APPENDIX D

TRAFFIC ANALYSIS MEMO FOR BECK ROAD CORRIDOR IMPROVEMENT PROJECT

Traffic Analysis Memo for Beck Road Corridor Improvement Project

City of Novi

March 03, 2025

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position

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Responses of Comments

AECOM received comments from MDOT's C&R and SUTA units on January 10, 2025. Following these comments, responses were submitted to MDOT on February 5, 2025. MDOT provided their approval of the responses on March 3, 2025. This report has been updated to reflect the approved changes.

No.	Comments from MDOT	Responses
1	On page 9, the following comment is made that "From a capacity analysis standpoint (in Synchro), a five-lane cross section or a four-lane boulevard are essentially the same." I think the statement, especially being in bold, is a bit misleading to someone not familiar with traffic analysis. In general, I think it implies that there is no real operational difference between going with the 5-lane cross section vs. a 4-lane boulevard. For numerous safety and operational reasons, the boulevard option provides less turbulent flow in the non-intersection area, and the improved safety benefits or left-turn restrictions (in the midblock) create better reliability, and hence better operation. To be fair and technical, the signalized intersections are the dictating factor for capacity in either scenario. And because (presumably) indirect-left-turns at these signalized intersections are not proposed for the boulevard design, than yes they would be modeled the same in Synchro and thus have the same outputs.	The Boulevard alternative referred to here is a 'raised median roadway' with direct left turns at all the signalized intersections. Due to similarities in both the alternatives i) direct left turn at all intersections and ii) adding a lane in both directions, from a capacity analysis perspective, in Synchro both alternatives have been shown as one alternative. This is the reason we do not have LOS/Delay or MOEs separately for both alternatives. The meaning of that statement upfront is only to convey that there is no difference between the two proposed alternatives from a capacity analysis perspective at the major intersections, and a hybrid option is considered, 5-lane and Boulevard with direct lefts incorporated in the proposed design.
2	Additionally, there may be additional cost and right-of-way issues with the boulevard option. But again, overall from a safety and operational perspective, for vulnerable road users, and for traffic flow holistically, the boulevard design is almost always more preferable than a 5-lane cross section. So, to have the statement phrased in bold like it is, again I think it messages to the decision maker that there is no difference between the two, which isn't true. I would recommend rewording that bolded statement, to ensure the more holistic message is conveyed. The analysis shows that even in the build scenario (with additional lanes), there are still some intersections that operate poorly. Were indirect left-turns considered? If the boulevard option is pursued, and there is an opportunity to include indirect left turns at some of the key signals, then there may be a significant operational advantage to doing so. At a minimum, that indirect left turn operation should be analyzed or looked at for feasibility at the signalized intersections.	The city of Novi conceptually considered a boulevard option that included indirect left turns (Michigan Lefts) at all major intersections. However, it was not pursued further due to several factors: the overall impact on the right-of-way (ROW), the narrow median necessitating truck maneuvers at crossovers (truck loons), and concerns about emergency vehicle response times in a predominantly residential area.
3	Finally, there were no Synchro models included in the email. Thus I have no comments on the modeling itself. Typically the Synchro is reviewed by the Local Agency Engineer, and/or sometimes the Signals and TSC engineer for accuracy. If there are still questions on the accuracy of the Synchro models, the C&R unit can weigh in. But I do agree that Synchro is the appropriate modeling tool for this evaluation.	Noted

4	Repeating for emphasis, as the department's goals are to encourage and provide for a safer and more reliable transportation network, especially for vulnerable road users, there really should be more emphasis in this document on the benefits of the boulevard cross section over the 5-lane cross section, even if they are described in more holistic and systematic terms. There may be cost or feasibility reasons why a boulevard cannot be pursued. But from a general standpoint, a boulevard option with indirect left turns at signalized intersections should be viewed as the more preferable operational (and safer) alternative when compared to the 5-lane cross section.	Noted. The Traffic Analysis Memo is focused on a comparative analysis of the existing conditions, No Build, and the Preferred Alternative. A full alternatives analysis that takes into account traffic, safety, and other factors is provided in the actual EA document itself.
5	**Traffic Count Adjustment Rate:** The document currently references a 1.63% rate for the traffic count adjustment. Based on the data provided in the appendices, it appears that this is a 1.63% Compound Annual Growth Rate (CAGR) applied to the 2018 and 2020 traffic counts, as well as future build/no-build scenarios. To avoid any confusion, I recommend clarifying this in the document and explicitly stating that the 1.63% rate refers to a CAGR.	Noted
6	**Concern Regarding the 1.63% CAGR:** The 1.63% CAGR appears to be very high, considering that MDOT typically suggests a 0.3% CAGR for projects in this region unless a Travel Demand Model analysis indicates otherwise so it would be helpful to include additional explanations as to why this higher CAGR was chosen for this project, particularly addressing the following: a. **The source of the CAGR.** The Report just mentioned "from SEMCOG" but more detail about it would be helpful. Was a SEMCOG Travel Demand Model analysis conducted for this project? If so, we should specify which model version, and which year's scenarios were considered. Additionally, if analyses were conducted, did they encompass the entire SEMCOG model area or focus solely on the project limits? b. **Potential Development in the Area:** Are there any significant developments anticipated in the area that could justify applying a higher CAGR? If so, we should mention it in the report to support the adopted rate.	The 1.63% growth rate was provided to AECOM by SEMCOG through an email dated 11/8/2023, assuming based on the Travel Demand Model analysis. AECOM has not reviewed or contributed to SEMCOG's travel demand model, but it is our understanding that the model includes the entire area. The growth is further discussed in the point no. 8.
7	**Traffic Count Dates and COVID-19 Considerations:** Could we specify the month in which the 2020 traffic counts were collected? Additionally, was the potential impact of COVID-19 on traffic volumes considered in the analysis? a. After discussing this report with some MDOT staff in SUTA section, we believe that a 1.63% CAGR might be appropriate for the 2020 traffic counts if they were collected during the pandemic, as traffic volumes were lower than typical during that time. However, if this is the case, the report should clarify this point and it would also be advisable to apply a more conservative CAGR for the 2018 traffic count adjustment, and for the future build/no-build scenarios.	2020 Traffic count was 2/5/2020 and 2/11/2020 before pandemic-related restrictions were put in place. The 1.63% growth rate provided by SEMCOG is based on their Travel Demand Model for 2015 to 2045.

8	Upon review of the model, I found that the projected volume increase on Beck Road from 8 Mile to Pontiac (2025–2050) aligns with the adopted 1.63% CAGR. However, this growth rate is significantly higher than what we've seen for other projects: • I-94 max of 0.4% • I-275 0.5% • I-375 does include higher CAGR (at 1.12%) for some facilities in the downtown core but it includes a section justifying this with a larger area analysis looking into population and employment trends. Given this difference, I think the document could benefit from a more detailed explanation of why this higher CAGR was chosen for Beck Road. I reviewed a list of new facilities in the SEMCOG area and doesn't seem to be much development around Beck Road that would fully justify the 1.63% CAGR. However, the population, household, and employment changes projected between 2025 and 2050 seem more substantial and could explain the adopted future traffic volumes (2045). To help clarify this, I've created maps showing population and employment changes. Household changes closely mirror the population trends.	As discussed, SEMCOG has provided the growth rate for Beck Road, representing the assigned traffic growth from 2015 to 2045 based on their model. AECOM has not reviewed or contributed to SEMCOG's travel demand model for this project and, therefore, cannot comment further. However, it is generally understood that Beck Road is a crucial link between the interchanges at I-96 and M-14, serving areas such as Novi, Northville, Wixom, South Lyon, and Plymouth. These areas have experienced growth in new developments and activities. Additionally, the difference in VMT between the no-build (136,557,865) and build (136,551,883) scenarios suggests that Beck Road is a preferred and shorter route for origin-destination travel in the model. By adding capacity, Beck Road becomes a more attractive route choice. SEMCOG concluded in their TDM analysis that "vehicles affected by this project may take longer travel time (no-build) to reach their original destination compared to the build scenario." No change in regional VMT between the build and no-build conditions, along with the 1.63% annual increase in traffic on Beck Road, indicates that traffic is being attracted to this roadway rather than influenced only by population or household changes.

1. Introduction

The cities of Novi and Wixom, in cooperation with the Michigan Department of Transportation (MDOT) and the Federal Highway Administration (FHWA), are proposing the Beck Road Corridor Improvement Project (hereinafter referred to as the Project). The proposed improvements to Beck Road aim to address various transportation challenges by improving traffic flow, enhancing safety for all road users, accommodating pedestrians and bicyclists, and providing a consistent road cross-section.

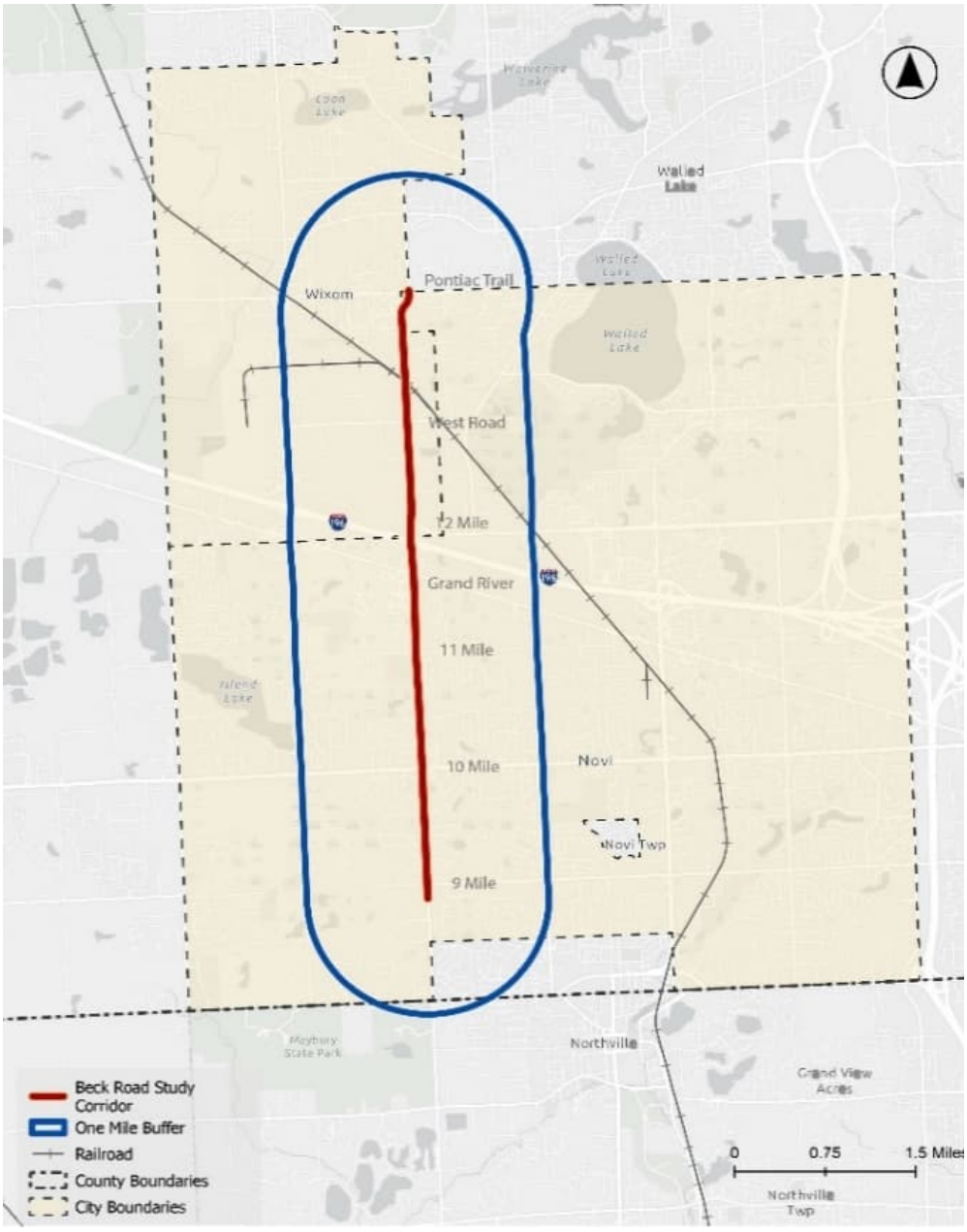
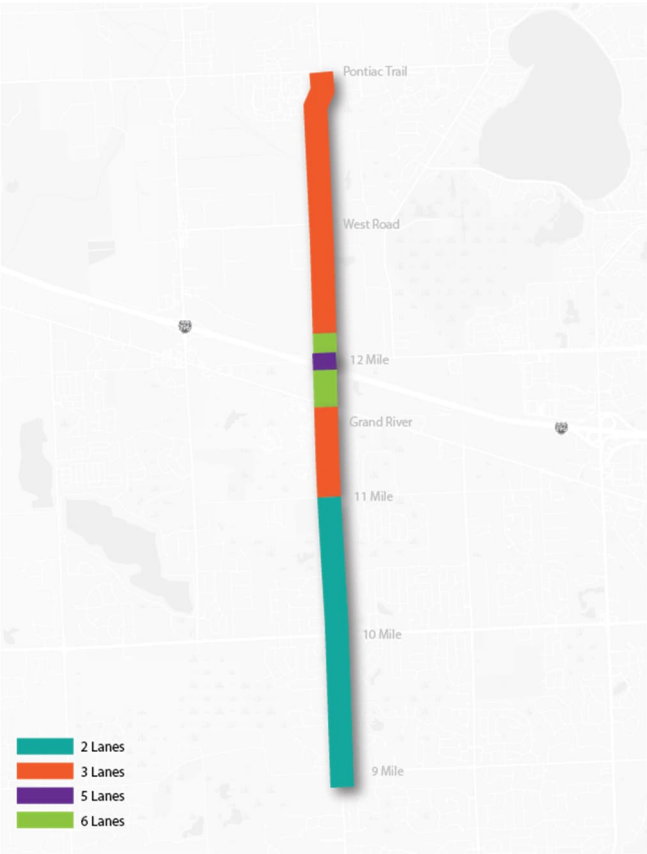


Figure 1: Beck Road Study Area

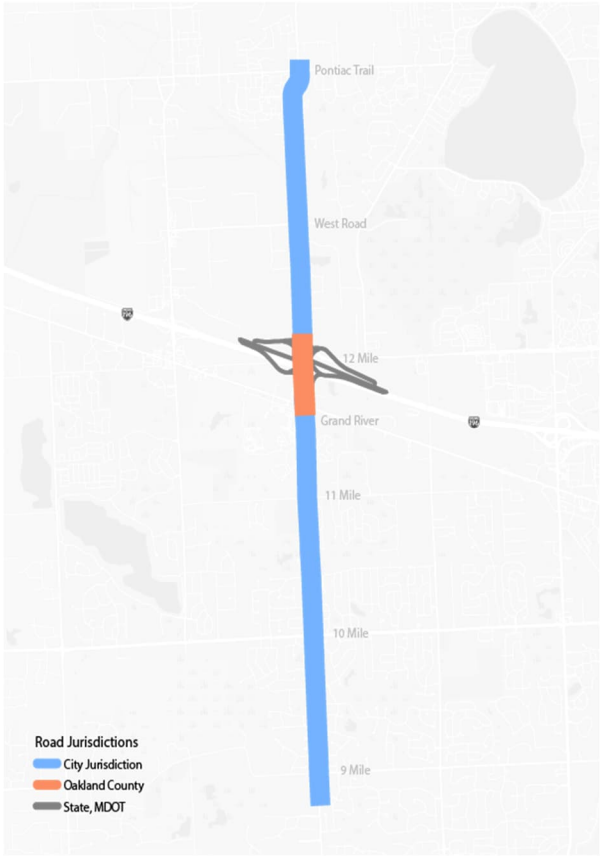
- The Project encompasses a 5.3-mile stretch of Beck Road, a vital north-south thoroughfare connecting communities in Oakland County, Michigan.
- The study area commences at Pontiac Trail to the north and extends southward beyond 9 Mile Road (Figure 1).
- The study area for the Beck Road corridor spans the cities of Wixom and Novi. Wixom and Novi are approximately 30 miles northwest of downtown Detroit in Oakland County, Michigan.
- Beck Road crosses major signalized intersections:
    - Pontiac Trail
    - West Road
    - 12 Mile Road
    - I-96 Interchange
    - Grand River Avenue
    - 11 Mile Road
    - 10 Mile Road
    - 9 Mile Road
- Figure 2 illustrates the existing variable lane distribution along Beck Road. In the segment spanning
    - From Pontiac Trail to 12 Mile Road, Beck Road predominantly features 3 lanes
    - At the I-96 interchange, Beck Road is a 5-lane wide
    - Some segments between 12 Mile Road and Grand River Avenue even widening to a 6-lane
    - From Grand River Avenue to 11 Mile Road, Beck Road narrows to 3 lanes
    - From 11 Mile to 9 Mile Road, Beck is reduced to 2 lanes
- The jurisdiction of Beck Road also changes throughout the Study Area, as shown in Figure 3. While the north and south sections of Beck Road are under the jurisdictions of the City of Wixom and the City of Novi, respectively, the stretch between Grand River Avenue and 12 Mile Road falls under the jurisdiction of the Road Commission for Oakland County. Additionally, approximately 0.3 miles north of West Road, an at-grade railroad crossing intersects the freight-rail tracks owned by CSX Transportation. Currently, this rail line is under lease to Lake State Railroad.
- Beck Road is pivotal in the regional transportation network, serving as a crucial connector with strategic interchanges at M-14 and I-96.
- The road passes by various residential and commercial properties, major parks (Bosco Fields), and Ascension Providence Hospital's Novi Campus. In Wixom, Beck Road hosts a bustling industrial and commercial hub, featuring a wide range of businesses.
- Beck Road currently grapples with traffic congestion and subpar pavement conditions. Additionally, the presence of the at-grade railroad crossing with CSX between Pontiac Trail and West Road exacerbates congestion when trains are crossing Beck Road.
- Beck Road has an inconsistent infrastructure design, with a lack of adequate space at certain intersections, differing cross-sections, occasional right-turning lanes, and incomplete non-motorized facilities.



Lane Configuration

Source- SEMCOG Open Data Portal, 2021

Figure 3: Beck Road Lane Configuration



Road Jurisdiction

Source- SEMCOG Road Jurisdiction

Figure 2: Beck Road Jurisdiction

Table 1: List of Signals and Cycle Lengths

Signalized Intersection	Stop/Signal	AM Peak Cycle length	PM Peak Cycle length
Beck Rd / 8 Mile Rd	Signal	100	110
Beck Rd / 9 Mile Rd	Signal	100	100
Beck Rd / 10 Mile Rd	Signal	120	120
Beck Rd / Cider Mill Dr	Signal	120	120
Beck Rd / 11 Mile Rd	Signal	120	120
Beck Rd / Central Park Blvd	Signal	120	120
Beck Rd / Grand River Ave	Signal	120	120
Beck Rd / I-96 Interchange	SPUI Signal	100	100
Beck Rd / 12 Mile Rd	Signal	100	100
Beck Rd / West Rd	Signal	100	120
Beck Rd / Pontiac Trail	Signal	120	120

2. Purpose and Need of the Project

The Project focuses on upgrading the current transportation conditions to serve the community's needs better. It involves the redesign and potential expansion of Beck Road from south of 9 Mile Road to Pontiac Trail in the cities of Novi and Wixom. The Project aims to implement improvements that better accommodate the existing and projected traffic volumes. Additionally, the Project entails the implementation of infrastructure improvements to prioritize the safety of pedestrians and bicyclists.

2.1 Purpose

The purpose of the Beck Road Project is multi-faceted. This Project aims to increase the capacity of the Beck Road corridor to meet current needs, cater to the population and economic growth in the area, and enhance safety by reducing the crashes in the area, including the risk and potential for serious vehicle crashes. The purposes of the Beck Road Project specifically include:

- Alleviating traffic congestion, potentially by expanding the roadway, to better accommodate the existing and projected traffic volumes.
- Improving traffic flow, reducing delays, and enhancing the overall operations of the roadway.
- Enhancing safety for all roadway users by addressing current crash issues at critical intersections.
- Providing safer and more accessible infrastructure for pedestrians and bicyclists.
- Improving the quality of infrastructure and aesthetics along the corridor, particularly in the residential areas of Beck Road.

2.2 Need

The proposed Beck Road Corridor Improvement Project seeks to address several pressing needs that necessitate the corridor improvements. The growth in commercial and residential areas within the Project vicinity has led to higher traffic demands, necessitating an expansion of the road capacity to enhance safety and mobility for both motorized and non-motorized users.

3. Operation Analysis Methodology

Level of service (LOS), defined by the Highway Capacity Manual, 7th Edition (HCM), is the performance measure reported from the operational analysis in this report. Specifically, the LOS intersection delay thresholds used are provided in **Table 2**.

Table 2: Intersection LOS Delay Thresholds

Level of Service (LOS)	Signalized Intersection Control Delay (seconds/vehicle)	Unsignalized Intersection Control Delay (seconds/vehicle)
A	≤ 10	≤ 10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

Source: Highway Capacity Manual, 7th Edition.

The following outlines the parameters used to complete the *Synchro 12* analysis of arterial intersection traffic operations for Existing (2023) and Design (2045) Years.

- Synchro, Version 11/12
- Analysis Periods – Typical Weekday morning and afternoon peak hours
- Existing Intersection Geometry and Lane Assignments
  - Satellite imagery used as a base for intersection geometry and lane disciplines.
- Approach Speed Limits
  - Approach speeds are coded based on posted speed limits.
- Existing Signal Timing Data
  - Existing signal timings and settings.
- Traffic Volumes
  - Input volumes are based upon the VCU volumes taken by AECOM (2020 and 2023)
- Peak Hour Factor
  - A calculated factor for each turning movement, based on VCU counts by AECOM.
- Percent Heavy Vehicles
  - This was calculated using VCU counts taken by AECOM.
- Saturation Flow Rate
  - The Synchro default value of 1900 passenger cars per peak hour per lane (pc/ph/pl) is assumed.

4. Operation Analysis

AECOM conducted a high-level capacity analysis for the Beck Road corridor from 8 Mile Road to Pontiac Trail. The analysis used traffic data collected in 2023 for intersections at Beck Road at 9 Mile, 10 Mile, Cider Mill, 11 Mile, and Central Park Blvd. In addition, the analysis used adjusted traffic data from 2018 (Beck Road at Grand River Ave and 8 Mile Road) and 2020[1] (Beck Road at I-96 Ramps, 12 Mile, West Road, and Pontiac Trail) by CAGR 1.63%[2] to reflect the current 2023 traffic patterns. The traffic count and adjusted data are included in **Appendix A**. The latest signal timings were provided by the RCOC for all the signalized intersections within the study area. Utilizing the turning movement counts and signal timing data, existing condition traffic models were created for the Beck Road corridor, for the weekday morning and afternoon peak hours. The traffic models were created using the *Synchro 11.0* analysis software.

4.1 Existing analysis

Table 3 summarizes the existing (2023) overall intersection LOS values. As shown in Table 2, three intersections in the morning peak hour and four intersections in the afternoon peak hour on Beck Road are currently estimated to operate with a poor LOS.

Table 3: Existing (2023) Overall Intersection LOS

Signalized Intersection	Weekday AM Peak-hour			Weekday PM Peak-hour		
	LOS	Delay (sec/veh)	V/C Ratio	LOS	Delay (sec/veh)	V/C Ratio
Beck Rd / 8 Mile Rd	**E**	**73.6**	**1.06**	D	50.2	**0.96**
Beck Rd / 9 Mile Rd	B	14.5	0.55	B	14.5	**0.52**
Beck Rd / 10 Mile Rd	D	37.1	0.81	**E**	**58.5**	**0.82**
Beck Rd / Cider Mill Dr	B	10.3	0.61	A	6.4	**0.46**
Beck Rd / 11 Mile Rd	D	36.1	0.75	C	24.3	**0.66**
Beck Rd / Central Park Blvd	B	10.6	0.59	C	20.1	**0.63**
Beck Rd / Grand River Ave	**E**	**57.7**	0.92	**E**	**58.2**	**0.95**
Beck Rd / I-96 Interchange	D	47.0	0.94	D	38.2	**0.69**
Beck Rd / 12 Mile Rd	B	16.7	0.82	**E**	**75.9**	**1.09**
Beck Rd / West Rd	C	22.0	0.82	C	27.3	**0.90**
Beck Rd / Pontiac Trail	**E**	**70.3**	**1.11**	**E**	**63.2**	0.94

Source: AECOM, November 2023

Several individual turning movements currently operate with a poor LOS during the weekday morning and afternoon peak hours. These poorly operating movements can be found across the corridor on the majority of the intersections. A summary of the poorly operating turning movements is provided in **Table 4**.

As shown in Table 3, several movements are barely operating above the LOS E threshold, with volume-to-capacity (V/C) ratios well under 1.0. The side-street movements at Cider Mill Drive and Central Park Boulevard are relatively low-volume movements and do not represent capacity concerns. There are currently no poorly operating traffic movements at the 9 Mile Road intersection.

[1] 2020 Traffic count was collected on 2/5/2020 and 2/11/2020 before pandemic-related restrictions were put in place.
[2] Growth rate provided by SEMCOG based on their Travel Demand Model for 2015 to 2045. This growth rate represents the assigned traffic growth from 2015 to 2045 based on their model. The Travel Demand Model also predicted no change in regional VMT between the build and no-build conditions, along with the 1.63% annual increase in traffic on Beck Road, indicating that traffic is being attracted to this roadway rather than influenced only by population or household changes.

Table 4: Existing (2023) Poorly Operating Traffic Movements

Signalized Intersection	Weekday AM Peak-hour			Weekday PM Peak-hour		
	LOS	Delay (sec/veh)	V/C Ratio	LOS	Delay (sec/veh)	V/C Ratio
Beck Rd / 8 Mile Rd:						
- **Eastbound Thru**	**F**	**173.4**	**1.26**			
- **Westbound Thru**				**F**	**111.6**	**1.00**
- **Westbound Left**	**F**	**105.8**	**1.01**			
- **Northbound Left**				E	77.8	**0.95**
- **Northbound Thru/Right**	E	56.9	0.98			
- **Southbound Thru**	E	57.2	0.92	E	53.1	**0.92**
Beck Rd / 10 Mile Rd:						
- **Eastbound Thru**	E	78.7	0.98	E	57.4	**0.87**
- **Westbound Thru**				**F**	**132.9**	**1.15**
- **Southbound Thru**				E	55.3	**0.63**
Beck Rd / Cider Mill Dr:						
- **Eastbound Left/Thru/Right**	E	58.8	0.53	E	55.2	**0.10**
- **Westbound Left/Thru/Right**				E	55.4	**0.13**
Beck Rd / 11 Mile Rd:						
- **Eastbound Left**				E	58.9	**0.53**
- **Eastbound Thru/Right**	E	75.9	0.88	E	57.0	**0.66**
- **Westbound Left**	E	55.7	0.24			
- **Westbound Thru/Right**	E	59.6	0.68	**F**	**100.3**	**1.00**
- **Southbound Left**	E	64.1	0.06			
Beck Rd / Central Park Blvd:						
- **Eastbound Left**	E	57.8	0.55	E	55.9	**0.55**
Beck Rd / Grand River Ave:						
- **Eastbound Left**	E	56.5	0.82	**F**	**126.6**	**1.12**
- **Westbound Left**				E	56.0	**0.60**
- **Northbound Left**	E	59.2	0.54	E	68.1	**0.69**
- **Northbound Thru/Right**	**F**	**82.2**	**1.02**	E	63.3	**0.97**
- **Southbound Left**	**F**	**121.6**	**1.08**	E	56.9	**0.72**
Beck Rd / I-96 Interchange:						
- **Westbound Left**	**F**	**101.1**	**1.09**			
- **Westbound Right**	E	56.7	0.96			
- **Southbound Right**				**F**	**91.0**	**0.46**
Beck Rd / 12 Mile Rd:						
- **Westbound Left**				**F**	**165.4**	**1.27**
- **Northbound Right**				E	60.0	**0.16**
Beck Rd / West Rd:						
- **Eastbound Left**				**F**	**123.0**	**0.97**
Beck Rd / Pontiac Trail:						
- **Westbound Left**	**F**	**179.1**	**1.26**	E	67.4	**0.83**
- **Northbound Thru**	E	56.4	0.70	**F**	**126.4**	**1.14**
- **Southbound Left**				E	55.9	**0.61**
- **Southbound Thru**	**F**	**104.5**	**1.09**	E	55.4	**0.76**
Source: AECOM, November 2023						

4.2 No-Build analysis

In order to evaluate the operational impact of no-build conditions, existing (2023) traffic volumes were grown twenty-two years into the future to the year 2045. An annual traffic growth rate was used to estimate growth on the study area roadway network based on information provided by the Southeastern Michigan Council of Governments (SEMCOG). Based on the information, an annual growth rate of 1.63% was applied to existing (2023) traffic volumes to determine future (2045) traffic volumes.

AECOM reviewed the long-term capacity needs of the corridor with this Future (2045) peak-hour traffic volumes input into the traffic models to produce a long-term capacity analysis. Without any long-term improvements (no-build), the Beck Road corridor is expected to experience significant congestion, and the majority of the intersections are expected to perform at LOS F in the morning and afternoon peak hours as shown in **Table 5**. Based on the no-build analysis, it was found that the Beck Road corridor will require, at a minimum, a five-lane cross-section throughout the study area, whether it is adding another through lane or creating a boulevard. The biggest capacity issues (LOS F) are estimated to be at 8 Mile Road, Grand River Avenue, 10 Mile Road, 12 Mile Road, and Pontiac Trail intersections, and to a lesser extent at the West Road and I-96 ramp intersections during the afternoon peak-hour.

Table 5: Projected (2045) Overall Intersection LOS – No Build

Signalized Intersection	Weekday AM Peak-hour			Weekday PM Peak-hour		
	LOS	Delay (sec/veh)	V/C Ratio	LOS	Delay (sec/veh)	V/C Ratio
Beck Rd / 8 Mile Rd	**F**	**191.3**	**1.44**	**F**	**154.5**	**1.52**
Beck Rd / 9 Mile Rd	C	20.1	0.79	C	22.7	**0.87**
Beck Rd / 10 Mile Rd	**F**	**84.8**	**1.20**	**F**	**132.4**	**1.38**
Beck Rd / Cider Mill Dr	B	19.2	0.89	A	8.8	**0.67**
Beck Rd / 11 Mile Rd	**E**	**72.2**	**1.11**	D	40.5	**0.98**
Beck Rd / Central Park Blvd	B	15.9	0.87	C	33.6	**0.92**
Beck Rd / Grand River Ave	**F**	**139.9**	**1.33**	**F**	**167.8**	**1.37**
Beck Rd / I-96 Interchange	**F**	**119.5**	**1.39**	**E**	**61.7**	**1.16**
Beck Rd / 12 Mile Rd	D	38.4	**1.14**	**F**	**145.6**	**1.51**
Beck Rd / West Rd	**F**	**84.3**	**1.23**	**F**	**107.8**	**1.50**
Beck Rd / Pontiac Trail	F	141.7	1.59	F	161.3	**1.58**

Source: AECOM, November 2023

4.3 Build Analysis

Based on the failing level of services at the intersections, it was concluded that the corridor is under capacity for the future year build traffic forecast and adding a lane/capacity can be considered as build alternative and will improve the operation along the corridor. Two different cross sections were investigated as part of adding a capacity on the corridor as shown in Figure 4. *From a capacity analysis standpoint (in Synchro), a five-lane cross-section or a four-lane boulevard are essentially the same*[3]. In addition, a roundabout option is being considered at the intersection of 11 Mile Road and Beck Road, given that 11 Mile Road functions as a nonthoroughfare collector road.

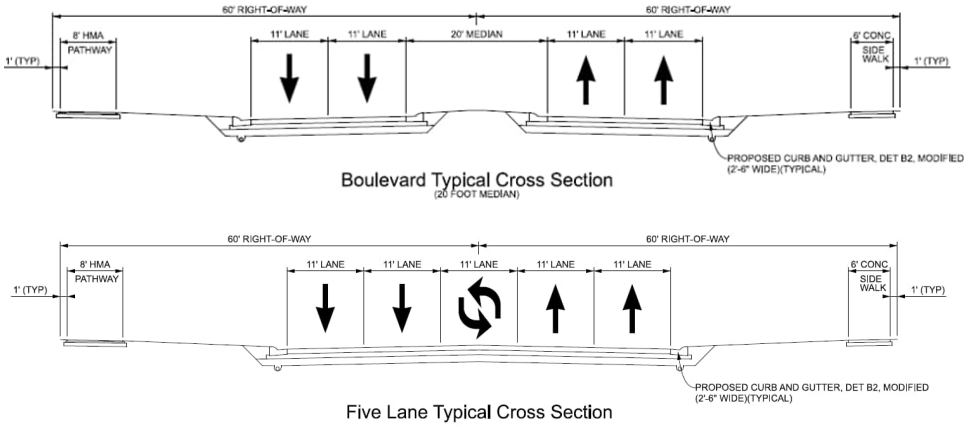


Figure 4: Beck Road Build alternative cross-section

A summary of the overall intersection LOS values, with recommended long-term capacity improvements in place, is provided in **Table 6**. As shown in Table 6, all intersections are projected to operate with an improved LOS compared to the no-build scenario with some elevated congestion near Grand River Avenue and the I-96 interchange. Two northbound and two southbound through lanes along Beck Road at all these intersections are estimated to reduce the delay significantly as shown in **Table 6**.

Table 6: Projected (2045) Overall Intersection LOS

Signalized Intersection	Weekday AM Peak-hour			Weekday PM Peak-hour		
	LOS	Delay (sec/veh)	V/C Ratio	LOS	Delay (sec/veh)	V/C Ratio
Beck Rd / 8 Mile Rd	E	67.3	1.14	D	50.8	1.04
Beck Rd / 9 Mile Rd	B	14.4	0.66	B	16.1	0.64
Beck Rd / 10 Mile Rd	D	39.9	0.95	**E**	**57.0**	**1.06**
Beck Rd / Cider Mill Dr	A	7.7	0.51	A	6.0	0.36
Beck Rd / 11 Mile Rd (Roundabout)^	C	24.8	-	C	23.9	-
Beck Rd / Central Park Blvd	A	9.4	0.51	B	15.7	0.53
Beck Rd / Grand River Ave	**F**	**130.6**	**1.29**	**F**	**136.3**	**1.27**
Beck Rd / I-96 Interchange	**F**	**120.4**	**1.39**	**E**	**63.5**	**1.16**
Beck Rd / 12 Mile Rd	B	19.1	0.85	**E**	**63.0**	**1.09**
Beck Rd / West Rd	C	23.9	0.72	C	26.4	**1.16**
Beck Rd / Pontiac Trail	**F**	**94.2**	**1.28**	E	71.8	**1.05**

Source: AECOM, November 2023; ^ Roundabout analysis in RODEL

[3] The Boulevard alternative referred to here is a 'raised median roadway' with direct left turns at all the signalized intersections. Due to similarities in both the alternatives i) direct left turn at all intersections and ii) adding a lane in both directions, from a capacity analysis perspective, in Synchro both alternatives have been shown as one alternative.

5. Crash Analysis

Traffic crash data for a four-year period from January 1, 2018 to December 31, 2022 was supplied by the Transportation Improvement Association (TIA) Traffic Crash Analysis Tool (TCAT) 2.0. Crashes were reviewed at eleven intersections and eight roadway segments along Beck Road from 8 Mile Road to Pontiac Trail.

Beck Road Intersections

1. Beck Road at 8 Mile Road
2. Beck Road at 9 Mile Road
3. Beck Road at 10 Mile Road
4. Beck Road at Cider Mill
5. Beck Road at 11 Mile Road
6. Beck Road at Central Park / Providence Parkway
7. Beck Road at Grand River Avenue
8. Beck Road at I-96 Diverging Diamond Interchange
9. Beck Road at 12 Mile Road
10. Beck Road at West Road
11. Beck Road at Pontiac Trail

Beck Road Segments

1. Beck Road north of 8 Mile Road to south of 9 Mile Road
2. Beck Road north of 9 Mile Road to south of 10 Mile Road
3. Beck Road north of 10 Mile Road to south of Cider Mill
4. Beck Road north of Cider Mill to south of 11 Mile Road
5. Beck Road north of 11 Mile Road to south of Central Park / Providence Parkway
6. Beck Rd north of Central Park / Providence Parkway to south of Grand River Avenue
7. Beck Rd north of 12 Mile Rd to south of West Road
8. Beck Rd north of West Rd to south of Pontiac Trail

5.1 Intersection Crash Analysis

Total crashes for the five-year period for each of the intersections varied greatly, ranging from 11 to 135 crashes. No fatalities and nine “A” level injury crashes were reported during the five-year period at the study area intersections. “A” level injury crashes include individuals who sustained incapacitating injuries, such as broken limbs or paralysis.

A breakdown of crashes for each intersection by crash type is depicted in **Table 7**.

Table 7: Beck Road Intersections - Traffic Crash History (01/01/2018 thru 12/31/2022)

Intersection	TOTAL	Crash Type									Injuries		Crash Rate [1]
		Angle	Backing	Head -On	Head On LT	Rear End	Side Swipe-Opposite	Side Swipe-Same	Single Vehicle	Other	Total	"A" Injury	
Beck Rd/ 8 Mile Rd	**132**	12	2	2	13	87	4	8	4	0	35	0	**0.67**
Percent	**100%**	**9%**	**1%**	**2%**	**10%**	**66%**	**3%**	**6%**	**3%**	**0%**			
Beck Rd/ 9 Mile Rd	**19**	5	0	0	0	11	1	0	2	0	5	1	**0.09**
Percent	**100%**	**26%**	**0%**	**0%**	**0%**	**58%**	**5%**	**0%**	**11%**	**0%**			
Beck Rd/ 10 Mile Rd	**118**	18	1	3	10	68	0	9	6	3	35	0	**0.59**
Percent	**100%**	**15%**	**1%**	**3%**	**8%**	**58%**	**0%**	**7%**	**5%**	**3%**			
Beck Rd/ Cider Mill Blvd	**11**	3	0	0	1	5	0	1	1	0	3	0	**0.07**
Percent	**100%**	**27%**	**0%**	**0%**	**9%**	**46%**	**0%**	**9%**	**9%**	**0%**			
Beck Rd/ 11 Mile Rd	**27**	5	0	0	1	17	1	1	1	1	11	0	**0.13**
Percent	**100%**	**20%**	**0%**	**0%**	**3%**	**65%**	**3%**	**3%**	**3%**	**3%**			
Beck Rd/ Providence Dr	**14**	2	0	0	0	10	0	1	1	0	3	0	**0.07**
Percent	**100%**	**14%**	**0%**	**0%**	**0%**	**72%**	**0%**	**7%**	**7%**	**0%**			
Beck Rd/ Grand River Ave	**135**	16	3	0	1	79	0	31	2	3	28	0	**0.42**
Percent	**100%**	**12%**	**2%**	**0%**	**1%**	**59%**	**0%**	**23%**	**1%**	**2%**			
Beck Rd/ EB On & Off Ramps	**74**	1	0	0	0	67	0	4	1	1	16	0	**0.25**
Percent	**100%**	**1%**	**0%**	**0%**	**0%**	**92%**	**0%**	**5%**	**1%**	**1%**			
Beck Rd/ I-96 SPUI	**90**	1	1	1	1	52	0	21	11	1	23	0	**0.29**
Percent	**100%**	**1%**	**1%**	**1%**	**1%**	**59%**	**0%**	**24%**	**12%**	**1%**			
Beck Rd/ WB On & Off Ramps	**88**	2	1	0	0	75	0	7	3	0	25	0	**0.27**
Percent	**100%**	**2%**	**1%**	**0%**	**0%**	**85%**	**0%**	**8%**	**4%**	**0%**			
Beck Rd/ 12 Mile Rd	**117**	13	1	0	3	63	0	14	13	2	32	4	**0.50**
Percent	**100%**	**12%**	**1%**	**0%**	**3%**	**55%**	**0%**	**13%**	**12%**	**3%**			
Beck Rd/ West Rd	**83**	17	2	2	16	39	0	2	1	0	40	2	**0.35**
Percent	**100%**	**21%**	**3%**	**3%**	**19%**	**48%**	**0%**	**3%**	**2%**	**0%**			
Beck Rd/ Pontiac Trail	**121**	40	2	1	5	50	3	14	3	3	14	2	**0.74**
Percent	**100%**	**33%**	**1%**	**1%**	**4%**	**42%**	**3%**	**12%**	**3%**	**3%**			

Source: Crash Data - Traffic Crash Analysis Tool 2.0, Transportation Improvement Association
Source: Crash Rates - Crash Analysis Process, SEMCOG, Appendix A, Table 1.4, January 2016

[1] Crashes per million entering vehicles.
Note: Intersection crashes include those within a 200-foot buffer.
No fatal crashes were reported for the study period.

None of the intersections had crash rates above the SEMCOG average.

A robust rear-end crash pattern occurred at all twelve intersections - ranging from 42% to 92% of all crashes by intersection. Beck Road is a congested corridor, contributing to the high number of rear-end crashes. Out of the total number of crashes at all the intersections, rear-end crashes make up 61%.

Angle crashes were most common at the Beck Road / Pontiac Trail intersection (33% of intersection crashes), the Beck Rd/ Cider Mill Blvd (27%), and the Beck Road/ 9 Mile Road intersection (26%). Angle crashes were much less prevalent at the other intersections (21% or less of total intersection crashes).

Head-on left turn crashes ranged from 0% to 20%. Beck Road / West Road has the highest head-on left turn crashes, and this is an intersection without a designated left turn timing phase meaning the driver uses their own judgement to complete the turn. The other eight intersections with this type of crash have left turn phasing at the traffic light or only had one head-on left turn crash.

Side-swipe same crashes ranged from 3% to 24% per intersection, with the Beck Road/Grand River Avenue intersection having the highest percentage of side-swipe crashes. The higher percentage of side-swipe crashes at the Beck Rd/ I-96 SPUI intersection may be at least in part due to the high volume of left-turning and right-turning traffic at the interchange.

5.2 Segment Crashes

Beck Road segmental crashes ranged from between 20 and 182 crashes on eight segments:

- Beck Road north of 8 Mile Road to south of 9 Mile Road
- Beck Road north of 9 Mile Road to south of 10 Mile Road
- Beck Road north of 10 Mile Road to south of Cider Mill
- Beck Road north of Cider Mill to south of 11 Mile Road
- Beck Road north of 11 Mile Road to south of Central Park / Providence Parkway
- Beck Rd north of Central Park / Providence Parkway to south of Grand River Avenue
- Beck Rd north of 12 Mile Rd to south of West Rd
- Beck Rd north of West Rd to south of Pontiac Tr

Amongst the eight segments, zero fatal crashes and five “A” injury crash were reported during the five-year period.

A breakdown of all study area segmental crashes by crash type along Beck Road is depicted in **Table 8**.

Table 8: Beck Road Segments - Traffic Crash History (01/01/2018 thru 12/31/2022)

Segment (1)	Length (miles)	TOTAL	Crash Type									Injuries	
			Animal	Fixed Object	Misc Single Vehicle	Head -On	Head -On LT	Angle	Rear -End	Sideswipe	Other	Total	"A" Injury
8 Mile Rd to 9 Mile Rd	0.94	56	0	0	18	1	0	1	33	2	1	16	1
Percent		**100%**	**0%**	**0%**	**32.1%**	**1.8%**	**0%**	**1.8%**	**58.9%**	**3.6%**	**1.8%**	**28.6%**	
9 Mile Rd to 10 Mile Rd	0.95	35	0	0	9	0	0	6	17	3	0	6	0
Percent		**100%**	**0%**	**0%**	**25.7%**	**0%**	**0%**	**17.1%**	**48.6%**	**8.6%**	**0%**	**17.1%**	
10 Mile Rd to Cider Mill	0.39	29	0	0	2	1	0	1	20	2	2	5	0
Percent		**100%**	**0%**	**0%**	**6.9%**	**3.4%**	**0%**	**3.4%**	**69.0%**	**6.9%**	**6.9%**	**17.2%**	
Cider Mill to 11 Mile Rd	0.50	22	0	0	4	0	0	1	15	2	0	2	0
Percent		**100%**	**0%**	**0%**	**18.2%**	**0%**	**0%**	**4.5%**	**68.2%**	**9.1%**	**0%**	**9.1%**	
11 Mile Rd to Central Park/ Providence Parkway	0.31	20	0	0	3	0	0	0	16	0	1	5	0
Percent		**100%**	**0%**	**0%**	**15.0%**	**0%**	**0%**	**0%**	**80%**	**0%**	**5.0%**	**25.0%**	
Central Park/ Providence Parkway to Grand River Ave	0.26	21	0	0	2	0	0	1	13	3	2	4	0
Percent		**100%**	**0%**	**0%**	**9.5%**	**0%**	**0%**	**4.8%**	**61.9%**	**14.3%**	**9.5%**	**19.0%**	
Grand River Ave to I-96	0.22	96	0	0	1	0	1	5	77	11	1	12	0
Percent		**100%**	**0%**	**0%**	**1.0%**	**0%**	**1.0%**	**5.2%**	**80.2%**	**11.5%**	**1.0%**	**12.5%**	
I-96 to 12 Mile Rd	0.09	72	0	0	2	0	0	1	61	7	1	17	0
Percent		**100%**	**0%**	**0%**	**2.7%**	**0%**	**0%**	**1.4%**	**84.7%**	**9.7%**	**1.4%**	**23.6%**	
12 Mile Rd to West Rd	0.84	140	0	0	13	1	2	6	93	16	9	24	1
Percent		**100%**	**0%**	**0%**	**9.3%**	**0.7%**	**1.4%**	**4.3%**	**66.4%**	**11.4%**	**6.4%**	**17.1%**	
West Rd to Pontiac Tr	1.05	182	0	0	9	1	7	52	74	29	9	45	3
Percent		**100%**	**0%**	**0%**	**4.9%**	**0.5%**	**3.8%**	**28.6%**	**40.7%**	**15.9%**	**4.9%**	**24.7%**	

Source: Traffic Crash Analysis Tool 2.0, Transportation Improvement Association
(1)All segment crashes are taken from 150 feet north of the southernmost road to 150 feet south of the northernmost road

5.3 Segment Hot Spots

There were five (5) hot spots along Beck Road in the study area. Each cluster revealed a strong pattern of rear-end and angle crashes, as 65 of the 158 total crashes in the six hot spot areas (41%) were comprised of rear-end crashes and 46 of the 158 total crashes in the six hot spot areas (29%) were comprised of angle crashes. Crashes during peak-hours, defined as 7:00 to 9:00 AM and 4:00 to 6:00 PM, were common amongst rear-end crashes. Following is a description of each hot spot.

Beck Road PR 656605 at MP 0.0 *- SB Beck Road between 200 feet and 500 feet north of 8 Mile Road*
- 13 crashes in a 0.1 mile segment

Nine of the thirteen crashes were rear-end crashes, and two of them were collisions with deer. All the crashes occurred on southbound Beck Road approaching 8 Mile Road (between 200 feet and 500 feet north of 8 Mile Road). UD-10s for six of these crashes noted that traffic back-ups on southbound Beck Road as contributing to the pattern of rear-end crashes at this hot spot. Five of the thirteen rear-end crashes occurred during the peak-hour (7:00 to 9:00 AM – 1 crash, and 4:00 to 6:00 PM – 4 crashes) and four occurred after dark. Four rear-end crashes occurred on a wet road surface.

Beck Road PR 662105 at MP 0.3 *- Beck Road near Enterprise Ct and Progress Dr*
- 19 crashes in a 0.1 mile segment

Fourteen of the nineteen crashes were rear-end, three angle, and two single-motor vehicle. Twelve of the rear-end crashes occurred on southbound Beck Road approaching Enterprise Ct (between 5 feet and 100 feet away from Enterprise Ct) and Progress Dr (between 170 feet and 500 feet away from Progress Dr). UD-10s for four of these crashes noted that traffic back-ups on southbound Beck Road as contributing to the pattern of rear-end crashes at this hot spot. Seven of the nineteen rear-end crashes occurred during the peak-hour (2 morning, 5 afternoon), one occurred after dark, and two occurred on a slippery road surface. Two of the three angle crashes occurred during the peak-hour (2 afternoon), none occurred after dark, and none occurred on a slippery road surface.

Beck Road PR 662105 at MP 0.8 *- Beck Road south of Magellan Dr*
- 22 crashes in a 0.1 mile segment

Sixteen of the twenty-two crashes were rear-end, one angle, three single-motor vehicle, one head-on left turn, and one other crash. Most of the rear-end crashes occurred on northbound Beck Road approaching Magellan Dr (between 0 feet and 300 feet south of Magellan Dr) and West Rd (between 500 feet and 750 feet south of West Rd). Nine UD-10s for these crashes noted that traffic back-ups on northbound Beck Road as contributing to the pattern of rear-end crashes at this hot spot. Eight of the twelve rear-end crashes occurred during the afternoon peak-hour, none occurred after dark, and three occurred on a slippery road surface.

Beck Road PR 662105 at MP 1.6 *- Beck Road near Cartier Dr and Anderson Ct*
- 21 crashes in a 0.1 mile segment

Thirteen of the twenty-one crashes were rear-end, two were side-swipe, and six were angle. Most of the rear-end crashes occurred on southbound Beck Road approaching Andersen Ct (between 0 feet and 200 feet north of Andersen Ct) and Cartier Dr (between 0 feet and 100 feet north of Cartier Dr). Five UD-10s for crashes in this location noted that traffic back-ups on southbound Beck Road as contributing to the pattern of rear-end and angle crashes at this hot spot. Five of the thirteen rear-end crashes occurred during the peak-hour (2 morning, 3 afternoon), four occurred after dark, and two occurred on a slippery surface. Two of the six angle crashes occurred during the afternoon peak-hour, two occurred after dark, and one occurred on a slippery surface.

Beck Road PR 662105 from MP 1.8 to MP 2.0 *- Beck Road near Tamarack St to Hickory St*
- 83 crashes in a 0.2 mile segment

Thirty-six of the eighty-three crashes were angle, sixteen sideswipe same-direction, thirteen rear-end, five head-on left-turn, three single-motor vehicle, 2 sideswipe opposite-direction, one head-on, one rear-end left-turn, one unknown, and five other. All eighty-three hot spot crashes occurred south of the Beck Road/Pontiac Tr intersection, near either Tamarack St or Hickory Street. Several UD-10s for crashes in this location noted that traffic back-ups on Beck Road as contributing to the pattern of angle crashes at this hot spot. Fifteen of the thirty-six angle crashes occurred during the peak-hour (5 morning, 10 afternoon), six occurred after dark, and twelve occurred on a slippery road surface.

A robust rear-end crash pattern occurred at all twelve intersections - ranging from 42% to 92% of all crashes by intersection. Beck Road is a congested corridor, contributing to the high number of rear-end crashes. All eight segments had a marked rear-end crash pattern, ranging from 40.7% to 84.7% amongst the segments. The prevalence of rear-end crashes along segments, based on a review of UD-10s indicates that traffic congestion and back-ups along Beck Road contributed to the pattern of rear-end crashes. Additionally, angle crashes were prevalent within the 9 Mile Rd to 10 Mile Rd and West Rd to Pontiac Trail segments. Traffic backups on Beck Road were noted as a factor in these angle crashes. The proposed project is estimated to relieve congestion significantly and will help in the reduction of total crashes. Additionally, based on the Crash Modification Factor from the CMF Clearinghouse, CMF ID: 7566, Convert 2 lane roadway to 4 lane divided roadway revealed a 66% reduction in the total crashes.

Appendix A Traffic Counts & Adjusted Traffic Volume

AM Peak Hour Traffic Volume, Truck/Heavy Vehicle Percentages and Peak Hour Factor (PHF)

8 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.89			0.76			0.95			0.95	
Heavy Vehicles		1%			2%			4%			2%	
Heavy Vehicles (2023)	1	5	2	3	2	2	2	22	6	3	15	1
2018 Counted Volumes	115	457	153	125	112	71	43	506	143	121	690	60
Existing/Base (2023)	125	495	166	136	121	77	47	549	155	131	748	65
Future (No Build) 2045	178	707	237	193	173	110	67	783	221	187	1068	93
Future (Build) 2045	178	707	237	193	173	110	67	783	221	187	1068	93

9 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.67			0.87			0.95			0.9	
Heavy Vehicles		5%			4%			4%			5%	
Heavy Vehicles (2023)	0	5	1	2	0	4	0	24	2	7	34	0
2023 Counted Volumes	7	95	29	43	8	98	6	610	62	135	673	6
Future (No Build)	10	136	41	61	11	140	9	871	88	193	961	9
Future (Build)	10	136	41	61	11	140	9	871	88	193	961	9

10 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.9			0.9			0.86			0.89	
Heavy Vehicles		2%			6%			3%			7%	
Heavy Vehicles (2023)	3	9	4	5	16	6	5	16	3	7	30	8
2023 Counted Volumes	163	430	193	89	264	98	162	528	98	103	422	108
Future (No Build)	233	614	275	127	377	140	231	754	140	147	602	154
Future (Build)	233	614	275	127	377	140	231	754	140	147	602	154

Cider Mill Dr	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
`		0.66			0.69			0.86			0.86	
Heavy Vehicles		0%			0%			3%			8%	
Heavy Vehicles (2023)	0	0	0	0	0	0	0	26	0	1	47	1
2023 Counted Volumes	31	0	22	6	0	48	8	858	6	18	589	15
Future (No Build)	44	0	31	9	0	69	11	1225	9	26	841	21
Future (Build)	44	0	31	9	0	69	11	1225	9	26	841	21

11 Mile	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.91			0.83			0.95			0.92	
Heavy Vehicles		7%			3%			5%			6%	
Heavy Vehicles (2023)	8	11	5	1	3	1	4	40	2	2	31	6
2023 Counted Volumes	120	155	74	20	88	48	73	792	46	35	512	94
Future (No Build)	171	221	106	29	126	69	104	1130	66	50	731	134
Future (Build)	171	221	106	29	126	69	104	1130	66	50	731	134

Central Park / Providence	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.65			0.76			0.95			0.91	
Heavy Vehicles		2%			0%			4%			6%	
Heavy Vehicles (2023)	1	0	1	0	0	0	5	32	1	1	36	2
2023 Counted Volumes	40	2	25	30	3	51	123	803	13	9	599	39
Future (No Build)	57	3	36	43	4	73	176	1146	19	13	855	56
Future (Build)	57	3	36	43	4	73	176	1146	19	13	855	56

Grand River	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.88			0.92			0.93			0.88	
Heavy Vehicles		4%			4%			1%			4%	
Heavy Vehicles (2023)	17	25	4	4	12	8	1	8	1	15	26	13
2018 Counted Volumes	395	585	87	83	277	190	79	778	48	343	610	307
Existing/Base (2023)	428	634	94	90	300	206	86	844	52	372	661	333
Future (No Build)	611	905	135	128	429	294	122	1204	74	531	944	475
Future (Build)	611	905	135	128	429	294	122	1204	74	531	944	475

I-96 On/Off Ramps	EB I-96 Ramps			WB I-96 Ramps			NB Beck			SB Beck		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.95			0.85			0.91			0.9	
Heavy Vehicles		2%			3%			4%			4%	
Heavy Vehicles (2023)	11	x	7	19	x	24	10	26	29	24	25	9
2020 Counted Volumes	507	x	313	614	x	763	233	624	692	575	588	207
Existing/Base (2023)	532	x	329	645	x	801	245	655	726	604	617	217
Future (No Build)	760	x	469	920	x	1143	349	935	1037	861	881	310
Future (Build)	760	x	469	920	x	1143	349	935	1037	861	881	310

12 Mile	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		x			0.89			0.92			0.95	
Heavy Vehicles		x			3%			2%			4%	
Heavy Vehicles (2023)	x	x	x	12	x	2	x	20	16	5	44	x
2020 Counted Volumes	x	x	x	387	x	73	x	956	739	111	1038	x
Existing/Base (2023)	x	x	x	406	x	77	x	1004	776	117	1090	x
Future (No Build)	x	x	x	580	x	109	x	1432	1107	166	1555	x
Future (Build)	x	x	x	580	x	109	x	1432	1107	166	1555	x

West Rd	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.95			0.87			0.95			0.95	
Heavy Vehicles		4%			5%			4%			2%	
Heavy Vehicles (2023)	2	7	7	3	8	2	2	17	5	1	22	2
2020 Counted Volumes	59	171	157	57	160	37	53	407	124	38	1043	88
Existing/Base (2023)	62	179	165	60	168	39	56	427	130	40	1095	92
Future (No Build)	88	256	235	85	240	55	79	610	186	57	1563	132
Future (Build)	88	256	235	85	240	55	79	610	186	57	1563	132

Pontiac Trail	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF		0.92			0.74			0.84			0.92	
Heavy Vehicles		3%			2%			7%			2%	
Heavy Vehicles (2023)	3	9	7	6	6	3	4	11	5	2	12	3
2020 Counted Volumes	107	301	235	306	270	166	48	150	71	105	576	124
Existing/Base (2023)	112	316	247	321	283	174	50	157	75	110	605	130
Future (No Build)	160	451	352	458	404	249	72	225	106	157	863	186
Future (Build)	160	451	352	458	404	249	72	225	106	157	863	186

X - marked movement/approach not present.

PM Peak Hour Traffic Volume, Truck/Heavy Vehicle Percentages and Peak Hour Factor (PHF)

8 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.8			0.91			0.95			0.93		
Heavy Vehicles (%)	1%			1%			2%			2%		
Heavy Vehicles (2023)	1	2	1	2	4	2	3	12	2	2	13	3
2018 Counted Volumes	87	185	115	166	381	166	151	567	92	84	610	127
Existing/Base (2023)	94	201	125	180	413	180	164	615	100	91	661	138
Future (No Build)	135	286	178	257	590	257	234	877	142	130	944	197
Future (Build)	135	286	178	257	590	257	234	877	142	130	944	197

9 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.75			0.93			0.87			0.91		
Heavy Vehicles (%)	19%			2%			3%			1%		
Heavy Vehicles (2023)	2	7	1	2	1	4	0	18	1	1	6	0
2023 Counted Volumes	8	36	4	79	67	178	6	609	39	120	600	12
Future (No Build)	11	51	6	113	96	254	9	869	56	171	856	17
Future (Build)	11	51	6	113	96	254	9	869	56	171	856	17

10 Mile Road	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.91			0.9			0.93			0.94		
Heavy Vehicles	2%			1%			4%			1%		
Heavy Vehicles (2023)	3	8	4	1	5	1	7	19	5	1	5	2
2023 Counted Volumes	130	403	182	104	529	92	177	479	132	93	459	154
Future (No Build)	186	575	260	148	755	131	253	684	188	133	655	220
Future (Build)	186	575	260	148	755	131	253	684	188	133	655	220

Cider Mill Dr	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.72			0.92			0.94			0.9		
Heavy Vehicles	0%			0%			3%			1%		
Heavy Vehicles (2023)	0	0	0	0	0	0	0	21	1	1	7	0
2023 Counted Volumes	13	0	9	7	0	47	12	697	17	67	728	40
Future (No Build)	19	0	13	10	0	67	17	995	24	96	1039	57
Future (Build)	19	0	13	10	0	67	17	995	24	96	1039	57

11 Mile	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.82			0.85			0.95			0.95		
Heavy Vehicles	1%			0%			4%			1%		
Heavy Vehicles (2023)	1	1	1	0	0	0	3	25	2	1	7	2
2023 Counted Volumes	50	94	52	41	176	44	83	631	49	78	701	228
Future (No Build)	71	95	53	42	177	45	84	632	50	79	702	229
Future (Build)	71	95	53	42	177	45	84	632	50	79	702	229

Central Park / Providence	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.95			0.77			0.95			0.95		
Heavy Vehicles	1%			0%			3%			1%		
Heavy Vehicles (2023)	1	0	1	0	0	0	1	20	1	0	9	1
2023 Counted Volumes	75	4	68	14	6	32	29	671	20	49	895	55
Future (No Build)	107	6	97	20	9	46	41	958	29	70	1277	78
Future (Build)	107	6	97	20	9	46	41	958	29	70	1277	78

Grand River	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.92			0.94			0.93			0.86		
Heavy Vehicles	2%			1%			1%			2%		
Heavy Vehicles (2023)	11	14	3	1	8	4	1	8	1	5	14	6
2018 Counted Volumes	496	629	158	106	722	375	124	711	73	244	629	259
Existing/Base (2023)	538	682	171	115	783	407	134	771	79	265	682	281
Future (No Build)	767	973	244	164	1117	580	192	1100	113	378	973	401
Future (Build)	767	973	244	164	1117	580	192	1100	113	378	973	401

I-96 On/Off Ramps	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.83			0.94			0.93			0.95		
Heavy Vehicles	2%			1%			1%			1%		
Heavy Vehicles (2023)	5	x	6	3	x	3	4	8	6	8	7	6
2020 Counted Volumes	229	x	264	323	x	316	423	731	610	715	670	600
Existing/Base (2023)	240	x	277	339	x	332	444	767	640	751	703	630
Future (No Build)	343	x	396	484	x	473	634	1095	914	1071	1004	899
Future (Build)	343	x	396	484	x	473	634	1095	914	1071	1004	899

12 Mile	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	x			0.82			0.92			0.95		
Heavy Vehicles	x			1%			1%			1%		
Heavy Vehicles (2023)	x	x	x	11	x	1	x	9	5	1	10	x
2020 Counted Volumes	x	x	x	1000	x	118	x	904	461	83	994	x
Existing/Base (2023)	x	x	x	1050	x	124	x	949	484	87	1043	x
Future (No Build)	x	x	x	1498	x	177	x	1354	691	124	1489	x
Future (Build)	x	x	x	1498	x	177	x	1354	691	124	1489	x

West Rd	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.81			0.78			0.88			0.87		
Heavy Vehicles	2%			2%			2%			1%		
Heavy Vehicles (2023)	2	4	2	1	5	2	2	20	1	1	6	2
2020 Counted Volumes	84	193	79	63	222	103	72	950	66	55	596	185
Existing/Base (2023)	88	203	83	66	233	108	76	997	69	58	626	194
Future (No Build)	126	289	118	94	333	154	108	1423	99	82	893	277
Future (Build)	126	289	118	94	333	154	108	1423	99	82	893	277

Pontaic Trail	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
PHF	0.9			0.92			0.95			0.88		
Heavy Vehicles	1%			1%			1%			2%		
Heavy Vehicles (2023)	2	4	1	2	4	1	2	7	3	2	5	2
2020 Counted Volumes	205	417	98	171	340	127	183	639	287	99	226	87
Existing/Base (2023)	215	438	103	179	357	133	192	671	301	104	237	91
Future (No Build)	307	625	147	256	509	190	274	957	430	148	339	130
Future (Build)	307	625	147	256	509	190	274	957	430	148	339	130

X - marked movement/approach not present.