

Coolidge Highway - Road Diet

City of Berkley

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Contents

Introduction	2
Existing Geometry.....	2
Crash History.....	3
Existing Traffic Operations	4
Existing Traffic with Proposed Geometry.....	5
Planned Development	9
SEMCOG Travel Demand Modeling	9
Projected Traffic Conditions (2023)	9
Conclusions and Recommendations.....	11



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City of Berkeley

Introduction

The City of the Berkeley and the Downtown Development Authority requested the Transportation Improvement Association (TIA) conduct a corridor study for Coolidge Highway between 10 Mile Road and 12 Mile Road. The study is to assess the feasibility of reducing the cross section of Coolidge Highway to a three (3) lane cross section. The scope of the study includes evaluating the current and proposed traffic operations for the seven (7) signalized intersection in the corridor. Additionally, the crash history of the corridor and the access point density will be examined.

Existing Geometry

The corridor is a five (5) lane section between 10 Mile and 11 Mile with a center turn lane and two (2) travel lanes in each direction. The width is approximately 61 feet with an eleven feet (11') turn lane and twelve feet to thirteen feet (12'-13') wide travel lanes. No on street parking exists in this section.

Between 11 Mile Road and 12 Mile Road the cross section is a four (4) lane section, two travel lanes in each direction and intermittent on street parking. The basic width is 58 feet, with four (4) eleven feet (11') travel lanes and a seven (7) feet parking lane. At the signalized intersections a center turn lane is developed.

Access point density or driveway density measures the total number of access points onto the roadway, driveways and intersections, for a segment. It is a good measure of the suitability of a center turn lane. The number of access points for corridor segments are illustrated in Table 1. All the segments average more than 30 access points per mile, which would be considered high for an arterial roadway.

Table 1 Access Point Density

Segment	Length (miles)	Number of Access Points
10 Mile Rd (I-696) to Lincoln Dr	0.45	34
Lincoln Dr to 11 Mile Rd	0.50	28
11 Mile Rd to Havard Rd	0.22	20
Havard Rd to Catalpa Dr	0.28	23
Catalpa Dr to Wiltshire Dr	0.18	13
Wiltshire Dr to 12 Mile Rd	0.32	27

Crash History

The three year crash history (2014-2016) was examined for the corridor. In order to evaluate the proposed geometry the signalized intersections, which include left lanes, were excluded from the summary. The results are shown in Table 2.

Table 2 Crash Frequencies

Segment	Total Crashes	Injury Crashes	PDO Crashes	Mitigated by Turn Lane*
10 Mile to Lincoln	11	2	9	N/A
Lincoln to 11 Mile	15	4	11	N/A
11 Mile to Havard	15	3	12	13
Havard to Catalpa	16	6	10	10
Catalpa to Wiltshire	10	1	9	8
Wiltshire to 12 Mile	13	1	12	11
Corridor Complete	80	17	63	42

*Sideswipe same, rear end, rear end /left and head on /left type crashes.

North of 11 Mile Road, in the 4 lane areas, eight (8) side-swipe same type crashes occurred. These are due to lane changes or collisions with parked vehicles. Additionally, 20 rear-end crashes occurred outside of the signalized intersections. These are typically the result of vehicle stopping or slowing to turn and can be mitigated by the addition of center turn lane.

The conversion of a 4 lane roadway to a 3 lane roadway with center turn lane has been shown to reduce crashes. The expected decrease in crashes would be 29% of all crashes (in the existing 4 lane section).

Existing Traffic Operations

For the study both manual peak hour turning movement counts and 24 hour automatic counts were collected. Figure 1 contains the daily traffic volumes and Figure 2 illustrates the peak hour counts at the major intersections.

Using the existing traffic volumes and the current signal timings, a capacity analysis was performed using Synchro software. The corridor was modeled as a network from 10 Mile to 12 Mile. Based on the *Highway Capacity Manual* methodologies the level of service (LOS) was generated. Table 1 illustrates the levels of service definitions per the

Table 3 Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (secs/veh)	General Description
A	0-10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

The summary of the analysis is contained in Table 2. The complete Synchro reports are contained in Appendix B.

Table 4 Intersection Level of Service- Existing Conditions

Intersection	AM Peak Level of Service	PM Peak Level of Service
10 Mile / Coolidge	B	C
Lincoln / Coolidge	B	A
11 Mile / Coolidge	C	B
Havard / Coolidge	A	A
Catalpa/ Coolidge	B	A
Wiltshire / Coolidge	B	B
12 Mile / Coolidge	D	D



Travel time runs were conducted along the corridor to measure the existing time it takes to travel between 10 Mile and 12 Mile. The runs occurred during the AM and PM peak hours. The results are contained in Table 5. The travel times are important to collect prior to any changes as post implementation is a key measure to evaluate.

Table 5 Travel Time Runs- average time

Segment	AM Peak	PM Peak
NB – 10 Mile to 12 Mile	5'46"	5'34"
SB – 10 Mile to 12 Mile	5'35"	5'-1"

Using the average travel times per direction and the length of the corridor this equates to an average speed northbound of 21 miles per hour in the AM period and 21 miles per hour in the PM peak. The southbound average speeds were 21 mph and 23 mph respectively.

The Synchro model was also used to estimate arterial speed and arterial level of service for Coolidge Highway. The simulation report had an average speeds of 23.6 mph for northbound and 25.8 mph for southbound in the AM peak (slightly optimistic over observed). This equates to an arterial level of service of C/B for northbound / southbound respectively. The PM peak period had average speeds of 25.1 mph and 26.1 mph, with corresponding level of service B /B, respectively. Again slightly above what was measured in the field.

Existing Traffic with Proposed Geometry

As the comparison of existing traffic with the 3 lane cross section is relevant to measure the impact of any such changes, Synchro was again utilized to assess level of service. Table 6 summarizes the intersection level of services. There are some decreases in level of services, but still acceptable levels are provided. Arterial level of service remained in the B/C range with arterial speeds of 21.8 to 24.0 mph predicted.



Table 6 Intersection Level of Service- Projected Geometry-Existing Traffic

Intersection	AM Peak Level of Service	PM Peak Level of Service
10 Mile / Coolidge	B	C
Lincoln / Coolidge	B	B
11 Mile / Coolidge	C	C
Havard / Coolidge	B	B
Catalpa/ Coolidge	B	B
Wiltshire / Coolidge	C	D
12 Mile / Coolidge	D	D

Based on the summary of level of service it appears the proposed geometry is feasible and would have minimal operational impact.

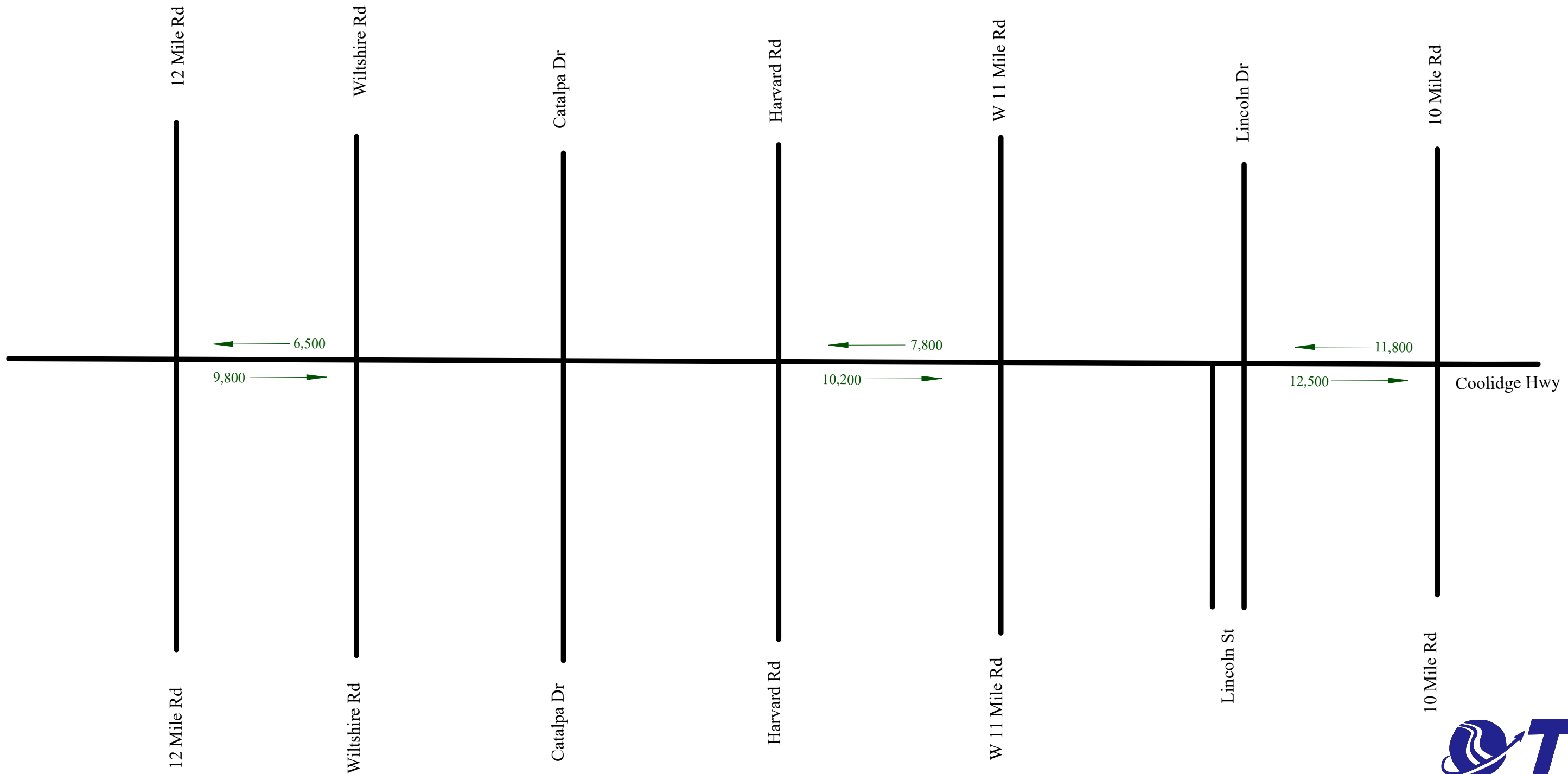


Figure 1
Existing Daily
Traffic Volumes

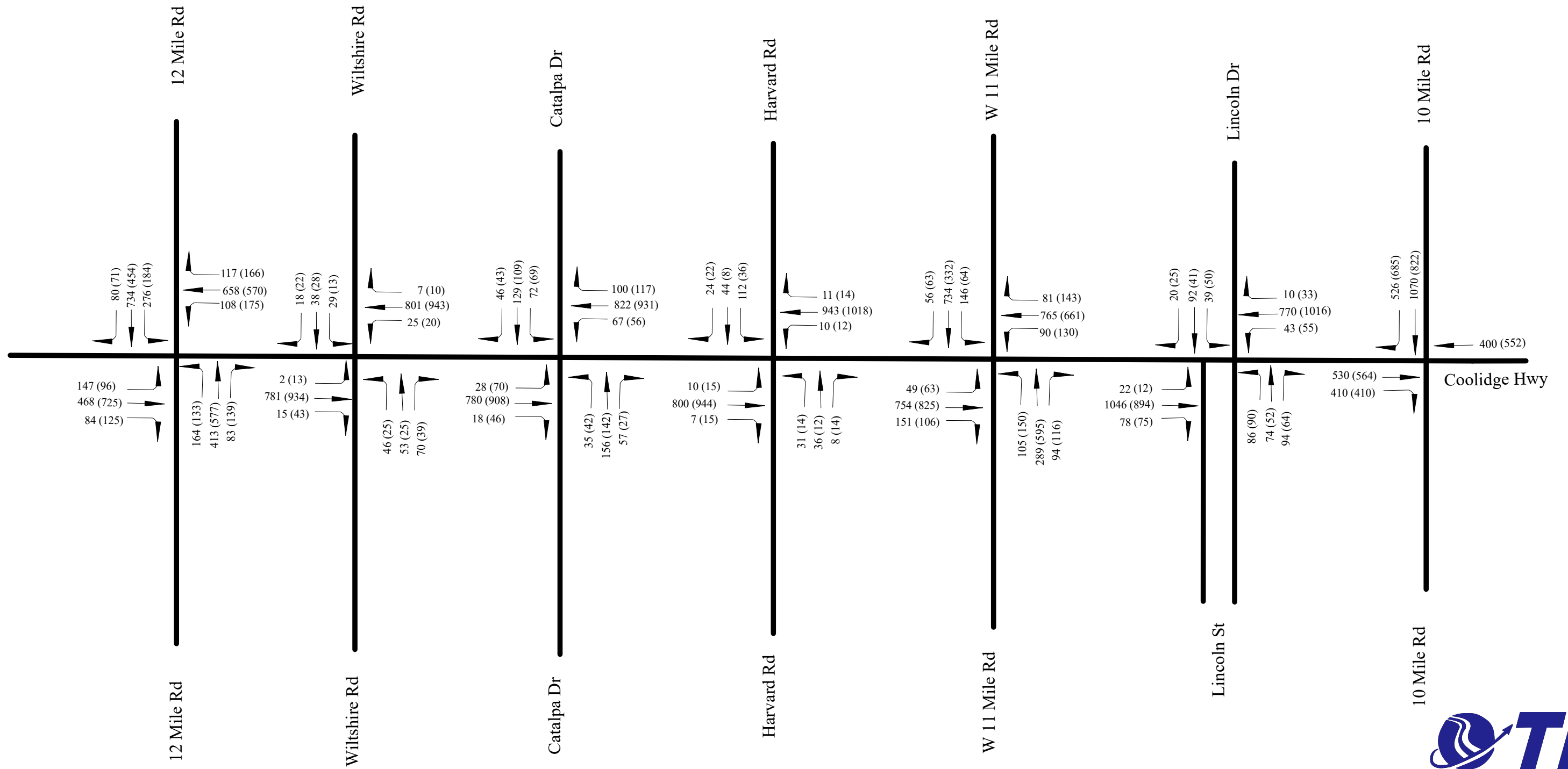


Figure 2
Turning Movement Volumes
7AM-8AM (4:45PM-5:45PM)



Planned Development

Based on current plans submitted to the City that are in the development / plan review process two (2) new developments are expected to impact the corridor. These include the following:

- La Salette School Property Development
- Harvard Commons Condominiums (under construction)

The current proposed development on the La Salette site calls for 130 apartment units and 8 condo units. Based on the traffic impact study prepared for the La Salette project a total of 87 new trips in the AM peak and 112 in the PM peak period. Harvard Commons is a 15 unit condominium development that is constructed and has units in various states of being occupied. For this study the traffic for Harvard Commons was considered to be in the existing volumes.

SEMCOG Travel Demand Modeling

The City requested that the Southeast Michigan Council of Governments (SEMCOG) perform modeling of the impact to the network if the geometry of Coolidge Highway is reduced. SEMCOG provided models for the existing condition, the 2040 with existing network and the 2040 with proposed changes.

Based on the macroscopic travel demand model traffic is expected to shift to adjacent north-south roadways. The 2040 no build condition compared to the proposed geometry predicts a 30-37% decrease in daily traffic volumes on Coolidge Highway. This will lead to a 6-10% increase on Greenfield Road and 2-7% increase on Woodward Avenue. A macroscopic model relies on a rough approximations of the roadway link capacity and in this case it appears to overestimate the amount of diversion. In a signalized roadway network the intersection performance will drive the throughput of the corridor. To assess this involves the micro level analysis, such as contained within the report and this is likely not reflected in the SEMCOG modeling.

The other aspect of the SEMCOG modeling is the expected growth of traffic within the corridor. Based on the comparison of existing traffic to 2040 traffic, it is predicted to have a net decrease in traffic volumes.

Projected Traffic Conditions (2023)

The proposed improvements primarily consist of pavement marking modifications. As such they will have a service life of 5 years or less. Based on this a horizon year of 2023 was chosen for the



projected condition. The north end of the project is assumed to be just south of Beverly Boulevard. At signalized intersections within the corridor, the right most lane which is a right –through lane was converted to right only operation.

As stated earlier the SEMCOG projections show a net decrease in traffic volumes over time. In order to perform a conservative analysis, an assumption that some short term growth will occur. In this case a growth rate of 1.0% per year was applied as background growth to volumes derived with the committed development added as well. The 2023 daily volumes are shown in Figure 3 and projected 2023 turning movement volumes are shown in Figure 4.

A capacity analysis was again performed using Synchro software based on the 2023 volumes and with optimized traffic signal split, but retaining the existing cycle length (90 seconds) and offsets in the signal timings. The expected level of service was calculated and a summary of the analysis is contained in Table 7.

Table 7 Intersection Level of Service- 2023 Projected Geometry / Traffic

Intersection	AM Peak Level of Service	PM Peak Level of Service
10 Mile / Coolidge	B	C
Lincoln / Coolidge	C	B
11 Mile / Coolidge	D	C
Havard / Coolidge	B	B
Catalpa/ Coolidge	B	B
Wiltshire / Coolidge	C	D
12 Mile / Coolidge	E	D

In the 2023 horizon year some degradation of level of service is shown, but it is not significant. The AM peak level of service at 11 Mile / Coolidge is expected to operate at a LOS D and 12 Mile / Coolidge is expected to operate at LOS E. Level of service D is deemed an adequate level in most urbanized areas. The PM peak period retains the same levels of service for each intersection.

The analysis was rerun with modified signal timing, specifically increasing the cycle length across the corridor and removing, as necessary, signals from coordination. The optimization improves overall corridor performance with a 120 second cycle length and removing two intersections from coordination. This still resulted in a level of service E at 12 Mile Road.



The corridor level of service is expected to be at LOS C for the both directions in the AM and PM peak periods. The arterial speeds are predicted to average 18.5 mph northbound and 20.5 southbound in the AM peak. The PM peak is expected to average 25.1 mph and 26.1 mph northbound and southbound respectively. These represent a decrease in average speed of 2-5 mph depending on time and direction

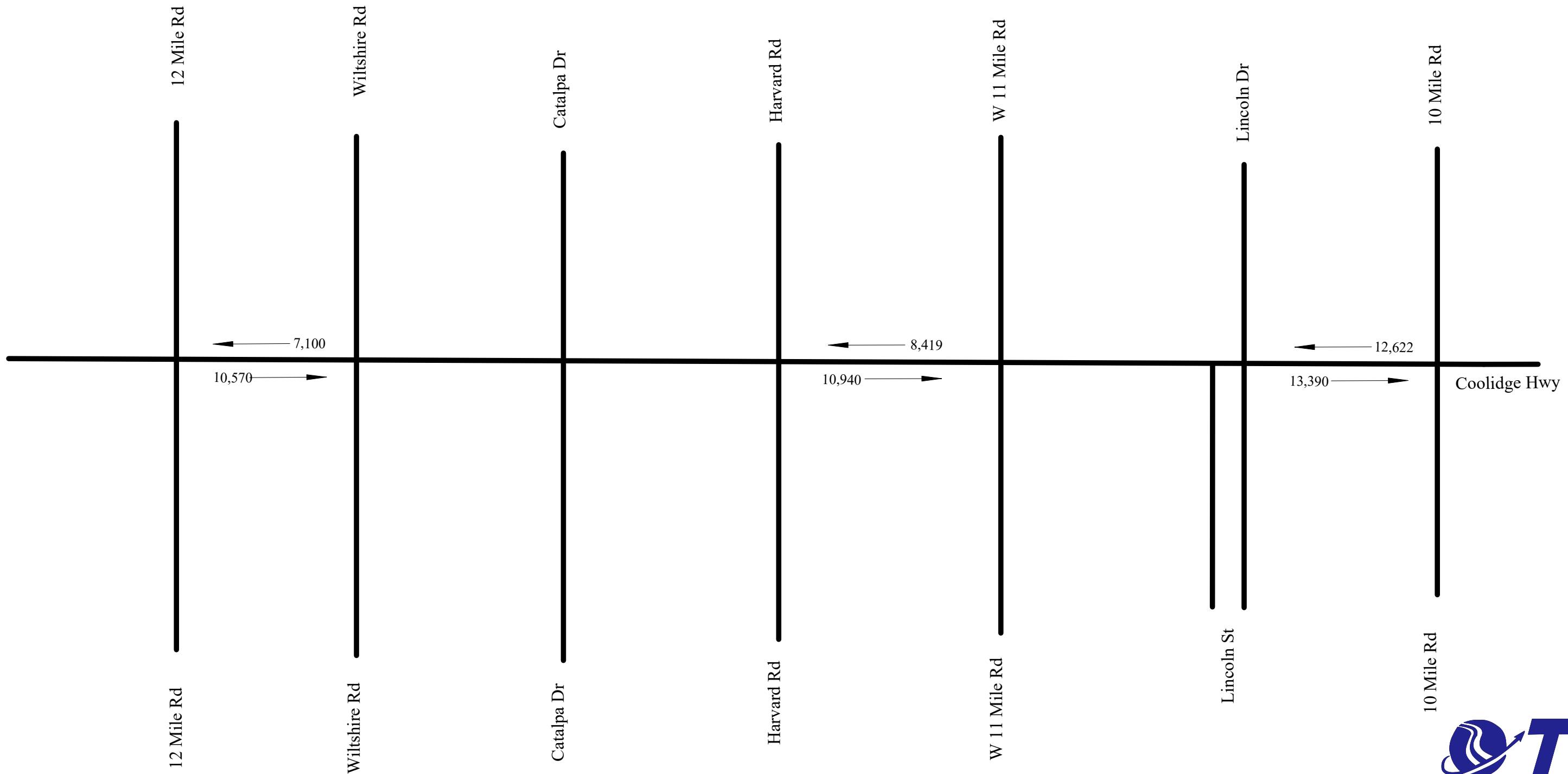


Figure 3
2023 Daily
Traffic Volumes

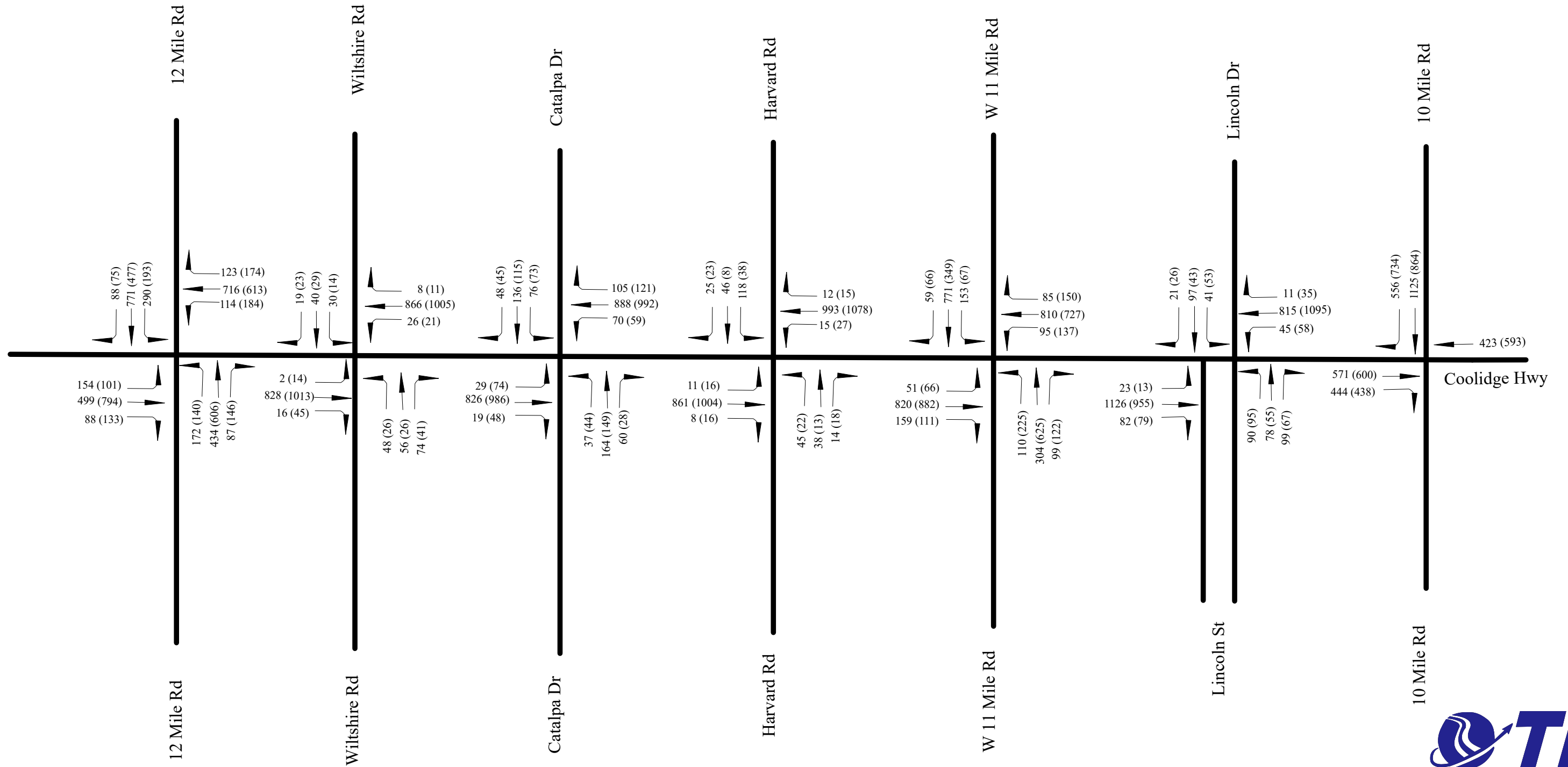


Figure 4
 2023 Turning Movement Vols.
 7AM-8AM (4:45PM-5:45PM)



Conclusions and Recommendations

Based on the analysis of the existing and future traffic operations, the reconfiguration of the roadway to three (3) lanes is feasible. The intersection level of service is acceptable with minimal deviations for the base condition of existing traffic volumes on the projected geometry.

The implementation of a three (3) lane cross section will reduce crashes within the corridor. Based on applicable research on such conversions a reduction in crashes on the order of 29% would be expected.

The future year 2023 traffic, which assumes background growth and anticipated development continues to operate at acceptable levels of service with the exception of 12 Mile and Coolidge in the AM peak hour. As the geometry of the intersection is unchanged by the proposed improvements, the situation will occur regardless. Future mitigation might be needed if the LaSalette property is developed. This might include turn lane additions for the westbound or northbound approaches.

The recommendations are as follows:

- Implement the three (3) lane cross-section beginning approximately 275 feet north of 10 Mile Rd and terminating approximately 130 feet south of Beverly Blvd.
- Convert through –right lanes to right turn only at needed signalized intersections
- Provide two (2) through lanes 11 feet in width and one (1) center turn lane a minimum of 10 feet in width.
- Repurpose excess space with bike lanes and /or widened parking lanes.
- Perform warrant analysis for possible removal of the traffic signals at Wiltshire and Harvard (low peak hour approach volumes).

Appendix A
Traffic Volume Data

Appendix B
Synchro Reports

Appendix C
Traffic Crash Data