

December 27, 2023

Steve Fernstrom, Executive Director
Bethlehem Parking Authority
85 West North Street
Bethlehem, PA 18018

Traffic Assessment Letter
Walnut Street Parking Garage
City of Bethlehem, Northampton County, Pennsylvania
Colliers Engineering & Design Project No. 17005421C

Dear Mr. Fernstrom,

This traffic assessment has been prepared for the Bethlehem Parking Authority in association with the Walnut Street Parking Garage and the removal of the westbound left-turn lane at the entrance, within the City of Bethlehem, Northampton County, Pennsylvania. The subject site is bound by Walnut Street to the north, commercial land uses to the west, and residential land uses to the south and east. The site is currently developed with a 714-space parking garage. Access is currently provided via two (2) ingress lanes and two (2) egress lanes. It is proposed to eliminate the dedicated westbound left-turn lane at the garage entrance and instead provide one (1) shared left-turn/through lane along Walnut Street. A site location map is enclosed as **Figure 1**.

Existing Traffic Conditions

Traffic volume data was collected at the Walnut Street Parking Garage entrance to gain an understanding of the existing roadway conditions and operations through Turning Movement Counts ("TMC") conducted on Thursday, December 7, 2023. The processed TMC data has been enclosed and detailed in **Table 1**. A Volume Flow Diagram illustrating the 2023 Existing Conditions is enclosed as **Figure 2**.

Table 1 – Data Collection Efforts and Observed Peak Hours

Peak Period	Date Collected	Traffic Count Time Frame	Observed Peak Hour
Weekday Morning	Thursday, December 7, 2023	7:00 AM – 9:00 AM	7:45 AM – 8:45 AM
Weekday Evening		4:00 PM – 6:00 PM	4:45 PM – 5:45 PM

Capacity Analysis

The peak hour traffic operations were evaluated at the study intersection. The analyses were performed using *Synchro Trafficware*, a traffic analysis and simulation program. The results of these analyses provide Levels of Service (LOS), volume/capacity descriptions, average seconds of delay, and 95th percentile queue lengths for the intersection movements. The capacity analysis calculation worksheets are enclosed.

Under the Existing condition, the westbound left-turn movement operates at a Level of Service "A" with calculated 95th percentile queue lengths of approximately one (1) vehicle or less during both peak hours studied. Under the Proposed condition, the shared westbound left-turn/through lane will experience the same delays and queue lengths as the existing left-turn movement. Therefore, the elimination of the left-turn lane will have no impact on the signalized intersection of New Street & Walnut Street to the east.

Conclusion

Based on a review of the capacity analysis, the elimination of the dedicated westbound left-turn lane at the Walnut Street Parking Garage entrance will not have a significant impact on the operations of the intersection. No vehicles queued in the westbound lane will interact with the traffic signal at the easterly adjacent intersection of New Street & Walnut Street. Should you have any questions, please do not hesitate to contact this office.

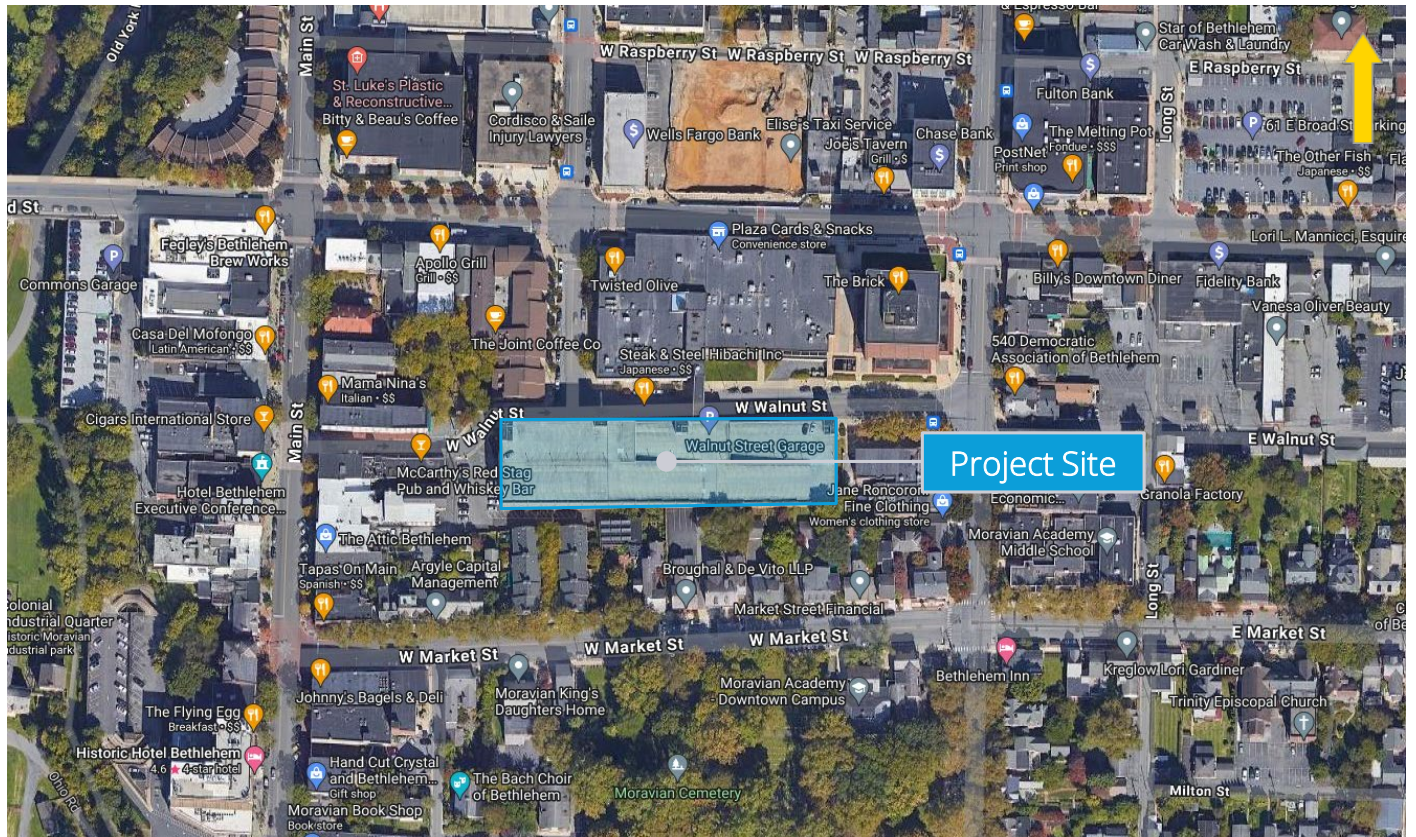
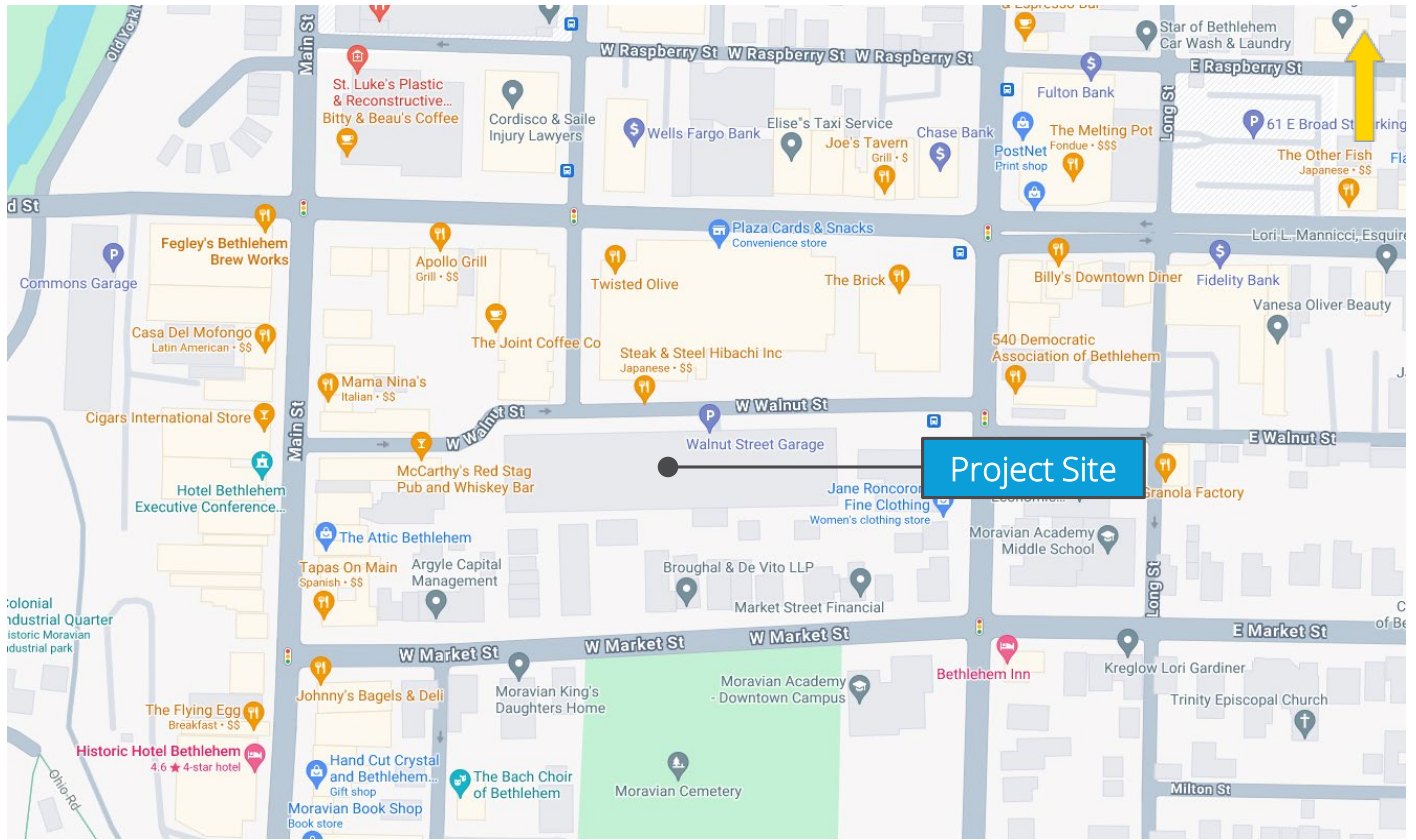
Sincerely,

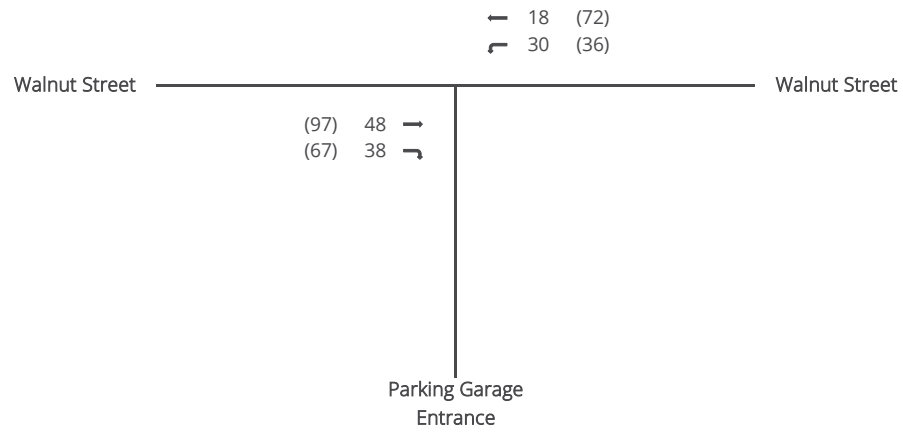
Colliers Engineering & Design



Jeffrey M. Fiore, P.E.
Principal
Traffic Planning Discipline Leader

cc: C. Richard Roseberry, P.E., AICP, Colliers Engineering & Design





	Walnut Street Garage Project No. 17005421C City of Bethlehem, Northampton County, PA	Legend AM Peak Hour: ### Through Movement: ← PM Peak Hour: (###) Turning Movement: ↘	Figure 2
			2023 Existing Conditions
			AM & PM Peak Hours

1. Walnut Street & Parking Garage Entrance - TMC

Thu Dec 7, 2023

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1141526, Location: 40.621598, -75.379797, Site Code: 1

Provided by: Imperial Traffic & Data Collection

PO Box 4637, Cherry Hill, NJ, 08003, US

Leg Direction	Walnut Street Eastbound					Walnut Street Westbound					Parking Garage Entrance Northbound					
Time	T	R	U	App	Ped*	L	T	U	App	Ped*	L	R	U	App	Ped*	Int
2023-12-07 7:00AM	4	1	0	5	0	1	4	0	5	0	0	0	0	0	1	10
7:15AM	8	3	0	11	2	3	1	0	4	2	0	1	0	1	1	16
7:30AM	13	4	0	17	0	5	0	0	5	0	0	0	0	0	0	22
7:45AM	17	6	0	23	0	8	5	0	13	0	0	0	0	0	2	36
Hourly Total	42	14	0	56	2	17	10	0	27	2	0	1	0	1	4	84
8:00AM	9	12	0	21	0	8	5	0	13	1	0	0	0	0	4	34
8:15AM	10	12	0	22	0	9	3	0	12	5	0	0	0	0	3	34
8:30AM	12	8	0	20	0	5	5	0	10	1	0	1	0	1	3	31
8:45AM	12	6	0	18	0	5	4	0	9	0	0	0	0	0	2	27
Hourly Total	43	38	0	81	0	27	17	0	44	7	0	1	0	1	12	126
4:00PM	26	10	0	36	0	4	9	0	13	1	1	1	0	2	4	51
4:15PM	24	12	0	36	0	9	14	0	23	8	1	5	0	6	15	65
4:30PM	24	17	0	41	7	6	20	0	26	6	1	0	0	1	16	68
4:45PM	24	17	0	41	3	6	22	0	28	7	0	2	0	2	16	71
Hourly Total	98	56	0	154	10	25	65	0	90	22	3	8	0	11	51	255
5:00PM	24	11	0	35	2	9	19	0	28	1	0	1	0	1	19	64
5:15PM	22	17	0	39	1	9	15	0	24	0	1	0	0	1	11	64
5:30PM	27	22	0	49	1	12	16	0	28	3	0	1	0	1	10	78
5:45PM	23	26	0	49	5	6	9	0	15	0	0	0	0	0	17	64
Hourly Total	96	76	0	172	9	36	59	0	95	4	1	2	0	3	57	270
Total	279	184	0	463	21	105	151	0	256	35	4	12	0	16	124	735
% Approach	60.3%	39.7%	0%	-	-	41.0%	59.0%	0%	-	-	25.0%	75.0%	0%	-	-	-
% Total	38.0%	25.0%	0%	63.0%	-	14.3%	20.5%	0%	34.8%	-	0.5%	1.6%	0%	2.2%	-	-
Lights	243	184	0	427	-	105	150	0	255	-	4	12	0	16	-	698
% Lights	87.1%	100%	0%	92.2%	-	100%	99.3%	0%	99.6%	-	100%	100%	0%	100%	-	95.0%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	36	0	0	36	-	0	1	0	1	-	0	0	0	0	-	37
% Buses and Single-Unit Trucks	12.9%	0%	0%	7.8%	-	0%	0.7%	0%	0.4%	-	0%	0%	0%	0%	-	5.0%
Pedestrians	-	-	-	-	21	-	-	-	-	35	-	-	-	-	124	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-

* Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

1. Walnut Street & Parking Garage Entrance - TMC

Thu Dec 7, 2023

AM Peak (7:45 AM - 8:45 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1141526, Location: 40.621598, -75.379797, Site Code: 1

Provided by: Imperial Traffic & Data Collection

PO Box 4637, Cherry Hill, NJ, 08003, US

Leg Direction	Walnut Street Eastbound					Walnut Street Westbound					Parking Garage Entrance Northbound					
Time	T	R	U	App	Ped*	L	T	U	App	Ped*	L	R	U	App	Ped*	Int
2023-12-07 7:45AM	17	6	0	23	0	8	5	0	13	0	0	0	0	0	2	36
8:00AM	9	12	0	21	0	8	5	0	13	1	0	0	0	0	4	34
8:15AM	10	12	0	22	0	9	3	0	12	5	0	0	0	0	3	34
8:30AM	12	8	0	20	0	5	5	0	10	1	0	1	0	1	3	31
Total	48	38	0	86	0	30	18	0	48	7	0	1	0	1	12	135
% Approach	55.8%	44.2%	0%	-	-	62.5%	37.5%	0%	-	-	0%	100%	0%	-	-	-
% Total	35.6%	28.1%	0%	63.7%	-	22.2%	13.3%	0%	35.6%	-	0%	0.7%	0%	0.7%	-	-
PHF	0.706	0.792	-	0.935	-	0.833	0.900	-	0.923	-	-	0.250	-	0.250	-	0.938
Lights	38	38	0	76	-	30	17	0	47	-	0	1	0	1	-	124
% Lights	79.2%	100%	0%	88.4%	-	100%	94.4%	0%	97.9%	-	0%	100%	0%	100%	-	91.9%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	10	0	0	10	-	0	1	0	1	-	0	0	0	0	-	11
% Buses and Single-Unit Trucks	20.8%	0%	0%	11.6%	-	0%	5.6%	0%	2.1%	-	0%	0%	0%	0%	-	8.1%
Pedestrians	-	-	-	-	0	-	-	-	-	7	-	-	-	-	12	
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

1. Walnut Street & Parking Garage Entrance - TMC

Thu Dec 7, 2023

Forced Peak (4:15 PM - 5:15 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1141526, Location: 40.621598, -75.379797, Site Code: 1

Provided by: Imperial Traffic & Data Collection






PO Box 4637, Cherry Hill, NJ, 08003, US

Leg Direction	Walnut Street Eastbound					Walnut Street Westbound					Parking Garage Entrance Northbound					
Time	T	R	U	App	Ped*	L	T	U	App	Ped*	L	R	U	App	Ped*	Int
2023-12-07 4:15PM	24	12	0	36	0	9	14	0	23	8	1	5	0	6	15	65
4:30PM	24	17	0	41	7	6	20	0	26	6	1	0	0	1	16	68
4:45PM	24	17	0	41	3	6	22	0	28	7	0	2	0	2	16	71
5:00PM	24	11	0	35	2	9	19	0	28	1	0	1	0	1	19	64
Total	96	57	0	153	12	30	75	0	105	22	2	8	0	10	66	268
% Approach	62.7%	37.3%	0%	-	-	28.6%	71.4%	0%	-	-	20.0%	80.0%	0%	-	-	-
% Total	35.8%	21.3%	0%	57.1%	-	11.2%	28.0%	0%	39.2%	-	0.7%	3.0%	0%	3.7%	-	-
PHF	1.000	0.838	-	0.933	-	0.833	0.852	-	0.938	-	0.500	0.400	-	0.417	-	0.944
Lights	89	57	0	146	-	30	75	0	105	-	2	8	0	10	-	261
% Lights	92.7%	100%	0%	95.4%	-	100%	100%	0%	100%	-	100%	100%	0%	100%	-	97.4%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	7	0	0	7	-	0	0	0	0	-	0	0	0	0	-	7
% Buses and Single-Unit Trucks	7.3%	0%	0%	4.6%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	2.6%
Pedestrians	-	-	-	-	12	-	-	-	-	22	-	-	-	-	66	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn






17005421C - Walnut Street Garage
1: Parking Garage Entrance & Walnut Street

Existing Conditions
AM Peak

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	48	38	30	18	0	0
Future Vol, veh/h	48	38	30	18	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	20	2	2	6	2	2
Mvmt Flow	51	40	32	19	0	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	91	0	154	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1504	-	838	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1504	-	820	991
Mov Cap-2 Maneuver	-	-	-	-	820	-
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	920	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		4.7		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1504	-	
HCM Lane V/C Ratio	-	-	-	0.021	-	
HCM Control Delay (s)	0	-	-	7.4	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	-	-	-	0.1	-	




17005421C - Walnut Street Garage
1: Parking Garage Entrance & Walnut Street

Existing Conditions
PM Peak

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	97	67	36	72	0	0
Future Vol, veh/h	97	67	36	72	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	7	2	2	2	2	2
Mvmt Flow	109	75	40	81	0	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	184	0	308	147
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	161	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1391	-	684	900
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	868	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1391	-	664	900
Mov Cap-2 Maneuver	-	-	-	-	664	-
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	843	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.6		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1391	-	
HCM Lane V/C Ratio	-	-	-	0.029	-	
HCM Control Delay (s)	0	-	-	7.7	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	-	-	-	0.1	-	




17005421C - Walnut Street Garage
1: Parking Garage Entrance & Walnut Street

Proposed Conditions
AM Peak

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	48	38	30	18	0	0
Future Vol, veh/h	48	38	30	18	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	20	2	2	6	2	2
Mvmt Flow	51	40	32	19	0	0
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	91	0	154	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	83	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1504	-	838	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1504	-	820	991
Mov Cap-2 Maneuver	-	-	-	-	820	-
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	919	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	4.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1504	-	
HCM Lane V/C Ratio	-	-	-	0.021	-	
HCM Control Delay (s)	0	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	-	-	-	0.1	-	

17005421C - Walnut Street Garage
1: Parking Garage Entrance & Walnut Street

Proposed Conditions
PM Peak

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	97	67	36	72	0	0
Future Vol, veh/h	97	67	36	72	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	7	2	2	2	2	2
Mvmt Flow	109	75	40	81	0	0
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	184	0	308	147
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	161	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1391	-	684	900
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	868	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1391	-	663	900
Mov Cap-2 Maneuver	-	-	-	-	663	-
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	842	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.6		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1391	-	
HCM Lane V/C Ratio	-	-	-	0.029	-	
HCM Control Delay (s)	0	-	-	7.7	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	-	-	-	0.1	-	