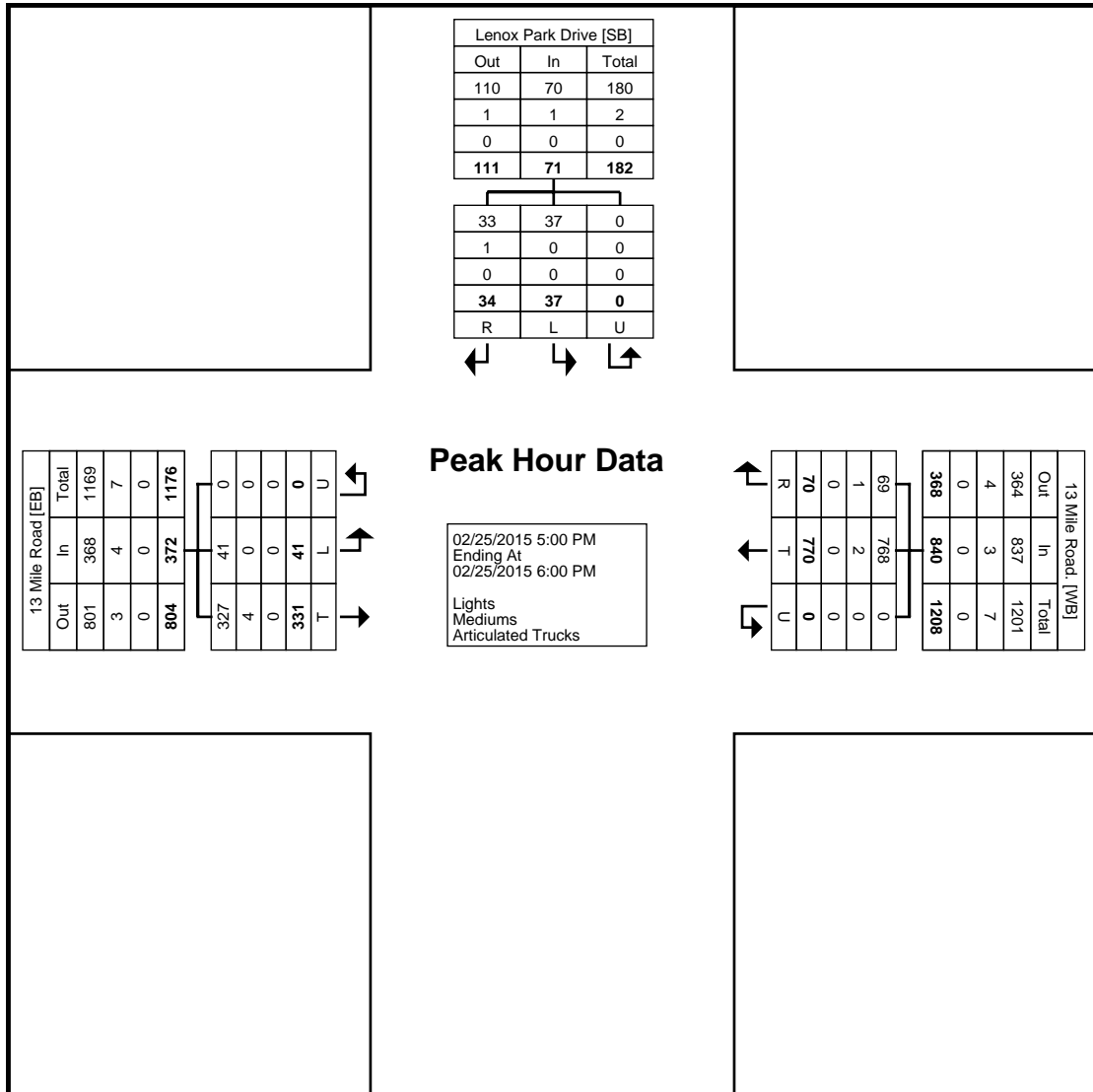




**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
 Lenox Park Weekday  
 Site Code: TMC\_1  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 7



Turning Movement Peak Hour Data Plot (5:00 PM)

**Traffic Data Collection****7504 Sawgrass Drive****www.tdccounts.com****Washington, Michigan, United States 48094****Ph. (586) 786-5407****Reliable Traffic Data**

Project: Brightmoor  
Christian Church Traffic  
Study  
Corridor: 13 Mile Road  
Weather: Snow Showers  
AM, Clear PM Temp. 10's  
Video VCU ID: SCU\_3CU

Count Name: 13 Mile &  
Lenox Park Weekday  
Site Code: TMC\_1  
Wednesday  
Start Date: 02/25/2015  
Page No: 8

***Comments: 24 hour intersection video turning movement count conducted during typical weekday (Wednesday), while school was in session. Intersection peak hour reports provided for 12:00 AM - 12:00 PM & 12:00 PM - 12:00 AM. TMC was performed with Miovision video VCU recording cameras for Brightmoor Christian Church Traffic Study for Hubbell, Roth & Clark, Inc.***

***Non-signalized "T" intersection, video VCU camera was located at NE quadrant. Classification Summary Details & Percentages: Three (3) Groupings:***

***1)Lights Includes: FHWA Classes 1-3 (Motorcycles, Cars, Light Goods Vehicles)***

***2)Mediums Includes: FHWA Class 4 (School Buses & Regional Transportation Metro Buses) Single-Unit Trucks: FHWA Classes 5-7 (2-4 Axle SU Medium Trucks)***

***3)Articulated Trucks Includes: FHWA Classes 8-12 (Heavy Trucks W/Single & Multi Unit Trailers)***



**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_34G

Count Name: 13 Mile &  
 Church Dw. Sunday  
 Site Code: TMC\_2 Sunday  
 Start Date: 02/22/2015  
 Page No: 1

Turning Movement Data

Start Time	Brightmoor Church Dw. Southbound				13 Mile Road. Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
12:00 AM	2	6	0	8	0	21	0	21	23	0	0	23	52
12:15 AM	0	0	0	0	0	22	0	22	12	0	0	12	34
12:30 AM	0	0	0	0	0	20	0	20	7	0	0	7	27
12:45 AM	0	0	0	0	0	12	0	12	10	0	0	10	22
Hourly Total	2	6	0	8	0	75	0	75	52	0	0	52	135
1:00 AM	0	0	0	0	0	9	0	9	8	0	0	8	17
1:15 AM	0	0	0	0	0	11	0	11	9	0	0	9	20
1:30 AM	0	0	0	0	0	8	0	8	2	0	0	2	10
1:45 AM	0	0	0	0	0	6	0	6	5	0	0	5	11
Hourly Total	0	0	0	0	0	34	0	34	24	0	0	24	58
2:00 AM	0	0	0	0	0	3	0	3	5	0	0	5	8
2:15 AM	0	0	0	0	0	13	0	13	4	0	0	4	17
2:30 AM	0	0	0	0	0	5	0	5	11	0	0	11	16
2:45 AM	0	0	0	0	0	11	0	11	4	0	0	4	15
Hourly Total	0	0	0	0	0	32	0	32	24	0	0	24	56
3:00 AM	0	1	0	1	0	6	0	6	5	0	0	5	12
3:15 AM	0	0	0	0	0	7	0	7	3	0	0	3	10
3:30 AM	0	0	0	0	0	5	0	5	10	0	0	10	15
3:45 AM	0	0	0	0	0	3	0	3	3	0	0	3	6
Hourly Total	0	1	0	1	0	21	0	21	21	0	0	21	43
4:00 AM	0	0	0	0	1	4	0	5	0	0	0	0	5
4:15 AM	0	0	0	0	0	8	0	8	5	0	0	5	13
4:30 AM	0	0	0	0	0	2	0	2	6	0	0	6	8
4:45 AM	0	0	0	0	0	1	0	1	1	0	0	1	2
Hourly Total	0	0	0	0	1	15	0	16	12	0	0	12	28
5:00 AM	0	1	0	1	0	2	0	2	9	0	0	9	12
5:15 AM	0	0	0	0	0	2	0	2	3	0	0	3	5
5:30 AM	0	0	0	0	0	5	0	5	3	0	0	3	8
5:45 AM	0	0	0	0	0	4	0	4	7	0	0	7	11
Hourly Total	0	1	0	1	0	13	0	13	22	0	0	22	36
6:00 AM	0	0	0	0	0	3	0	3	11	0	0	11	14
6:15 AM	0	0	0	0	0	7	0	7	11	0	0	11	18
6:30 AM	0	0	0	0	0	12	0	12	8	0	0	8	20
6:45 AM	0	0	0	0	2	29	0	31	21	0	0	21	52
Hourly Total	0	0	0	0	2	51	0	53	51	0	0	51	104
7:00 AM	0	0	0	0	1	16	0	17	16	0	0	16	33
7:15 AM	0	0	0	0	0	14	0	14	22	0	0	22	36
7:30 AM	0	0	0	0	3	15	0	18	25	0	0	25	43
7:45 AM	0	0	0	0	2	20	0	22	29	1	0	30	52
Hourly Total	0	0	0	0	6	65	0	71	92	1	0	93	164
8:00 AM	0	0	0	0	6	20	0	26	23	0	0	23	49
8:15 AM	1	2	0	3	23	16	0	39	27	5	0	32	74
8:30 AM	0	0	0	0	27	37	0	64	28	2	0	30	94
8:45 AM	1	1	0	2	91	52	0	143	39	6	0	45	190
Hourly Total	2	3	0	5	147	125	0	272	117	13	0	130	407
9:00 AM	1	0	0	1	89	76	0	165	45	5	0	50	216
9:15 AM	0	2	0	2	56	64	0	120	61	7	0	68	190
9:30 AM	0	1	0	1	16	26	0	42	55	4	0	59	102
9:45 AM	0	0	0	0	11	35	0	46	57	0	0	57	103
Hourly Total	1	3	0	4	172	201	0	373	218	16	0	234	611
10:00 AM	0	2	0	2	4	34	0	38	48	1	0	49	89
10:15 AM	0	2	0	2	5	42	0	47	65	3	0	68	117
10:30 AM	0	3	0	3	13	59	0	72	63	0	0	63	138
10:45 AM	7	30	0	37	39	96	0	135	86	3	0	89	261
Hourly Total	7	37	0	44	61	231	0	292	262	7	0	269	605
11:00 AM	3	58	0	61	96	112	0	208	136	6	0	142	411
11:15 AM	1	27	0	28	63	76	0	139	102	8	0	110	277
11:30 AM	2	4	0	6	33	77	0	110	70	3	0	73	189
11:45 AM	0	1	0	1	12	60	0	72	66	1	0	67	140







**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_34G

Count Name: 13 Mile &  
 Church Dw. Sunday  
 Site Code: TMC\_2 Sunday  
 Start Date: 02/22/2015  
 Page No: 4

Turning Movement Peak Hour Data (10:45 AM)

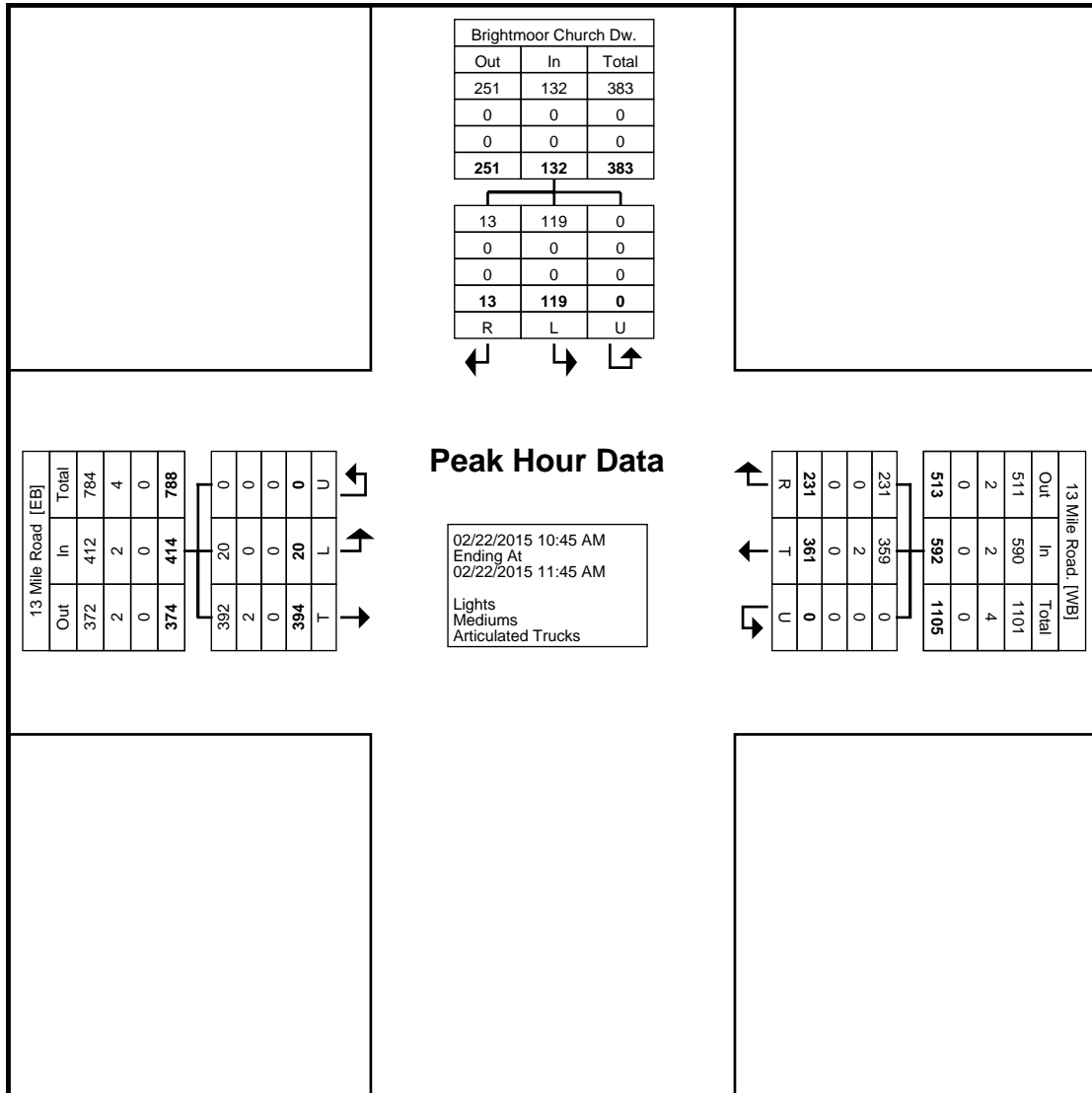
Start Time	Brightmoor Church Dw. Southbound				13 Mile Road. Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
10:45 AM	7	30	0	37	39	96	0	135	86	3	0	89	261
11:00 AM	3	58	0	61	96	112	0	208	136	6	0	142	411
11:15 AM	1	27	0	28	63	76	0	139	102	8	0	110	277
11:30 AM	2	4	0	6	33	77	0	110	70	3	0	73	189
Total	13	119	0	132	231	361	0	592	394	20	0	414	1138
Approach %	9.8	90.2	0.0	-	39.0	61.0	0.0	-	95.2	4.8	0.0	-	-
Total %	1.1	10.5	0.0	11.6	20.3	31.7	0.0	52.0	34.6	1.8	0.0	36.4	-
PHF	0.464	0.513	0.000	0.541	0.602	0.806	0.000	0.712	0.724	0.625	0.000	0.729	0.692
Lights	13	119	0	132	231	359	0	590	392	20	0	412	1134
% Lights	100.0	100.0	-	100.0	100.0	99.4	-	99.7	99.5	100.0	-	99.5	99.6
Mediums	0	0	0	0	0	2	0	2	2	0	0	2	4
% Mediums	0.0	0.0	-	0.0	0.0	0.6	-	0.3	0.5	0.0	-	0.5	0.4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0



**Traffic Data Collection**  
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 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Cldy. Snow  
 Flurries Temp. 10's  
 Video VCU ID: SCU\_34G

Count Name: 13 Mile &  
 Church Dw. Sunday  
 Site Code: TMC\_2 Sunday  
 Start Date: 02/22/2015  
 Page No: 5



Turning Movement Peak Hour Data Plot (10:45 AM)









Project: Brightmoor  
Christian Church Traffic  
Study  
Corridor: 13 Mile Road  
Weather: Cldy. Snow  
Flurries Temp. 10's  
Video VCU ID: SCU\_34G

**Traffic Data Collection**  
*7504 Sawgrass Drive*  
*www.tdccounts.com*  
*Washington, Michigan, United States 48094*  
*Ph. (586) 786-5407*  
**Reliable Traffic Data**

Count Name: 13 Mile &  
Church Dw. Sunday  
Site Code: TMC\_2 Sunday  
Start Date: 02/22/2015  
Page No: 8

***Comments: 24 hour intersection video turning movement count conducted during typical Sunday. Intersection peak hour reports provided for 12:00 AM - 12:00 PM & 12:00 PM - 12:00 AM. TMC was performed with Miovision video VCU recording cameras for Brightmoor Christian Church Traffic Study for Hubbell, Roth & Clark, Inc.***

***Non-signalized "T" intersection, video VCU camera was located at NE quadrant. Classification Summary Details &***

***Percentages: Three (3) Groupings:***

***1)Lights Includes: FHWA Classes 1-3 (Motorcycles, Cars, Light Goods Vehicles)***

***2)Mediums Includes: FHWA Class 4 (School Buses & Regional Transportation Metro Buses) Single-Unit Trucks: FHWA Classes 5-7 (2-4 Axle SU Medium Trucks)***

***3)Articulated Trucks Includes: FHWA Classes 8-12 (Heavy Trucks W/Single & Multi Unit Trailers)***



**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3EP

Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 1

Turning Movement Data

Start Time	Brightmoor Church Dw. Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
12:00 AM	0	0	0	0	0	6	0	6	9	0	0	9	15
12:15 AM	0	0	0	0	0	12	0	12	2	0	0	2	14
12:30 AM	0	0	0	0	0	9	0	9	3	0	0	3	12
12:45 AM	0	0	0	0	0	11	0	11	2	0	0	2	13
Hourly Total	0	0	0	0	0	38	0	38	16	0	0	16	54
1:00 AM	0	0	0	0	0	11	0	11	1	0	0	1	12
1:15 AM	0	0	0	0	0	3	0	3	3	0	0	3	6
1:30 AM	0	0	0	0	0	3	0	3	5	0	0	5	8
1:45 AM	0	0	0	0	0	3	0	3	4	0	0	4	7
Hourly Total	0	0	0	0	0	20	0	20	13	0	0	13	33
2:00 AM	0	0	0	0	0	3	0	3	1	0	0	1	4
2:15 AM	0	0	0	0	0	3	0	3	1	0	0	1	4
2:30 AM	0	0	0	0	0	2	0	2	3	0	0	3	5
2:45 AM	0	0	0	0	0	5	0	5	3	0	0	3	8
Hourly Total	0	0	0	0	0	13	0	13	8	0	0	8	21
3:00 AM	0	0	0	0	0	2	0	2	4	0	0	4	6
3:15 AM	0	0	0	0	0	5	0	5	4	0	0	4	9
3:30 AM	0	0	0	0	0	2	0	2	3	0	0	3	5
3:45 AM	0	0	0	0	0	1	0	1	2	0	0	2	3
Hourly Total	0	0	0	0	0	10	0	10	13	0	0	13	23
4:00 AM	0	0	0	0	0	3	0	3	7	0	0	7	10
4:15 AM	0	0	0	0	0	4	0	4	9	0	0	9	13
4:30 AM	0	0	0	0	0	4	0	4	14	0	0	14	18
4:45 AM	0	0	0	0	0	4	0	4	11	0	0	11	15
Hourly Total	0	0	0	0	0	15	0	15	41	0	0	41	56
5:00 AM	0	0	0	0	0	1	0	1	20	0	0	20	21
5:15 AM	0	1	0	1	0	10	0	10	30	0	0	30	41
5:30 AM	0	0	0	0	0	7	0	7	31	0	0	31	38
5:45 AM	0	0	0	0	0	9	0	9	47	0	0	47	56
Hourly Total	0	1	0	1	0	27	0	27	128	0	0	128	156
6:00 AM	0	0	0	0	0	12	0	12	39	0	0	39	51
6:15 AM	0	0	0	0	1	33	0	34	67	0	0	67	101
6:30 AM	0	1	0	1	0	43	0	43	93	0	0	93	137
6:45 AM	0	0	0	0	2	58	0	60	126	1	0	127	187
Hourly Total	0	1	0	1	3	146	0	149	325	1	0	326	476
7:00 AM	1	1	0	2	5	38	0	43	144	2	0	146	191
7:15 AM	2	3	0	5	9	53	0	62	163	1	0	164	231
7:30 AM	1	12	0	13	0	105	0	105	202	0	0	202	320
7:45 AM	24	54	0	78	0	119	0	119	197	0	0	197	394
Hourly Total	28	70	0	98	14	315	0	329	706	3	0	709	1136
8:00 AM	8	12	0	20	2	80	0	82	187	0	0	187	289
8:15 AM	0	0	0	0	1	82	0	83	175	0	0	175	258
8:30 AM	0	2	0	2	2	87	0	89	183	0	0	183	274
8:45 AM	0	2	0	2	2	107	0	109	164	0	0	164	275
Hourly Total	8	16	0	24	7	356	0	363	709	0	0	709	1096
9:00 AM	0	0	0	0	2	59	0	61	134	1	0	135	196
9:15 AM	0	4	0	4	3	54	0	57	91	1	0	92	153
9:30 AM	0	2	0	2	1	49	0	50	92	1	0	93	145
9:45 AM	0	1	0	1	1	48	0	49	66	0	0	66	116
Hourly Total	0	7	0	7	7	210	0	217	383	3	0	386	610
10:00 AM	0	0	0	0	0	28	0	28	63	0	0	63	91
10:15 AM	1	0	0	1	4	51	0	55	58	0	0	58	114
10:30 AM	2	7	0	9	1	41	0	42	47	0	0	47	98
10:45 AM	0	1	0	1	5	43	0	48	63	0	0	63	112
Hourly Total	3	8	0	11	10	163	0	173	231	0	0	231	415
11:00 AM	1	3	0	4	1	48	0	49	53	0	0	53	106
11:15 AM	2	1	0	3	0	75	0	75	62	0	0	62	140
11:30 AM	0	0	0	0	0	105	0	105	65	0	0	65	170
11:45 AM	0	0	0	0	0	93	0	93	59	0	0	59	152

WEDNESDAY

CHURCH DRIVEWAY & 13 MILE

ATTACHMENT B

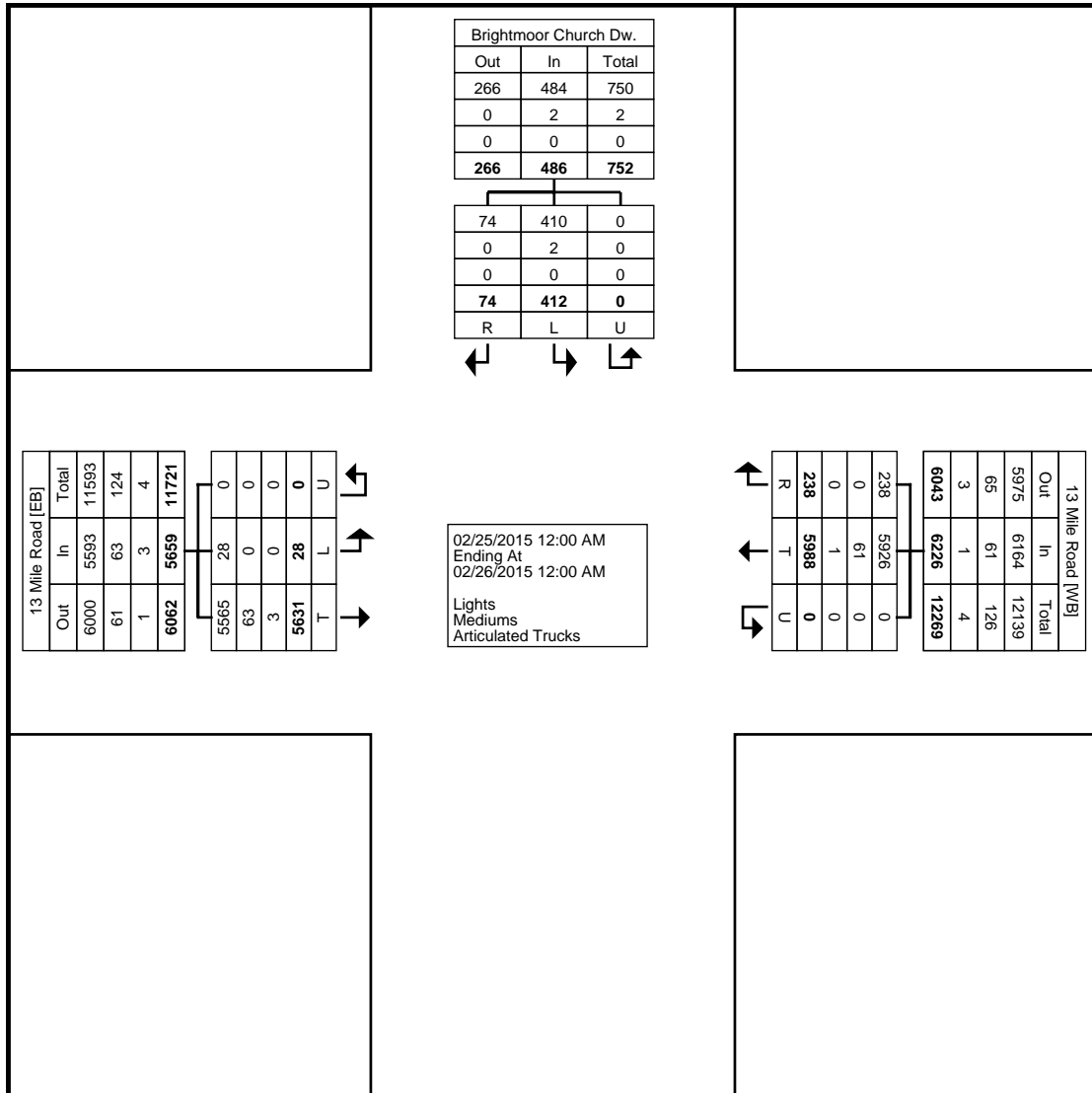
Hourly Total	3	4	0	7	1	321	0	322	239	0	0	239	568
12:00 PM	0	2	0	2	0	83	0	83	69	0	0	69	154
12:15 PM	0	3	0	3	0	85	0	85	71	0	0	71	159
12:30 PM	0	2	0	2	1	65	0	66	70	0	0	70	138
12:45 PM	0	4	0	4	1	63	0	64	62	0	0	62	130
Hourly Total	0	11	0	11	2	296	0	298	272	0	0	272	581
1:00 PM	1	2	0	3	1	60	0	61	83	0	0	83	147
1:15 PM	0	1	0	1	2	76	0	78	82	0	0	82	161
1:30 PM	1	1	0	2	3	47	0	50	61	0	0	61	113
1:45 PM	0	3	0	3	3	73	0	76	55	0	0	55	134
Hourly Total	2	7	0	9	9	256	0	265	281	0	0	281	555
2:00 PM	0	2	0	2	2	51	0	53	68	0	0	68	123
2:15 PM	0	0	0	0	3	73	0	76	58	1	0	59	135
2:30 PM	0	1	0	1	1	104	0	105	69	0	0	69	175
2:45 PM	0	6	0	6	1	145	0	146	58	0	0	58	210
Hourly Total	0	9	0	9	7	373	0	380	253	1	0	254	643
3:00 PM	14	46	0	60	1	137	0	138	80	0	0	80	278
3:15 PM	4	20	0	24	0	128	0	128	111	0	0	111	263
3:30 PM	1	8	0	9	1	119	0	120	93	0	0	93	222
3:45 PM	0	4	0	4	3	132	0	135	73	0	0	73	212
Hourly Total	19	78	0	97	5	516	0	521	357	0	0	357	975
4:00 PM	0	6	0	6	0	152	0	152	109	0	0	109	267
4:15 PM	1	5	0	6	0	131	0	131	83	0	0	83	220
4:30 PM	0	4	0	4	0	150	0	150	82	0	0	82	236
4:45 PM	0	2	0	2	0	188	0	188	69	1	0	70	260
Hourly Total	1	17	0	18	0	621	0	621	343	1	0	344	983
5:00 PM	2	1	0	3	2	201	0	203	102	1	0	103	309
5:15 PM	3	4	0	7	10	238	0	248	91	1	0	92	347
5:30 PM	0	5	0	5	9	236	0	245	101	0	0	101	351
5:45 PM	0	6	0	6	11	182	0	193	76	0	0	76	275
Hourly Total	5	16	0	21	32	857	0	889	370	2	0	372	1282
6:00 PM	0	3	0	3	11	160	0	171	92	3	0	95	269
6:15 PM	0	0	0	0	14	149	0	163	78	4	0	82	245
6:30 PM	0	1	0	1	31	109	0	140	62	3	0	65	206
6:45 PM	1	8	0	9	35	119	0	154	52	4	0	56	219
Hourly Total	1	12	0	13	91	537	0	628	284	14	0	298	939
7:00 PM	0	4	0	4	28	126	0	154	71	2	0	73	231
7:15 PM	0	4	0	4	8	72	0	80	48	1	0	49	133
7:30 PM	0	2	0	2	1	64	0	65	41	0	0	41	108
7:45 PM	0	1	0	1	2	57	0	59	36	0	0	36	96
Hourly Total	0	11	0	11	39	319	0	358	196	3	0	199	568
8:00 PM	0	5	0	5	3	60	0	63	42	0	0	42	110
8:15 PM	0	6	0	6	3	65	0	68	38	0	0	38	112
8:30 PM	0	63	0	63	3	65	0	68	67	0	0	67	198
8:45 PM	0	40	0	40	0	42	0	42	66	0	0	66	148
Hourly Total	0	114	0	114	9	232	0	241	213	0	0	213	568
9:00 PM	2	11	0	13	0	45	0	45	42	0	0	42	100
9:15 PM	1	9	0	10	1	50	0	51	32	0	0	32	93
9:30 PM	1	3	0	4	1	39	0	40	16	0	0	16	60
9:45 PM	0	1	0	1	0	46	0	46	28	0	0	28	75
Hourly Total	4	24	0	28	2	180	0	182	118	0	0	118	328
10:00 PM	0	5	0	5	0	24	0	24	32	0	0	32	61
10:15 PM	0	1	0	1	0	28	0	28	23	0	0	23	52
10:30 PM	0	0	0	0	0	24	0	24	18	0	0	18	42
10:45 PM	0	0	0	0	0	27	0	27	13	0	0	13	40
Hourly Total	0	6	0	6	0	103	0	103	86	0	0	86	195
11:00 PM	0	0	0	0	0	18	0	18	7	0	0	7	25
11:15 PM	0	0	0	0	0	18	0	18	9	0	0	9	27
11:30 PM	0	0	0	0	0	17	0	17	22	0	0	22	39
11:45 PM	0	0	0	0	0	11	0	11	8	0	0	8	19
Hourly Total	0	0	0	0	0	64	0	64	46	0	0	46	110
Grand Total	74	412	0	486	238	5988	0	6226	5631	28	0	5659	12371
Approach %	15.2	84.8	0.0	-	3.8	96.2	0.0	-	99.5	0.5	0.0	-	-
Total %	0.6	3.3	0.0	3.9	1.9	48.4	0.0	50.3	45.5	0.2	0.0	45.7	-
Lights	74	410	0	484	238	5926	0	6164	5565	28	0	5593	12241
% Lights	100.0	99.5	-	99.6	100.0	99.0	-	99.0	98.8	100.0	-	98.8	98.9
Mediums	0	2	0	2	0	61	0	61	63	0	0	63	126
% Mediums	0.0	0.5	-	0.4	0.0	1.0	-	1.0	1.1	0.0	-	1.1	1.0
Articulated Trucks	0	0	0	0	0	1	0	1	3	0	0	3	4
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.1	0.0	-	0.1	0.0



**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
 Ph. (586) 786-5407  
 Reliable Traffic Data

Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3EP

Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 3



Turning Movement Data Plot



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 AM, Clear PM Temp. 10's  
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Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 4

Turning Movement Peak Hour Data (7:30 AM)

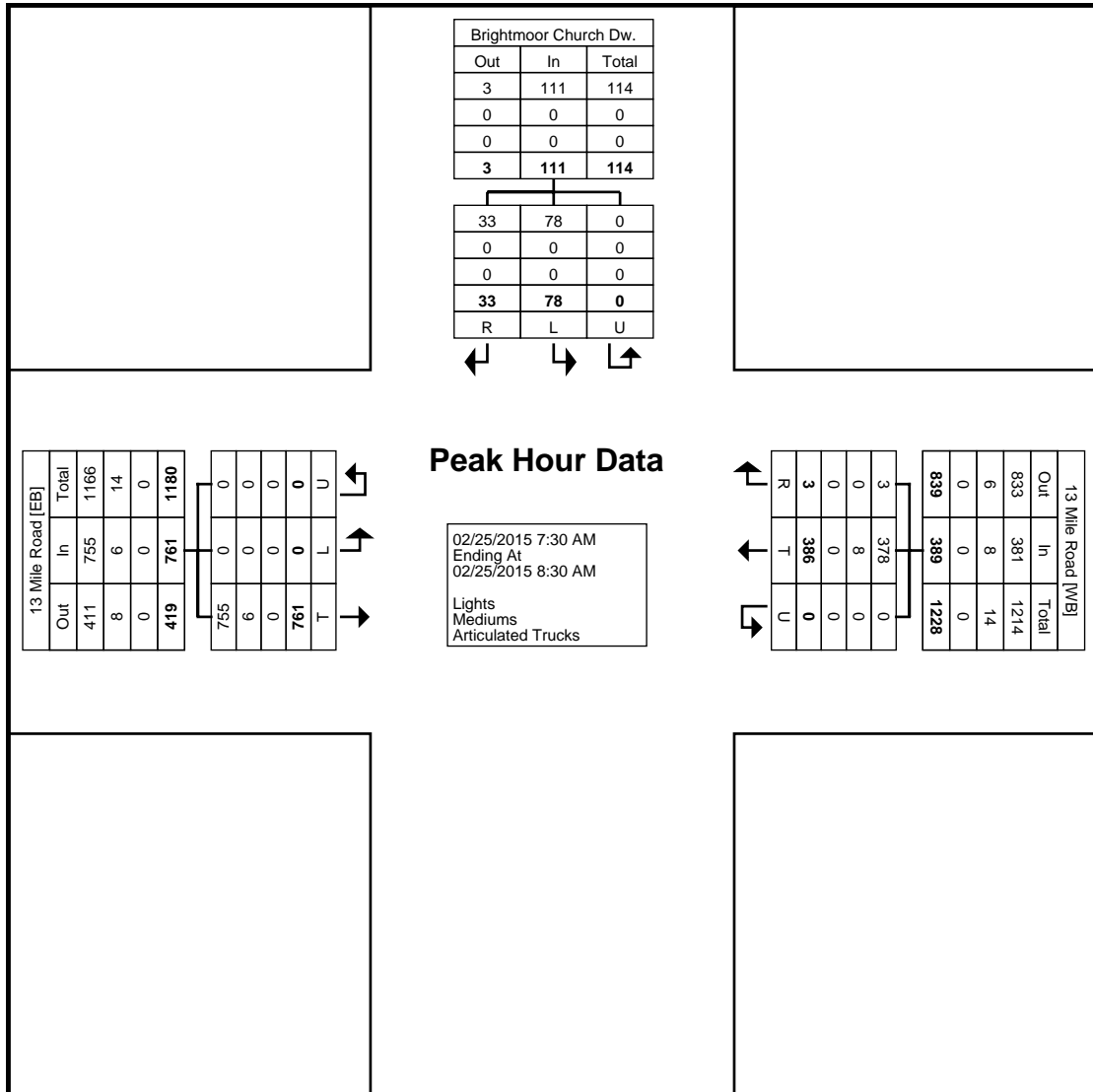
Start Time	Brightmoor Church Dw. Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
7:30 AM	1	12	0	13	0	105	0	105	202	0	0	202	320
7:45 AM	24	54	0	78	0	119	0	119	197	0	0	197	394
8:00 AM	8	12	0	20	2	80	0	82	187	0	0	187	289
8:15 AM	0	0	0	0	1	82	0	83	175	0	0	175	258
Total	33	78	0	111	3	386	0	389	761	0	0	761	1261
Approach %	29.7	70.3	0.0	-	0.8	99.2	0.0	-	100.0	0.0	0.0	-	-
Total %	2.6	6.2	0.0	8.8	0.2	30.6	0.0	30.8	60.3	0.0	0.0	60.3	-
PHF	0.344	0.361	0.000	0.356	0.375	0.811	0.000	0.817	0.942	0.000	0.000	0.942	0.800
Lights	33	78	0	111	3	378	0	381	755	0	0	755	1247
% Lights	100.0	100.0	-	100.0	100.0	97.9	-	97.9	99.2	-	-	99.2	98.9
Mediums	0	0	0	0	0	8	0	8	6	0	0	6	14
% Mediums	0.0	0.0	-	0.0	0.0	2.1	-	2.1	0.8	-	-	0.8	1.1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	-	0.0	0.0



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 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3EP

Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



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Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3EP

Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 6

Turning Movement Peak Hour Data (5:00 PM)

Start Time	Brightmoor Church Dw. Southbound				13 Mile Road Westbound				13 Mile Road Eastbound				Int. Total
	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	
5:00 PM	2	1	0	3	2	201	0	203	102	1	0	103	309
5:15 PM	3	4	0	7	10	238	0	248	91	1	0	92	347
5:30 PM	0	5	0	5	9	236	0	245	101	0	0	101	351
5:45 PM	0	6	0	6	11	182	0	193	76	0	0	76	275
Total	5	16	0	21	32	857	0	889	370	2	0	372	1282
Approach %	23.8	76.2	0.0	-	3.6	96.4	0.0	-	99.5	0.5	0.0	-	-
Total %	0.4	1.2	0.0	1.6	2.5	66.8	0.0	69.3	28.9	0.2	0.0	29.0	-
PHF	0.417	0.667	0.000	0.750	0.727	0.900	0.000	0.896	0.907	0.500	0.000	0.903	0.913
Lights	5	16	0	21	32	853	0	885	365	2	0	367	1273
% Lights	100.0	100.0	-	100.0	100.0	99.5	-	99.6	98.6	100.0	-	98.7	99.3
Mediums	0	0	0	0	0	4	0	4	5	0	0	5	9
% Mediums	0.0	0.0	-	0.0	0.0	0.5	-	0.4	1.4	0.0	-	1.3	0.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

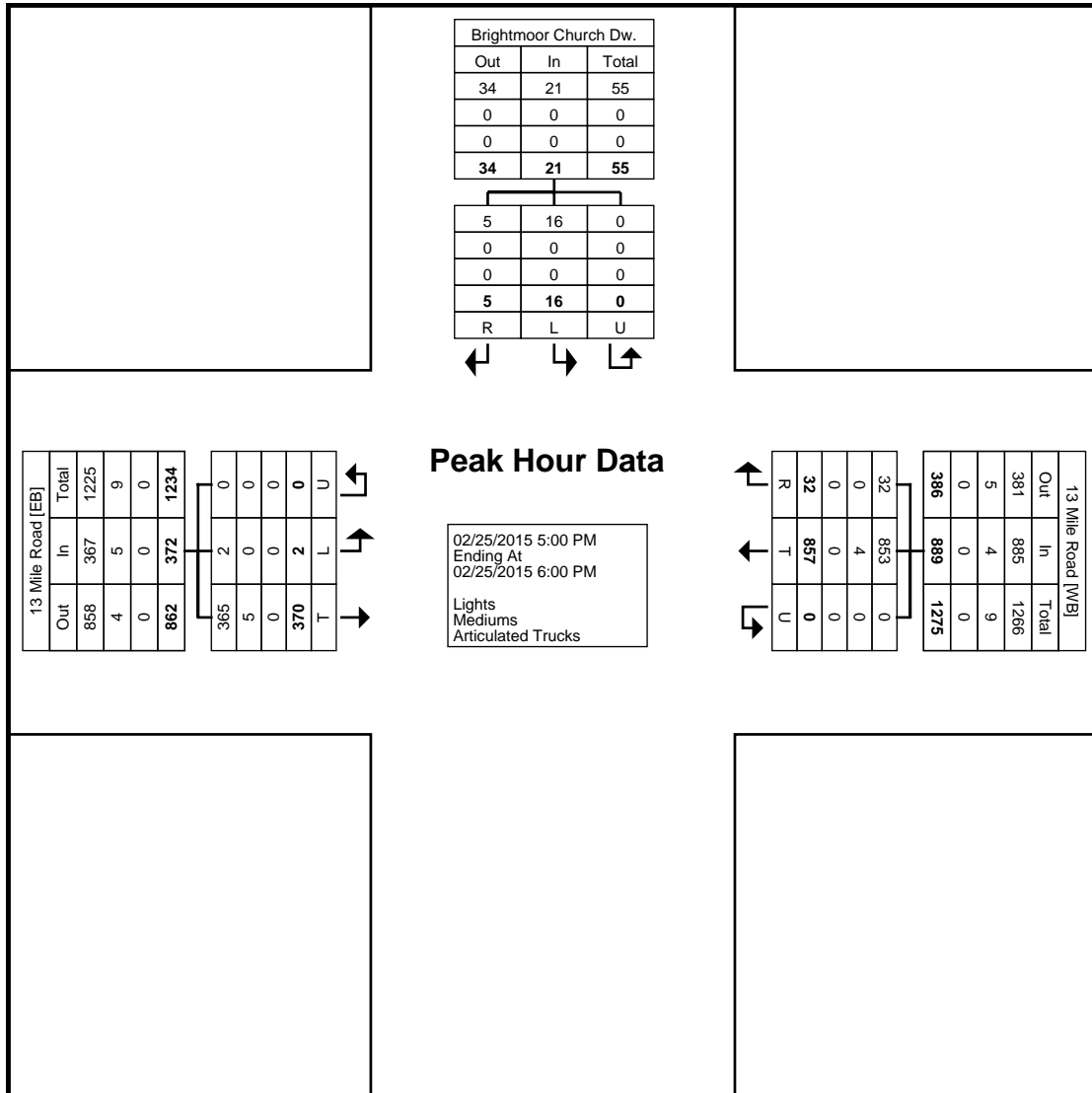




**Traffic Data Collection**  
 7504 Sawgrass Drive  
 www.tdccounts.com  
 Washington, Michigan, United States 48094  
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Project: Brightmoor  
 Christian Church Traffic  
 Study  
 Corridor: 13 Mile Road  
 Weather: Snow Showers  
 AM, Clear PM Temp. 10's  
 Video VCU ID: SCU\_3EP

Count Name: 13 Mile &  
 Church Dw Weekday  
 Site Code: TMC\_2  
 Wednesday  
 Start Date: 02/25/2015  
 Page No: 7



Turning Movement Peak Hour Data Plot (5:00 PM)



Project: Brightmoor  
Christian Church Traffic  
Study  
Corridor: 13 Mile Road  
Weather: Snow Showers  
AM, Clear PM Temp. 10's  
Video VCU ID: SCU\_3EP

**Traffic Data Collection**  
*7504 Sawgrass Drive*  
*www.tdccounts.com*  
*Washington, Michigan, United States 48094*  
*Ph. (586) 786-5407*  
**Reliable Traffic Data**

Count Name: 13 Mile &  
Church Dw Weekday  
Site Code: TMC\_2  
Wednesday  
Start Date: 02/25/2015  
Page No: 8

***Comments: 24 hour intersection video turning movement count conducted during typical weekday (Wednesday), while school was in session. Intersection peak hour reports provided for 12:00 AM - 12:00 PM & 12:00 PM - 12:00 AM. TMC was performed with Miovision video VCU recording cameras for Brightmoor Christian Church Traffic Study for Hubbell, Roth & Clark, Inc.***

***Non-signalized "T" intersection, video VCU camera was located at NE quadrant. Classification Summary Details & Percentages: Three (3) Groupings:***

***1)Lights Includes: FHWA Classes 1-3 (Motorcycles, Cars, Light Goods Vehicles)***

***2)Mediums Includes: FHWA Class 4 (School Buses & Regional Transportation Metro Buses) Single-Unit Trucks: FHWA Classes 5-7 (2-4 Axle SU Medium Trucks)***

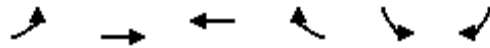
***3)Articulated Trucks Includes: FHWA Classes 8-12 (Heavy Trucks W/Single & Multi Unit Trailers)***

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	394	361	231	119	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.71	0.71	0.54	0.54
Hourly flow rate (vph)	27	540	508	325	220	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	834				1103	508
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	834				1103	508
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				2	96
cM capacity (veh/h)	799				226	565

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	27	540	508	325	244
Volume Left	27	0	0	0	220
Volume Right	0	0	0	325	24
cSH	799	1700	1700	1700	240
Volume to Capacity	0.03	0.32	0.30	0.19	1.02
Queue Length 95th (ft)	3	0	0	0	246
Control Delay (s)	9.7	0.0	0.0	0.0	107.1
Lane LOS	A				F
Approach Delay (s)	0.5		0.0		107.1
Approach LOS					F

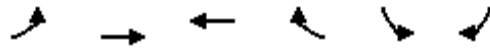
Intersection Summary					
Average Delay			16.1		
Intersection Capacity Utilization			34.8%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	64	230	262	112	184	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.78	0.78	0.57	0.57
Hourly flow rate (vph)	78	280	336	144	323	198
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	479				772	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	479				772	336
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				5	72
cM capacity (veh/h)	1083				341	706

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	78	280	336	144	323	198
Volume Left	78	0	0	0	323	0
Volume Right	0	0	0	144	0	198
cSH	1083	1700	1700	1700	341	706
Volume to Capacity	0.07	0.16	0.20	0.08	0.95	0.28
Queue Length 95th (ft)	6	0	0	0	248	29
Control Delay (s)	8.6	0.0	0.0	0.0	71.6	12.1
Lane LOS	A				F	B
Approach Delay (s)	1.9		0.0		49.0	
Approach LOS					E	

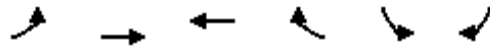
Intersection Summary						
Average Delay			19.3			
Intersection Capacity Utilization			37.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	410	375	231	119	13
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.71	0.71	0.54	0.54
Hourly flow rate (vph)	27	562	528	325	220	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	854				1145	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	854				1145	528
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				0	96
cM capacity (veh/h)	786				213	550

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	27	562	528	325	244
Volume Left	27	0	0	0	220
Volume Right	0	0	0	325	24
cSH	786	1700	1700	1700	227
Volume to Capacity	0.03	0.33	0.31	0.19	1.08
Queue Length 95th (ft)	3	0	0	0	269
Control Delay (s)	9.7	0.0	0.0	0.0	127.9
Lane LOS	A				F
Approach Delay (s)	0.5		0.0		127.9
Approach LOS					F

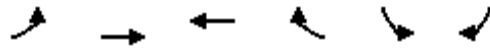
Intersection Summary			
Average Delay		18.7	
Intersection Capacity Utilization		35.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	64	246	276	112	184	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.78	0.78	0.57	0.57
Hourly flow rate (vph)	78	300	354	144	323	198
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	497				810	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	497				810	354
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				0	71
cM capacity (veh/h)	1066				324	690

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	78	300	354	144	323	198
Volume Left	78	0	0	0	323	0
Volume Right	0	0	0	144	0	198
cSH	1066	1700	1700	1700	324	690
Volume to Capacity	0.07	0.18	0.21	0.08	1.00	0.29
Queue Length 95th (ft)	6	0	0	0	273	30
Control Delay (s)	8.6	0.0	0.0	0.0	86.0	12.3
Lane LOS	A				F	B
Approach Delay (s)	1.8		0.0		58.0	
Approach LOS					F	

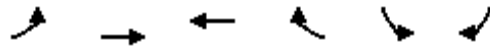
Intersection Summary						
Average Delay			22.1			
Intersection Capacity Utilization			38.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	40	574	470	462	238	26
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.71	0.71	0.54	0.54
Hourly flow rate (vph)	55	786	662	651	441	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1313				1558	662
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1313				1558	662
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				0	90
cM capacity (veh/h)	527				111	462

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	55	786	662	651	489
Volume Left	55	0	0	0	441
Volume Right	0	0	0	651	48
cSH	527	1700	1700	1700	120
Volume to Capacity	0.10	0.46	0.39	0.38	4.08
Queue Length 95th (ft)	9	0	0	0	Err
Control Delay (s)	12.6	0.0	0.0	0.0	Err
Lane LOS	B				F
Approach Delay (s)	0.8		0.0		Err
Approach LOS					F

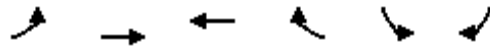
Intersection Summary					
Average Delay			1850.1		
Intersection Capacity Utilization			52.8%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Sun

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	128	246	272	224	368	226
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.78	0.78	0.57	0.57
Hourly flow rate (vph)	156	300	349	287	646	396
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	636				961	349
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	636				961	349
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				0	43
cM capacity (veh/h)	948				238	695

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	156	300	349	287	646	396
Volume Left	156	0	0	0	646	0
Volume Right	0	0	0	287	0	396
cSH	948	1700	1700	1700	238	695
Volume to Capacity	0.16	0.18	0.21	0.17	2.72	0.57
Queue Length 95th (ft)	15	0	0	0	1385	91
Control Delay (s)	9.5	0.0	0.0	0.0	816.7	16.8
Lane LOS	A				F	C
Approach Delay (s)	3.3		0.0		512.4	
Approach LOS					F	

Intersection Summary						
Average Delay			250.9			
Intersection Capacity Utilization			51.8%		ICU Level of Service	A
Analysis Period (min)			15			





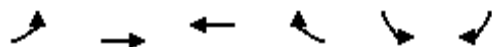
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	1	419	282	10	211	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.90	0.90	0.49	0.49
Hourly flow rate (vph)	1	574	313	11	431	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	324				890	313
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	324				890	313
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	93
cM capacity (veh/h)	1235				313	727

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	1	574	313	11	480
Volume Left	1	0	0	0	431
Volume Right	0	0	0	11	49
cSH	1235	1700	1700	1700	332
Volume to Capacity	0.00	0.34	0.18	0.01	1.44
Queue Length 95th (ft)	0	0	0	0	637
Control Delay (s)	7.9	0.0	0.0	0.0	246.0
Lane LOS	A				F
Approach Delay (s)	0.0		0.0		246.0
Approach LOS					F

Intersection Summary					
Average Delay			85.5		
Intersection Capacity Utilization			41.9%	ICU Level of Service	A
Analysis Period (min)			15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	30	252	277	29	168	157
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.88	0.88	0.52	0.52
Hourly flow rate (vph)	34	283	315	33	323	302
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	348				665	315
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348				665	315
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				22	58
cM capacity (veh/h)	1211				413	726
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	34	283	315	33	323	302
Volume Left	34	0	0	0	323	0
Volume Right	0	0	0	33	0	302
cSH	1211	1700	1700	1700	413	726
Volume to Capacity	0.03	0.17	0.19	0.02	0.78	0.42
Queue Length 95th (ft)	2	0	0	0	168	51
Control Delay (s)	8.1	0.0	0.0	0.0	38.7	13.5
Lane LOS	A				E	B
Approach Delay (s)	0.9		0.0		26.5	
Approach LOS					D	
Intersection Summary						
Average Delay			13.0			
Intersection Capacity Utilization			37.2%		ICU Level of Service	A
Analysis Period (min)			15			



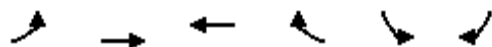
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	1	429	293	10	211	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.90	0.90	0.49	0.49
Hourly flow rate (vph)	1	588	326	11	431	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	337				916	326
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	337				916	326
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	93
cM capacity (veh/h)	1223				302	716

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	1	588	326	11	480
Volume Left	1	0	0	0	431
Volume Right	0	0	0	11	49
cSH	1223	1700	1700	1700	321
Volume to Capacity	0.00	0.35	0.19	0.01	1.49
Queue Length 95th (ft)	0	0	0	0	665
Control Delay (s)	7.9	0.0	0.0	0.0	268.4
Lane LOS	A				F
Approach Delay (s)	0.0		0.0		268.4
Approach LOS					F

Intersection Summary					
Average Delay			91.6		
Intersection Capacity Utilization		42.4%		ICU Level of Service	A
Analysis Period (min)		15			



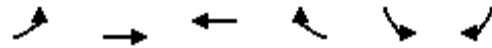
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Volume (veh/h)	30	262	288	29	168	157
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.88	0.88	0.52	0.52
Hourly flow rate (vph)	34	294	327	33	323	302
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	360				689	327
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360				689	327
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				19	58
cM capacity (veh/h)	1198				400	714
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	34	294	327	33	323	302
Volume Left	34	0	0	0	323	0
Volume Right	0	0	0	33	0	302
cSH	1198	1700	1700	1700	400	714
Volume to Capacity	0.03	0.17	0.19	0.02	0.81	0.42
Queue Length 95th (ft)	2	0	0	0	180	53
Control Delay (s)	8.1	0.0	0.0	0.0	42.5	13.7
Lane LOS	A				E	B
Approach Delay (s)	0.8		0.0		28.6	
Approach LOS					D	
Intersection Summary						
Average Delay			13.8			
Intersection Capacity Utilization			37.8%		ICU Level of Service	A
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	2	596	269	20	422	48
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.90	0.90	0.49	0.49
Hourly flow rate (vph)	3	816	299	22	861	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	321				1121	299
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321				1121	299
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	87
cM capacity (veh/h)	1239				228	741

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	3	816	299	22	959
Volume Left	3	0	0	0	861
Volume Right	0	0	0	22	98
cSH	1239	1700	1700	1700	245
Volume to Capacity	0.00	0.48	0.18	0.01	3.91
Queue Length 95th (ft)	0	0	0	0	Err
Control Delay (s)	7.9	0.0	0.0	0.0	Err
Lane LOS	A				F
Approach Delay (s)	0.0		0.0		Err
Approach LOS					F

Intersection Summary					
Average Delay			4568.2		
Intersection Capacity Utilization			64.3%	ICU Level of Service	C
Analysis Period (min)			15		



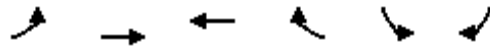
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	30	262	288	29	336	314
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.88	0.88	0.52	0.52
Hourly flow rate (vph)	34	294	327	33	646	604
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	360				689	327
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360				689	327
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				0	15
cM capacity (veh/h)	1198				400	714
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	34	294	327	33	646	604
Volume Left	34	0	0	0	646	0
Volume Right	0	0	0	33	0	604
cSH	1198	1700	1700	1700	400	714
Volume to Capacity	0.03	0.17	0.19	0.02	1.62	0.85
Queue Length 95th (ft)	2	0	0	0	932	242
Control Delay (s)	8.1	0.0	0.0	0.0	312.9	31.2
Lane LOS	A				F	D
Approach Delay (s)	0.8		0.0		176.8	
Approach LOS					F	
Intersection Summary						
Average Delay			114.2			
Intersection Capacity Utilization			47.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	370	835	32	16	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	2	411	928	36	21	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	963				1343	928
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	963				1343	928
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				87	98
cM capacity (veh/h)	715				167	325

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	2	411	928	36	28
Volume Left	2	0	0	0	21
Volume Right	0	0	0	36	7
cSH	715	1700	1700	1700	189
Volume to Capacity	0.00	0.24	0.55	0.02	0.15
Queue Length 95th (ft)	0	0	0	0	13
Control Delay (s)	10.1	0.0	0.0	0.0	27.4
Lane LOS	B				D
Approach Delay (s)	0.1		0.0		27.4
Approach LOS					D

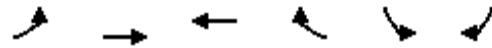
Intersection Summary					
Average Delay			0.6		
Intersection Capacity Utilization			53.9%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	41	335	770	70	37	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.81	0.81
Hourly flow rate (vph)	48	390	895	81	46	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	977				1380	895
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977				1380	895
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				69	88
cM capacity (veh/h)	706				148	339

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	48	390	895	81	46	42
Volume Left	48	0	0	0	46	0
Volume Right	0	0	0	81	0	42
cSH	706	1700	1700	1700	148	339
Volume to Capacity	0.07	0.23	0.53	0.05	0.31	0.12
Queue Length 95th (ft)	5	0	0	0	30	10
Control Delay (s)	10.5	0.0	0.0	0.0	39.7	17.1
Lane LOS	B				E	C
Approach Delay (s)	1.1		0.0		28.9	
Approach LOS					D	

Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			50.5%		ICU Level of Service	A
Analysis Period (min)			15			

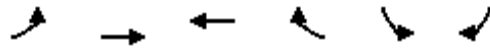


HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	2	385	866	32	16	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	2	428	962	36	21	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	998				1394	962
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	998				1394	962
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				86	98
cM capacity (veh/h)	694				155	310

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	2	428	962	36	28
Volume Left	2	0	0	0	21
Volume Right	0	0	0	36	7
cSH	694	1700	1700	1700	176
Volume to Capacity	0.00	0.25	0.57	0.02	0.16
Queue Length 95th (ft)	0	0	0	0	14
Control Delay (s)	10.2	0.0	0.0	0.0	29.2
Lane LOS	B				D
Approach Delay (s)	0.1		0.0		29.2
Approach LOS					D

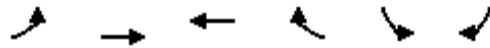
Intersection Summary					
Average Delay			0.6		
Intersection Capacity Utilization			55.6%	ICU Level of Service	B
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	41	350	801	70	37	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.81	0.81
Hourly flow rate (vph)	48	407	931	81	46	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1013				1434	931
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1013				1434	931
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				67	87
cM capacity (veh/h)	685				137	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	48	407	931	81	46	42
Volume Left	48	0	0	0	46	0
Volume Right	0	0	0	81	0	42
cSH	685	1700	1700	1700	137	323
Volume to Capacity	0.07	0.24	0.55	0.05	0.33	0.13
Queue Length 95th (ft)	6	0	0	0	33	11
Control Delay (s)	10.7	0.0	0.0	0.0	43.8	17.8
Lane LOS	B				E	C
Approach Delay (s)	1.1		0.0		31.3	
Approach LOS					D	

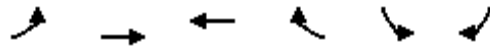
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			52.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/17/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	383	896	64	32	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	4	426	996	71	43	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1067				1430	996
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1067				1430	996
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				71	96
cM capacity (veh/h)	653				147	297

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	4	426	996	71	56
Volume Left	4	0	0	0	43
Volume Right	0	0	0	71	13
cSH	653	1700	1700	1700	167
Volume to Capacity	0.01	0.25	0.59	0.04	0.33
Queue Length 95th (ft)	1	0	0	0	34
Control Delay (s)	10.5	0.0	0.0	0.0	37.0
Lane LOS	B				E
Approach Delay (s)	0.1		0.0		37.0
Approach LOS					E

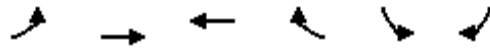
Intersection Summary					
Average Delay			1.4		
Intersection Capacity Utilization			57.2%	ICU Level of Service	B
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/17/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	62	350	801	105	37	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.81	0.81
Hourly flow rate (vph)	72	407	931	122	46	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1053				1483	931
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1053				1483	931
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				63	87
cM capacity (veh/h)	661				123	323

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	72	407	931	122	46	42
Volume Left	72	0	0	0	46	0
Volume Right	0	0	0	122	0	42
cSH	661	1700	1700	1700	123	323
Volume to Capacity	0.11	0.24	0.55	0.07	0.37	0.13
Queue Length 95th (ft)	9	0	0	0	38	11
Control Delay (s)	11.1	0.0	0.0	0.0	50.8	17.8
Lane LOS	B				F	C
Approach Delay (s)	1.7		0.0		35.0	
Approach LOS					D	

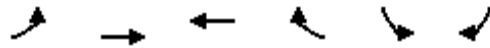
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			58.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	0	207	209	4	123	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.77	0.77	0.75	0.75	0.50	0.50
Hourly flow rate (vph)	0	269	279	5	246	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	284				547	279
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	284				547	279
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				51	99
cM capacity (veh/h)	1278				498	760

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	0	269	279	5	252
Volume Left	0	0	0	0	246
Volume Right	0	0	0	5	6
cSH	1700	1700	1700	1700	502
Volume to Capacity	0.00	0.16	0.16	0.00	0.50
Queue Length 95th (ft)	0	0	0	0	69
Control Delay (s)	0.0	0.0	0.0	0.0	19.2
Lane LOS					C
Approach Delay (s)	0.0		0.0		19.2
Approach LOS					C

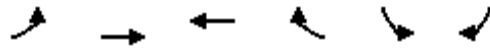
Intersection Summary					
Average Delay			6.0		
Intersection Capacity Utilization			24.7%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	7	117	194	18	90	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.75	0.75	0.57	0.57
Hourly flow rate (vph)	8	139	259	24	158	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	283				415	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	283				415	259
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				73	86
cM capacity (veh/h)	1280				590	780

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	8	139	259	24	158	109
Volume Left	8	0	0	0	158	0
Volume Right	0	0	0	24	0	109
cSH	1280	1700	1700	1700	590	780
Volume to Capacity	0.01	0.08	0.15	0.01	0.27	0.14
Queue Length 95th (ft)	0	0	0	0	27	12
Control Delay (s)	7.8	0.0	0.0	0.0	13.3	10.4
Lane LOS	A				B	B
Approach Delay (s)	0.4		0.0		12.1	
Approach LOS					B	

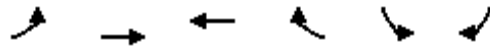
Intersection Summary						
Average Delay			4.7			
Intersection Capacity Utilization			21.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	0	215	217	4	123	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.77	0.77	0.75	0.75	0.50	0.50
Hourly flow rate (vph)	0	279	289	5	246	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	295				569	289
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	295				569	289
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				49	99
cM capacity (veh/h)	1267				484	750

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	0	279	289	5	252
Volume Left	0	0	0	0	246
Volume Right	0	0	0	5	6
cSH	1700	1700	1700	1700	488
Volume to Capacity	0.00	0.16	0.17	0.00	0.52
Queue Length 95th (ft)	0	0	0	0	73
Control Delay (s)	0.0	0.0	0.0	0.0	20.0
Lane LOS					C
Approach Delay (s)	0.0		0.0		20.0
Approach LOS					C

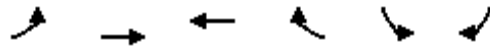
Intersection Summary					
Average Delay			6.1		
Intersection Capacity Utilization			25.1%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/16/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	7	125	202	18	90	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.75	0.75	0.57	0.57
Hourly flow rate (vph)	8	149	269	24	158	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	293				435	269
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	293				435	269
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				73	86
cM capacity (veh/h)	1268				575	769

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	8	149	269	24	158	109
Volume Left	8	0	0	0	158	0
Volume Right	0	0	0	24	0	109
cSH	1268	1700	1700	1700	575	769
Volume to Capacity	0.01	0.09	0.16	0.01	0.27	0.14
Queue Length 95th (ft)	0	0	0	0	28	12
Control Delay (s)	7.9	0.0	0.0	0.0	13.6	10.4
Lane LOS	A				B	B
Approach Delay (s)	0.4		0.0		12.3	
Approach LOS					B	

Intersection Summary						
Average Delay			4.7			
Intersection Capacity Utilization			22.3%		ICU Level of Service	A
Analysis Period (min)			15			

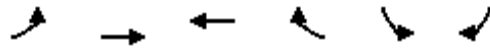


HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

3: 13 Mile & Brightmoor Church Drive

3/17/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	0	305	214	8	246	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.77	0.77	0.75	0.75	0.50	0.50
Hourly flow rate (vph)	0	396	285	11	492	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	296				681	285
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	296				681	285
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	98
cM capacity (veh/h)	1265				416	754

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	0	396	285	11	504
Volume Left	0	0	0	0	492
Volume Right	0	0	0	11	12
cSH	1700	1700	1700	1700	420
Volume to Capacity	0.00	0.23	0.17	0.01	1.20
Queue Length 95th (ft)	0	0	0	0	499
Control Delay (s)	0.0	0.0	0.0	0.0	139.9
Lane LOS					F
Approach Delay (s)	0.0		0.0		139.9
Approach LOS					F

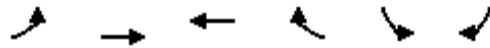
Intersection Summary					
Average Delay			58.9		
Intersection Capacity Utilization			36.7%	ICU Level of Service	A
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis

Timing Plan: Wed

5: 13 Mile & Lenox Park

3/17/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Volume (veh/h)	7	125	202	18	180	124
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.75	0.75	0.57	0.57
Hourly flow rate (vph)	8	149	269	24	316	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	293				435	269
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	293				435	269
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				45	72
cM capacity (veh/h)	1268				575	769

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	8	149	269	24	316	218
Volume Left	8	0	0	0	316	0
Volume Right	0	0	0	24	0	218
cSH	1268	1700	1700	1700	575	769
Volume to Capacity	0.01	0.09	0.16	0.01	0.55	0.28
Queue Length 95th (ft)	0	0	0	0	83	29
Control Delay (s)	7.9	0.0	0.0	0.0	18.6	11.5
Lane LOS	A				C	B
Approach Delay (s)	0.4		0.0		15.7	
Approach LOS					C	

Intersection Summary						
Average Delay			8.6			
Intersection Capacity Utilization			27.3%		ICU Level of Service	A
Analysis Period (min)			15			

Summary of Warrants			
Spot Number:	Existing-SUN		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/22/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	YES	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
	E-W	N-S											
00:01 - 01:00	114	14	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	58	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	46	7	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	42	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	27	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	35	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	102	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	151	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	295	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	474	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	476	114	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	636	219	420	140	YES	630	70	YES	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	559	86	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	588	325	420	140	YES	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	602	48	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	578	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	491	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	518	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	464	19	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	328	36	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	270	16	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	178	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	137	6	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	90	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

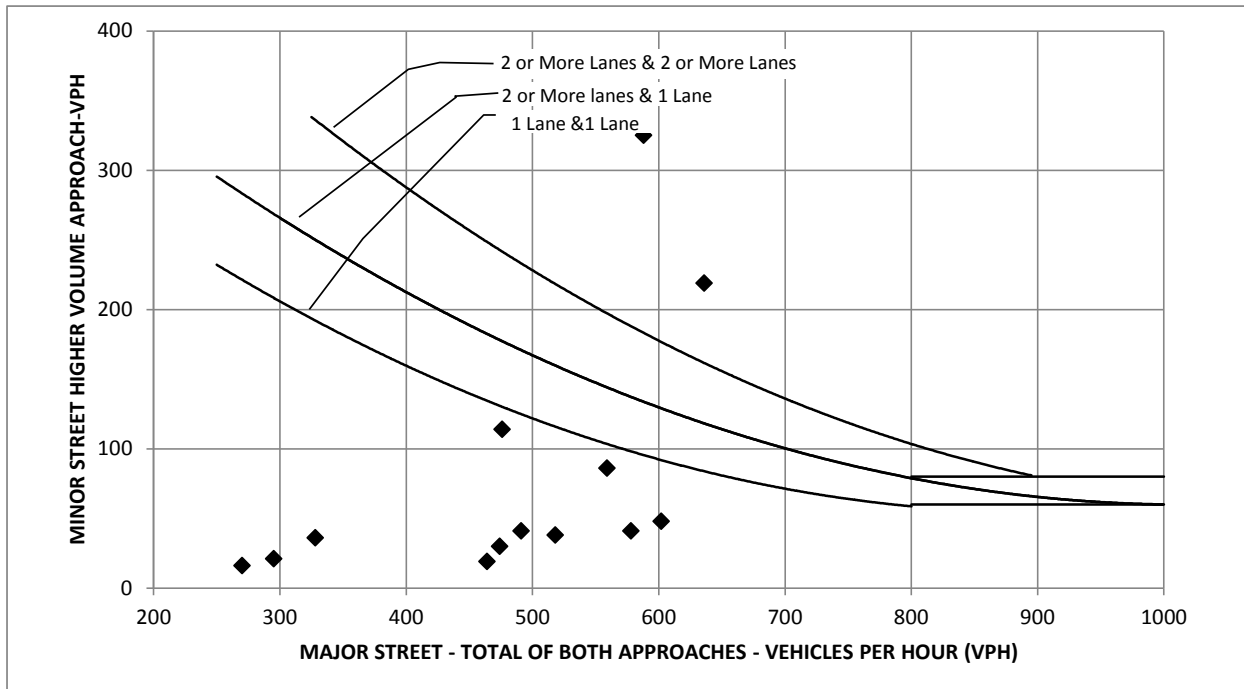
Number of Hours that met the warrant 1A =	2
Number of Hours that met the warrant 1B =	1
Number of Hours that met the warrant 1 A & B =	0

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

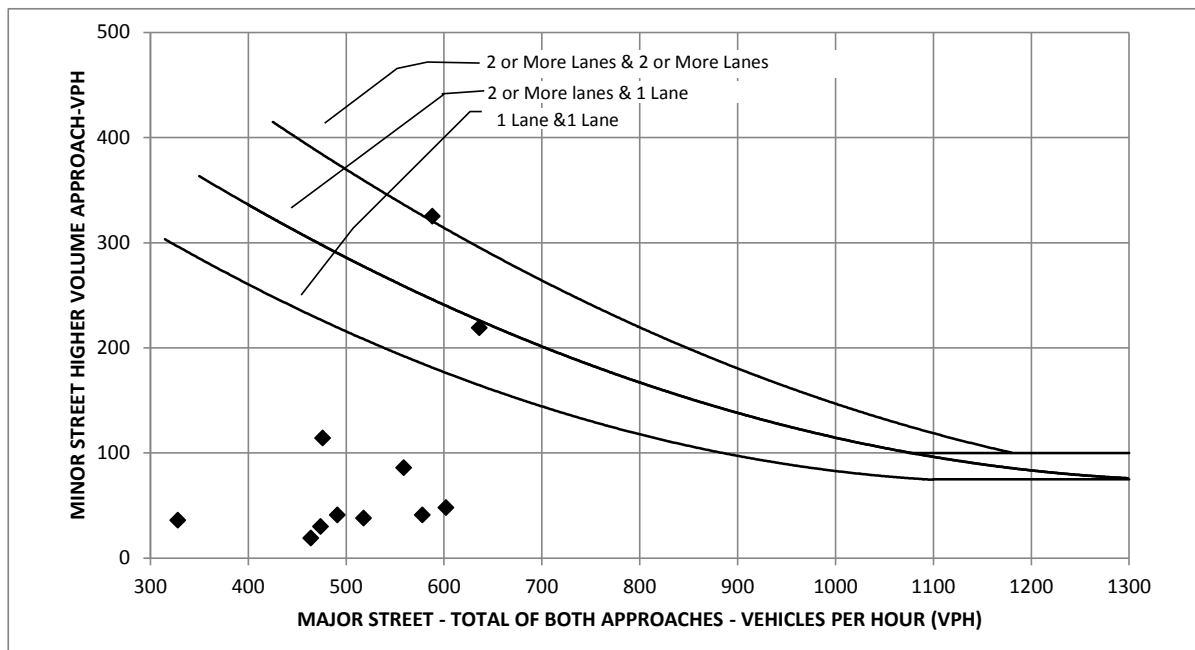
Is Warrant (70%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

1

Is Warrant (70%) Met?

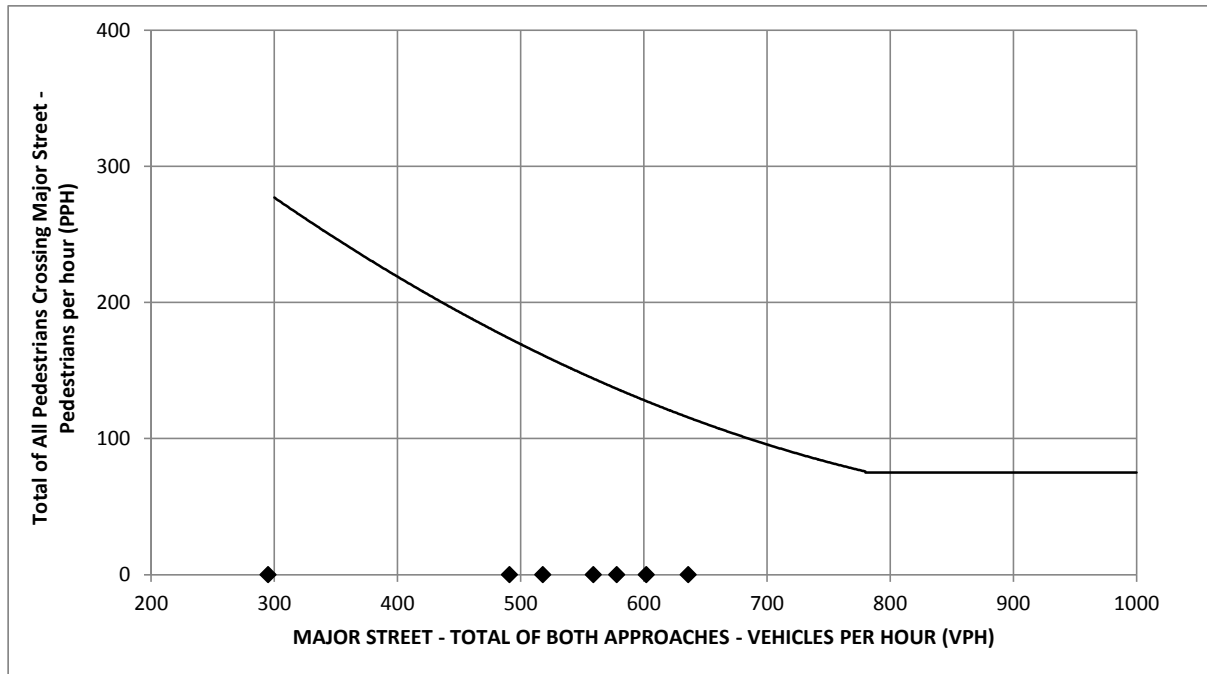
YES

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



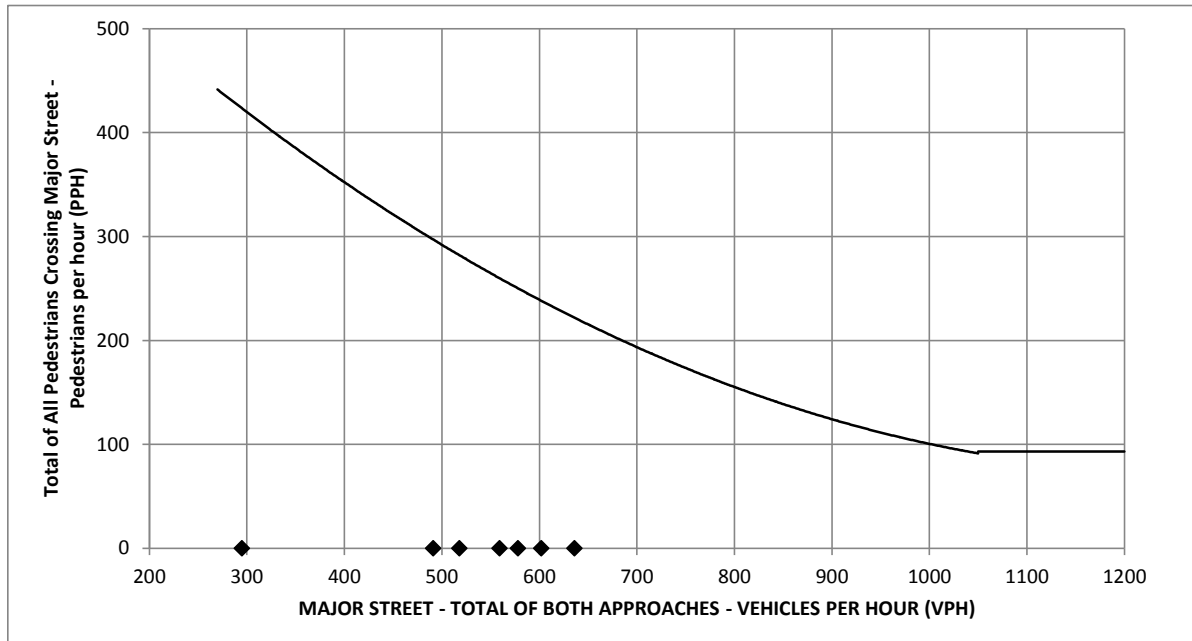
How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



**How Many Hours Are Met**

N/A

**Is Warrant 4 B (70%): Peak Hour Met?**

N/A



Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 5: School Crossing																			
Spot Number:	Existing-SUN																		
Intersection:	13 Mile @ Lenox Park Dr																		
Date	3/9/2015	by	BJL																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Distance to Nearest Signal or Stop Control on Major Road</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Width of Street</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Children per Group</td> </tr> <tr> <td style="text-align: center;">3</td> <td>: Safe Gap (Seconds)</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Gaps in Study Period</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Study Period (Minutes)</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of School Children</td> </tr> </table>				0	: Distance to Nearest Signal or Stop Control on Major Road	0	: Width of Street	0	: Number of Children per Group	3	: Safe Gap (Seconds)			0	: Number of Gaps in Study Period	0	: Study Period (Minutes)	0	: Number of School Children
0	: Distance to Nearest Signal or Stop Control on Major Road																		
0	: Width of Street																		
0	: Number of Children per Group																		
3	: Safe Gap (Seconds)																		
0	: Number of Gaps in Study Period																		
0	: Study Period (Minutes)																		
0	: Number of School Children																		
Is Warrant 5 Met?			NO																

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																
Spot Number:		Existing-SUN														
Intersection:		13 Mile @ Lenox Park Dr														
Date	3/9/2015	by	BJL													
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>							2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?															
2	: No. of Lanes on Minor St?															
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?															
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?															
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?								
Time	E-W	N-S														
00:01 - 01:00	114	14	480	160	NO	720	80	NO								
01:00 - 02:00	58	2	480	160	NO	720	80	NO								
02:00 - 03:00	46	7	480	160	NO	720	80	NO								
03:00 - 04:00	42	0	480	160	NO	720	80	NO								
04:00 - 05:00	27	2	480	160	NO	720	80	NO								
05:00 - 06:00	35	0	480	160	NO	720	80	NO								
06:00 - 07:00	102	3	480	160	NO	720	80	NO								
07:00 - 08:00	151	9	480	160	NO	720	80	NO								
08:00 - 09:00	295	21	480	160	NO	720	80	NO								
09:00 - 10:00	474	30	480	160	NO	720	80	NO								
10:00 - 11:00	476	114	480	160	NO	720	80	NO								
11:00 - 12:00	636	219	480	160	YES	720	80	NO								
12:00 - 13:00	559	86	480	160	NO	720	80	NO								
13:00 - 14:00	588	325	480	160	YES	720	80	NO								
14:00 - 15:00	602	48	480	160	NO	720	80	NO								
15:00 - 16:00	578	41	480	160	NO	720	80	NO								
16:00 - 17:00	491	41	480	160	NO	720	80	NO								
17:00 - 18:00	518	38	480	160	NO	720	80	NO								
18:00 - 19:00	464	19	480	160	NO	720	80	NO								
19:00 - 20:00	328	36	480	160	NO	720	80	NO								
20:00 - 21:00	270	16	480	160	NO	720	80	NO								
21:00 - 22:00	178	24	480	160	NO	720	80	NO								
22:00 - 23:00	137	6	480	160	NO	720	80	NO								
23:00 - 00:00	90	2	480	160	NO	720	80	NO								
Number of Hours that met the warrant 7A =					2											
Number of Hours that met the warrant 7B =					0											
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)								NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)								NO								

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 8: Roadway Network			
Spot Number:	Existing-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <ul style="list-style-type: none"> <li>(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</li> <li>(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</li> </ul>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing				
Spot Number:	Existing-SUN			
Intersection:	13 Mile @ Lenox Park Dr			
Date	3/9/2015	by	BJL	
<b>Adjustment Factors</b>	0	:	Clear Storage Distance (ft)	
	0	:	Number of Approach Lanes Crossing Tracks	
	0	:	Peak Hour	
	#N/A	:	Peak Hour Major Street Volume	
	#N/A	:	Peak Hour Minor Street Volume	
	fail	:	Trains per Day	
	1	:	Percentage High Occupancy Busses	
	#N/A	:	Percentage Tractor Trailers	
		:	Adjusted Minor Street Volume	
		:	Is Figure 4C-10 Satisfied?	
	<b>Is Warrant 9 Met?</b>			#N/A

Summary of Warrants			
Spot Number:	Background-SUN		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/22/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	YES	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
00:01 - 01:00	119	14	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	60	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	48	7	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	44	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	28	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	37	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	106	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	156	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	303	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	486	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	493	114	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	655	219	420	140	YES	630	70	YES	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	580	86	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	609	325	420	140	YES	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	624	48	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	599	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	508	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	538	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	481	19	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	340	36	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	280	16	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	184	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	143	6	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	94	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

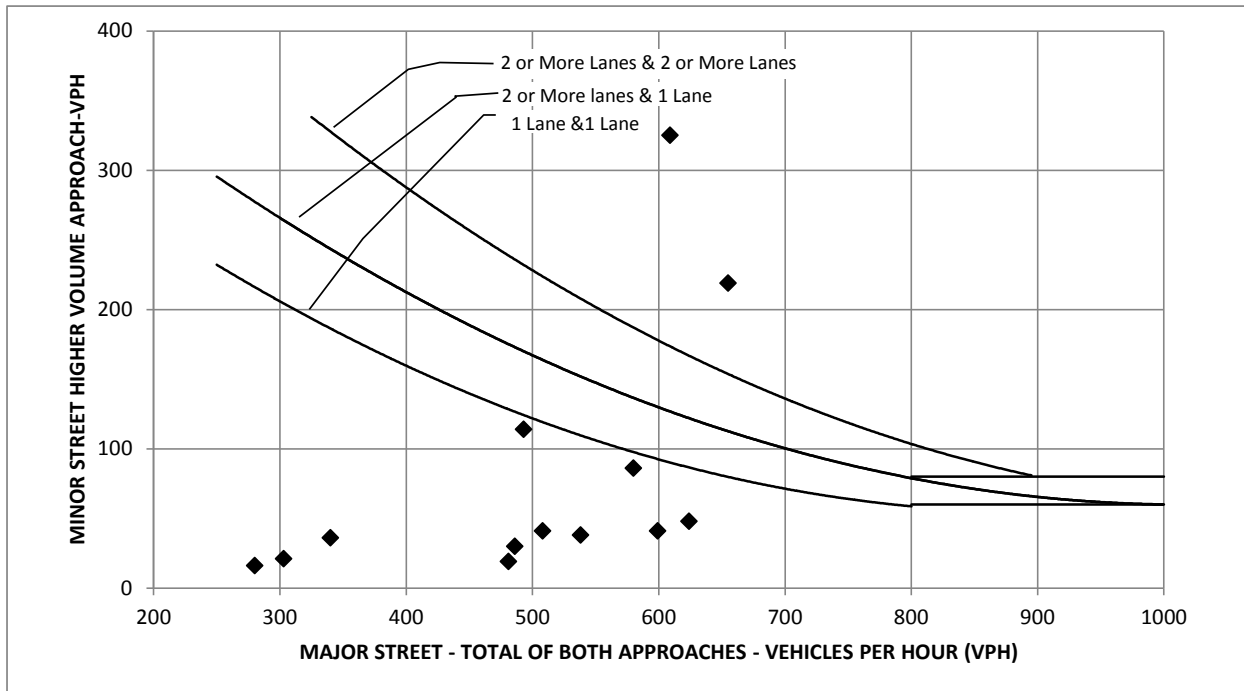
Number of Hours that met the warrant 1A =	2
Number of Hours that met the warrant 1B =	1
Number of Hours that met the warrant 1 A & B =	0

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

Is Warrant (70%) Met?

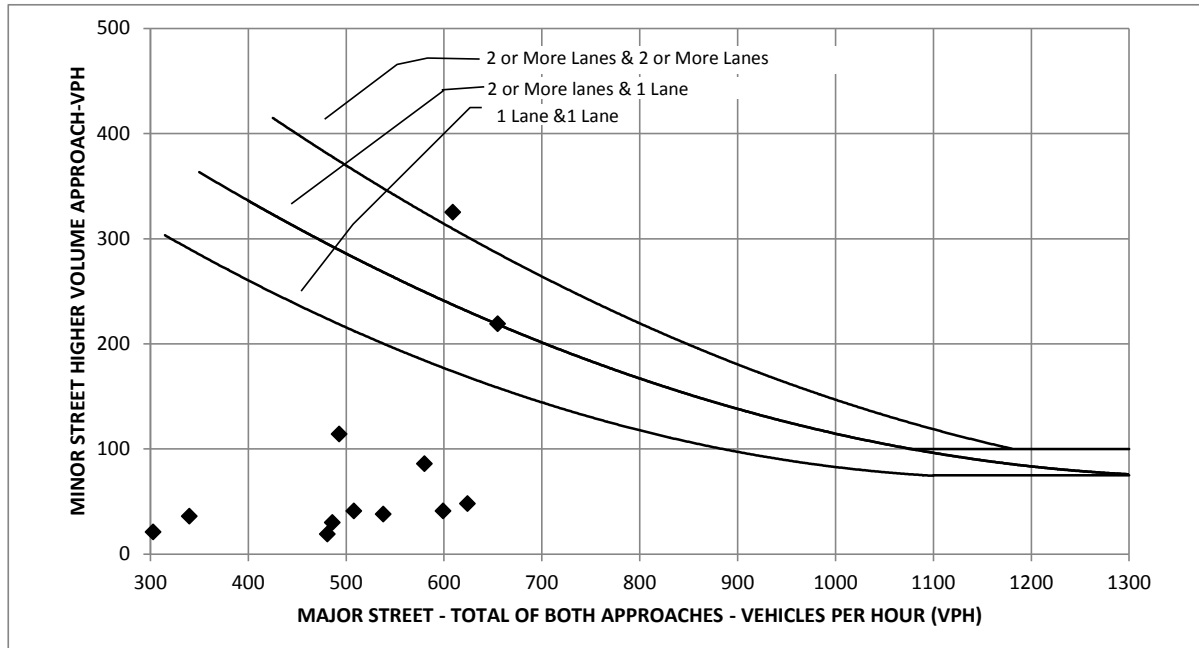
NO



**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

1

Is Warrant (70%) Met?

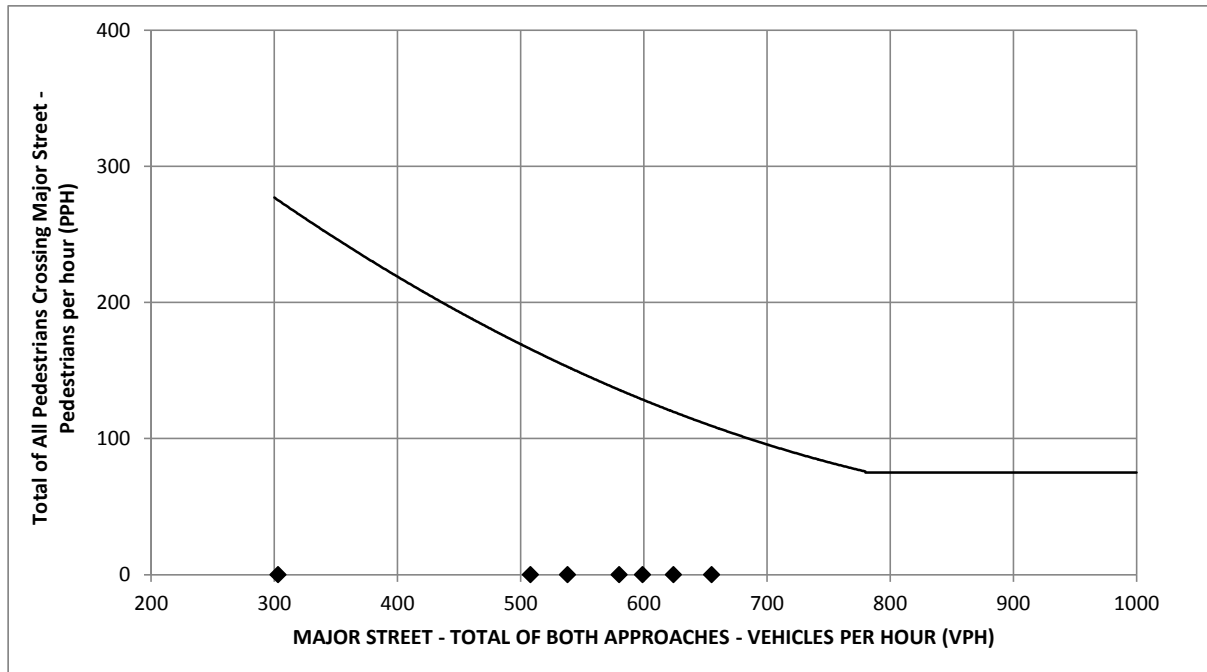
YES

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



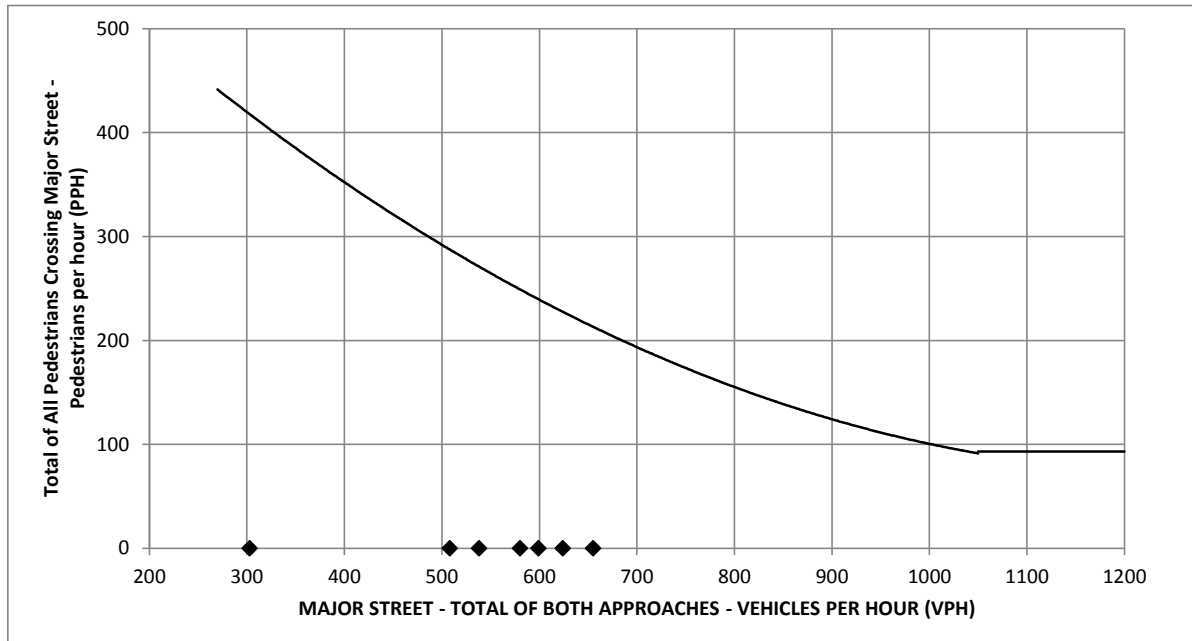
How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



**How Many Hours Are Met**

N/A

**Is Warrant 4 B (70%): Peak Hour Met?**

N/A

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 5: School Crossing</b>																	
Spot Number:	Background-SUN																
Intersection:	13 Mile @ Lenox Park Dr																
Date	3/9/2015	by	BJL														
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Distance to Nearest Signal or Stop Control on Major Road</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Width of Street</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Children per Group</td> </tr> <tr> <td style="text-align: center;">3</td> <td>: Safe Gap (Seconds)</td> </tr> </table> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Number of Gaps in Study Period</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Study Period (Minutes)</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of School Children</td> </tr> </table>				0	: Distance to Nearest Signal or Stop Control on Major Road	0	: Width of Street	0	: Number of Children per Group	3	: Safe Gap (Seconds)	0	: Number of Gaps in Study Period	0	: Study Period (Minutes)	0	: Number of School Children
0	: Distance to Nearest Signal or Stop Control on Major Road																
0	: Width of Street																
0	: Number of Children per Group																
3	: Safe Gap (Seconds)																
0	: Number of Gaps in Study Period																
0	: Study Period (Minutes)																
0	: Number of School Children																
Is Warrant 5 Met?			NO														

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																
Spot Number:		Background-SUN														
Intersection:		13 Mile @ Lenox Park Dr														
Date	3/9/2015	by	BJL													
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>							2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?															
2	: No. of Lanes on Minor St?															
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?															
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?															
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?								
Time	E-W	N-S														
00:01 - 01:00	119	14	480	160	NO	720	80	NO								
01:00 - 02:00	60	2	480	160	NO	720	80	NO								
02:00 - 03:00	48	7	480	160	NO	720	80	NO								
03:00 - 04:00	44	0	480	160	NO	720	80	NO								
04:00 - 05:00	28	2	480	160	NO	720	80	NO								
05:00 - 06:00	37	0	480	160	NO	720	80	NO								
06:00 - 07:00	106	3	480	160	NO	720	80	NO								
07:00 - 08:00	156	9	480	160	NO	720	80	NO								
08:00 - 09:00	303	21	480	160	NO	720	80	NO								
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12:00 - 13:00	580	86	480	160	NO	720	80	NO								
13:00 - 14:00	609	325	480	160	YES	720	80	NO								
14:00 - 15:00	624	48	480	160	NO	720	80	NO								
15:00 - 16:00	599	41	480	160	NO	720	80	NO								
16:00 - 17:00	508	41	480	160	NO	720	80	NO								
17:00 - 18:00	538	38	480	160	NO	720	80	NO								
18:00 - 19:00	481	19	480	160	NO	720	80	NO								
19:00 - 20:00	340	36	480	160	NO	720	80	NO								
20:00 - 21:00	280	16	480	160	NO	720	80	NO								
21:00 - 22:00	184	24	480	160	NO	720	80	NO								
22:00 - 23:00	143	6	480	160	NO	720	80	NO								
23:00 - 00:00	94	2	480	160	NO	720	80	NO								
Number of Hours that met the warrant 7A = <input style="width: 50px; text-align: center;" type="text" value="2"/> Number of Hours that met the warrant 7B = <input style="width: 50px; text-align: center;" type="text" value="0"/>																
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)								NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)								NO								

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 8: Roadway Network			
Spot Number:	Background-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <ul style="list-style-type: none"> <li>(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</li> <li>(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</li> </ul>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing						
Spot Number:	Background-SUN					
Intersection:	13 Mile @ Lenox Park Dr					
Date	3/9/2015	by	BJL			
<b>Adjustment Factors</b> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr><td style="text-align: center;">fail</td></tr> <tr><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">#N/A</td></tr> </table>	fail	1	#N/A	0	:	Clear Storage Distance (ft)
	fail					
	1					
	#N/A					
	0	:	Number of Approach Lanes Crossing Tracks			
	0	:	Peak Hour			
	#N/A	:	Peak Hour Major Street Volume			
	#N/A	:	Peak Hour Minor Street Volume			
	0	:	Trains per Day			
	0%	:	Percentage High Occupancy Busses			
	0	:	Percentage Tractor Trailers			
	#N/A	:	Adjusted Minor Street Volume			
#N/A	:	Is Figure 4C-10 Satisfied?				
Is Warrant 9 Met?			#N/A			



Summary of Warrants			
Spot Number:	Future-SUN		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/22/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	YES	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
00:01 - 01:00	119	14	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	60	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	48	7	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	44	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	28	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	37	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	106	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	156	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	402	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	658	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	557	228	420	140	YES	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	807	438	420	140	YES	630	70	YES	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	609	172	420	140	YES	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	609	650	420	140	YES	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	624	48	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	599	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	508	41	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	538	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	481	19	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	340	36	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	280	16	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	184	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	143	6	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	94	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

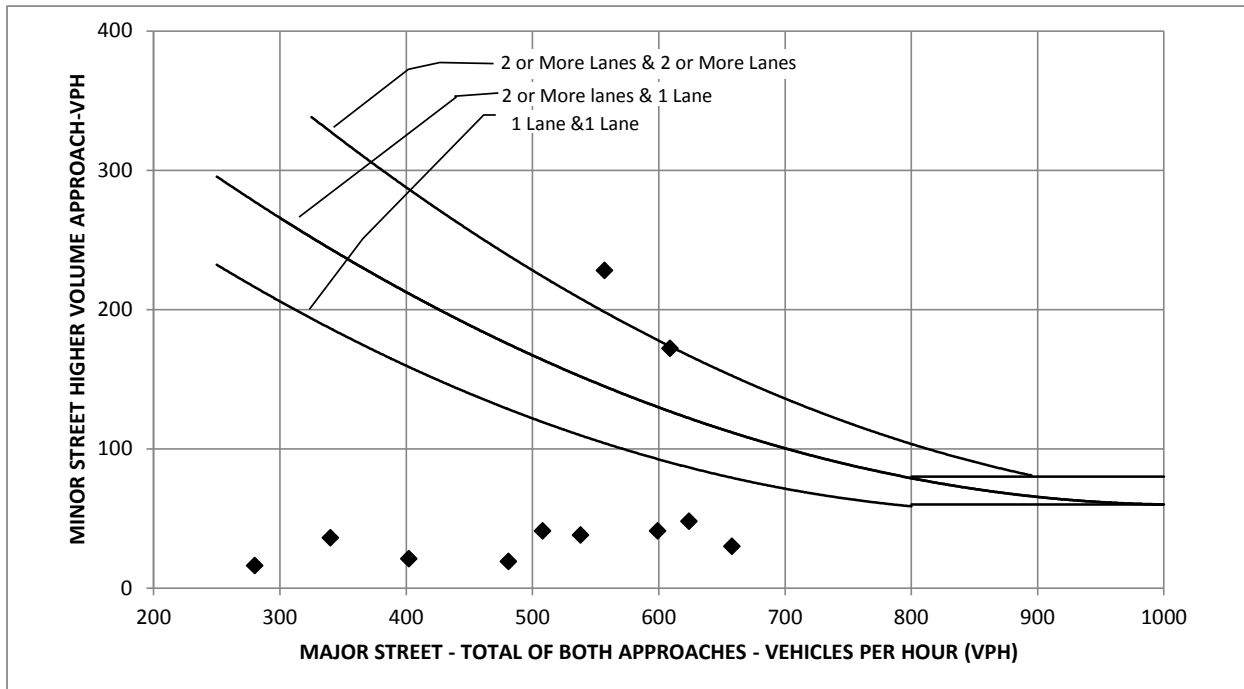
Number of Hours that met the warrant 1A =	4
Number of Hours that met the warrant 1B =	1
Number of Hours that met the warrant 1 A & B =	0

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

3

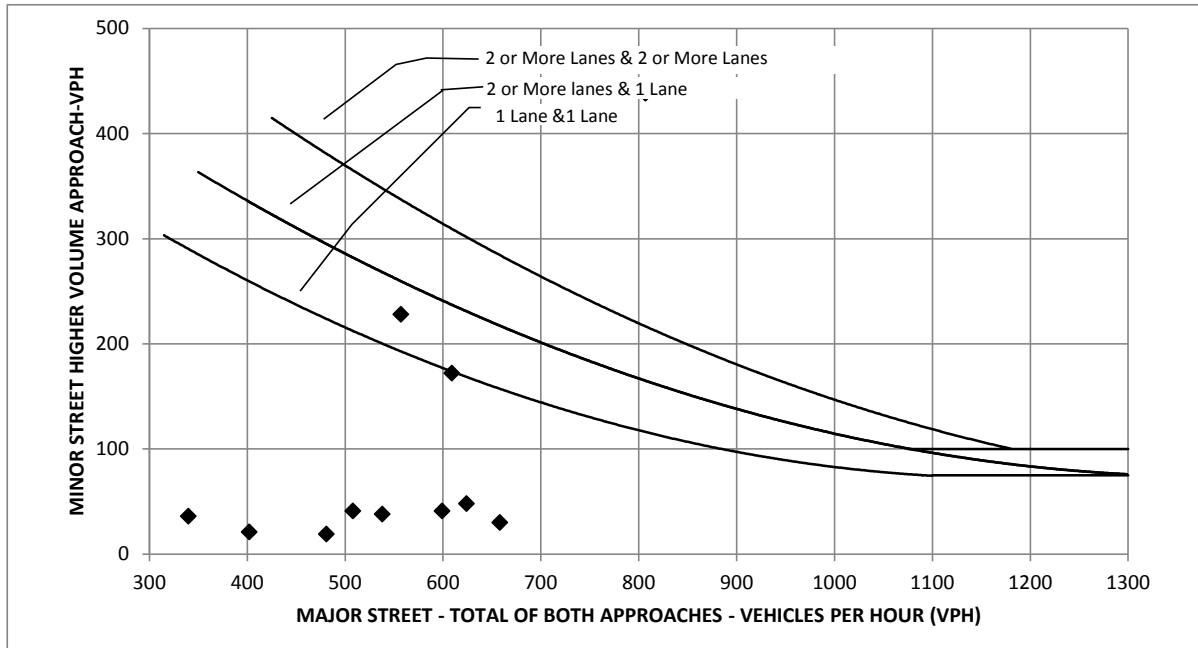
Is Warrant (70%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

Is Warrant (70%) Met?

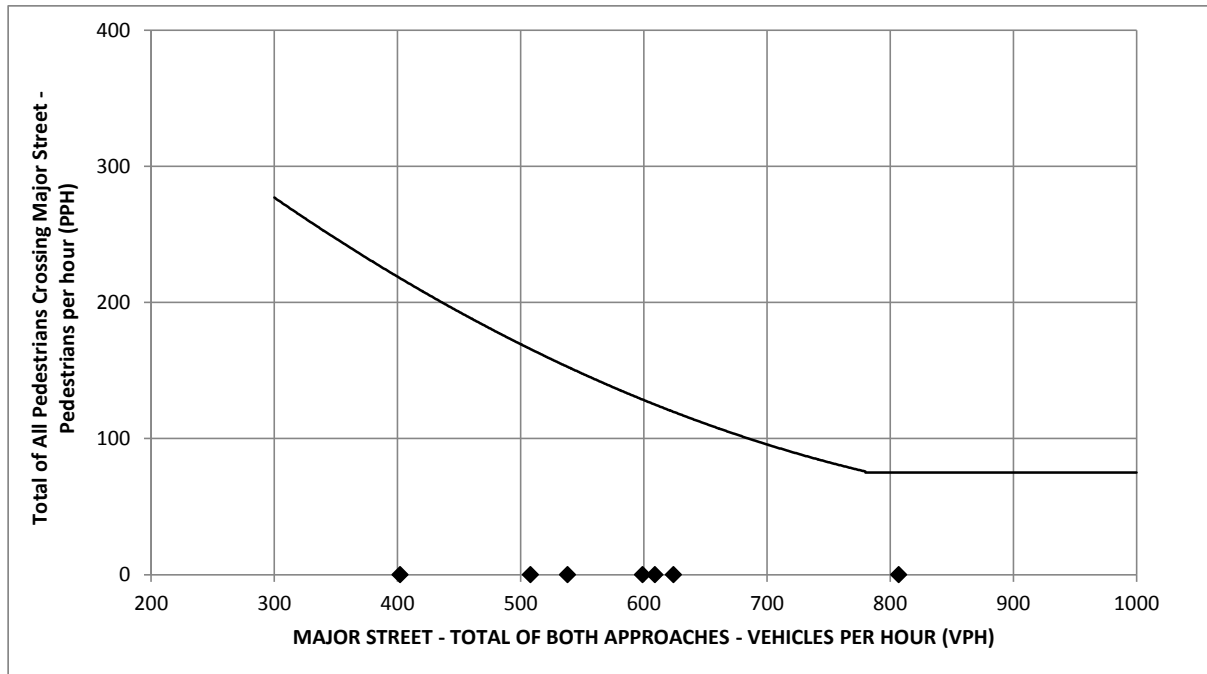
YES

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



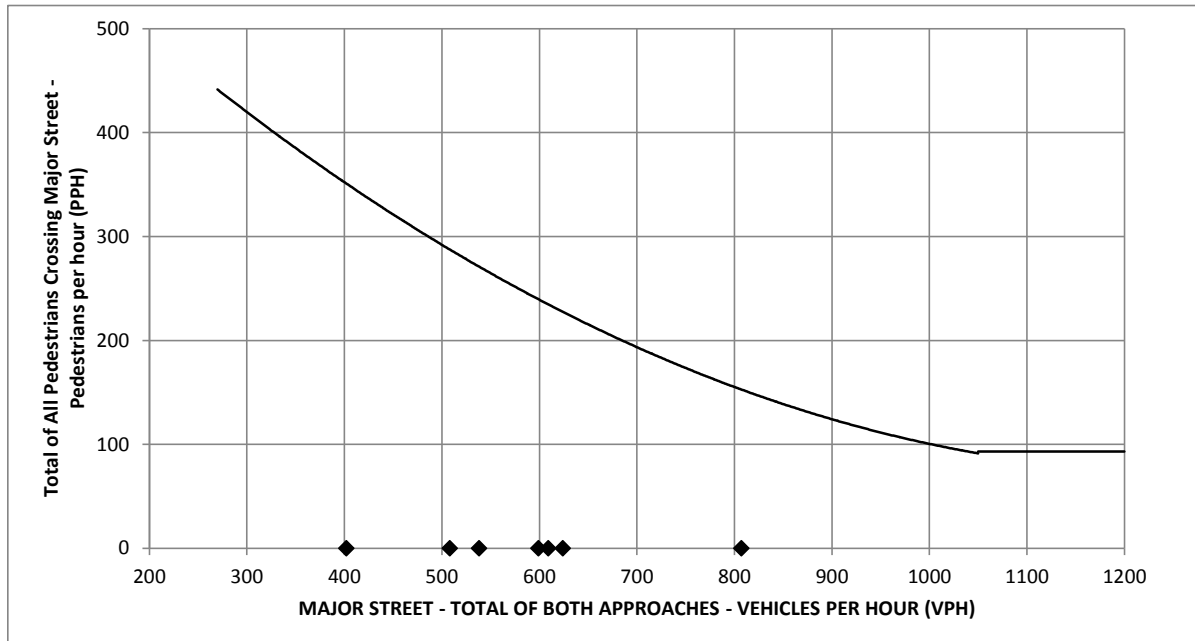
How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Peak Hour Met?	N/A

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 5: School Crossing																	
Spot Number:	Future-SUN																
Intersection:	13 Mile @ Lenox Park Dr																
Date	3/9/2015	by	BJL														
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Distance to Nearest Signal or Stop Control on Major Road</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Width of Street</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Children per Group</td> </tr> <tr> <td style="text-align: center;">3</td> <td>: Safe Gap (Seconds)</td> </tr> </table> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Number of Gaps in Study Period</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Study Period (Minutes)</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of School Children</td> </tr> </table>				0	: Distance to Nearest Signal or Stop Control on Major Road	0	: Width of Street	0	: Number of Children per Group	3	: Safe Gap (Seconds)	0	: Number of Gaps in Study Period	0	: Study Period (Minutes)	0	: Number of School Children
0	: Distance to Nearest Signal or Stop Control on Major Road																
0	: Width of Street																
0	: Number of Children per Group																
3	: Safe Gap (Seconds)																
0	: Number of Gaps in Study Period																
0	: Study Period (Minutes)																
0	: Number of School Children																
Is Warrant 5 Met?			NO														

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>



Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																
Spot Number:		Future-SUN														
Intersection:		13 Mile @ Lenox Park Dr														
Date	3/9/2015	by	BJL													
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>							2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?															
2	: No. of Lanes on Minor St?															
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?															
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?															
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?								
Time	E-W	N-S														
00:01 - 01:00	119	14	480	160	NO	720	80	NO								
01:00 - 02:00	60	2	480	160	NO	720	80	NO								
02:00 - 03:00	48	7	480	160	NO	720	80	NO								
03:00 - 04:00	44	0	480	160	NO	720	80	NO								
04:00 - 05:00	28	2	480	160	NO	720	80	NO								
05:00 - 06:00	37	0	480	160	NO	720	80	NO								
06:00 - 07:00	106	3	480	160	NO	720	80	NO								
07:00 - 08:00	156	9	480	160	NO	720	80	NO								
08:00 - 09:00	402	21	480	160	NO	720	80	NO								
09:00 - 10:00	658	30	480	160	NO	720	80	NO								
10:00 - 11:00	557	228	480	160	YES	720	80	NO								
11:00 - 12:00	807	438	480	160	YES	720	80	YES								
12:00 - 13:00	609	172	480	160	YES	720	80	NO								
13:00 - 14:00	609	650	480	160	YES	720	80	NO								
14:00 - 15:00	624	48	480	160	NO	720	80	NO								
15:00 - 16:00	599	41	480	160	NO	720	80	NO								
16:00 - 17:00	508	41	480	160	NO	720	80	NO								
17:00 - 18:00	538	38	480	160	NO	720	80	NO								
18:00 - 19:00	481	19	480	160	NO	720	80	NO								
19:00 - 20:00	340	36	480	160	NO	720	80	NO								
20:00 - 21:00	280	16	480	160	NO	720	80	NO								
21:00 - 22:00	184	24	480	160	NO	720	80	NO								
22:00 - 23:00	143	6	480	160	NO	720	80	NO								
23:00 - 00:00	94	2	480	160	NO	720	80	NO								
Number of Hours that met the warrant 7A =					4											
Number of Hours that met the warrant 7B =					1											
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)								NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)								NO								

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 8: Roadway Network			
Spot Number:	Future-SUN		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <p style="margin-left: 40px;">(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p style="margin-left: 40px;">(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</p>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing				
Spot Number:	Future-SUN			
Intersection:	13 Mile @ Lenox Park Dr			
Date	3/9/2015	by	BJL	
<b>Adjustment Factors</b>	0	:	Clear Storage Distance (ft)	
	0	:	Number of Approach Lanes Crossing Tracks	
	0	:	Peak Hour	
	#N/A	:	Peak Hour Major Street Volume	
	#N/A	:	Peak Hour Minor Street Volume	
	fail	:	Trains per Day	
	1	:	Percentage High Occupancy Busses	
	#N/A	:	Percentage Tractor Trailers	
		:	Adjusted Minor Street Volume	
		:	Is Figure 4C-10 Satisfied?	
	<b>Is Warrant 9 Met?</b>			#N/A

Summary of Warrants			
Spot Number:	Existing-WED		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/25/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	NO	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
	E-W	N-S											
00:01 - 01:00	56	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	33	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	22	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	23	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	57	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	154	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	460	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	1072	77	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	1053	81	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	587	63	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	399	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	506	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	556	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	530	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	640	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	866	105	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	972	54	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	1212	71	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	858	44	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	534	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	396	120	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	277	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	171	23	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	111	1	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	4
Number of Hours that met the warrant 1 A & B =	0

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

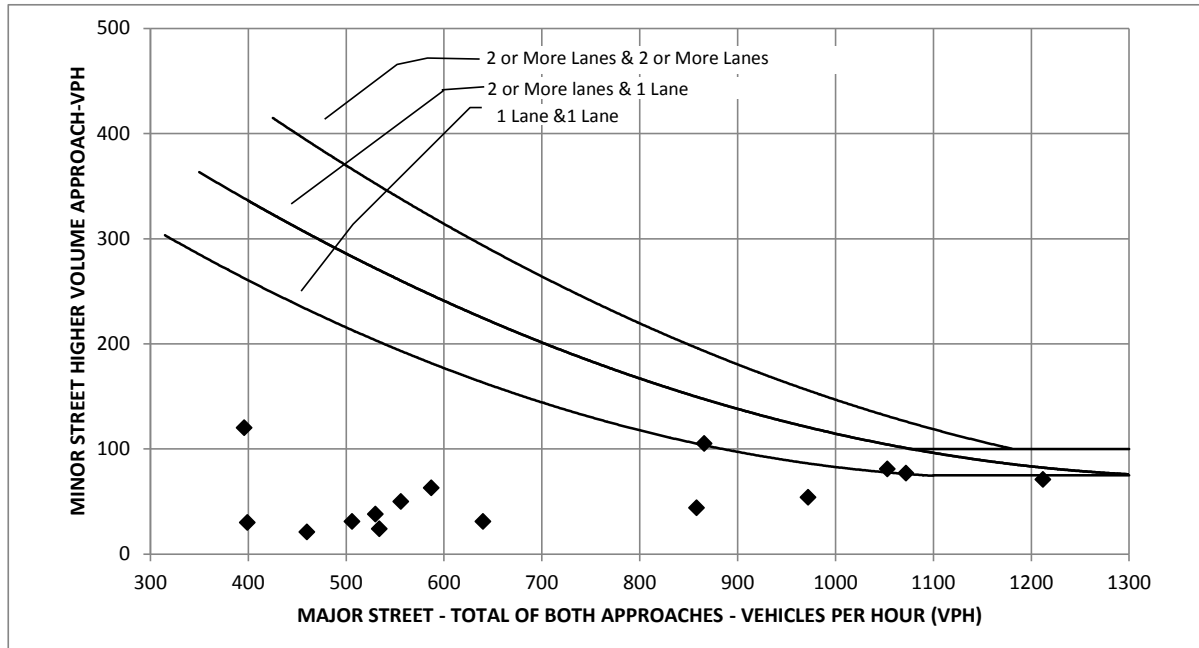
Is Warrant (70%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

<b>2</b>	<b>: No. of Lanes on Major St.</b>
<b>2</b>	<b>: No. of Lanes on Minor St.</b>
<b>45</b>	<b>: Speed limit or 85th Percentile? (MPH)</b>
<b>NO</b>	<b>: Is the intersection within an Isolated community?</b>
<b>0</b>	<b>: What is the of the population isolated community?</b>



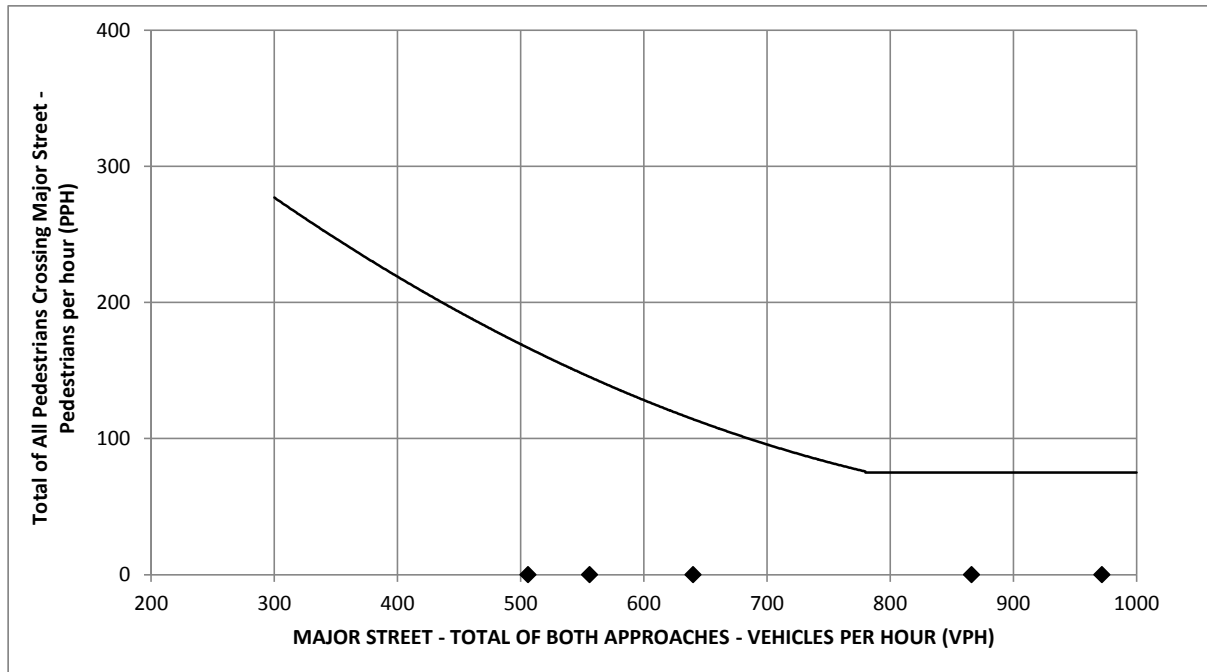
<b>How Many Hours Are Met</b>	<b>0</b>
<b>Is Warrant (70%) Met?</b>	<b>NO</b>

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

### Adjacent Traffic Signal or Stop Sign is Too Close



How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

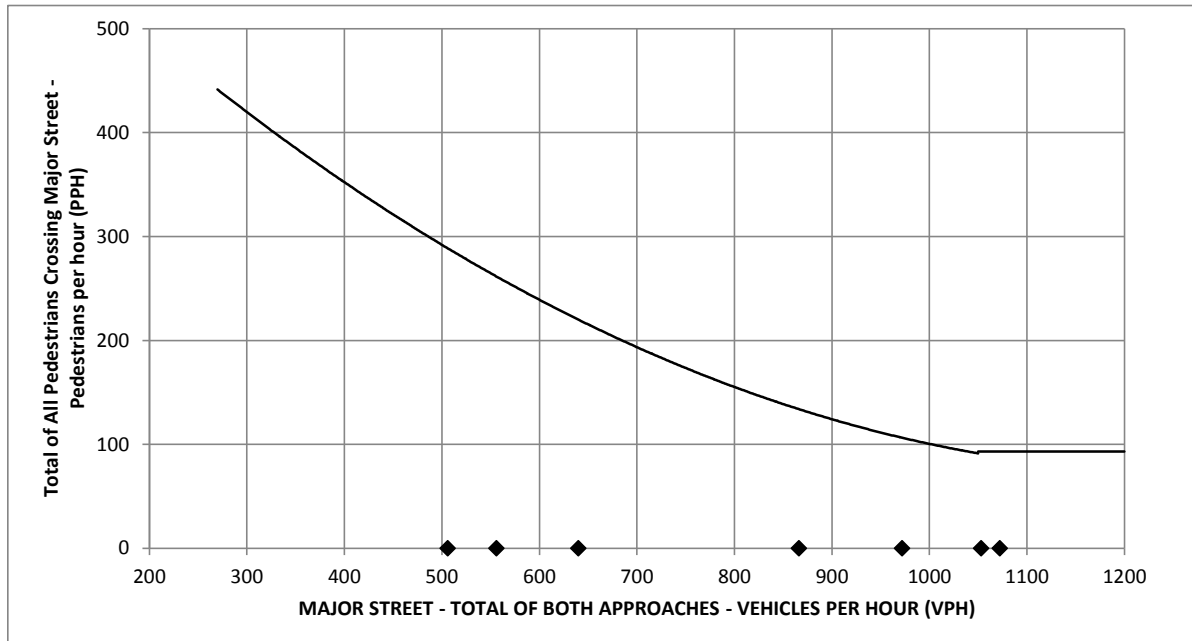


**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Peak Hour Met?	N/A

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 5: School Crossing</b>																			
Spot Number:	Existing-WED																		
Intersection:	13 Mile @ Lenox Park Dr																		
Date	3/9/2015	by	BJL																
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0	: Distance to Nearest Signal or Stop Control on Major Road																		
0	: Width of Street																		
0	: Number of Children per Group																		
3	: Safe Gap (Seconds)																		
0	: Number of Gaps in Study Period																		
0	: Study Period (Minutes)																		
0	: Number of School Children																		
Is Warrant 5 Met?			NO																

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																	
Spot Number:		Existing-WED															
Intersection:		13 Mile @ Lenox Park Dr															
Date	3/9/2015	by	BJL														
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>								2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?																
2	: No. of Lanes on Minor St?																
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?																
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?																
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?									
Time	E-W	N-S															
00:01 - 01:00	56	2	480	160	NO	720	80	NO									
01:00 - 02:00	33	0	480	160	NO	720	80	NO									
02:00 - 03:00	22	0	480	160	NO	720	80	NO									
03:00 - 04:00	23	0	480	160	NO	720	80	NO									
04:00 - 05:00	57	3	480	160	NO	720	80	NO									
05:00 - 06:00	154	9	480	160	NO	720	80	NO									
06:00 - 07:00	460	21	480	160	NO	720	80	NO									
07:00 - 08:00	1072	77	480	160	NO	720	80	NO									
08:00 - 09:00	1053	81	480	160	NO	720	80	YES									
09:00 - 10:00	587	63	480	160	NO	720	80	NO									
10:00 - 11:00	399	30	480	160	NO	720	80	NO									
11:00 - 12:00	506	31	480	160	NO	720	80	NO									
12:00 - 13:00	556	50	480	160	NO	720	80	NO									
13:00 - 14:00	530	38	480	160	NO	720	80	NO									
14:00 - 15:00	640	31	480	160	NO	720	80	NO									
15:00 - 16:00	866	105	480	160	NO	720	80	YES									
16:00 - 17:00	972	54	480	160	NO	720	80	NO									
17:00 - 18:00	1212	71	480	160	NO	720	80	NO									
18:00 - 19:00	858	44	480	160	NO	720	80	NO									
19:00 - 20:00	534	24	480	160	NO	720	80	NO									
20:00 - 21:00	396	120	480	160	NO	720	80	NO									
21:00 - 22:00	277	50	480	160	NO	720	80	NO									
22:00 - 23:00	171	23	480	160	NO	720	80	NO									
23:00 - 00:00	111	1	480	160	NO	720	80	NO									
Number of Hours that met the warrant 7A = <input style="width: 50px; text-align: center;" type="text" value="0"/> Number of Hours that met the warrant 7B = <input style="width: 50px; text-align: center;" type="text" value="2"/>																	
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)									NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)									NO								

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 8: Roadway Network			
Spot Number:	Existing-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <p style="margin-left: 40px;">(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p style="margin-left: 40px;">(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</p>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing				
Spot Number:	Existing-WED			
Intersection:	13 Mile @ Lenox Park Dr			
Date	3/9/2015	by	BJL	
<b>Adjustment Factors</b>	0	:	Clear Storage Distance (ft)	
	0	:	Number of Approach Lanes Crossing Tracks	
	0	:	Peak Hour	
	#N/A	:	Peak Hour Major Street Volume	
	#N/A	:	Peak Hour Minor Street Volume	
	fail	:	Trains per Day	
	1	:	Percentage High Occupancy Busses	
	#N/A	:	Percentage Tractor Trailers	
		:	Adjusted Minor Street Volume	
		:	Is Figure 4C-10 Satisfied?	
	<b>Is Warrant 9 Met?</b>			#N/A

Summary of Warrants			
Spot Number:	Background-WED		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/25/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	NO	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
	E-W	N-S											
00:01 - 01:00	59	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	35	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	23	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	24	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	60	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	160	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	478	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	1107	77	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	1093	81	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	609	63	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	413	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	525	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	577	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	550	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	661	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	896	105	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	1008	54	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	1256	71	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	887	44	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	549	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	410	120	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	288	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	176	23	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	115	1	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	4
Number of Hours that met the warrant 1 A & B =	0

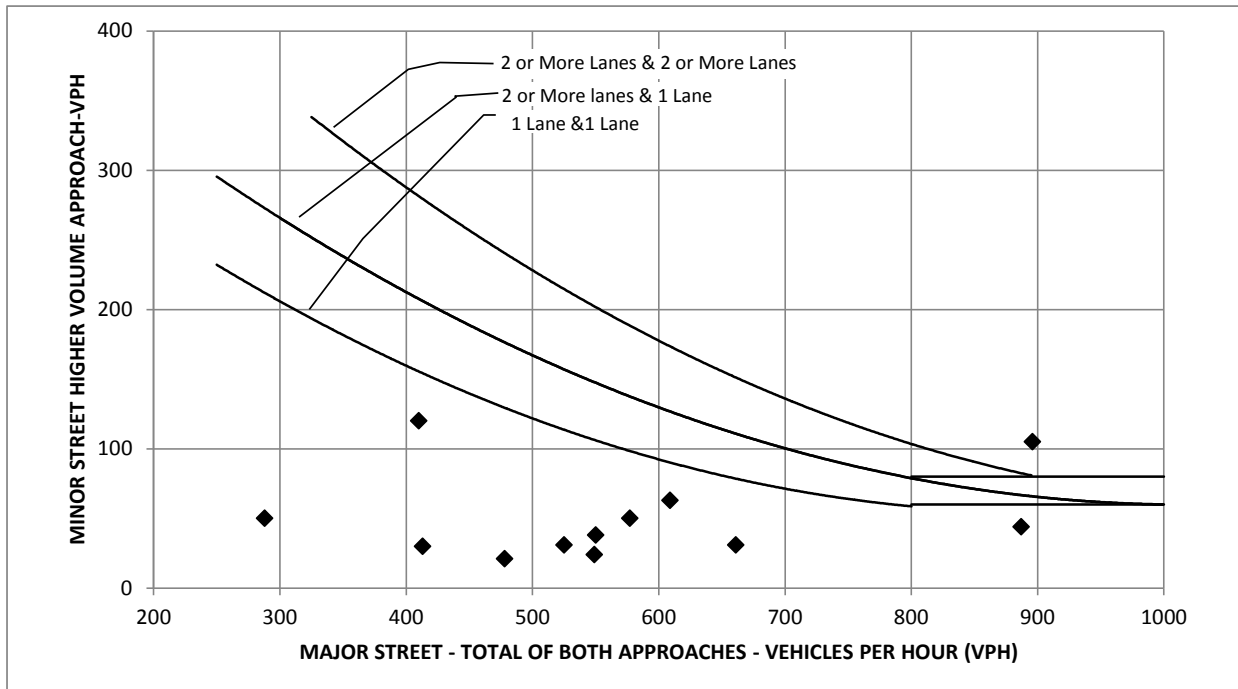
A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A



**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

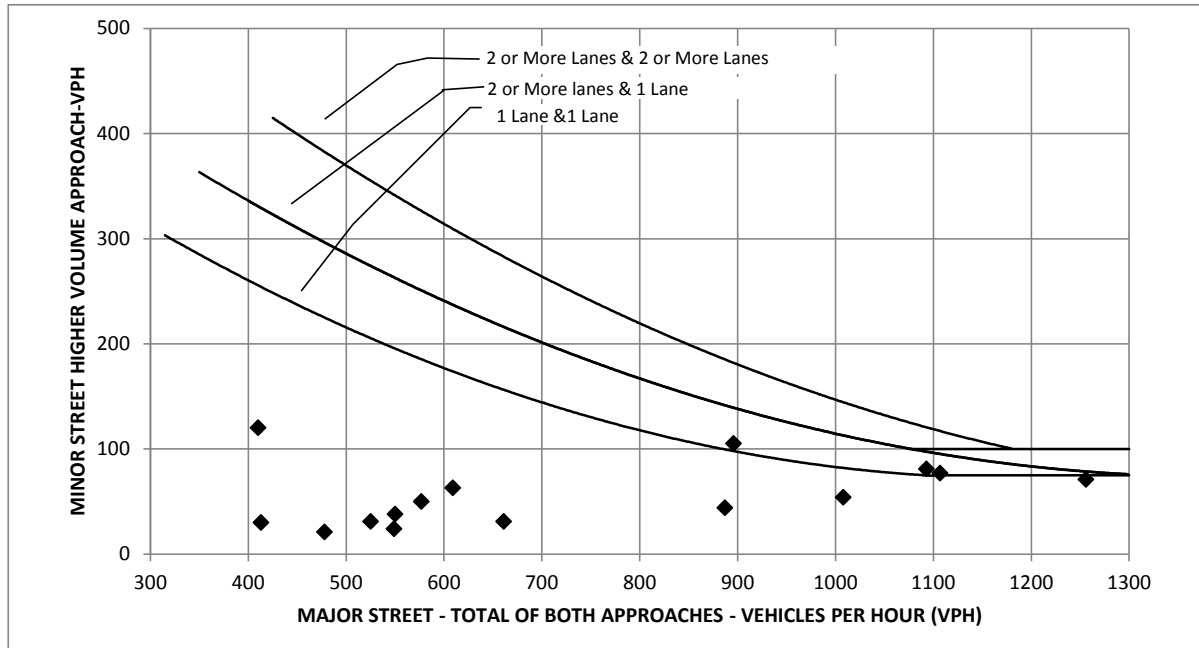
Is Warrant (70%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

<b>2</b>	<b>: No. of Lanes on Major St.</b>
<b>2</b>	<b>: No. of Lanes on Minor St.</b>
<b>45</b>	<b>: Speed limit or 85th Percentile? (MPH)</b>
<b>NO</b>	<b>: Is the intersection within an Isolated community?</b>
<b>0</b>	<b>: What is the of the population isolated community?</b>



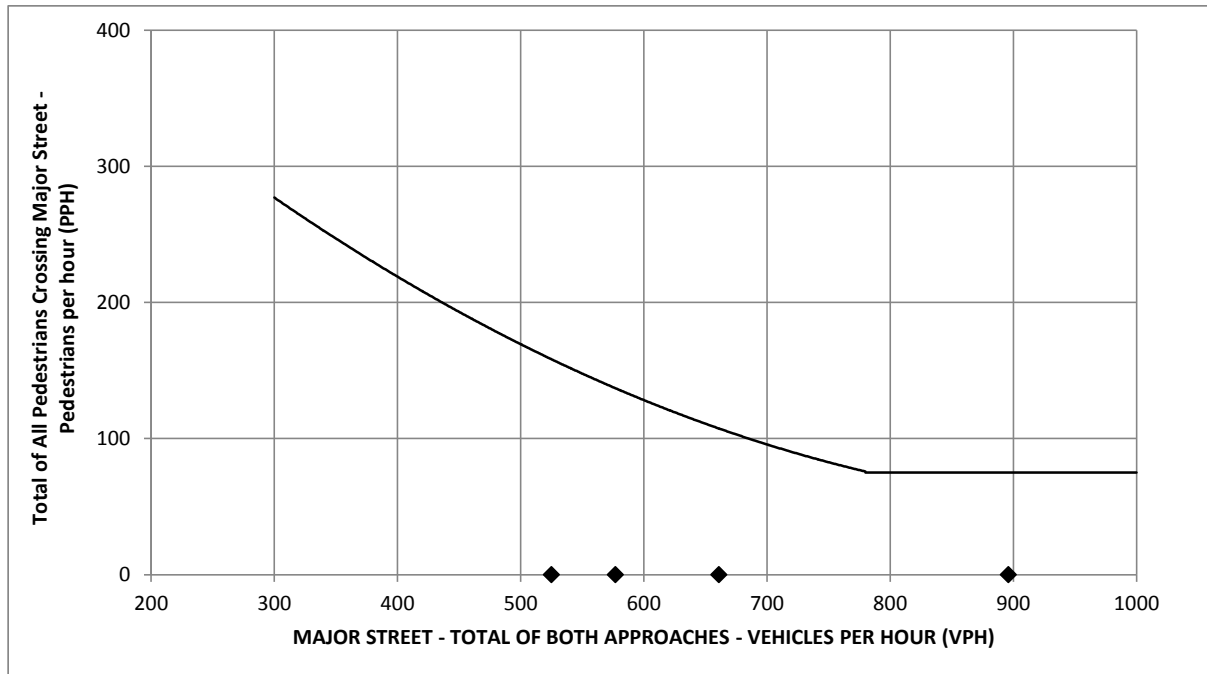
<b>How Many Hours Are Met</b>	<b>0</b>
<b>Is Warrant (70%) Met?</b>	<b>NO</b>

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



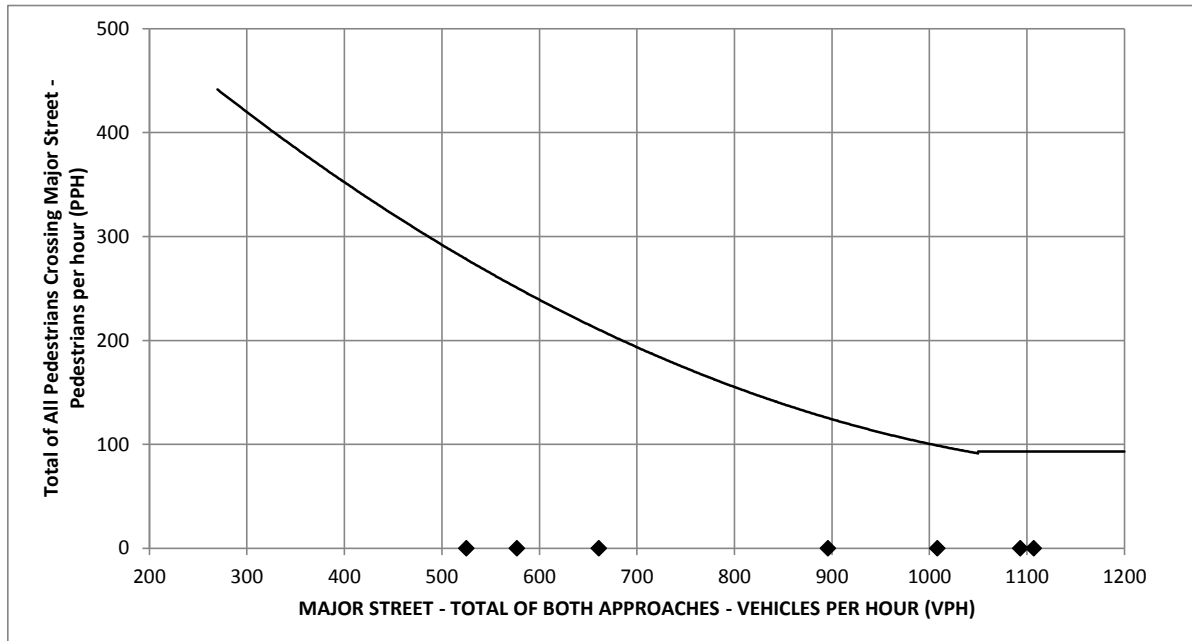
How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by:	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Peak Hour Met?	N/A

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 5: School Crossing</b>																			
Spot Number:	Background-WED																		
Intersection:	13 Mile @ Lenox Park Dr																		
Date	3/9/2015	by	BJL																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Distance to Nearest Signal or Stop Control on Major Road</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Width of Street</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Children per Group</td> </tr> <tr> <td style="text-align: center;">3</td> <td>: Safe Gap (Seconds)</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Gaps in Study Period</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Study Period (Minutes)</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of School Children</td> </tr> </table>				0	: Distance to Nearest Signal or Stop Control on Major Road	0	: Width of Street	0	: Number of Children per Group	3	: Safe Gap (Seconds)			0	: Number of Gaps in Study Period	0	: Study Period (Minutes)	0	: Number of School Children
0	: Distance to Nearest Signal or Stop Control on Major Road																		
0	: Width of Street																		
0	: Number of Children per Group																		
3	: Safe Gap (Seconds)																		
0	: Number of Gaps in Study Period																		
0	: Study Period (Minutes)																		
0	: Number of School Children																		
Is Warrant 5 Met?			NO																

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																	
Spot Number:		Background-WED															
Intersection:		13 Mile @ Lenox Park Dr															
Date	3/9/2015	by	BJL														
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>								2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?																
2	: No. of Lanes on Minor St?																
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?																
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?																
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?									
Time	E-W	N-S															
00:01 - 01:00	59	2	480	160	NO	720	80	NO									
01:00 - 02:00	35	0	480	160	NO	720	80	NO									
02:00 - 03:00	23	0	480	160	NO	720	80	NO									
03:00 - 04:00	24	0	480	160	NO	720	80	NO									
04:00 - 05:00	60	3	480	160	NO	720	80	NO									
05:00 - 06:00	160	9	480	160	NO	720	80	NO									
06:00 - 07:00	478	21	480	160	NO	720	80	NO									
07:00 - 08:00	1107	77	480	160	NO	720	80	NO									
08:00 - 09:00	1093	81	480	160	NO	720	80	YES									
09:00 - 10:00	609	63	480	160	NO	720	80	NO									
10:00 - 11:00	413	30	480	160	NO	720	80	NO									
11:00 - 12:00	525	31	480	160	NO	720	80	NO									
12:00 - 13:00	577	50	480	160	NO	720	80	NO									
13:00 - 14:00	550	38	480	160	NO	720	80	NO									
14:00 - 15:00	661	31	480	160	NO	720	80	NO									
15:00 - 16:00	896	105	480	160	NO	720	80	YES									
16:00 - 17:00	1008	54	480	160	NO	720	80	NO									
17:00 - 18:00	1256	71	480	160	NO	720	80	NO									
18:00 - 19:00	887	44	480	160	NO	720	80	NO									
19:00 - 20:00	549	24	480	160	NO	720	80	NO									
20:00 - 21:00	410	120	480	160	NO	720	80	NO									
21:00 - 22:00	288	50	480	160	NO	720	80	NO									
22:00 - 23:00	176	23	480	160	NO	720	80	NO									
23:00 - 00:00	115	1	480	160	NO	720	80	NO									
Number of Hours that met the warrant 7A =					0												
Number of Hours that met the warrant 7B =					2												
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)									NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)									NO								

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 8: Roadway Network</b>			
Spot Number:	Background-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <p style="margin-left: 40px;">(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p style="margin-left: 40px;">(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</p>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>



Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing					
Spot Number:	Background-WED				
Intersection:	13 Mile @ Lenox Park Dr				
Date	3/9/2015	by BJJ			
<b>Adjustment Factors</b> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr><td style="text-align: center;">fail</td></tr> <tr><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">2.7</td></tr> </table>	fail	1	2.7	0	: Clear Storage Distance (ft)
	fail				
	1				
	2.7				
	0	: Number of Approach Lanes Crossing Tracks			
	0	: Peak Hour			
	#N/A	: Peak Hour Major Street Volume			
	#N/A	: Peak Hour Minor Street Volume			
	0	: Trains per Day			
	0%	: Percentage High Occupancy Busses			
	2.6% to 7.5%	: Percentage Tractor Trailers			
	#N/A	: Adjusted Minor Street Volume			
#N/A	: Is Figure 4C-10 Satisfied?				
Is Warrant 9 Met?		#N/A			

Summary of Warrants			
Spot Number:	Future-WED		
Major Street:	13 Mile	Minor Street:	Lenox Park Dr
Intersection:	13 Mile at Lenox Park Dr		
City/Twp:	Novi		
Date Performed:	3/9/2015	Performed By:	BJL
Date Volumes Collected:	2/25/2015		
Warrant	Condition	Is Warrant Met	
Data Has Been Validated		YES	
<b>WARRANT 1: Eight-Hour Vehicular Volume</b>		NO	
	Condition A	NO	
	Condition B	NO	
	Condition A&B	N/A	
<b>WARRANT 2: Four-Hour Vehicular Volume</b>	(70%)	NO	
<b>WARRANT 3: Peak-Hour Vehicular Volume</b>	(70%)	#N/A	
	Condition A	#N/A	
	Condition B	NO	
<b>WARRANT 4: Pedestrian Volume</b>	(70%)	NO	
	Four Hour	N/A	
	Peak Hour	N/A	
	(Threshold)	HAWK	NO
	(Threshold)	RRFB	NO
<b>WARRANT 5: School Crossing</b>		NO	
<b>WARRANT 6: Coordinated Signal System</b>		NO	
<b>WARRANT 7: Crash Experience</b>		NO	
	Condition A	NO	
	Condition B	NO	
<b>WARRANT 8: Roadway Network</b>		NO	
<b>WARRANT 9: Intersection Near a Grade Crossing</b>		#N/A	
<b>Issue to Be Addressed by Signalization:</b>			
0			

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 1: Eight-Hour Vehicular Volume**

Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

2	: No. of Lanes on Major St?
2	: No. of Lanes on Minor St?
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: if answer 4 is Yes, then what is the of the population isolated community?
0%	: Have other remedial measures been tried?

USE 70% WARRANTS 1A AND 1B. DO NOT USE COMBINATION OF A & B

Time	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?	Combination Major A	Combination Minor A	Combination Major B	Combination Minor B	Warrant Condition A&B met?
	E-W	N-S											
00:01 - 01:00	59	2	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
01:00 - 02:00	35	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
02:00 - 03:00	23	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
03:00 - 04:00	24	0	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
04:00 - 05:00	60	3	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
05:00 - 06:00	160	9	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
06:00 - 07:00	478	21	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
07:00 - 08:00	1107	77	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
08:00 - 09:00	1093	81	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
09:00 - 10:00	609	63	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
10:00 - 11:00	413	30	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
11:00 - 12:00	525	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
12:00 - 13:00	577	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
13:00 - 14:00	550	38	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
14:00 - 15:00	661	31	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
15:00 - 16:00	896	105	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
16:00 - 17:00	1008	54	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
17:00 - 18:00	1311	71	420	140	NO	630	70	YES	N/A	N/A	N/A	N/A	NO
18:00 - 19:00	950	44	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
19:00 - 20:00	549	24	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
20:00 - 21:00	410	240	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
21:00 - 22:00	288	50	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
22:00 - 23:00	176	23	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO
23:00 - 00:00	115	1	420	140	NO	630	70	NO	N/A	N/A	N/A	N/A	NO

Number of Hours that met the warrant 1A =	0
Number of Hours that met the warrant 1B =	4
Number of Hours that met the warrant 1 A & B =	0

A. Is the Minimum Vehicular Volume Warrant Met? (Condition A)	NO
B. Is the Interruption of Continuous Traffic Met? (Condition B)	NO
C. Combination of Warrants A and B Criteria Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 2: Four-Hour Vehicular Volume**

Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met

2

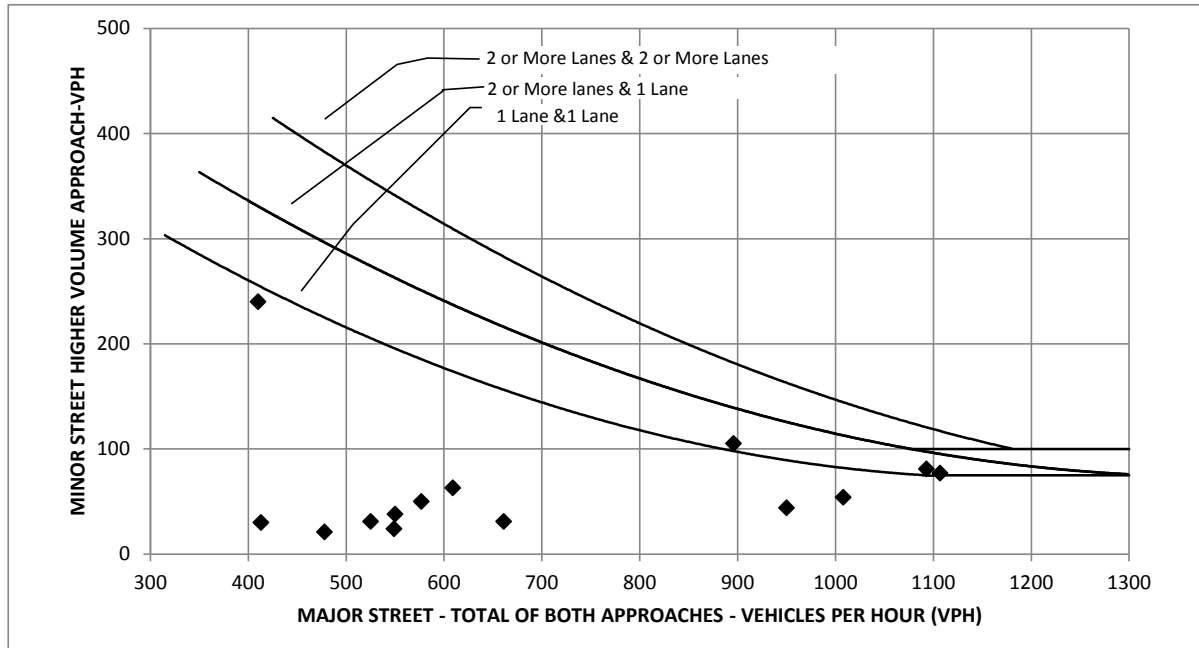
Is Warrant (70%) Met?

NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 3 B(70%): Peak-Hour Vehicular Volume**

Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



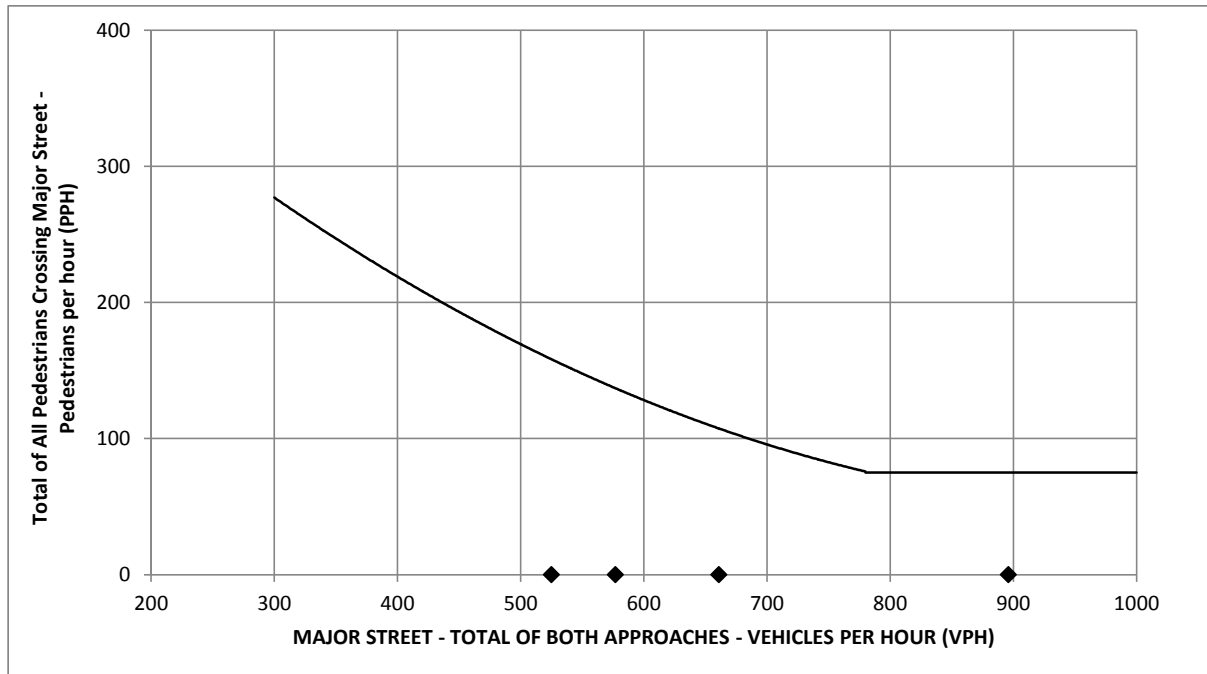
How Many Hours Are Met	0
Is Warrant (70%) Met?	NO

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Four-Hour Pedestrian Volume**

Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



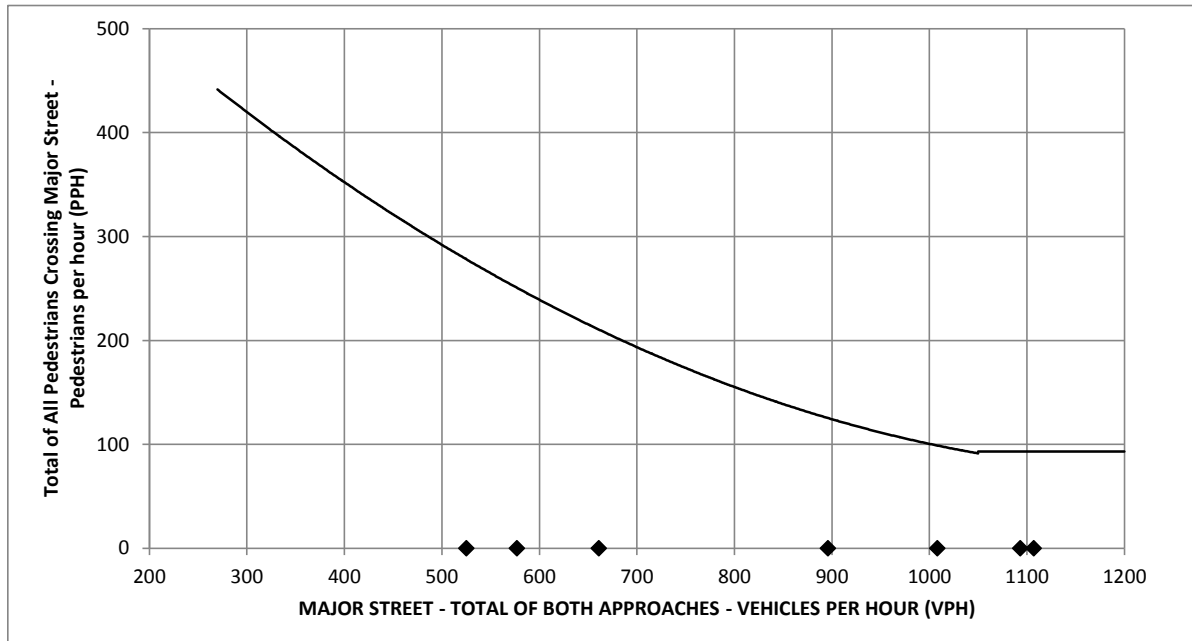
How Many Hours Are Met	N/A
Is Warrant 4 B (70%): Four Hour Met?	N/A

**Michigan Manual of Uniform Traffic Control Devices  
Worksheet for Signal Warrants (Section 4C)  
WARRANT 4 (70%): Peak-Hour Pedestrian Volume**

Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date:	3/9/2015	by	BJL

0	: Distance to Nearest Signal or Stop Control on Major Road
0%	: Percentage Reduction in Pedestrian Volumes
45	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?

**Adjacent Traffic Signal or Stop Sign is Too Close**



**How Many Hours Are Met**

N/A

**Is Warrant 4 B (70%): Peak Hour Met?**

N/A

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 5: School Crossing</b>																			
Spot Number:	Future-WED																		
Intersection:	13 Mile @ Lenox Park Dr																		
Date	3/9/2015	by	BJL																
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0</td> <td>: Distance to Nearest Signal or Stop Control on Major Road</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Width of Street</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Children per Group</td> </tr> <tr> <td style="text-align: center;">3</td> <td>: Safe Gap (Seconds)</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of Gaps in Study Period</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Study Period (Minutes)</td> </tr> <tr> <td style="text-align: center;">0</td> <td>: Number of School Children</td> </tr> </table>				0	: Distance to Nearest Signal or Stop Control on Major Road	0	: Width of Street	0	: Number of Children per Group	3	: Safe Gap (Seconds)			0	: Number of Gaps in Study Period	0	: Study Period (Minutes)	0	: Number of School Children
0	: Distance to Nearest Signal or Stop Control on Major Road																		
0	: Width of Street																		
0	: Number of Children per Group																		
3	: Safe Gap (Seconds)																		
0	: Number of Gaps in Study Period																		
0	: Study Period (Minutes)																		
0	: Number of School Children																		
Is Warrant 5 Met?			NO																



<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 6: Coordinated Signal System</b>			
Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The Progressive Movement warrant is satisfied when:</p> <ol style="list-style-type: none"> <li>1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or</li> <li>2. On a two-way street, adjacent signals do not provide the necessary degree of a platooning and the proposed or adjacent signals could constitute a progressive signal system.</li> </ol> <p>The installation of a signal according to this warrant should not be considered where the resultant signal spacing is less than 1,000 feet.</p>			
<b>Is Warrant 6 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 7: Crash Experience																	
Spot Number:		Future-WED															
Intersection:		13 Mile @ Lenox Park Dr															
Date	3/9/2015	by	BJL														
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: center;">2</td> <td>: No. of Lanes on Major St?</td> </tr> <tr> <td style="text-align: center;">2</td> <td>: No. of Lanes on Minor St?</td> </tr> <tr> <td style="text-align: center;">0%</td> <td>: Has adequate trial of remedial measure with adequate enforcement been tried?</td> </tr> <tr> <td style="text-align: center;">NO</td> <td>: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?</td> </tr> </table>								2	: No. of Lanes on Major St?	2	: No. of Lanes on Minor St?	0%	: Has adequate trial of remedial measure with adequate enforcement been tried?	NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?
2	: No. of Lanes on Major St?																
2	: No. of Lanes on Minor St?																
0%	: Has adequate trial of remedial measure with adequate enforcement been tried?																
NO	: Have there been 5 or more crashes susceptible to correction by Signalization occurred in a 12 month period?																
	Major Volume (Both Apr.)	Minor Volume (One Apr.)	Condition A Major Volume	Condition A Minor Volume	Warrant Condition A Met?	Condition B Major Volume	Condition B Minor Volume	Warrant Condition B Met?									
Time	E-W	N-S															
00:01 - 01:00	59	2	480	160	NO	720	80	NO									
01:00 - 02:00	35	0	480	160	NO	720	80	NO									
02:00 - 03:00	23	0	480	160	NO	720	80	NO									
03:00 - 04:00	24	0	480	160	NO	720	80	NO									
04:00 - 05:00	60	3	480	160	NO	720	80	NO									
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07:00 - 08:00	1107	77	480	160	NO	720	80	NO									
08:00 - 09:00	1093	81	480	160	NO	720	80	YES									
09:00 - 10:00	609	63	480	160	NO	720	80	NO									
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11:00 - 12:00	525	31	480	160	NO	720	80	NO									
12:00 - 13:00	577	50	480	160	NO	720	80	NO									
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19:00 - 20:00	549	24	480	160	NO	720	80	NO									
20:00 - 21:00	410	240	480	160	NO	720	80	NO									
21:00 - 22:00	288	50	480	160	NO	720	80	NO									
22:00 - 23:00	176	23	480	160	NO	720	80	NO									
23:00 - 00:00	115	1	480	160	NO	720	80	NO									
Number of Hours that met the warrant 7A = <input style="width: 50px; text-align: center;" type="text" value="0"/> Number of Hours that met the warrant 7B = <input style="width: 50px; text-align: center;" type="text" value="2"/>																	
A. Is the Minimum Vehicular Volume Warrant Met Based on Crash Patterns? (Condition A)									NO								
B. Is the Interruption of Continuous Traffic Met Based on Crash Patterns? (Condition B)									NO								

<b>Michigan Manual of Uniform Traffic Control Devices</b> <b>Worksheet for Signal Warrants (Section 4C)</b> <b>WARRANT 8: Roadway Network</b>			
Spot Number:	Future-WED		
Intersection:	13 Mile @ Lenox Park Dr		
Date	3/9/2015	by	BJL
<p>The need for a traffic signal control study is applicable when the common intersection of two or more major routes meets one or both of the following criteria :</p> <p style="margin-left: 40px;">(1) has a total existing, or immediately projected, entering volume of at least 1,000 vehicles during the peak hour and has five-year projected volumes, based on an engineering study, which meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p style="margin-left: 40px;">(2) has a total existing or immediately projected entering volume of at least 1,000 vehicles for each of any five hours of a non-normal business day (Saturday and/or Sunday).</p>			
<b>Is Warrant 8 Met?</b>			<b>NO</b>

Michigan Manual of Uniform Traffic Control Devices Worksheet for Signal Warrants (Section 4C) WARRANT 9: Intersection Near a Grade Crossing						
Spot Number:	Future-WED					
Intersection:	13 Mile @ Lenox Park Dr					
Date	3/9/2015	by	BJL			
<b>Adjustment Factors</b> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr><td style="text-align: center;">fail</td></tr> <tr><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">2.7</td></tr> </table>	fail	1	2.7	0	:	Clear Storage Distance (ft)
	fail					
	1					
	2.7					
	0	:	Number of Approach Lanes Crossing Tracks			
	0	:	Peak Hour			
	#N/A	:	Peak Hour Major Street Volume			
	#N/A	:	Peak Hour Minor Street Volume			
	0	:	Trains per Day			
	0%	:	Percentage High Occupancy Busses			
	2.6% to 7.5%	:	Percentage Tractor Trailers			
#N/A	:	Adjusted Minor Street Volume				
#N/A	:	Is Figure 4C-10 Satisfied?				
Is Warrant 9 Met?			#N/A			



### *Education*

B.S., Civil Engineering,  
Transportation  
Wayne State University 2000

M.S., C.E., Transportation  
Wayne State University 2002

### *Professional Registration/ Certification*

Professional Engineer, Michigan  
No. 51514

Professional Traffic Operations  
Engineer  
No. 1427

### *Affiliations*

American Society of Civil Engineers

Institute of Transportation Engineers

Tau Beta Pi, The Engineering Honor  
Society

Women's Transportation Seminar

Intelligent Transportation Society of  
Michigan

## Colleen Hill-Stramsak, P.E., PTOE

Associate

Ms. Hill-Stramsak has been with HRC since 2002. She manages the Traffic Engineering Department and provides municipal traffic engineering services to several communities in Michigan. She prepares transportation studies, impact studies for land developments, traffic crash analysis, traffic operations, safety studies and traffic maintenance plans. She is responsible for modeling and simulating transportation networks to optimize, also evaluating safety and operational improvements. Software proficiency in Highway Capacity Software, Synchro/SimTraffic, CORSIM, ACCUSIM II, MicroStation, Autodesk Map 3D, RODEL and VISSIM. Ms. Hill-Stramsak is also responsible for preparing traffic control and detours plans, traffic signal design and layout plans. She conducted the Older Driver Highway Design Workshop while at Wayne State University. She is a former member of the International Board of Direction and the Great Lakes District President (2012-2014) of the Institute of Transportation Engineers and a member of the Michigan Section.

### *Professional Experience*

#### ***Providence Park Hospital Parking Study St. John Providence***

HRC performed a site analysis of existing and future parking requirements at Providence Park Hospital in the City of Novi. As Project Manager, evaluated the existing and projected future conditions based planned 32 bed expansion of the hospital. Aerial photographs were used to evaluate existing parking demand during typical weekday peak hours. Relocation of accessible parking spaces based on need was also included in the study.

#### ***Site Circulation and Traffic Impact Assessment Yeshiva Beth Yehudah Schools***

A traffic study was performed for the proposed school expansion of Yeshiva Beth Yehudah at the 10 Mile Road campus in the City of Oak Park. Extensive data collection was conducted to analyze the site access, circulation and parking needs at the existing girls' school and the preschool center. Recommendations were provided for future traffic operations, site access and student drop off and pick circulation for the proposed schools.

#### ***Traffic Impact Study for MotorCity Casino Detroit Entertainment, LLC***

Traffic impact study for site plan approval of the original Casino, with a gaming floor area of 68,000 sq. ft. The study responded to all of the transportation requirements set forth in the Development Agreement between the City of Detroit and the casino developers. This included access for pedestrians and transit vehicles. Approximately six months after the MotorCity Casino was opened, HRC conducted a traffic operation study to identify any operational and/or safety problems and to develop countermeasures to reduce the risk of crashes and conflicts.

#### ***Westmarket Square City of Novi***

HRC performed a shared parking study for Westmarket Square for the peak design month of December and used the time of day factors for a peak day in December for the retail stores. HRC utilized the Urban Land Institute's Shared Parking, 2<sup>nd</sup> Edition to determine if the number of parking spaces provided met the requirements of the City of Novi Zoning Ordinance. The parking lot provided in excess of 1,570 spaces initially and was expanded during the various project phases while maintaining parking and access to the operational portion of the center.



Colleen Hill-Stramsak, P.E., PTOE

Associate

***Traffic Impact Study for Rezoning of Northwest Corner of 10 Mile Road and Beck Road***

**Ten & Beck, LLC**

A traffic impact study was performed for the rezoning of 10 Mile Road and Beck Road in the City of Novi. The study included estimation of background traffic, trip generation, trip distribution and assignment, capacity analysis, recommendations to mitigate impacts of additional traffic and a report summarizing results.

***Dixie Highway Safety Study***

**Charter Township of Springfield**

The study area included the Dixie Highway corridor from Big Lake Road north to Davisburg Road. The study included crash analysis, review and evaluation of safety countermeasures, access management techniques, signal warrant study, left-turn phasing study and possible realignment of Big Lake Road/Dixie Highway intersection with Deerhill Drive/Dixie Highway intersection. A comprehensive report was prepared and the results presented to the Township Board of Trustees.

***Traffic Impact Study for Mixed Use Development***

**Real Estate interests Group, Inc.**

Preparation of traffic impact study for the mixed use development in Northville Township including all field data collection and two traffic signal warrant studies.

***Shoppes of Fenton***

**Detroit Development**

Corrected, revised and optimized traffic model of existing and future traffic for a planned unit development including five adjacent signals in the city of Fenton.

***Traffic Impact and Parking Analysis for Heritage Park North***

**Grand Sakwa of Grand Blanc, LLC**

Traffic Engineer for traffic impact analysis of 600,000 SF mixed commercial development in Grand Blanc Township to accompany rezoning request and subsequent site plan review. Study included data collection, trip generation and comparisons, trip assignment, capacity analysis of existing and future traffic conditions, parking analysis, signal optimization and recommendations. Conducted signal warrant analysis and access management review. Retained to develop alternatives for access issues, design the new traffic signal on Saginaw Road and modify traffic signal on Dort Highway.

***Transportation and Infrastructure Assessment and Master Plan***

**Vandewalle & Associates**

Traffic Engineer for Project Development Study to provide transportation and utilities planning and analysis for 640 acre planned unit development for the Lansing Township Downtown Development Authority Master Plan. Work involved conducting traffic volume studies, performing trip generation and traffic assignment; determining internal capture rate, developing traffic model using Synchro 6.0 and SimTraffic for existing and eight alternative scenarios.

***Traffic Impact Analysis for White Lake Hill Mixed Use Development***

**Laurtec, Ltd.**

Traffic Engineer for traffic impact analysis of mixed commercial

Colleen Hill-Stramsak, P.E., PTOE

Associate

development in White Lake Township to accompany rezoning request and site plan review. Study included data collection, trip generation and comparisons, trip assignment, capacity analysis of existing and future traffic conditions, signal optimization and recommendations.

***Community Policy on Mid-Block Pedestrian Crossings***

**City of Wyoming**

Researched and recommended practices and developed policy for approving and format for evaluating requests for mid-block crossings.

***Traffic Impact Analysis for the Proposed National Street Extension***

**City of Howell**

Traffic Operations Study which involves developing traffic model of proposed extension of National Street from Grand River Avenue to D-19 at ramps to I-96 as a by-pass to downtown Howell. Developed methodology for calculating traffic to be diverted to National Street Extension and performed capacity analysis using Synchro for existing, background and 2015 traffic conditions. Evaluated alternatives to signalization and performed analysis of two recommended roundabouts using RODEL.

***Road Safety Audit for the Proposed Brandon Elementary School***

**Charter Township of Brandon**

Project Engineer for the road safety audit of a driveway onto Oakwood Road from the proposed Brandon Elementary School. Performed a sight distance evaluation and a detailed crash analysis for the road segment to be accessed by the proposed driveway. The road safety audit included: 24 hour traffic volumes and speeds; sight distance evaluation; a detailed crash analysis; projected traffic volumes and patterns for the proposed elementary school and recommended road improvements for safe access to and from the site.

***Traffic Circulation Analysis for Ann Arbor Huron High School***

**City of Ann Arbor**

Circulation and Safety Study to improve overall safety in and around school campus for drivers, bus users and pedestrians. Analyzed existing traffic conditions, identified deficiencies and suggested countermeasures. Conducted license plate survey to track traffic on the school premise. Performed capacity analysis using HCS and detailed crash analysis at two intersections and two driveways.

***State Farm Intersection Safety Studies***

**Road Commission for Oakland County**

Reviewed geometrics, traffic volume, traffic crash and traffic conflict characteristics for three high crash intersections. Evaluated existing safety issues, recommended potential traffic safety engineering countermeasures, and developed an implementation plan of action.

***M-15 Access Management Plan***

**Michigan Department of Transportation**

Performed driveway spacing analysis using MDOT, Oakland and Genesee County Standards. Responsible for performing traffic crash analysis for driveways and intersections along the M-15 corridor over its 20 mile length between I-75 and I-69.



## Colleen Hill-Stramsak, P.E., PTOE

Associate

### *Presentations/Publications*

"Road Safety Audits," ACEC/MDOT (American Council of Engineering Companies of Michigan/Michigan Department of Transportation) Partnering Workshop January 2014 (with Jeffrey Bagdade, P.E., PTOE, and Steven Loveland, P.E., PTOE).

"Intersection Safety within a Signal Optimization Project," Institute of Transportation Engineers 2004 Technical Conference and Exhibit Compendium of Technical Papers, March 2004 (with Stephen B. Dearing, P.E.).

"Intersection Safety within a Signal Optimization Project," Presented Institute of Transportation Engineers 2004 Technical Conference and Exhibit, March 31, 2004.

"Intersection Safety within a Signal Optimization Project," Presented Institute of Transportation Engineers Michigan Section Technical Session, February 12, 2004.

"Michigan ITE Website Update," Presented Institute of Transportation Engineers Michigan Section Technical Session, February 12, 2004.

"Change and Clearance Interval Design on Red-Light Running and Late Exits," Transportation Research Record, No. 1856 (p. 193-201), Washington D.C., 2003 (with Kerrie L. Schattler and Tapan K. Datta).



Letter of Support from  
Lennox Park of Novi Condominium Association

# LENOX *Park*

of Novi  
Condominium Association

March 18, 2015

City of Novi Planning Commission  
45175 Ten Mile Road  
Novi, Michigan 48375

To Whom It May Concern,

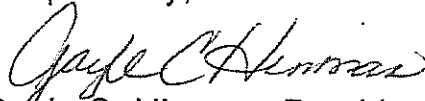
On behalf of the Board of Directors of Lenox Park Association, I would like to take this opportunity to express to you our complete support for the proposed building project that Brightmoor Christian Church has submitted to the City of Novi Planning Commission.

Our residents have received the Notice of the Public Hearing and the board of directors supports the approval of the project, including the additional building height that has been requested.

As a neighboring community of Brightmoor Christian Church, we appreciate all the past efforts they have made in making us aware of any future expansion plans that the church was planning. As an example, we were included in many meetings regarding the expansion of their parking lot and suggestions we made were taken into consideration.

Lenox Park has experienced a very positive relationship with Brightmoor Christian Church, working closely together in the spirit of cooperation and mutual benefit. We look forward to this continuing into the future.

Respectfully,

  
Gayle C. Hinman, President  
Lenox Park Association Board of Directors

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