



Board Report

File #: 2019-0663, File Type: Informational Report

Agenda Number: 27.

OPERATIONS, SAFETY, AND CUSTOMER EXPERIENCE COMMITTEE OCTOBER 17, 2019

SUBJECT: FLOWER STREET BUS LANE EVALUATION

ACTION: RECEIVE AND FILE

RECOMMENDATION

RECEIVE AND FILE status report on Flower Street Bus Lane Evaluation.

BACKGROUND

On June 3, 2019, Metro, in partnership with City of Los Angeles, installed a pilot, weekday PM rush hour (3:00 - 7:00 PM) bus only lane along Flower St in Downtown LA. This was in preparation for additional buses to be operated during PM rush on Flower Street during the New Blue major rehabilitation project. This resulted in up to 80 buses per hour during the PM rush traveling on Flower St, a 50% increase in trips compared to normal service. The bus only lane was implemented to provide faster and more reliable service to impacted Blue and Expo Line customers, other Metro and municipal bus customers, and to reduce traffic conflicts with other vehicles. Preliminary results indicate that buses have seen up to 20% improvement in travel time with the Flower St bus only lane.

LOCATION

1.8 miles of Flower St between 7th St and Adams Blvd, near the I-110 South ExpressLanes entrance.

DISCUSSION

An evaluation of the bus lane was carried out consisting of analyzing the average end-to-end travel time and travel time variability of the two heaviest services in the corridor, the Silver Line (Line 910/950) and Line 860, as well as customer and bus operator feedback of the bus only lane.

Key events that affected the bus speed and travel time variability before the bus lane (Before), during initial implementation of the bus lane (Mid) and after making adjustments to improve bus lane operations (Post) was observed during the study periods below:

- **Before** - Before Bus Only Lane Implementation (New Blue Phase 1: January thru May 2019):
 - Up to 53 buses/hour during PM rush period

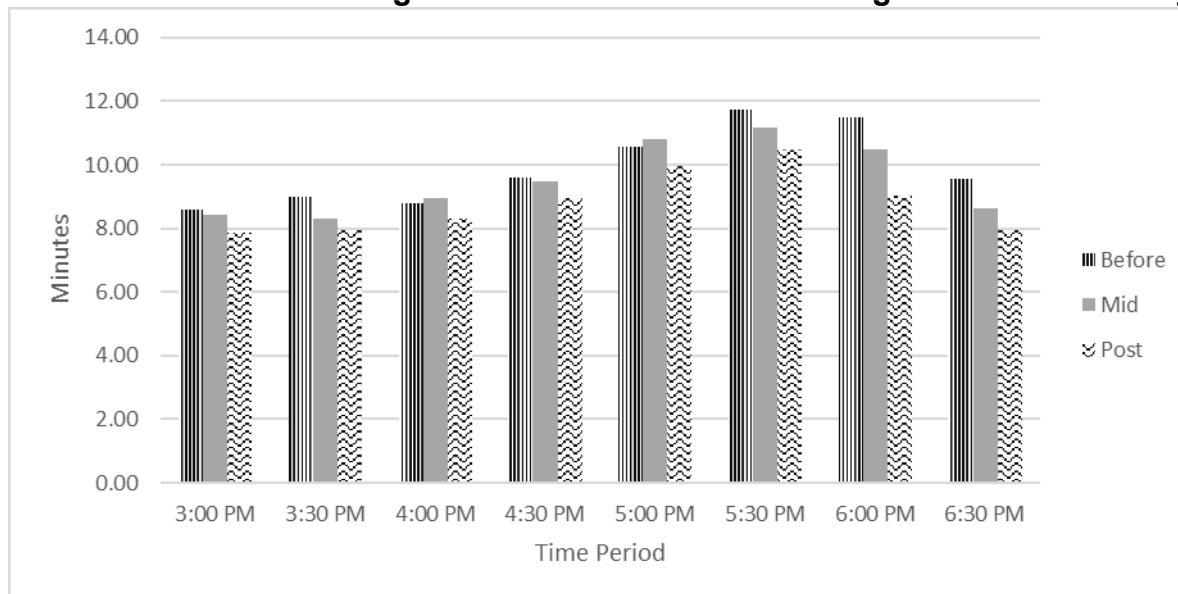
- **Mid - Initial** Bus Only Lane Operation (New Blue Phase 2: June thru mid-August 2019):
 - Up to 80 buses per hour during PM rush period
 - June 23, 2019: Added 4 additional Silver Line buses to the PM rush period due to significant ridership increase
 - June 24, 2019: Expo Line Closure // Implemented 10 new buses per hour for the Expo Shuttle Line 856

- **Post - Adjusted** Bus Only Lane Operation (mid-August 2019 thru Present):
 - August 12, 2019: Relocated Flower / Olympic bus stop from north side to south side of intersection to avoid heavy right turn congestion
 - August 24, 2019: Expo Line Reopened // Expo Shuttle Line 856 discontinued reducing ten buses per hour during PM rush period

Additionally, the Flower St Bus Only Lane is used by other Metro lines, LADOT DASH and Commuter Express, Orange County Transportation Authority, Torrance Transit, and Foothill Transit.

TRAVEL TIME IMPROVEMENT RESULTS

Silver Line 910/950 Average End-to-End Travel Time along Flower St Bus Only Lane



Time Period	Average End-to-End Travel Time by Study Periods (Min.)			Percent Change in Travel Time		
	Before	Mid	Post	Before to Mid	Mid to Post	Before to Post
3:00 PM	8.58	8.44	7.88	-2%	-7%	-8%
3:30 PM	9.00	8.31	7.96	-8%	-4%	-12%

4:00 PM	8.78	8.94	8.30	2%	-7%	-5%
4:30 PM	9.61	9.46	8.94	-2%	-5%	-7%
5:00 PM	10.55	10.82	9.96	3%	-8%	-6%
5:30 PM	11.74	11.18	10.49	-5%	-6%	-11%
6:00 PM	11.49	10.49	9.02	-9%	-14%	-21%
6:30 PM	9.54	8.62	7.95	-10%	-8%	-17%

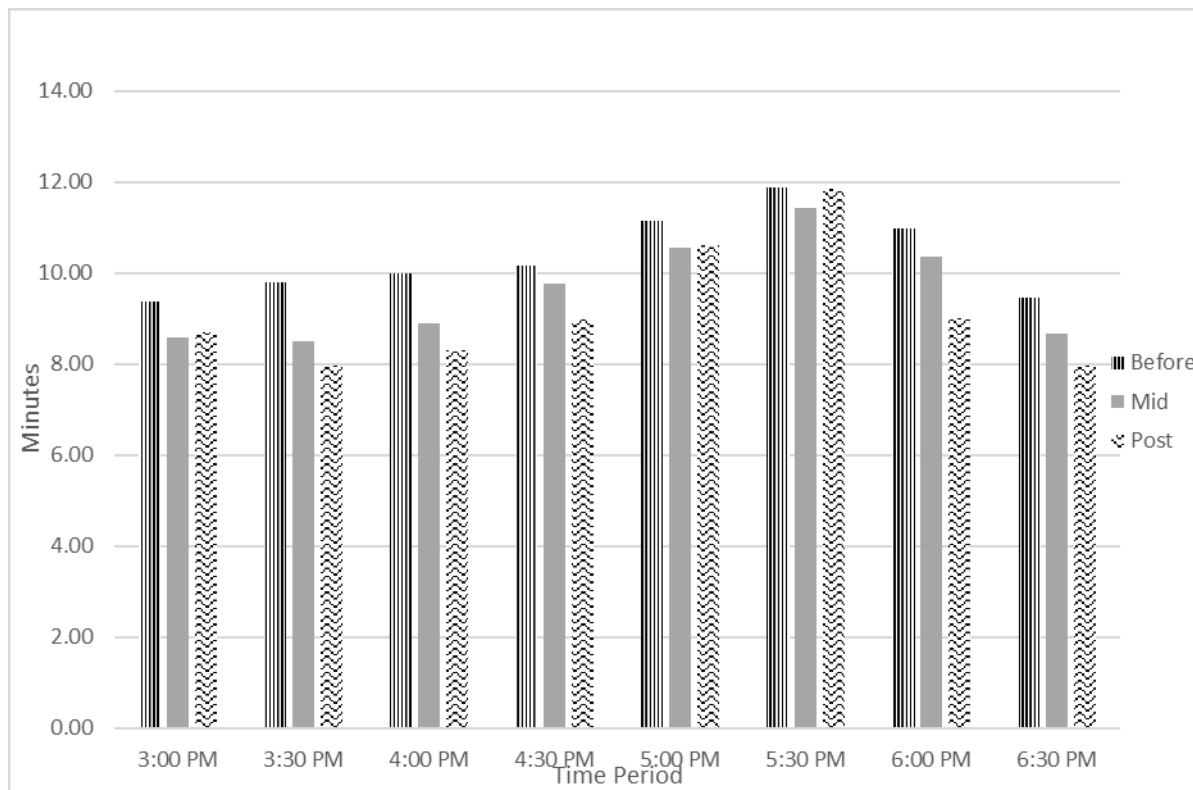
In nearly every time period, Silver Line buses saw an improvement immediately following implementation of the bus only lane, as indicated in Mid (Orange). The greatest improvement was achieved during the 6:00 - 6:30 PM period, when congestion is at its peak. During this time, a 21% travel time improvement was achieved when comparing Before to Post periods.

While the bus lanes showed an improvement in travel time overall, through field observation and bus operator feedback, staff identified several factors that impacted the performance of the bus only lane during certain times of the peak period, including:

- Saturation of Bus Only Lane - With implementation of New Blue Phase II, buses travelling down Flower St increased by 51% from 53 to 80 buses per hour during the peak period. Therefore, while the bus lane helped expedite buses through the corridor, the volume of buses in the lane resulted in congestion, especially at bus stops when bunched buses had to wait their turn to serve the stop.
- Nearside Stop at Flower/Olympic - Initially Line 910 served a stop before the intersection (nearside) at Flower St and Olympic Blvd. Staff observed a significant amount of right turn auto traffic merging into the bus only lane immediately in front of the Olympic bus stop. The volume of vehicles attempting to turn right from southbound Flower St to westbound Olympic Blvd would often block the bus stop and queue into the lane adjacent to the bus lane, blocking buses trying access and depart the bus stop. This congestion would result in buses missing several traffic light cycles before moving through the intersection.

Based on these observations, the nearside stop at Flower St and Olympic Blvd was moved farside (after the intersection, allowing the buses to merge into the general-purpose lanes to bypass the right turn traffic. In addition, the bus volumes were reduced by 10 buses on August 24 as the Expo Line service resumed to 7th/Metro. With these two changes, the data shows a 7% and 8% improvement in travel time from Mid to Post periods for the 4:00 PM and 5:00 PM time periods, respectively, when travel times increased with the implementation of the bus lanes.

New Blue Express Shuttle Line 860 Average End-to-End Travel Time along Flower St Bus Only Lane



Time Period	Average End-to-End Travel Time by Study Periods (Min.)			Percent Change in Travel Time		
	Before	Mid	Post	Before to Mid	Mid to Post	Before to Post
3:00 PM	9.37	8.59	8.69	-8%	1%	-7%
3:30 PM	9.79	8.51	7.95	-13%	-7%	-19%
4:00 PM	9.99	8.89	8.29	-11%	-7%	-17%
4:30 PM	10.15	9.77	8.98	-4%	-8%	-12%
5:00 PM	11.16	10.55	10.60	-5%	0%	-5%
5:30 PM	11.87	11.42	11.85	-4%	4%	0%
6:00 PM	10.99	10.35	9.01	-6%	-13%	-18%
6:30 PM	9.45	8.66	7.96	-8%	-8%	-16%

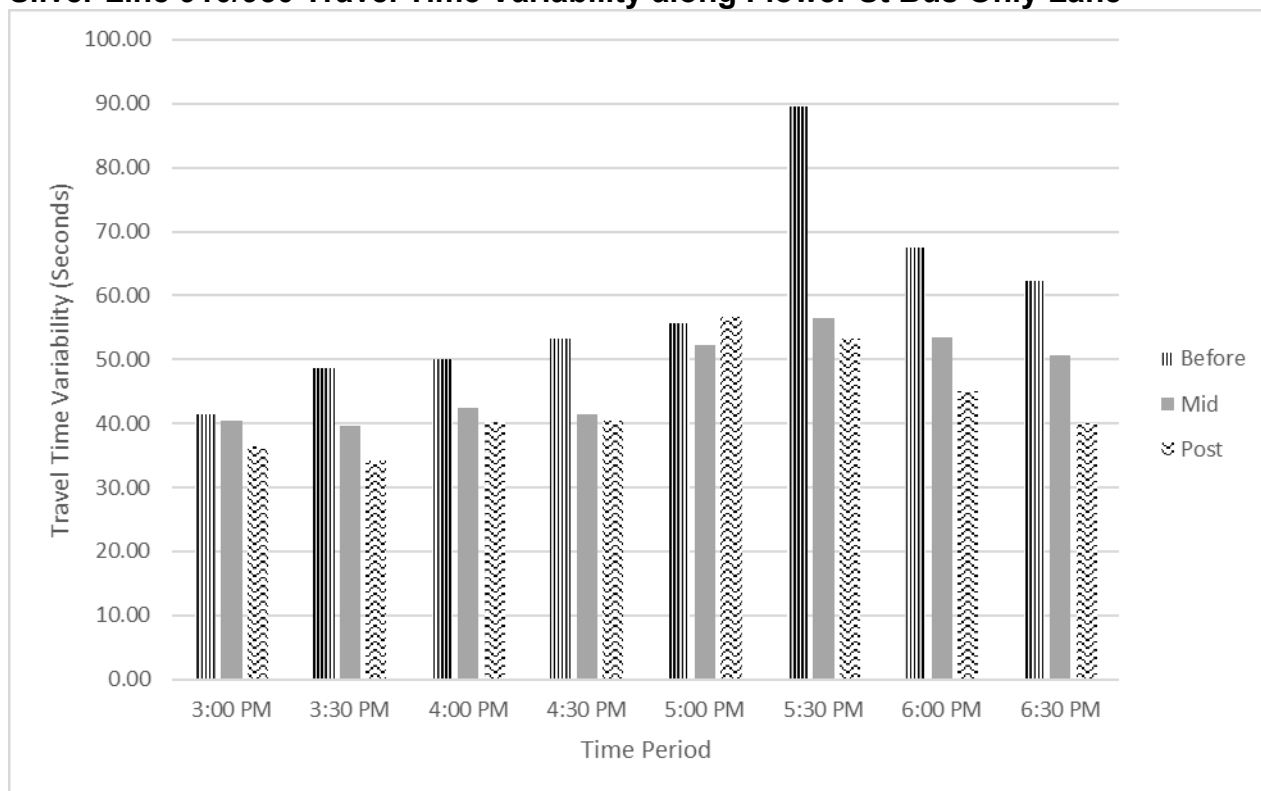
Like the Silver Line improvement, Line 860 buses also saw an improvement from the bus only lane with nearly 20% travel time improvement when comparing Before to Post periods. However, during the 5:30 PM time period, travel times increased from Mid to Post. Upon further investigation, it was identified that the increase in recorded travel time was a result of delay at Flower St and 7th St where Line 860 buses boarded customers nearside, prior to the intersection. As a result, some buses would depart the stop, which starts the travel time recording, only to be held at the red signal light. This

issue was not evident on the Silver Line as those buses pass through the signalized intersection before boarding customers farside and starting the travel time recording.

BUS TRAVEL TIME VARIABILITY RESULTS

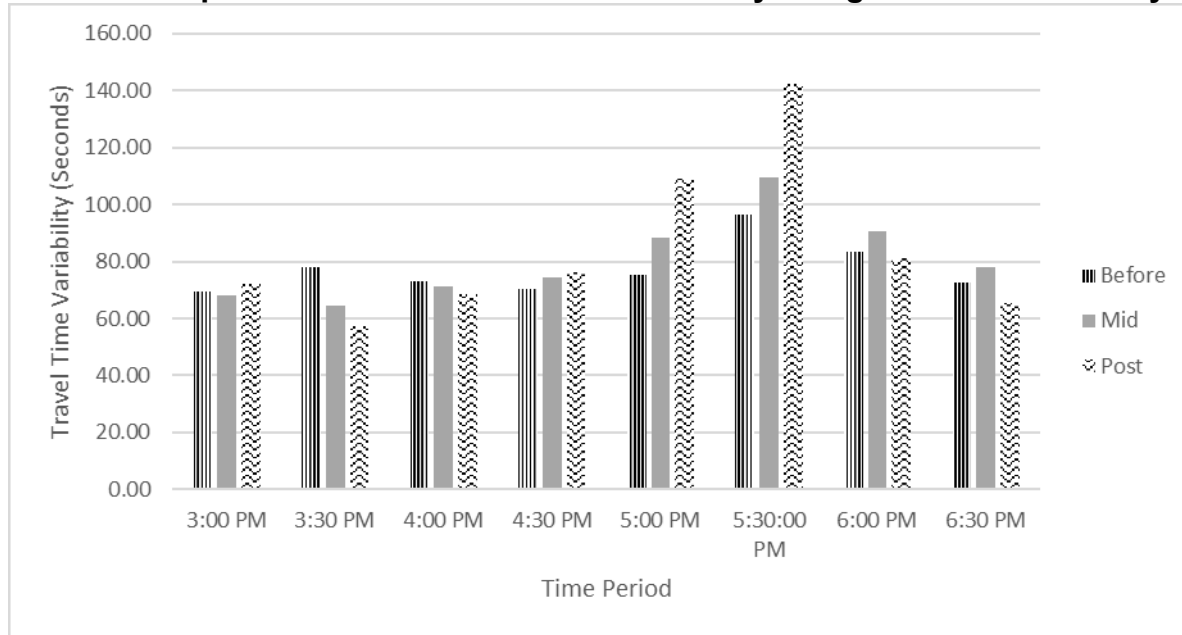
In addition to measuring travel time improvement, travel time variability was also analyzed, which measures how consistent a customer can expect their travel time. While the current study showed improvements in travel time during the Mid and Post periods, analyzing the travel time variability is important for measuring the consistency of meeting those improved travel times. Shorter bars indicate improved consistency in meeting the travel time improvements.

Silver Line 910/950 Travel Time Variability along Flower St Bus Only Lane



The consistency of travel time greatly improved with implementation of the bus only lane as shown from Before to Mid, with further improvement in the Post period when the Expo Line returned to normal service and the Flower/Olympic bus stop was moved farside to avoid right turn traffic congestion. This highlights the importance of complementing the bus only lane with other strategies available to improve travel time variability.

New Blue Express Line 860 Travel Time Variability along Flower St Bus Only Lane



Travel time variability improved during most time periods but increased in the Post period at 5:30 PM. As stated earlier, Line 860 boards customers north of 7th St, which results in some buses waiting for a green traffic signal at 7th Street before merging into through traffic. This results in an increase in travel time variability during the 5:30 PM segment when congestion peaks leaving Downtown LA. This is an example where relocating Line 860 stop to south of 7th St (farside) could improve travel time variability along this segment.

CUSTOMER/OPERATOR SURVEY RESULTS

Around 1,300 customers and over 100 bus operators were surveyed last month. Both customers and bus operators overwhelmingly reported greater perceived travel time savings than actual, which reveals positive public perception of the bus only lane. Key findings include:

- About one-thirds of customers perceived the bus only lane saving up to 5 minutes in their travel time
- Approximately one-thirds of customers indicated travel time savings over 5 minutes
- Three quarters of customers surveyed believed the bus only lane improved reliability
- Nearly identical results were received from bus operators

LESSONS LEARNED

The Flower St Bus Only Lane has provided measurable improvement to the thousands of transit customers on Metro and municipal bus services. This evaluation has also revealed that there are several other factors which can impact the bus only lane, including:

- Scheduling optimal volume of buses per hour for maximum bus only lane throughput

- During height of New Blue in Mid phase, bus only lane used over 80 trips/hour
 - In Post phase when Expo Line reopened, transit travel times improved with slight reduction in buses per hour
 - Too many buses per hour can congest a bus lane, at which time other measures should be employed to maintain throughput, including longer bus stop zones to serve more buses at the same time, and the ability to bypass stops being served by other buses.
- Enforcement is critical to keeping bus only lanes free of bus lane violators and other obstructions such as trash bins
 - Relocating bus stops away from bottlenecks and turning movements help to keep buses moving
 - Discontinued segments of bus only lane due to construction result in bottlenecks for buses merging in and out of general-purpose lanes

FINANCIAL IMPACT

There is no financial impact to receiving and filing this report.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

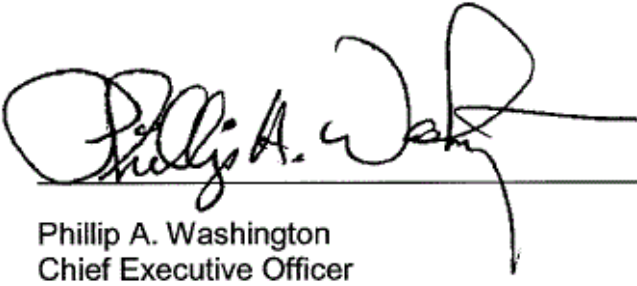
Recommendation supports strategic plan goal 1 to provide high-quality mobility options that enable people to spend less time traveling.

NEXT STEPS

While initial results are positive, several adjustments were needed to further optimize the bus only lane operations. As a result, data collection was limited to two weeks during the Post period evaluation, compared to the Before period which included data collected during the entire five months of New Blue Phase I. In addition, the bus volumes currently are still much greater than the Before period, despite the Expo Line bus bridge being cancelled as of August 24. Therefore, to ensure a true Before and Post comparison, staff recommends extending the Flower St bus only lane for an additional five months after the New Blue project is completed and operating conditions are returned to the Before conditions.

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Flower Street Bus Only Lane

Evaluation



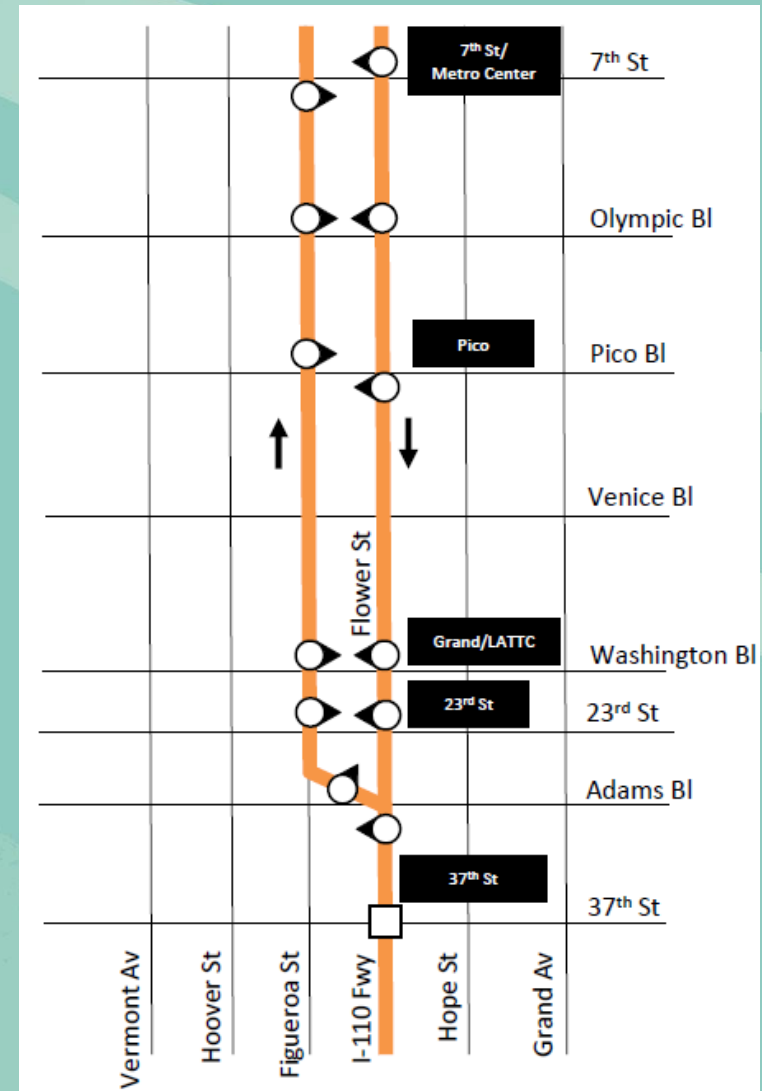
Metro

October 2019

Background

Partnership with City of Los Angeles to provide fast and reliable bus service during “New Blue” Metro Rail Capital Improvements Project.

- Pilot began June 3, 2019
- Weekday PM Peak Periods from 3:00 to 7:00 PM
- Supported up to 80 buses per hour (every 45 seconds)



Evaluation: Criteria

Metro Silver Line (Line 910/950) and Blue Line Express Bus Shuttle (Line 860) were analyzed for:

- Overall travel time
- Travel time variability
- Customer and bus operator feedback of Bus Only Lane



Flower St Bus Only Lane near LATTTC/Ortho Institute Station

Evaluation: Key Events

Key Events Impacting Speed & Reliability			
Before – General Traffic Lane New Blue Phase I: Jan through May 2019		Mid - Initial Bus Only Lane Operation New Blue Phase 2: Jun through mid-Aug 2019	Post - Adjusted Bus Only Lane Operation mid-Aug 2019 through Present
1.	Up to 53 buses per hour	Up to 80 buses per hour	Up to 70 buses per hour
2.		Jun 24, 2019: Expo Line Closure (Added Expo Shuttle Line 856)	Aug 24, 2019: Expo Line Reopens (Expo Shuttle Line 856 cancelled)
3.		Jun 24, 2019: Added 4 additional Silver Line buses to PM peak period	

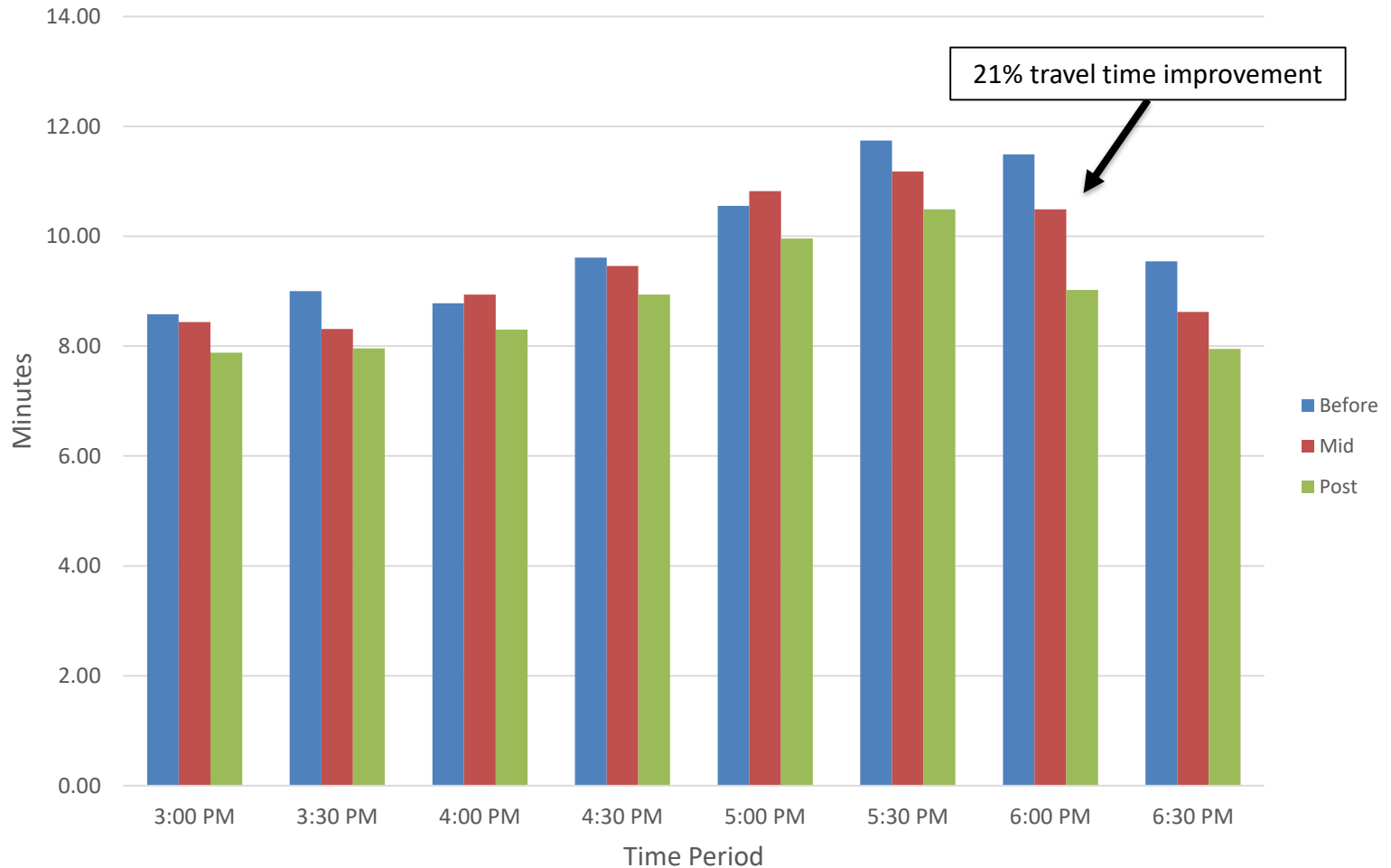
Travel Time Improvement Results



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Travel Time Improvement Results (Silver Line)

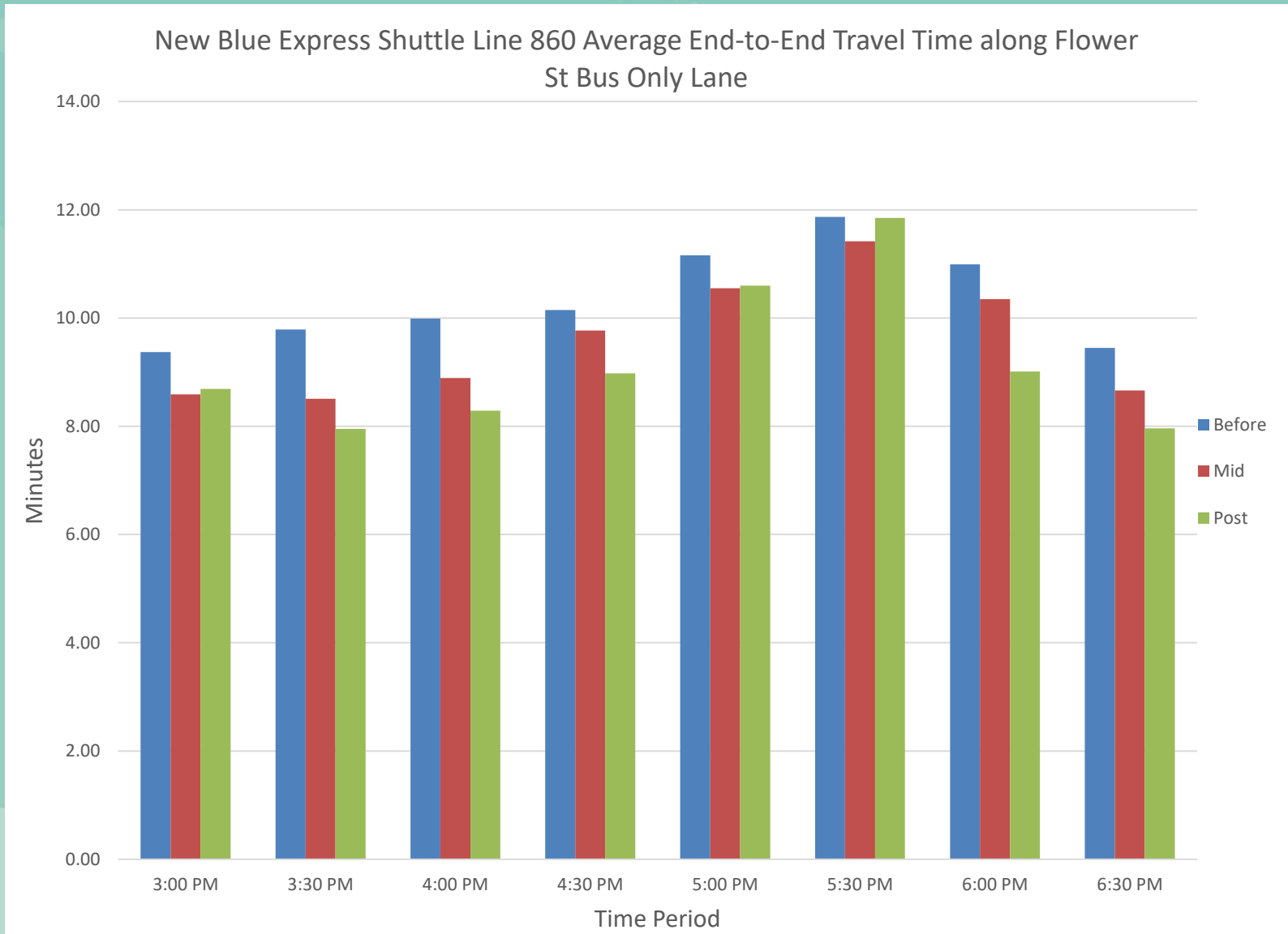
Silver Line 910/950 Average End-to-End Travel Time along Flower St Bus Only Lane



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Every time period saw an improvement with introduction of bus only lane

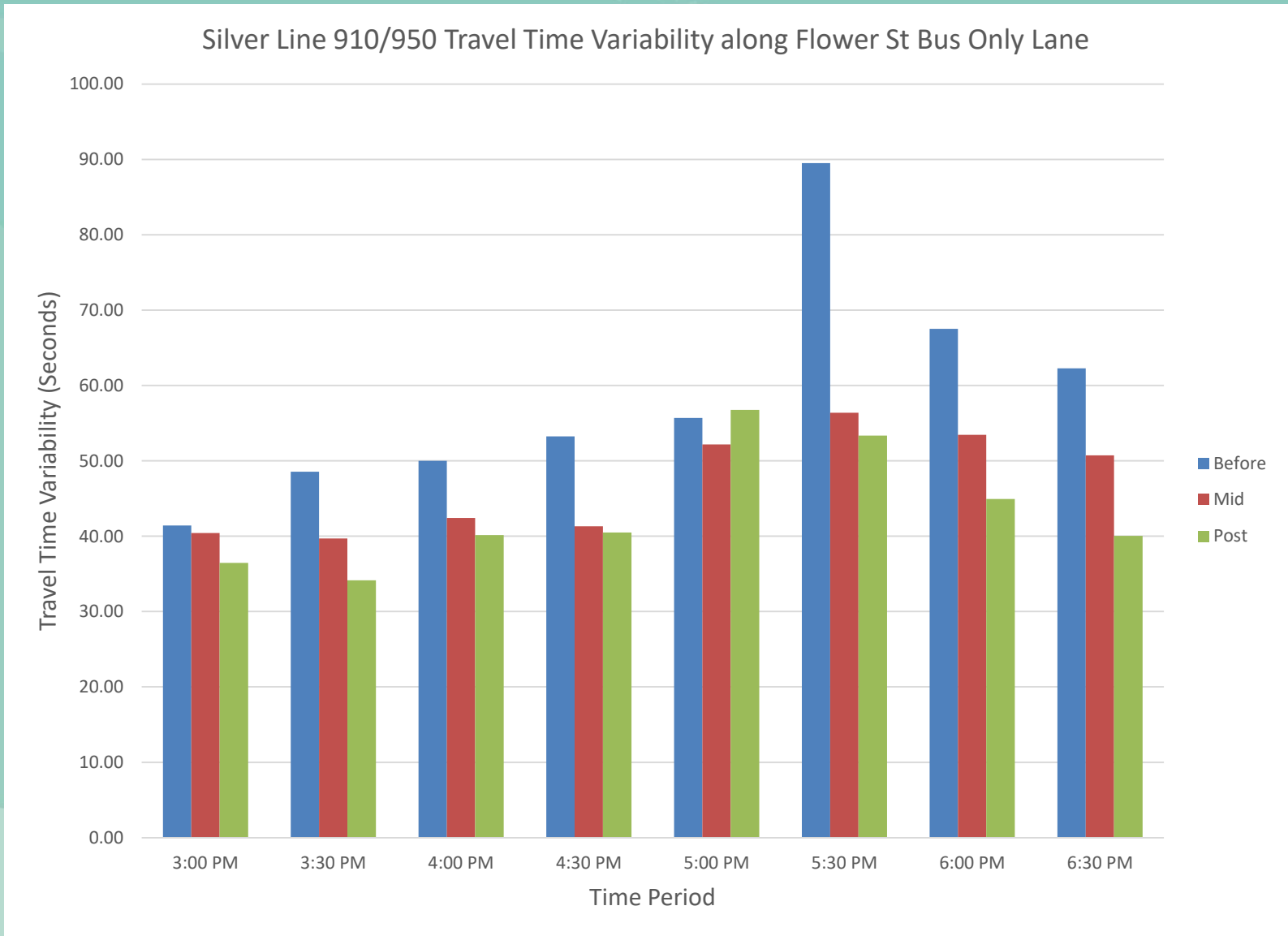
Travel Time Improvement Results (Line 860)



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20% travel time improvement when comparing "Before" to "Post" periods

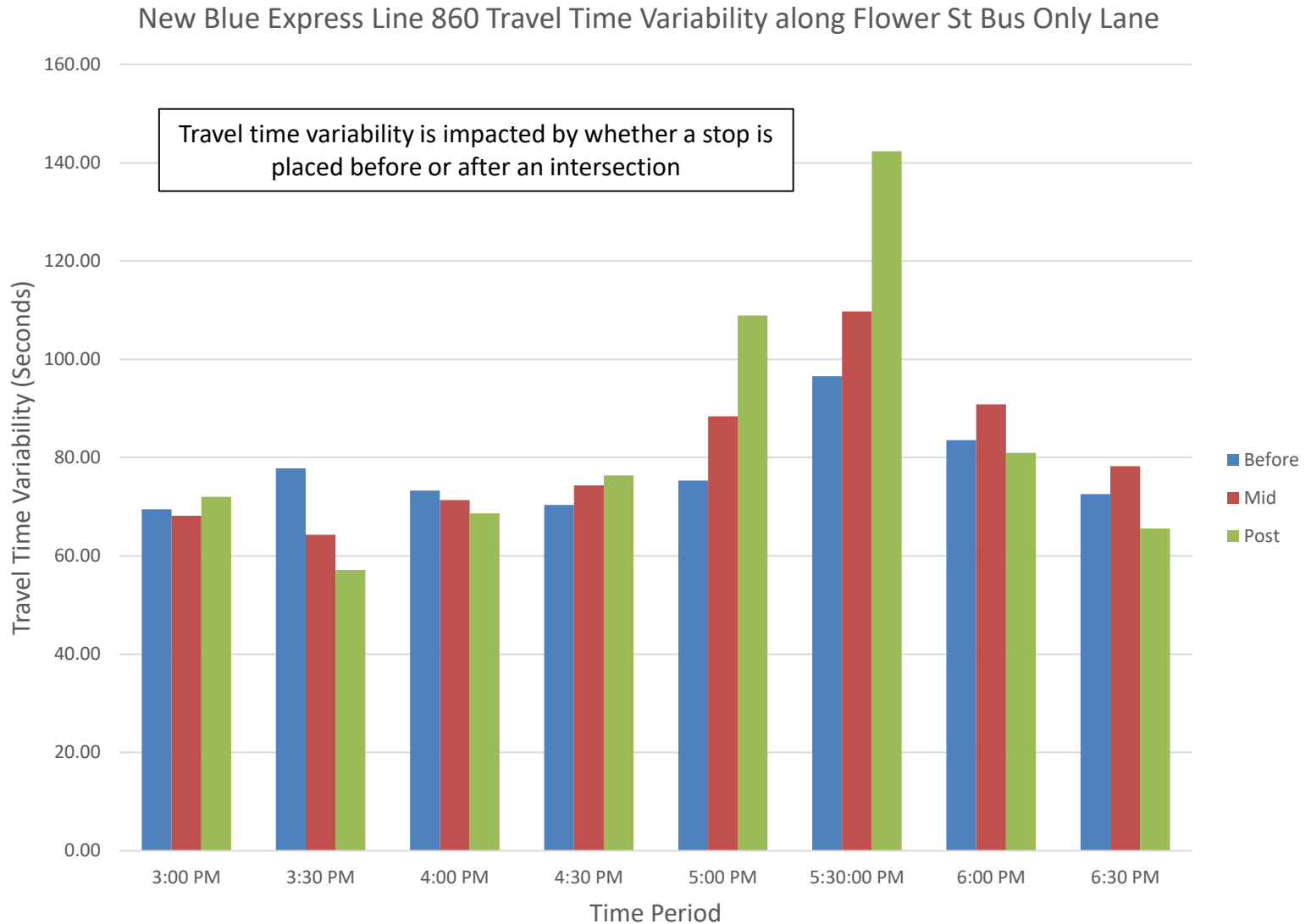
Bus Travel Time Variability Results (Silver Line)



Metro

Consistency of travel time greatly improved with bus lane

Bus Travel Time Variability Results (Line 860)



Metro

Travel time variability increased in the “Mid” and “Post” periods

Customer & Operator Survey Results

Customers and Operators responded positively when asked about the Bus Only Lane

More than 1,300 Customers and over 100 bus operators surveyed

- Over 65% of all respondents believe the bus lane speeds up their trip
 - 1/2 of respondents perceived savings up to 5 minutes
 - 1/2 of respondents perceived savings over 5 minutes
- Nearly 75% of all respondents surveyed believe the bus only lane improves reliability



Flower St Bus Only Lane attracted significant media attention

Lessons Learned (Bus Stop Placement)

- Flower St / Olympic Bl:



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Lessons Learned

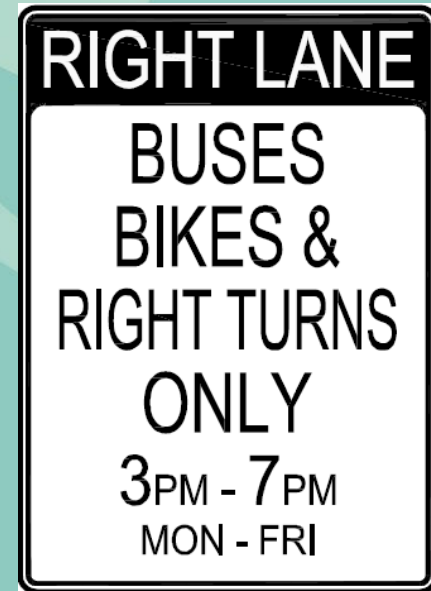
- Optimal volume of buses per hour essential for maximum bus lane performance
 - Too many buses at once can oversaturate the Bus Only Lane as observed during Mid-phase
- Enforcement and compliance is critical to keeping Bus Only Lanes clear of violators and other obstructions
- Relocating bus stops away from general traffic/turning movements and extending bus stop zones improve Bus Only Lane throughput
 - Avoid non-transit traffic congestion
 - Multiple buses can serve customers at the same stop at the same time
- Disjointed segments of Bus Only Lane for construction activities results in diminishing lane performance
 - Bottlenecks negate overall savings attributed to a continuous Bus Only Lane



Next Steps

Staff Recommendation

- Extend the Flower St Bus Only Lane through March 2020 for additional Post-condition evaluation
- Continue outreach on the future of Flower St bus only lane





Thank you



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