



To: Mr. Bruce Michael  
Three Oaks Communities

Re: South Oaks Development – Rochester Hills, MI  
Turn Lane Warrant Evaluation

From: Steven J. Russo, PE  
Transportation Engineer

Date: December 2, 2022

**INTRODUCTION**

This memorandum presents the results of a turn lane warrant evaluation for the proposed South Oaks residential development project in the City of Rochester Hills, Oakland County, Michigan. The project site is located on the north side of South Boulevard approximately 1/2 mile west of Crooks Road and is currently vacant. The proposed development project involves construction of nine single-family dwelling units with site access provided via a single driveway to South Boulevard.

In the vicinity of the site, South Boulevard is a two-lane road under jurisdiction of the Road Commission for Oakland County (RCOC); whereby access permitting will be subject to RCOC review and standards. In accordance with RCOC standards, a turn lane warrant analysis evaluation has been requested for the proposed site driveway as a requirement for project approval. Additionally, the project will be subject to City review and standards through the site plan approval process. The purpose of this study is to determine if right-turn deceleration lanes and/or passing lanes are warranted at the site driveway based on the warranting criteria outlined in the RCOC *Permit Rules, Specifications and Guidelines*.

**TURN LANE WARRANT ANALYSIS**

Existing weekday hourly traffic volume data for the study section of South Boulevard was obtained from the RCOC Transportation Data Management System (TDMS). This data was collected in March, 2016. An ambient growth factor was applied to the 2016 traffic volumes to account for future projects in the study area and population increases, as well as growth in regular traffic volumes due to development projects outside the study area. SEMCOG community information indicates a growth rate of approximately 0.17% per year in population and 0.3% per year in employment for the City of Rochester Hills from 2015 to 2045. Conservatively, a 1.0% per year growth rate was utilized for this study and this rate was therefore applied to the 2016 traffic volumes for a period of eight years (2024 Buildout). The resulting no-build two-way 24-hour traffic volume on South Boulevard is 12,830 vehicles.

The volume of peak hour turns was determined based on the number of vehicle trips that would be generated by the proposed development and existing traffic patterns. The number of site-generated trips was forecast based on the rates and equations published by the Institute of Transportation Engineers (ITE) in *Trip Generation, 11<sup>th</sup> Edition*. The proposed development is best represented by ITE land use 210 – Single-Family Detached Housing. Trip generation was calculated using the fitted curve equations in accordance with ITE methodology. The resultant trip generation forecast for the proposed development is shown in **Table 1**.

**Table 1: Site Trip Generation**

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
Single-Family	210	9	Dwellings	110	2	6	8	6	4	10

Conservatively, Bergmann evaluated the turn lane warrant for the maximum number of left turns at the intersection of the proposed site driveway with South Boulevard. Based on the ITE data summarized in **Table 1**, if all site traffic entered the site from the west and no site traffic traveled from the east, a maximum of six (6) inbound left turns



would be experienced during the PM peak hour. In order to determine the configuration of the proposed site driveway with South Boulevard, RCOOC warrants for left turn lanes were evaluated in accordance with Section 6.7 of the RCOOC *Permit Rules, Specifications and Guidelines*. The results of the analysis of these standards indicate that ***a left turn lane is not warranted at the proposed site driveway.***

The traffic data and turn lane warrant graph is attached for reference to this memorandum. Any questions related to this memorandum, analyses, and results should be addressed to Bergmann.

**Attached:** Existing Traffic Volume Data  
Left Turn Lane Warrant

Location Info		Count Data Info	
Location ID	2545	Start Date	3/29/2016
Type	LINK	End Date	3/30/2016
Functional Class	-	Start Time	11:00 AM
Located On	SOUTH BLVD	End Time	11:00 AM
Between	COOLIDGE AND CROOKS	Direction	
Direction	2-WAY	Notes	
Community	Troy	Count Source	FO345_____
MPO_ID	246811	File Name	D0329001.prn
HPMS ID		Weather	
Agency	Road Commission for Oakland County	Study	
		Owner	tiacounts
		QC Status	Accepted
<b>Interval: 60 mins</b>		<b>Growth Factor:</b>	<b>1.083</b>
		<b>Study Year:</b>	2016
		<b>Buildout Year:</b>	2024
		<b>Growth Rate (%):</b>	1.00%
		2024	
<b>Time</b>	<b>Hourly Count</b>		
00:00 - 01:00	41	44	
01:00 - 02:00	14	15	
02:00 - 03:00	15	16	
03:00 - 04:00	12	13	
04:00 - 05:00	22	24	
05:00 - 06:00	109	118	
06:00 - 07:00	344	373	
07:00 - 08:00	834	903	
08:00 - 09:00	904	979	
09:00 - 10:00	579	627	
10:00 - 11:00	567	614	
11:00 - 12:00	590	639	
12:00 - 13:00	685	742	
13:00 - 14:00	685	742	
14:00 - 15:00	756	819	
15:00 - 16:00	911	986	
16:00 - 17:00	1104	1195	
17:00 - 18:00	1216	1317	
18:00 - 19:00	843	913	
19:00 - 20:00	653	707	
20:00 - 21:00	469	508	
21:00 - 22:00	271	293	
22:00 - 23:00	143	155	
23:00 - 24:00	81	88	
<b>TOTAL</b>	<b>11848</b>	<b>12830</b>	

# Community Profiles

YOU ARE VIEWING DATA FOR:

## City of Rochester Hills

1000 Rochester Hills Dr  
Rochester Hills, MI 48309-  
3033

<https://www.rochesterhills.org/>



Census 2020 Population:  
76,300  
Area: 32.9 square miles

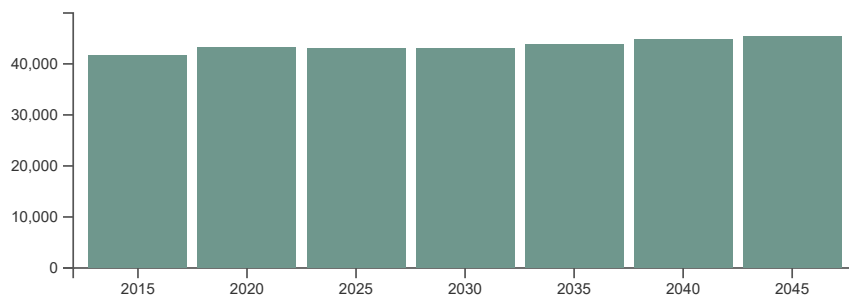
[VIEW COMMUNITY EXPLORER MAP](#)

[VIEW 2020 CENSUS MAP](#)

### Economy & Jobs

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

#### Forecasted Jobs



Source: SEMCOG 2045 Regional Development Forecast

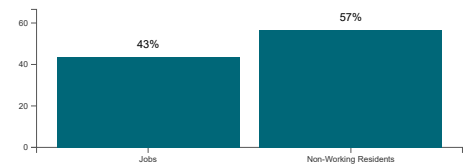
## Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
<b>Natural Resources, Mining, &amp; Construction</b>	1,755	2,005	1,907	1,886	1,911	1,938	1,967	212	12.1%
<b>Manufacturing</b>	5,018	4,705	4,429	4,098	3,886	3,704	3,505	-1,513	-30.2%
<b>Wholesale Trade</b>	1,437	1,484	1,482	1,465	1,465	1,464	1,454	17	1.2%
<b>Retail Trade</b>	6,186	6,284	5,952	5,927	5,740	5,662	5,599	-587	-9.5%
<b>Transportation, Warehousing, &amp; Utilities</b>	699	723	721	719	730	743	756	57	8.2%
<b>Information &amp; Financial Activities</b>	3,877	4,008	3,960	3,911	3,955	3,973	3,952	75	1.9%
<b>Professional and Technical Services &amp; Corporate HQ</b>	3,552	3,647	3,850	4,080	4,551	5,061	5,412	1,860	52.4%
<b>Administrative, Support, &amp; Waste Services</b>	3,708	3,835	3,885	3,906	3,992	4,080	4,134	426	11.5%
<b>Education Services</b>	2,261	2,377	2,375	2,363	2,389	2,419	2,449	188	8.3%
<b>Healthcare Services</b>	6,774	7,303	7,578	7,758	8,230	8,705	9,124	2,350	34.7%
<b>Leisure &amp; Hospitality</b>	3,951	4,433	4,527	4,572	4,660	4,776	4,818	867	21.9%
<b>Other Services</b>	1,982	2,041	1,993	1,956	1,950	1,937	1,910	-72	-3.6%
<b>Public Administration</b>	359	361	359	354	354	351	351	-8	-2.2%
<b>Total Employment Numbers</b>	41,559	43,206	43,018	42,995	43,813	44,813	45,431	3,872	9.3%

Source: **SEMCOG 2045 Regional Development Forecast**

## Daytime Population

Daytime Population	ACS 2016
Jobs	28,136
Non-Working Residents	36,638
Age 15 and under	14,444
Not in labor force	20,456
Unemployed	1,738
<b>Daytime Population</b>	<b>64,774</b>



Source: **2012-2016 American Community Survey 5-Year Estimates** and **2012-2016 Census Transportation Planning Products Program (CTPP)**. For additional information, visit SEMCOG's **Interactive Commuting Patterns Map**

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.

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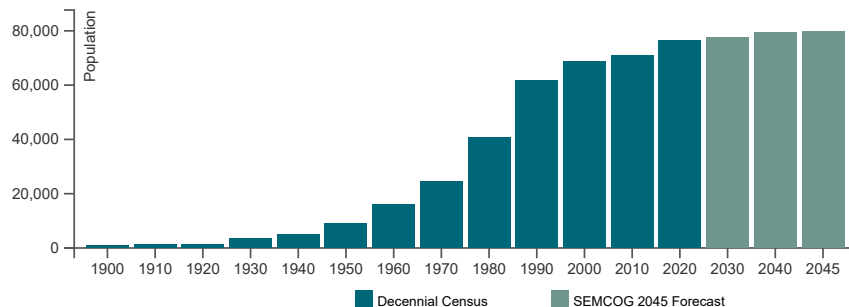
[VIEW 2020 CENSUS MAP](#)

### Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year**  **Social | Demographic**

#### Population and Household Estimates for Southeast Michigan, 2021

### Population Forecast



Note for City of Rochester Hills : Incorporated in 1984 from Avon Charter Township. Population numbers prior to 1984 are of the township.

## Population and Households

Population and Households	Census 2020	Census 2010	Change 2010-2020	Pct Change 2010-2020	SEMCOG Jul 2021	SEMCOG 2045
<b>Total Population</b>	76,300	70,995	5,305	7.5%	76,909	79,709
<b>Group Quarters Population</b>	1,280	1,181	99	8.4%	1,280	1,494
<b>Household Population</b>	75,020	69,814	5,206	7.5%	75,629	78,215
<b>Housing Units</b>	31,208	29,494	1,714	5.8%	31,359	-
<b>Households (Occupied Units)</b>	29,711	27,578	2,133	7.7%	29,962	32,471
<b>Residential Vacancy Rate</b>	4.8%	6.5%	-1.7%	-	4.5%	-
<b>Average Household Size</b>	2.52	2.53	-0.01	-	2.52	2.41

Source: U.S. Census Bureau and SEMCOG 2045 Regional Development Forecast

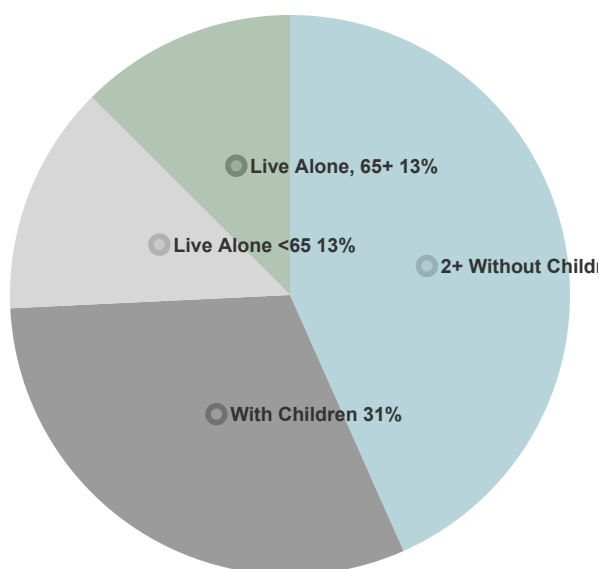
## Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2018 Avg.
<b>Natural Increase (Births - Deaths)</b>	384	233	176
<b>Births</b>	950	755	751
<b>Deaths</b>	566	522	575
<b>Net Migration (Movement In - Movement Out)</b>	-368	185	269
<b>Population Change (Natural Increase + Net Migration)</b>	16	418	445

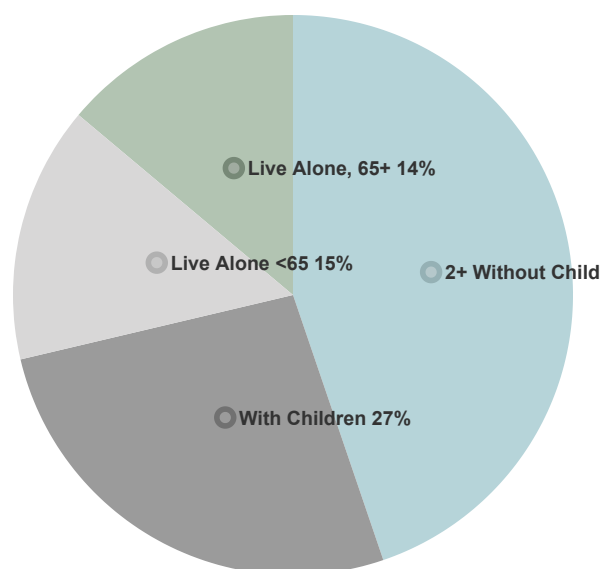
Source: Michigan Department of Community Health Vital Statistics, U.S. Census Bureau, and SEMCOG

## Household Types

ACS  
2020



SEMCOG  
2045



# SOUTH BOULEVARD & SITE DRIVEWAY LEFT-TURN LANE WARRANT

FIGURE 6-2

## WARRANT FOR PERMITTING LEFT TURNS

(BASED ON TOTAL DEVELOPMENT)

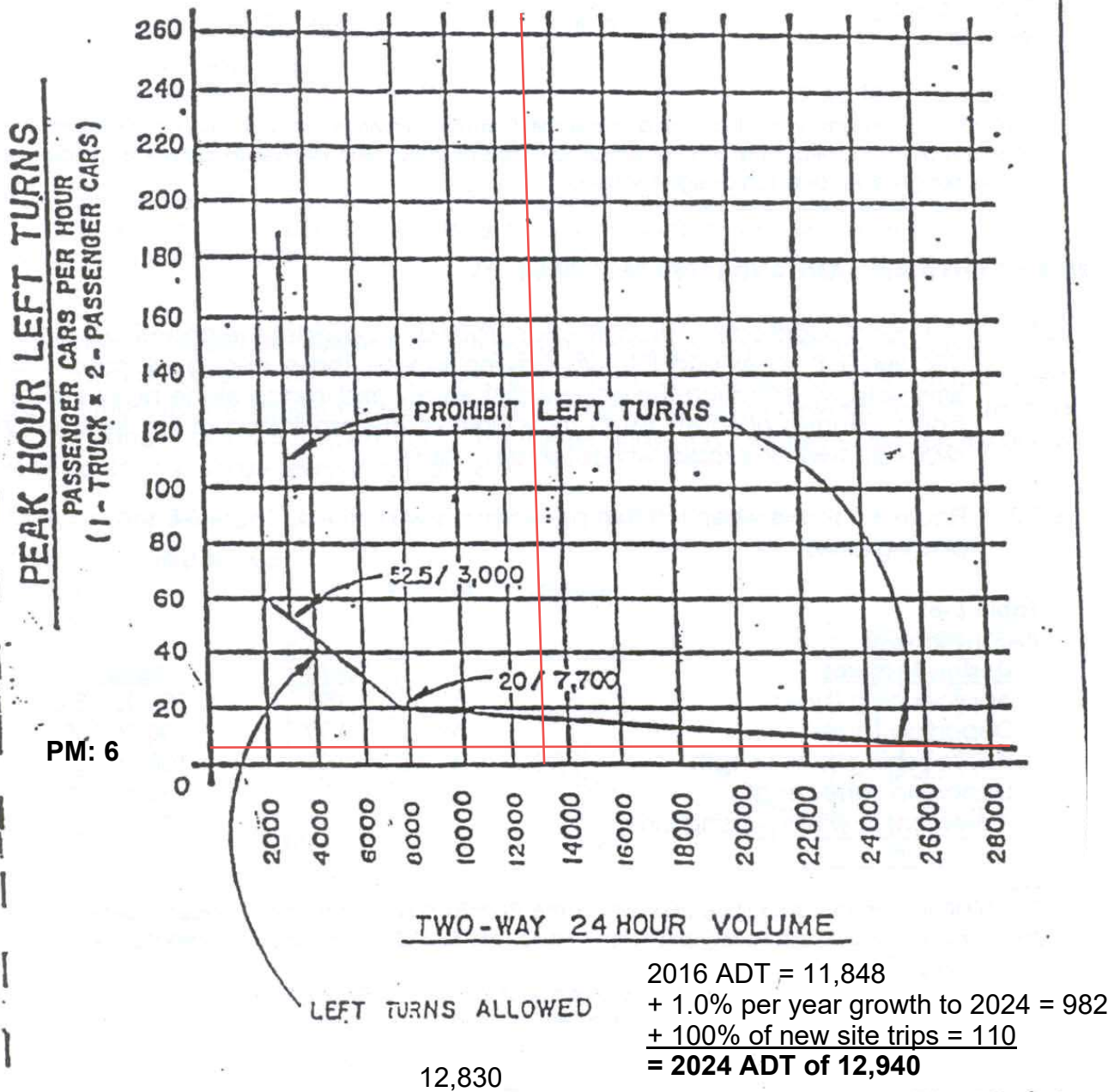


FIGURE 6-2

REVISED 8-6-79