

Appendix A

TERMINOLOGY AND TRAFFIC GROWTH RATES

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Appendix A

TERMINOLOGY AND TRAFFIC GROWTH RATES

A. 1.0 - Terminology

Terminology

Traffic Safety & Engineering

ADT

Acronym for *Average Daily Traffic*. The average 24-hour traffic volume (in both directions) passing a given point or traveling along a segment.

Approach

The group of lanes for traffic moving toward an intersection.

HMVMT

Acronym for *Hundred Million Vehicle Miles Traveled*. Crash rates along roadway segments are often reported as the number of crashes per 100 million vehicle miles traveled.

Injury Severity

A-level Injury	Crash resulted in an incapacitating injury.
B-level Injury	Crash resulted in a non-incapacitating injury.
C-level Injury	Crash resulted in a possible injury.

TCAT

Acronym for *Traffic Crash Analysis Tool*, a web-based program used to obtain detailed crash data and statistics for any location within the state of Michigan by drawing upon the master database of the Michigan State Police. TCAT is coordinated and funded by the TIA.

TIA

Acronym for the Traffic Improvement Association, a non-profit traffic safety agency that serves approximately 70 communities throughout Oakland, Macomb, Wayne, & Livingston Counties. More information about TIA is available at www.tiami.us

MEV

Acronym for *Million Entering Vehicles*. Crash rates at intersections are often reported as the number of crashes per one million entering vehicles.

v/c

Abbreviation for *volume to capacity*. A ratio of 1.0 indicates that a roadway is operating at a full theoretical capacity, whereas lower ratios indicate that the roadway is operating at less than full capacity.

50th percentile queue

The average maximum vehicular queue length for a typical signal cycle. The queue length is proportional to the amount of red time for the signalized approach.

Terminology

Traffic Safety & Engineering

LOS

Acronym for *Level of Service*, which is a measure of delay. LOS is based on factors such as number and types of lanes, intersection controls (such as stop signs or traffic signals), traffic volumes, pedestrian volumes, etc. LOS is expressed as a letter grade, in a range from A through F. In this context, LOS A represents the best conditions, with very little or no average delay to vehicles. LOS F is the worst of conditions, equated with very large average delays and few gaps of acceptable length. .

Table 1 summarizes the range in LOS as it relates to average vehicle delay at intersections under STOP or YIELD controls. Table 2 is for signalized intersections.

Level-of-Service C is considered by many traffic safety professionals to be the minimum acceptable condition in rural areas, and LOS D is the minimum for urban/ suburban areas.

Table 1 – Level of Service Criteria for Unsignalized Intersections

Level of Service	Avg. Delay/ Veh. (Seconds)	Description
A	< = 10	Little or no delay, very low main street traffic
B	> 10 to 20	Short traffic delays, many acceptable gaps
C	> 20 to 25	Average traffic delays, frequent gaps still occur
D	> 25 to 35	Longer traffic delays, limited number of acceptable gaps
E	> 35 to 50	Very long traffic delays, very small number of acceptable gaps
F	> 50	Extreme traffic delays, virtually no acceptable gaps in traffic

Table 2 – Level of Service Criteria for Signalized Intersections

Level of Service	Avg. Delay/ Veh. (Seconds)	Description
A	< = 10	Most vehicles do not stop at all. Most arrive during the green phase. Little or no delay.
B	> 10 to 20	More vehicles stop than for LOS A. Still good progression through lights. Short traffic delays.
C	> 20 to 35	Significant number of vehicles stop, although many pass through without stopping.
D	> 35 to 55	Many vehicles stop. Individual signal cycle failures are noticeable. Progression is intermittent.
E	> 55 to 80	Considered to be the limit of acceptable delay. Individual cycle failures are frequent, progression is poor.
F	> 80	Extreme and unacceptable traffic delays.

SOURCE: Transportation Research Board, Highway Capacity Manual, Special Report 209, 1998.

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- A. 2.0 - Traffic Growth Rates**
- A. 2.01 - OHM Technical Memo
- A. 2.02 - OHM Projected Growth Rates
- A. 2.03 - SEMCOG Memo: Baldwin and Waldon Road Model Volumes
- A. 2.04 - SEMCOG Project Growth Rates

Date: April 30, 2010

To: Jeff O'Brien, P.E.
Road Commission for Oakland County
31001 Lahser Road
Beverly Hills, MI 48025

CC: Tom Peeler - RCOC

From: Jim Marcinkowski, P.E.

Re: Baldwin Road EA – Morgan Road to Waldon Road
RCOC Project # 48691
Traffic Growth Rates

The following discussion was prepared by Steve Dearing, PE, PTOE and his staff. It details the reasoning and rationalizations for how the various traffic growth rates were established for this project.

BALDWIN ROAD EA – TRAFFIC GROWTH RATES

The Baldwin Road Environmental Assessment is to account for the safety and capacity needs of the Baldwin Road corridor over the next 25 years, through the year 2035. As part of this analysis, current traffic volumes are collected and form the basis for the forecasting used to estimate future traffic volumes.

OHM obtained traffic growth rates in November 2009 from the Southeast Michigan Council of Governments (SEMCOG). SEMCOG is the metropolitan planning organization for the project area, and is responsible for maintaining the regional travel demand model, based on land use data sets and forecasted socio-economic data. The travel demand model is used to analyze traffic patterns and congestion on a regional level. At a community level, the data may be distorted due to several reasons. One common problem is the lack of detailed local streets in the model's network. Another is the use of very large Traffic Analysis Zones (TAZ) to express both the traffic and socio-economic data for geographic areas. What may be acceptable resolution on a regional basis is too crude and unfocused for a detailed examination required by this EA. Finally, there may be proposed developments in the study area not accounted for in the travel demand model. OHM started with the SEMCOG growth rates and made adjustments to account for the points noted above.

SEMCOG provided traffic volumes and forecasts for the years 2010 and 2035, for Baldwin Road and Waldon Road within the project study area. Based on the regional model, SEMCOG projects that average daily traffic volumes on Baldwin Road will increase from 32.3 to 33.6% on Baldwin Road north of Gregory Road, and from 20.1 to 26.1% south of Gregory Road. For Waldon Road, volumes were projected to increase by 14.2% west of Baldwin, and decrease by 0.7% east of Baldwin.

Starting with these values, OHM chose to utilize a 35% growth rate for Baldwin Road north of Gregory, and 25% south of Gregory. A 15% growth rate for Waldon Road to the west of Baldwin was also utilized. These values are generally on the high side of the SEMCOG rates. Where we began to digress was Waldon Rd east of Baldwin Rd. While Waldon has been fully developed immediately to the east of Baldwin, there is considerable open space associated with the the DNR-owned Bald Mountain State Recreation Area. Anticipating no changes to the recreational land uses, there are no significant zoning changes proposed per the Master Plan. The only notable change in zoning is at the southwest corner of Baldwin & Waldon, which is currently Office & Professional but is planned to become Neighborhood Commercial. However, the development at this location already contains a grocery store, two banks, and a couple of quick-service/carry-out restaurants. Residential growth nearby is likely to utilize these shops, which will result in a slight increase in traffic on Waldon. For these reasons, a modest 5% growth rate was used for east of Baldwin.

Approximately 0.3 miles south of Waldon, on the west side of Baldwin, is Thornwood Drive. Thornwood is a local street that provides access to a small multiple-family residential community. It is bordered by a utility easement for overhead power lines on the north, low-density single family homes to the west, and a vacant parcel to the south. This vacant parcel is currently zoned "Planned Unit Development", and is master plan zoned for multiple-family/medium density residential. While it would be likely that a future multiple-family residential development would provide a cross-connection leading to Thornwood, the primary access would likely be on Maybee Road. Since future development is not anticipated to increase traffic on Thornwood, a 0% growth rate was used.

Since there are relatively few vacant parcels along Maybee, and this area is not planned to be rezoned in the future, traffic volumes generated by the existing residential homes are expected to remain roughly constant over the next 25 years. However, the future multiple-family residential development at the northwest corner of the intersection of Baldwin and Maybee will likely result in a modest increase in traffic volumes. Therefore, a growth rate of 10% on Maybee, west of Baldwin, was used.

Maybee Road to the east of Baldwin is largely developed. Maybee Road does not connect through to Joslyn; it terminates at a moderately-sized residential subdivision and therefore does not get much through traffic. The only large tract of vacant land in this area is the Gingell Nature Area, which has been master planned to remain open space. As such, traffic volumes on this stretch of Maybee are expected to remain constant.

Morgan and Gregory each extend approximately one mile west of Baldwin, and then terminate at Rohr Road, essentially forming a closed loop. Morgan, Gregory, and Rohr are all zoned and master planned single-family residential, of varying density. The medium density areas are fully built-out, and the low density areas are classified as suburban farms that are unlikely to be split off and redeveloped. As such, the traffic volumes on Morgan and Gregory are likely to remain constant, so a 0% growth rate was used.

At the southerly limit of the Gingellville business area is Judah Road. Judah runs east/west, connecting Baldwin and Joslyn Roads, and is bordered entirely by medium-density residential lots. The master plan calls for the several lots near Baldwin to be rezoned from Single-Family Residential to Village Center, Office Mixed Use, and General Commercial. When these are

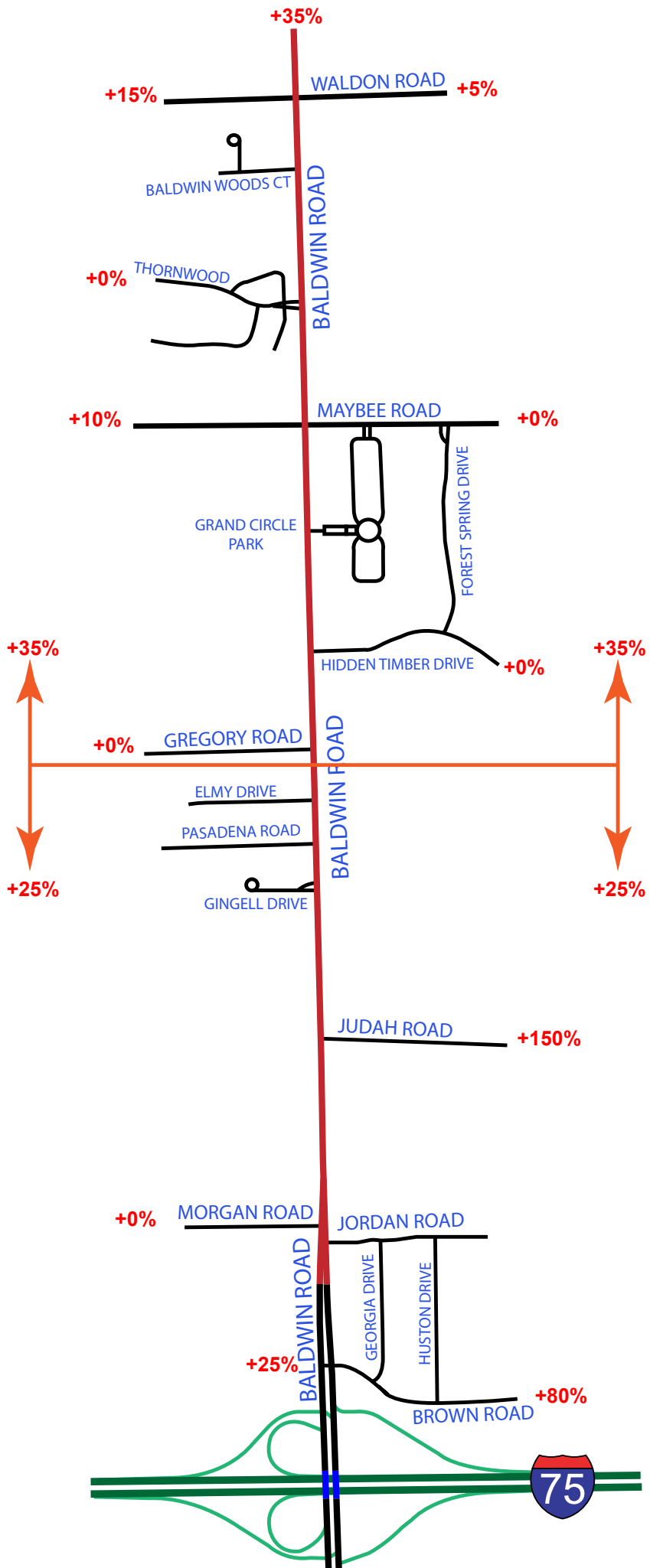
redeveloped, additional traffic on Judah is highly probable. Based on trip generation estimates for similar land uses, a growth rate of 150% has been used. While this appears to be a large percentage increase, the baseline is very low and it only equates to 64 additional vehicles during the PM peak hour,

Hidden Timber is a residential street that leads into the Lake Forest Site Condo development. The Lake Forest development is fully built-out, and traffic volumes on Hidden Timber are likely to remain constant over the next 25 years.

It is worth noting that Brown Road was also included in the capacity analysis, although it is outside the project limits of the Environmental Assessment. Brown Road is located just 0.2 miles south of Morgan, and there are currently several big-box stores (including Costco, Target, and Meijer) and casual-dining located on the south side of Brown within the City of Auburn Hills. Consequently, Brown carries significant traffic volumes.

However, the north side of Brown Road is largely undeveloped. There is some single-family residential, but most of it is zoned Limited Industrial, and presently contains several gravel pits and contractor storage yards. These facilities are located in the Brown Road Overlay District for Orion Township, which was established to promote a campus-type setting for a mixed-use high technology research and industrial park. Accessory uses permitted in the Overlay District include health clubs, restaurants (excluding drive-through), and retail and services uses.

When the existing properties along the north side of Brown are redeveloped, traffic volumes on Brown would increase substantially. A research and industrial park of the magnitude described in Orion Township's Master Plan would likely necessitate road improvements to Brown Road, due to the increase in traffic. While the research and industrial park alone would generate a significant number of trips, the restaurants, health clubs, and other accessory land uses permitted would generate even more traffic, especially during the PM peak hour. For this reason, a growth rate of 80% has been used for Brown Road.



SEMCOG**MEMO**

Southeast Michigan Council of Governments
535 Griswold Street, Suite 300
Detroit, Michigan 48226
(313) 961-4266
Fax (313) 961-4869
www.semcog.org

December 2, 2009

TO: Stephen Dearing, Manager of Traffic Engineering, OHM

FROM: Saima Masud

SUBJECT: Baldwin Road and Waldon Road Model Volumes

CC: Liyang Feng, Transportation Coordinator, SEMCOG and Thomas Blust, Director of Engineering, Road Commission for Oakland County

Please find attached file showing all day model volumes for year 2010 and 2035 for Baldwin road from Clarkston Rd. to Walton Blvd.; and Waldon Rd. from Clintonville Rd. to Joslyn Rd.

According to the forecasts, the overall daily traffic volume for all the study links will increase by approximately 14% from year 2010 to 2035.

The travel model used in this analysis is SEMCOG E5 FH10 and FH35. The projection uses SEMCOG 2035 Regional Development Forecast(RDF) land use data sets. The input data for the travel model are based on the forecasted socio-economic data adopted for SEMCOG 2035 RTP process. However, the estimated 2010 socio-economic data is higher than the reality.

Please note that the model is designed to analyze traffic patterns and congestion on a regional level. At the community level, the data may be distorted due to several reasons: large sized regional activity zones, lack of detailed local streets in the road network, or the placement of centroid connectors along model links. It is advised that the local traffic counts are also used as a reference.

If you have any questions please give me a call at 313-324-3341 or e-mail: masud@semcog.org.

2010 Model Volume				Observed
Segment	Direction	Limits	All day Volume	
Baldwin	Two-way	Clarkston to CC	17,460	16197(Two-way)
Baldwin	Two-way	CC to Waldon	24,320	
Baldwin	Two-way	Waldon to Maybee	22,949	
Baldwin	Two-way	Maybee to CC	18,323	11800 (NB)
Baldwin	NB	CC to Brown	13,985	
Baldwin	SB	CC to Brown	14,419	
Baldwin	NB	Brown to First ramp	21,288	
Baldwin	SB	Brown to First ramp	21,103	
Baldwin	NB	First ramp to Second ramp	19,657	
Baldwin	SB	First ramp to Second ramp	17,298	
Baldwin	NB	Second ramp to Third ramp	19,657	
Baldwin	SB	Second ramp to Third ramp	17,663	
Baldwin	NB	Third ramp to fourth ramp	19,657	
Baldwin	SB	Third ramp to fourth ramp	12,503	
Baldwin	NB	Fourth ramp to CC	15,445	
Baldwin	SB	Fourth ramp to CC	18,755	
Baldwin	NB	CC to Great Lakes crossing	14,941	
Baldwin	SB	CC to Great Lakes crossing	17,809	
Baldwin	Two-way	Great Lakes crossing to Walton	33,408	26000 (Two-way)
Waldon	Two-way	Clintonville to CC	9,933	783(Two-way)
Waldon	Two-way	CC to Baldwin	15,078	
Waldon	Two-way	Baldwin to Joslyn	12,702	10043(Two-way)
Overall			398,355	

2035 Volume				
Segment	Length (miles)	Direction	Limits	All day Volume
Baldwin	1.26	Two-way	Clarkston to CC	18,732
Baldwin	0.86	Two-way	CC to Waldon	26,348
Baldwin	0.51	NB	Waldon to Maybee	14,235
Baldwin	0.51	SB	Waldon to Maybee	16,120
Baldwin	1.24	NB	Maybee to CC	11,621
Baldwin	1.24	SB	Maybee to CC	12,866
Baldwin	0.22	NB	CC to Brown	16,799
Baldwin	0.22	SB	CC to Brown	18,188
Baldwin	0.07	NB	Brown to First ramp	24,087
Baldwin	0.07	SB	Brown to First ramp	23,879
Baldwin	0.03	NB	First ramp to Second ramp	21,073
Baldwin	0.03	SB	First ramp to Second ramp	21,369
Baldwin	0.12	NB	Second ramp to Third ramp	21,073
Baldwin	0.12	SB	Second ramp to Third ramp	21,712
Baldwin	0.08	NB	Third ramp to fourth ramp	21,073
Baldwin	0.08	SB	Third ramp to fourth ramp	14,029
Baldwin	0.32	NB	Fourth ramp to CC	16,863
Baldwin	0.32	SB	Fourth ramp to CC	20,602
Baldwin	0.09	NB	CC to Great Lakes crossing	16,319
Baldwin	0.09	SB	CC to Great Lakes crossing	19,444
Baldwin	1.49	Two-way	Great Lakes crossing to Walton	36,265
Waldon	1.11	Two-way	Clintonville to CC	10,419
Waldon	1.07	Two-way	CC to Baldwin	17,213
Waldon	1.01	Two-way	Baldwin to Joslyn	12,613
Overall				452,946

Growth Rate
2010-2035
7.3%
8.3%
32.3%
33.6%
20.1%
26.1%
13.1%
13.2%
7.2%
23.5%
7.2%
22.9%
7.2%
12.2%
9.2%
9.8%
9.2%
9.2%
8.6%
4.9%
14.2%
-0.7%
13.7%

CC = Centroid Connector
 First ramp = On and Off ramp NB I-75 to Baldwin Road
 Second ramp = Off ramp NB I-75 to S Baldwin Road
 Third ramp = On ramp Baldwin to SB I-75
 Fourth ramp = On and Off ramp SB I-75 to Baldwin Road