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OFFICE MEMORANDUM

DATE: September 14, 2015

TO: Brian McManus, City Engineer, and Brad Kaye, Planning Director, City of Midland

FROM: Brad Strader, AICP, PTP

SUBJECT: City of Midland Farmer's Market Traffic Evaluation

BACKGROUND

The City of Midland and the Michigan Municipal League (MML) engaged LSL Planning, a SafeBuilt Company, with DLZ as a sub consultant, to conduct an independent traffic evaluation of the proposed relocation of the Farmer Market. LSL Planning was selected in part because we are on the MML's list of pre-qualified firms for their "Place Plans" place making program. We were also selected due to our familiarly with Midland through several previous projects including the comprehensive plan, parks and recreation plan, the previous downtown plan, and the current U.S. 10 Corridor Plan for MDOT.

STUDY PURPOSE

The purpose of this traffic study is to evaluate: (1) current traffic operations at the intersections around the proposed Framers Market site, (2) predict traffic volumes generated by background growth and the expanded Farmer's Market, and; (3) identify roadway improvements needed to allow the street network to accommodate the future traffic, preferably with traffic operations similar to what exits today.

METHODOLOGY

The study was conducted consistent with the procedures outlined in the ITE impact study guide, the Michigan hand book "Evaluating Traffic Impacts" and the Highway Capacity Manual. As stipulated in those publications, the analysis was performed for the morning and evening rush hours (AM and PM peak hours) for a typical weekday. Since the Farmers Market operates on Wednesdays, that was the typical weekday studied. (Note: The Farmers Market activity is higher on Saturdays, but the overall traffic volumes are much lower. Therefore on a Saturday there is ample capacity to handle Farmers Market traffic.)

Key parts of the process are listed below, and explained in more detail afterward.

1. Traffic counts were provided by the City of Midland and MDOT at the following intersections:

    - Poseyville Road at St. Charles Street (City of Midland)
    - Ellsworth Street at Cronkright Street (City of Midland)
    - Ellsworth Street at George Street (City of Midland)
    - Cronkright Street at Buttles Street (US-10 BR) (MDOT)
    - Cronkright Street at Indian Street (US-10 BR) (MDOT)
    - George Street at Buttles Street (US-10 BR) (MDOT)
    - George Street at Indian Street (US-10 BR) (MDOT)

2. Actual vehicle and pedestrian trips into and from the Midland Farmers Market were counted, and future "trips" were then estimated. A 20% growth factor was used to estimate the increased attraction at the new, more visible location. In addition, it is expected there would be a slight increase in what are classified as "Pass-By" trips – those already traveling on the street who might make a stop at the new Farmer's Market location.

3. Traffic analysis for the AM and PM weekday (Wednesday) peak hours was then predicted. This included the following:

   A. Existing Traffic (as a benchmark)

   B. Existing Traffic
      + Farmers Market with increased visits at new location
      + Background traffic (growth expected) over the next 20-25 years based on development in the vicinity, per methodology.

4. Vehicle trips were distributed onto the street system based on expected travel patterns that are expected to mimic the current patterns. This established the left, right and through movements expected at the study area intersections.

5. The forecast of that traffic was evaluated using the commonly accepted software model, called Synchro, to predict the change in the delay for vehicles at the study intersections during the peak hours (i.e. where more delay could be expected, and by how much).

6. Then a series of improvements were tested using the model to determine the improvements that would be needed to generally retain the level of traffic operations that exist today.

HOW TRAFFIC OPERATIONS ARE MEASURED – DELAY AND "LEVEL OF SERVICE"

Traffic operations are typically based on the measurement of vehicle delay at intersections, known as level of service (LOS). The delay is measured in terms of the seconds of delay for the typical vehicle traveling through an intersection in the peak hour. A common scale used in Michigan and nationally is LOS A-F, but unlike grades in school, a LOS C is usually the target (20-35 seconds of delay) for the average vehicle in the peak hours, usually much less the rest of the day. Many communities in Michigan design for LOS D in downtown and urban areas, especially where there is a goal to also have a safe and convenient operations for pedestrians and bicyclists. A LOS F indicates severe congestion (about 1.5 minutes of delay for an average vehicle during the peak morning and evening rush hours).

EXISTING CONDITIONS ANALYSIS

Peak hour turning movement volumes for four intersections were obtained from a 2013 Michigan Department of Transportation (MDOT) Synchro model. The MDOT 2013 traffic volumes were increased by 0.5% per year to estimate current year (2015) volumes. For the other intersections (Poseyville Road/St. Charles Street, Ellsworth

Street/Cronkright Street, and Ellsworth Street/George Street) new peak hour turning movement counts were collected by the City of Midland in July 2015.

The existing peak hour turning movement volumes for the AM and PM peak hours were analyzed at the seven study area intersections using the *Trafficware Synchro and SimTraffic v9* software package. Using the 2010 *Highway Capacity Manual* (HCM) methodology (available through the *Synchro* software), the existing Levels of Service (LOS) (Table 1) were determined for the intersections. These results are summarized in Table 1. The analysis found that all of the study intersections currently operate at a LOS of D or better during all peak hours except for the PM peak hour at the intersection of Cronkright St and Indian St (US-10 BR), where the STOP-controlled southbound approach operates at a LOS F.

Table 1 – Existing (2015) Delays and Level of Service

Intersection	AM Peak Hour		PM Peak Hour	
	Overall LOS	Delay (sec/veh)	Overall LOS	Delay (sec/veh)
Poseyville at St. Charles (Unsignalized)*	C	15.2	D	26.7
Ellsworth at Cronkright (Signalized)	A	6.8	A	7.0
Ellsworth at George (Signalized)	B	10.4	B	11.5
Cronkright at Buttles (Signalized)	B	12.1	B	13.6
Cronkright at Indian (Unsignalized)*	B	16.9	F	55.9
George at Buttles (Signalized)	A	5.6	A	4.3
George at Indian (Signalized)	C	17.3	B	16.6

*Unsignalized LOS and delay is the maximum control delay from the STOP-controlled approaches only, not overall intersection LOS/delay

Figure 1 represents the Existing Roadway Geometry.

FUTURE BUILD CONDITIONS (YEAR 2040)

To forecast year 2040 background traffic volumes at the study intersections, year 2015 traffic volumes were grown by 0.5% per year for 25 years. This rate is based upon actual traffic counts taken in the city over the last 20 years. This rate has been endorsed by MDOT for the current evaluation of the US 10 corridor. In addition to general background traffic, it was assumed that the Dow Solar Shingle Plant will be fully operational, with up to 1500 employees on three shifts, with 80% of those new trips expected to travel north through the study area. The new Farmer's Market trips were then added to the future 2040 background traffic volumes.

The distribution of Farmer's Market trips through the study area (the routes used by those drivers) was based on anticipated parking locations. The available lots nearest to the proposed site are the existing parking lot along Ellsworth Street between George Street and Cronkright Street, and the lot on the northwest corner of the Ellsworth Street/Cronkright Street intersection. The remaining site traffic was then distributed to on-street parking spaces and lots throughout the downtown area. The trips entering and exiting these lots were distributed based on the existing traffic volume percentages throughout the study area.

IMPROVEMENTS NEEDED

Our charge was to identify the improvements that would be needed so that the future traffic (farmers market and other anticipated background traffic growth) could be absorbed with traffic operations similar to the conditions in 2015. To do that, several roadway improvements would be needed. These improvements are listed below.

- Reconfigure the existing one-way traffic on George Street and Cronkright Street to accommodate bi-directional traffic at the George Street location.
- Install a 200-foot exclusive northbound left turn lane with a 35-foot taper at the Ellsworth Street/Poseyville Road/George Street intersection.
- Extend the existing auxiliary northbound right turn lane by 70 feet at the Ellsworth Street/Poseyville Road/George Street intersection.
- Optimize the signal timing at each of the study intersections to increase capacity and mobility through the network.
- Install an additional southbound through lane from George Street/Buttles (US-10 BR) through the Ellsworth Street/ George Street intersection.

These proposed improvements are indicated in Figure 2 – Future Build (2040) Mitigation Measures.

With the implementation of these mitigation measures, the future 2040 capacity analysis found that the LOS at the study intersections would continue to operate at LOS B or better except for the Poseyville Road/St Charles Street and Cronkright Street/Indian Street (US-10 BR) intersections, which have approaches that operate at a LOS of F. Both of these intersections are unsignalized, and the LOS and delays presented only reflect the STOP-controlled approach with maximum delay. The capacity analysis results for this mitigated scenario are summarized in Table 2.

Table 2 – Future Build (2040) Delays and Level of Service

Intersection	AM Peak Hour		PM Peak Hour	
	Overall LOS	Delay (sec/veh)	Overall LOS	Delay (sec/veh)
Poseyville at St. Charles (Unsignalized)*	D	34.5	F	65.1
Ellsworth at Cronkright (Signalized)	A	8.4	B	12.9
Ellsworth at George (Signalized)	A	8.6	B	14.7
Cronkright at Buttles (Signalized)	B	13.6	B	14.8
Cronkright at Indian (Unsignalized)*	C	23.6	F	150.6
George at Buttles (Signalized)	A	8.9	B	10.8
George at Indian (Signalized)	B	11.3	B	16.9

*Unsignalized LOS and delays is the maximum control delay from the STOP-controlled approaches only, not overall intersection LOS/delay

There are likely no reasonable/practical countermeasures to mitigate the delays at the Poseyville Road/St Charles Street intersection, as the majority of the delayed movements are low volume left turning vehicles from St. Charles Street. This intersection would not likely meet warrants for traffic signal installation. Additionally, there are likely no practical countermeasures to mitigate the long delays predicted at the Cronkright Street/Indian Street (US-10 BR) intersection. The stop-controlled traffic along Cronkright Street would most

likely find alternate routes which would decrease delays at the intersection relative to what is reported in Table 2, as there are numerous alternate routes available.

Figure 1 Continued - Scenario 1
Existing Roadway Geometry

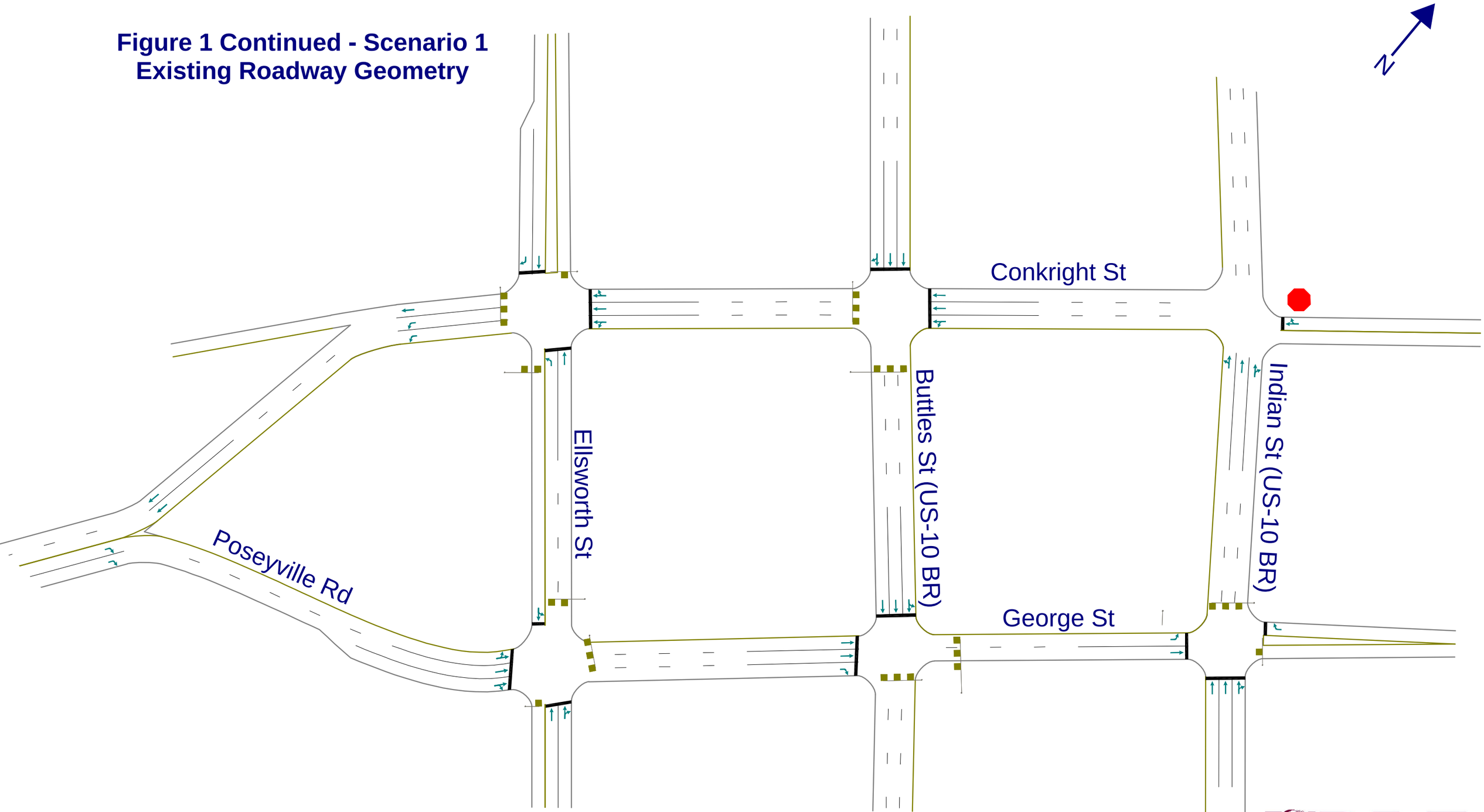

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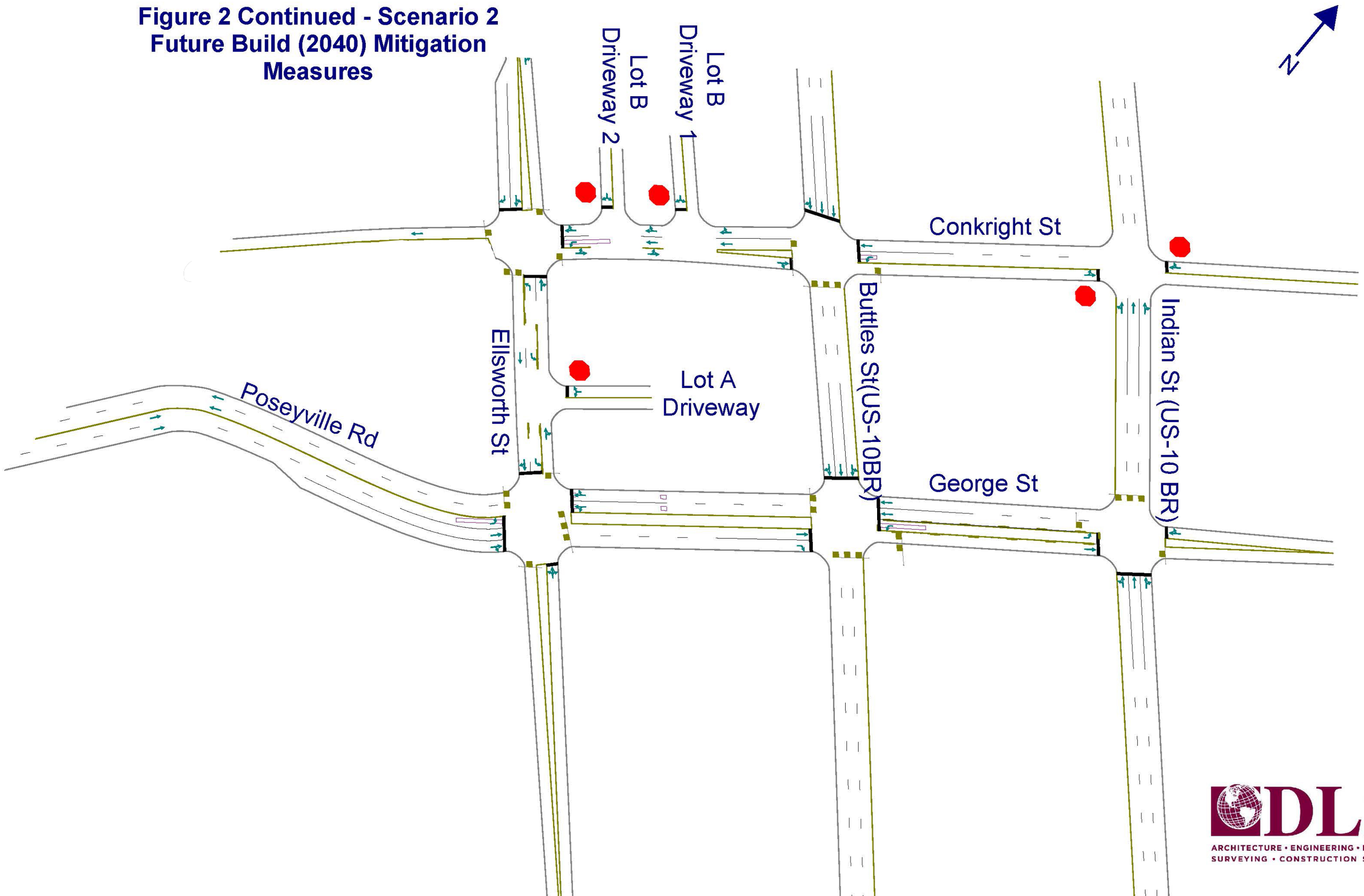
Figure 2 Continued - Scenario 2
Future Build (2040) Mitigation Measures



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