GORRILL PALMER

707 Sable Oaks Drive, Suite 30
South Portland, Maine 04106
207.772.2515

July 29, 2020

Mr. Steve Landry, P.E.
MaineDOT State Traffic Engineer
16 State House Station
Augusta, Maine 04330

Subject: Request for Traffic Signal Consideration
Saint John Street / D Street / MMC Garage
Portland, Maine

On behalf of MMC, Gorrill Palmer (GP) is providing an assessment for consideration of changing the operational status of the signal at the intersection of Saint John Street / D Street / MMC Garage. The intersection currently has all the infrastructure (including pedestrian accommodations) in place that is necessary to be a fully functional actuated traffic signal. The intersection is currently operating in flash mode with flashing red on the D Street and the MMC garage access approaches and flashing yellow on the Saint John Street (flashing red arrow into garage from Saint John Street) approaches. Based on our review, we offer the following:

1. Because the traffic peak hours of the garage are concentrated to the AM and PM time periods due to employee shifts, there are primarily two potential signal warrants that were explored; Warrant #3 – Peak Hour (AM, PM) and Warrant # 4 – Pedestrian Volume. The evaluation of if the hospital vehicular / pedestrian traffic meets either or both of those two warrants is described in more detail as follow:

   Warrant #3 – Peak Hour (AM, PM): Intersection turning movement counts were completed on March 11 & 12, 2020 (see attached Figures 2 & 3). It should be noted that at that time, not all the satellite parking locations were relocated to the garage, so the entering and exiting traffic could be expected to increase. As stated in the Traffic Impact Study for the MMC expansion dated November 2018, the new expansion is forecast to increase employment by approximately 324 employees, with the proposed expansion forecast to be operational in 2023. To consider the additional employees, it was assumed that 90% of the new employees (292 employees) would arrive and depart similar to the existing traffic patterns. The 2023 Design Hourly Volumes are shown on the attached Figure 1.

   The following is directly from the 2009 MUTCD, Section 4C.04, Warrant 3, Peak Hour

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and

2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and

3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

GP evaluated both categories (Part A & Part B) as follows:

Part A

1. Based on completed capacity analysis (attached), the garage access experiences a total stopped delay of 0.1 hours for the AM peak hour and 1.3 hours for the PM peak hour. Since this is less than the threshold, **Part A1 is not met.**
2. The garage access has two AM peak hours and one PM peak hour. The first AM peak hour is when employees are arriving for the morning shift, which generally occurs before 7 AM (See Figure 3). The second AM peak hour occurs when employees are leaving the overnight shift, which lags the employees arriving peak and typically occurs after 7 AM (See Figure 2). There only appears to be one primary PM peak hour that occurs concurrently with the adjacent street traffic. For the purposes of this evaluation, the PM peak hour was evaluated since it has the largest volume of exiting traffic. The 2023 PM peak hour forecast exiting volume on the garage access for the left/thru lane is 256 vehicles and a total of 531 vehicles if both left / thru and right lanes are included. Since the PM peak hour volumes exceed thresholds, **Part A2 is met.**
3. The 2023 total entering volume (TEV) is forecast to be approximately 1,045 vehicles in the AM peak hour and approximately 1,235 vehicles in the PM peak hour (See Figure 1). Since both these volumes exceed 800 vehicles per hour, **Part A3 is met for both the AM and PM peak hours.**

Part B

Of the two AM peak hours, the highest total volume is expected to be the entering volume prior to 7 AM. Because of the traffic patterns in the AM condition, with most of the traffic entering the garage, the alternate method allowed by the MUTCD of considering the left turn in as the "minor" street and the opposing traffic as the "major" street was used for this analysis. The PM peak hour was evaluated using the standard MUTCD approach.

GP plotted the AM and PM peak hour points on the attached MUTCD Figure 4C-3. Warrant 3, Peak Hour. Based on those plots, the AM peak hour does not meet the warrant; however, the PM peak hour is marginal. **Therefore, Part B is marginal and expected to meet.**

Warrant #4 – Pedestrian Volume: This warrant graphs the major street traffic that conflicts with the crosswalk and the number of pedestrian crossings. If the graphed point falls above the line, the warrant is satisfied. The garage opened in January of this year. All the turning movement counts / observations that were completed were during colder weather (latest was in March), when less pedestrians would be expected. Although there were some pedestrians crossing during those times (approximately 15 and 26 in the AM and PM peak hours respectively), the numbers were low. Due to the current Covid-19 situation, a pedestrian count cannot be completed because the hospital is not fully staffed, so pedestrian volumes would not be representative at this time.

Based on discussions with the hospital, the schedule to return to pre Covid-19 employee levels is unknown, but most likely will not occur until the fall. Therefore, pedestrian counts at this time would not be representative. GP plotted the AM and PM peak hour volumes on the pedestrian graph (Figure 4C-7. Warrant 4, Pedestrian Peak) to identify what the corresponding minimum number of pedestrians would need to be to meet the warrant. Based on the peak hour volumes on the Major Street, approximately 400 AM and 450 PM crossing pedestrians per peak hour would be required to meet the warrant. Although we expect the number of crossing pedestrians to be significant, it is not expected that the numbers of pedestrians needed to meet this warrant will be experienced, even when schedules are back to normal. **Therefore, this warrant is not expected to be met but should be monitored as employees return to work and the new expansion becomes operational.**

2. In addition to the above warrants, there are numerous safety and operational benefits to switching the signal from flash mode to a fully functional "green, yellow, red" that the intersection could benefit from now.

   - Pedestrian safety – In the current flash condition, during peak hours of the garage (see attached Figure 3) there are hundreds of vehicles entering / exiting the garage. This creates significant queues, especially entering the garage during the morning peak hour, with two lanes of traffic (lefts and rights into the garage) trying to enter the garage at once. MMC, in support of the TDM that was provided to the City, encourages walking to the hospital. Unfortunately, the surge of inflow traffic into the garage makes it difficult, confusing, and in our opinion unsafe, for pedestrians to cross at the intersection in the current flash mode. Switching the intersection to fully operational will allow for the activation of the pedestrian push buttons / signal heads, thus improving the safety for crossing pedestrians.

   - Traffic flow during peak time – The left turning traffic into the garage during the AM peak hour of the garage is approximately 180 vehicles / hour and is opposed by over 360 right turning vehicles / hour into the garage (see attached counts Figure 3). The majority of MMC entering traffic occurs in less than a half hour time span due to shift starting times at MMC. Based on our field observations, because the intersection is in flash mode, the left turning traffic has difficulty turning without the assistance of a traffic assistant in the intersection. If the intersection were fully operational (green, yellow, red), the proposed phasing of the intersection provides for a protected left turn phase that would allow for the left turning vehicles to have the right of way and enter the garage uninterrupted.

- Bicycle safety – While no bicycle activity has been observed due to the time of year of the observations, it is our opinion that switching the intersection to fully functional will improve the safety for bicycles traveling through the intersection by providing more organization and predictability to the traffic movements. In its current flash mode status, the intersection can be confusing for drivers due to the surge of traffic all trying to enter the garage during shift times at the hospital.

3. Disruption to Saint John Street traffic – Currently, because the intersection is in the flash mode, with drivers uncertain of other's movements, the through traffic on Saint John Street is sporadically stopped during peak hours. A fully functional traffic signal will provide organization and assign right of way during these peak times. In the off-peak times when there is minimal demand on D Street or the garage access, the green light will remain on Saint John Street such that they will not have to stop and can travel through the intersection uninterrupted.

MMC is requesting permission for switching the traffic signal from its current flash mode to "green, yellow, red" operation. Making the conversion from flash mode to green, yellow, red mode could have benefits to vehicular traffic, pedestrians, and bicycles. MMC appreciates your consideration of this request.

Sincerely,

Gorrill Palmer

Randall Dunton, P.E., PTOE
Project Manager

u:\2866.01-mmc bramhall campus\n traffic\7-29-2020 saint john traffic signal .doc