

MEMORANDUM

DATE: September 1, 2023

TO: Brendan McLaughlin, Village of Clarendon Hills

FROM: Liz Jensen, CBBEL

SUBJECT: Prospect Avenue Parking Study and Concept Geometry
Prospect Avenue at Park Avenue
Clarendon Hills, Cook County, Illinois
(CBBEL Project No. 230068.0001)

The Village of Clarendon Hills is seeking to enhance the northwest corner of Prospect Avenue at Park Avenue and evaluate the feasibility of creating a community plaza. The proposed plaza space would be created by revising the lane configuration to eliminate the large channelization island adjacent to the southbound right turn lane on Prospect Avenue at Park Avenue, and then repurpose the space for the community. See Figures 1 and 2 for existing intersection geometry and lane configuration. As part of the evaluation process, CBBEL was tasked with analyzing the traffic operations for the existing and proposed conditions as well as developing concept geometry.

Existing Conditions

Prospect Avenue and Park Avenue are both under Village maintenance and jurisdiction. Prospect Avenue is classified as a major collector and Park Avenue is classified as a local street. Both Prospect Avenue and Park Avenue have a 20 mph posted speed limit. The intersection is located within the Village's business district. Prospect Avenue serves as the main access and egress route to the business district and has an at-grade railroad crossing approximately 400 feet north of the subject intersection. The at-grade railroad crossing also services the adjacent Clarendon Hills Metra Station.

The existing lane configuration for the intersection of Prospect Avenue and Park Avenue are as follows: the north approach consists of a shared left-through lane and an exclusive right turn lane; the east approach consists of a shared left-through-right lane; the south approach consists of a shared left-through-right lane; and the west approach consists of a shared left-through-right lane. See Figure 2 for more details.

There are two marked mid-block crossings within the project limits: (1) a mid-block crossing located approximately 60 feet upstream of the eastbound approach of Park Avenue at Prospect Avenue, and (2) a mid-block crossing located approximately 130 feet upstream of the southbound approach of Prospect Avenue at Park Avenue.

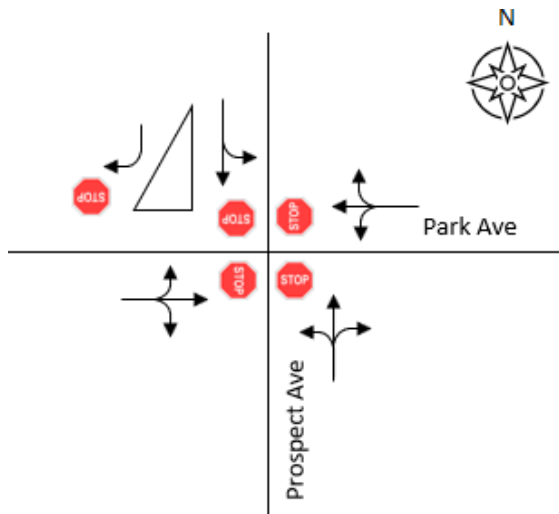


MEMORANDUM

Figure 1: Existing Intersection Geometry



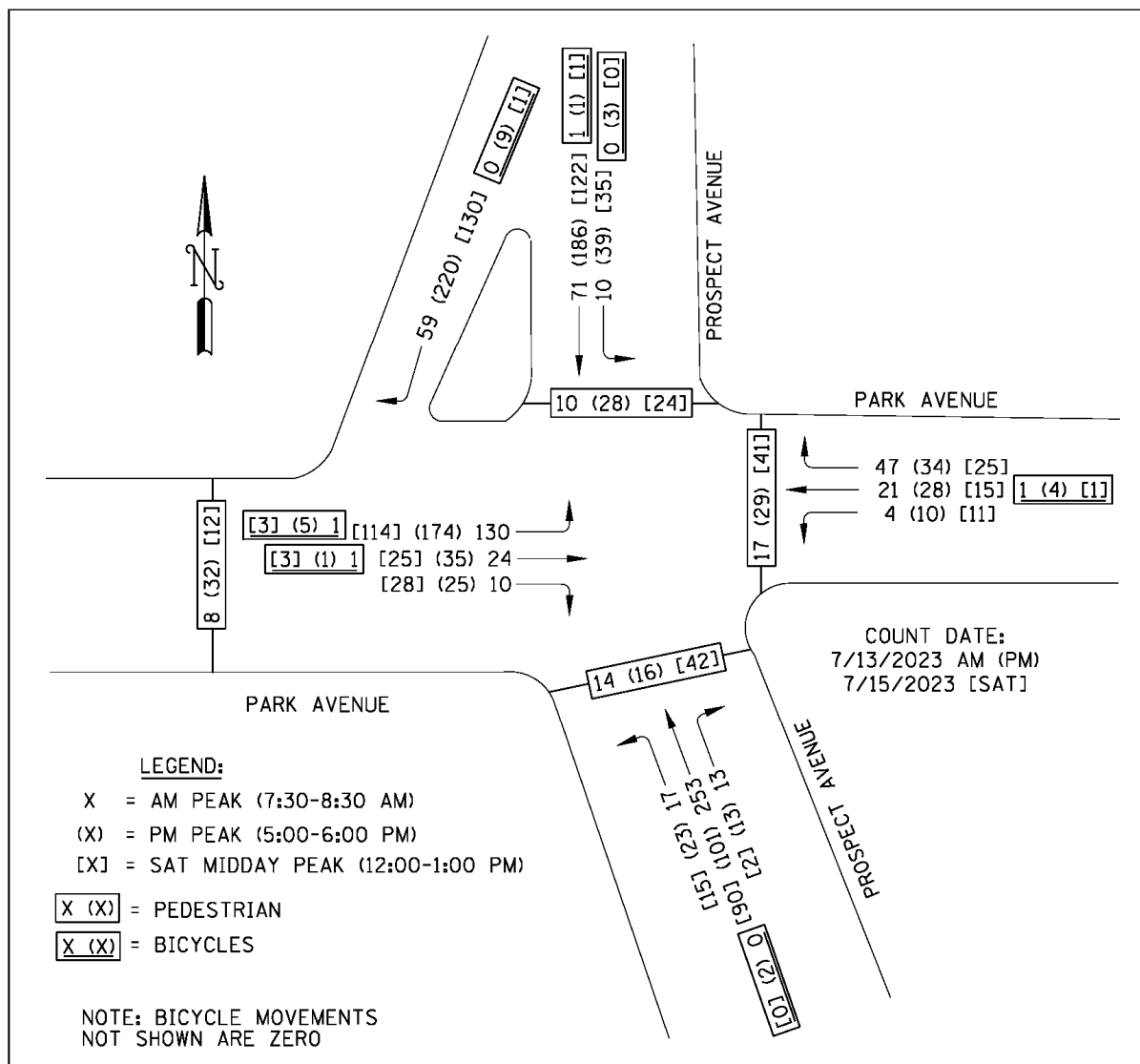
Figure 2: Existing Lane Configuration



MEMORANDUM

Data Collection

Peak hour turning movement counts were conducted at the intersection of Prospect Avenue and Park Avenue from 6:30 AM to 8:30 AM and from 4:30 PM to 6:30 PM on Thursday, July 13, 2023. Saturday midday turning movement counts were also conducted at the intersection from 11:00 AM to 3:00 PM on Saturday, July 15, 2023. These counts were the basis for the existing and proposed capacity analyses. CBBEL conducted a field reconnaissance of the project area on June 29, 2023 to verify existing roadway characteristics. From the existing traffic count data, the AM peak period occurs from 7:30 AM to 8:30 AM, the PM peak period occurs from 5:00 PM to 6:00 PM, and the Saturday midday peak occurs from 12:00 PM to 1:00 PM. The existing traffic count data is attached for reference.



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Existing and Proposed Capacity Analyses

CBBEL utilized the Highway Capacity Software (HCS) version 8.2 to analyze the existing intersection data and calculate a Level of Service (LOS), this software is based on the Transportation Research Board's Highway Capacity Manual. Table 1 details the average vehicle delay thresholds for LOS "A" through "F" regarding a stop-controlled intersection.

Table 1: Unsignalized/Stop Control LOS

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F ¹	> 50

Note 1: If the volume to capacity (v/c) ratio exceeds 1.0, then the minor street approach level of service will automatically be assigned a LOS F.

The existing and proposed capacity analysis was conducted for each peak period: AM, PM, and Saturday Midday. Table 2, below, shows the vehicle delay for drivers in seconds per vehicle as well as the 95% back of queue lengths during each study period. The intersection currently operates at a LOS B during the AM and PM peak periods and LOS A during the Saturday midday peak period. The proposed conditions analyze two future scenarios of reconfiguring the southbound right turn. The first proposed alternative converts the existing southbound shared left-through lane to a shared left-through-right lane. The second proposed alternative includes eliminating the channelization island and installing a right turn lane adjacent to the existing southbound shared left/through lane; see attached concept geometry for more details. The intersection in both proposed conditions would also operate at a LOS B during the AM and PM peak periods and LOS A during the Saturday midday peak period.



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Table 2: Existing and Proposed Intersection Capacity and Queuing Analysis Results

AM	Existing			Proposed - Alternative 1			Proposed - Alternative 2		
		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]
	EB	B - 10.5	27.5	EB	B - 10.4	27.5	EB	B - 10.5	27.5
	WB	A - 8.7	10	WB	A - 8.7	10	WB	A - 8.7	10
	NB	B - 11.8	55	NB	B - 11.5	52.5	NB	B - 11.8	55
	SB LT/Thru	A - 9.3	12.5	SB	A - 9.1	20	SB LT/Thru	A - 9.3	12.5
	SB RT	A - 8.1	7.5				SB RT	A - 8.1	7.5
	Intersection	B - 10.5		Intersection	B - 10.4		Intersection	B - 10.5	
PM	Existing			Proposed - Alternative 1			Proposed - Alternative 2		
		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]
	EB	B - 12.5	50	EB	B - 13	52.5	EB	B - 12.5	50
	WB	A - 9.5	10	WB	A - 9.8	10	WB	A - 9.5	10
	NB	B - 10.5	22.5	NB	B - 10.5	22.5	NB	B - 10.5	22.5
	SB LT/Thru	B - 12.4	50	SB	C - 17.7	135	SB LT/Thru	B - 12.4	50
	SB RT	B - 10.3	37.5				SB RT	B - 10.3	37.5
	Intersection	B - 11.4		Intersection	B - 14.7		Intersection	B - 11.4	
Sat Midday	Existing			Proposed - Alternative 1			Proposed - Alternative 2		
		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]		LOS / Delay [sec/veh]	95% Queue [feet]
	EB	A - 9.9	27.5	EB	A - 9.9	27.5	EB	A - 9.9	27.5
	WB	A - 8.4	7.5	WB	A - 8.5	7.5	WB	A - 8.4	7.5
	NB	A - 9.1	15	NB	A - 9	15	NB	A - 9.1	15
	SB LT/Thru	B - 10.1	27.5	SB	B - 10.5	50	SB LT/Thru	B - 10.1	27.5
	SB RT	A - 8.3	17.5				SB RT	A - 8.3	17.5
	Intersection	A - 9.4		Intersection	A - 9.9		Intersection	A - 9.4	



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Prospect Avenue Corridor Review

As part of the evaluation task, CBBEL was asked to conduct a brief safety review of the project limits to see if any additional improvements could be implemented. Below are the results of the crash history and midblock crossing review.

Existing Corridor Crash Data

The Clarendon Hills Police Department retrieved the most recent 5-year crash data (2018 – 2022) for the intersection of Prospect Avenue and Park Avenue. Over the course of 5 years, 13 crashes occurred within the project limits with 54% (7) of crashes involving parked cars, 23% (3) of crashes involving backing into traffic, 15% (2) of crashes involving a pedestrian or scooter, and 8% (1) of crashes involved hitting a building.

The crash history did not yield any prominent crash patterns that would involve implementing safety countermeasures. See below discussion on midblock crossings for heightened pedestrian safety.

Midblock Crossings

There are two marked mid-block crossings within the project limits: (1) a mid-block crossing located approximately 60 feet upstream of the eastbound approach of Park Avenue at Prospect Avenue, and (2) a mid-block crossing located approximately 130 feet upstream of the southbound approach of Prospect Avenue at Park Avenue. The Village requested that CBBEL review the existing pedestrian facilities for safety to see if improvements could be included in the project:

- (1) CBBEL recommends to relocate the Park Avenue midblock crossing to the all-way stop controlled (AWSC) intersection of Park Avenue and Prospect Avenue as part of the improvement project. Moving the crosswalk to the AWSC intersection would be safer for pedestrians since drivers are expecting to stop at the intersection already, vehicles are moving slower, and drivers have time to view/react to pedestrians in the crosswalk.
- (2) The Village expressed interest in elevating the safety at the Prospect Avenue midblock crossing without the use of RRFB or flashing beacons. The Village could consider installing a raised crosswalk at this location, which are typically about 10 feet wide and doubles as a speed hump requiring vehicles to slow down as they approach the crosswalk. The 10 feet width of the raised crosswalk means that both axles of a passenger vehicle would be on the raised crosswalk/speed hump at the same time to lessen the impacts/damage to vehicles which is a common driver concern with speed bumps. According to the FHWA Crash Modification Clearinghouse, raised crosswalks have been shown to reduce pedestrian crashes by 46%. Some items to consider would be the roadway drainage impacts, the attached cost estimate includes a line item for adding catch basins.



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Proposed Concept Geometry

CBBEL developed two alternatives for the reconfigured southbound approach of Prospect Avenue at Park Avenue. The first alternative closes the southbound right turn lane and repurposes the pavement and channelization island for a community plaza. The second alternative reconfigures the southbound approach to eliminate the channelization island and relocate the southbound right turn lane to be adjacent to the southbound shared left/through lane.

Aside from repurposing pavement from a community enhancement perspective, both alternatives also reconfigure the Prospect Avenue at Park Avenue intersection into a more recognizable, conventional, four-legged intersection. This new configuration meets driver expectations, increases pedestrian safety by relocating the Park Avenue midblock crossing (midblock crossing #1) and increases the driver line-of-sight for the southbound right turn driver. Another item to note is the alignment of the existing southbound right turn lane is skewed; this can cause line-of-sight issues for the drivers by additional sight obstructions in the channelization island or by the body of the driver's vehicle and can lead to issues with some drivers not being able to rotate their head to create the required line-of-sight to check for conflicting traffic.

Both alternatives replace the eight (8) impacted parking stalls with new parking spaces. Concept geometry exhibits are attached as well as preliminary level cost estimates. These estimates represent anticipated costs for required roadway improvements only (removing pavement, curb and gutter, sidewalk improvements, and seeding the plaza area, etc.) and do not include any community plaza improvements.

Recommendations and Findings

The two concept geometry alternatives are similar in terms of parking spaces and meeting the objective of creating the community plaza, but contrast on the southbound right turn accommodations. Combining the right turn lane with the shared left/through lane will push the peak hour back of queue to approximately 135 feet from the southbound stop bar which means the end of the queue will be near the Prospect Avenue midblock crossing (midblock crossing #2). In this situation, the northbound vehicles on Prospect Avenue would not have a good line-of-sight for pedestrians using this crosswalk and may involve a pedestrian crossing behind a car. The installation of a raised crosswalk would force vehicles to slow down when approaching the crosswalk and assist in giving drivers enough time to react to pedestrians in the crosswalk.

CBBEL would recommend using the second alternative if the Village decides against the raised crosswalk. The second proposed alternative would be utilized to allow northbound vehicles better line-of-sight of the Prospect Avenue midblock crossing and allow them time to view/react to pedestrians attempting to cross. The second alternative also converts space from the channelization island to roadway pavement which requires modifications to the lighting system, relocation of the electrical panel, and possibly tree removals.



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Attachments:

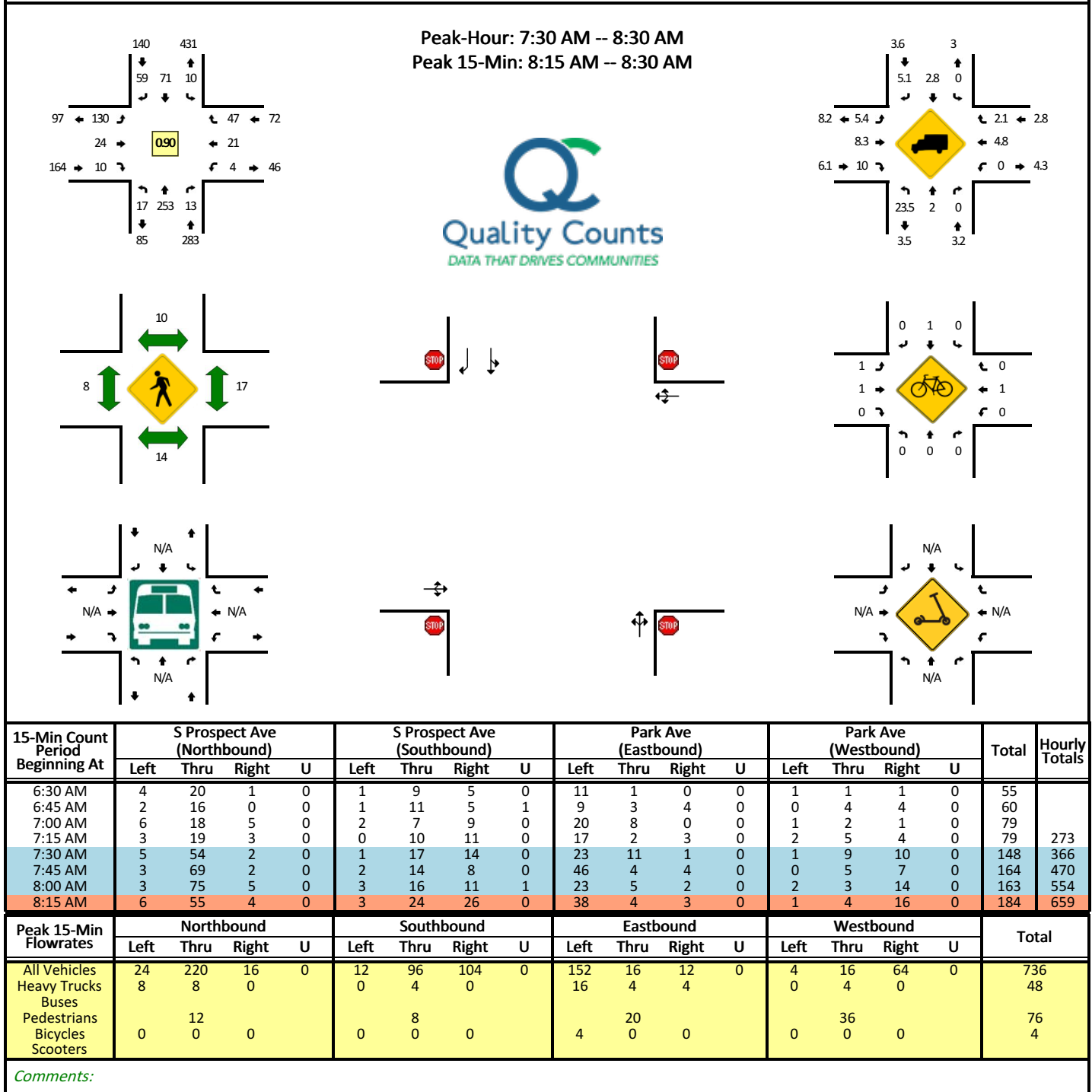
- Turning Movement Count Data
- Concept Geometry Exhibits with Preliminary Cost Estimates
- HCS Capacity Analysis Outputs



Existing Turing Movement Count Data

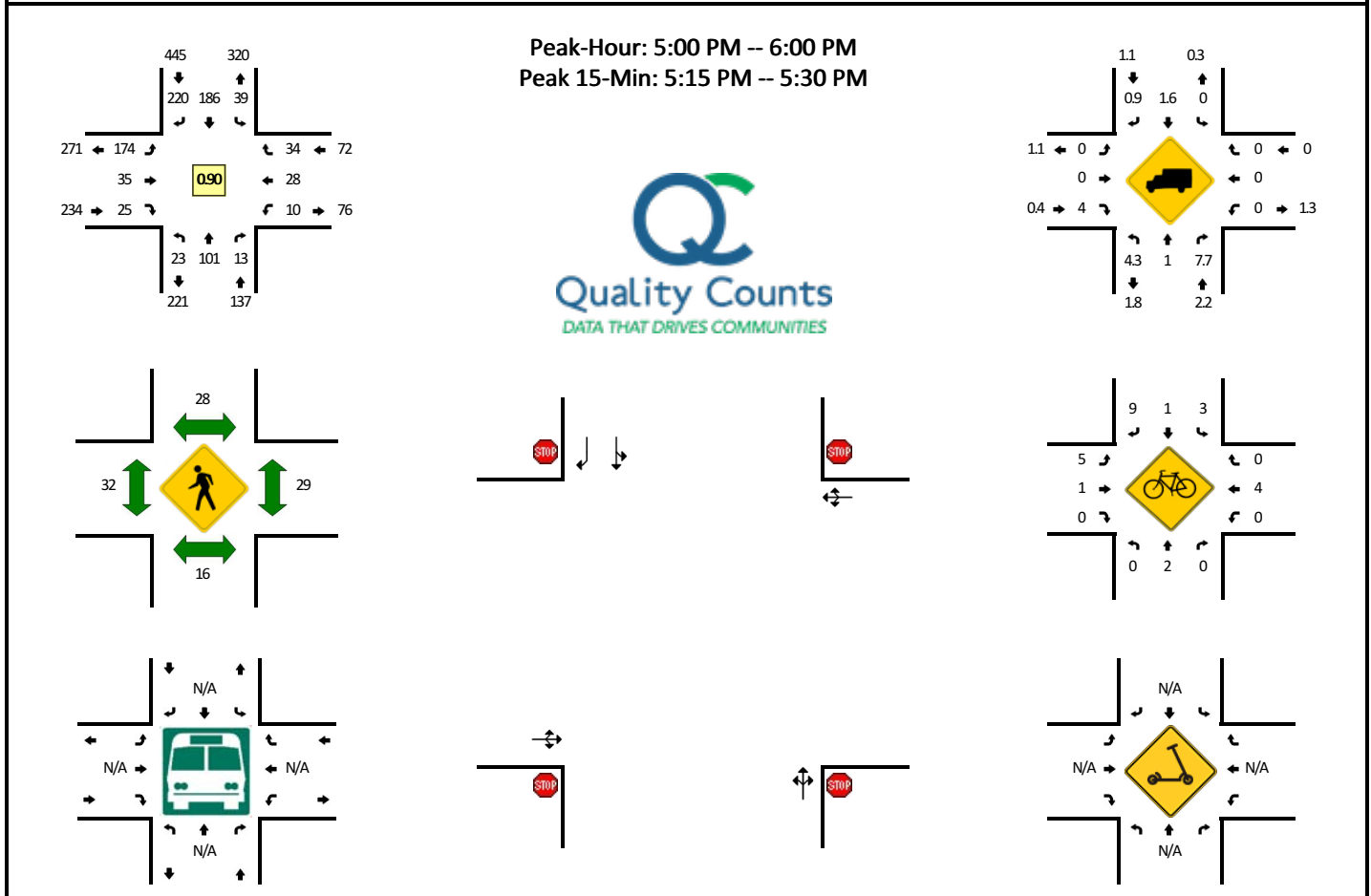
LOCATION: S Prospect Ave -- Park Ave
CITY/STATE: Clarendon Hills, IL

QC JOB #: 16265701
DATE: Thu, Jul 13 2023



LOCATION: S Prospect Ave -- Park Ave
CITY/STATE: Clarendon Hills, IL

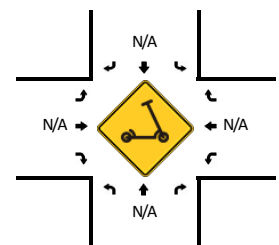
QC JOB #: 16265702
DATE: Thu, Jul 13 2023



15-Min Count Period Beginning At	S Prospect Ave (Northbound)				S Prospect Ave (Southbound)				Park Ave (Eastbound)				Park Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:30 PM	5	20	5	0	3	29	37	4	31	7	6	0	2	7	12	0	168	
4:45 PM	2	27	0	0	8	34	44	4	37	8	2	0	2	3	9	0	180	
5:00 PM	5	22	3	0	7	45	47	1	42	12	5	0	2	8	5	0	204	
5:15 PM	6	27	4	0	6	64	64	3	52	3	6	0	4	3	5	0	247	799
5:30 PM	9	28	3	0	10	42	44	6	40	12	7	0	1	7	11	0	220	851
5:45 PM	3	24	3	0	5	35	65	1	40	8	7	0	3	10	13	0	217	888
6:00 PM	7	27	2	0	3	30	37	1	31	4	6	0	3	8	9	0	168	852
6:15 PM	6	28	4	0	4	36	37	7	26	7	5	0	1	7	8	0	176	781
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	24	108	16	0	24	256	256	12	208	12	24	0	16	12	20	0	988	
Heavy Trucks	4	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	16	
Buses																		
Pedestrians		28				24				12				44			108	
Bicycles	0	0	0		0	0	8		8	0	0		0	4	0		20	
Scoters																		

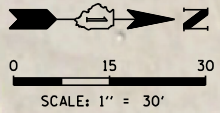
Comments:

QC JOB #: 16265703
DATE: Sat, Jul 15 2023



Comments:

Concept Geometry Exhibits with Preliminary Cost Estimates



CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:



219 55th St Ste 203,
Clarendon Hills, IL 60514

			DSGN.	EAJ	
			DWN.	FPB	
			CHKD.	GMZ	
			SCALE:	1" = 30'	
			PLOT DATE:	08/28/23	
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NO.	DATE	NATURE OF REVISION			
FILE NAME		N:\CLARENDONHILLS\230068.0000\Traffic\Exhibits\EXH-Prospect-Park-Concept_01.dgn			

TITLE:

**CONCEPT GEOMETRY
ALT 1**

PROJ. NO. 230068.00001
DATE: 08/28/23
SHEET OF
DRAWING NO.



CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
**VILLAGE OF CLARENDON HILLS**
THE VOLUNTEER COMMUNITY
219 55th St Ste 203,
Clarendon Hills, IL 60514

NO.	DATE	NATURE OF REVISION	CHKD.	MODEL	FILE NAME	DSGN.	EAJ	FPB	GM2	1" = 30'	PLOT DATE:	08/28/23	CAD USER:	fboriso	Default
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TITLE:
**CONCEPT GEOMETRY
ALT 2**

PROJ. NO. 230068.00001
DATE: 08/28/23
SHEET OF
DRAWING NO.

Christopher B. Burke Engineering, Ltd.
 9575 West Higgins Road, Suite 600
 Rosemont, Illinois 60018
 Project Number: 23-0068.00001
 Date: August 28, 2023

CALC'D BY: JADE
 CHECKED BY: JAL

Village of Clarendon Hills
Prospect Avenue Parking Concepts

Engineer's Opinion of Probable Cost

ITEMS	UNIT	UNIT PRICE	CONCEPT 1		CONCEPT 2	
			QUANTITY	COST	QUANTITY	COST
TREE REMOVAL	EACH	\$500.00	1	\$500.00	2	\$1,000.00
BOLLARDS	EACH	\$2,000.00	4	\$8,000.00	4	\$8,000.00
FURNISHED EXCAVATION	CU YD	\$50.00	250	\$12,500.00	275	\$13,750.00
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	\$6.00	500	\$3,000.00	520	\$3,120.00
SEEDING, CLASS 1A SPECIAL	SQ YD	\$5.00	500	\$2,500.00	520	\$2,600.00
EROSION CONTROL BLANKET	SQ YD	\$2.00	500	\$1,000.00	520	\$1,040.00
COMBINATION CURB AND GUTTER REMOVAL	FOOT	\$7.50	452	\$3,390.00	620	\$4,650.00
COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	\$30.00	360	\$10,800.00	492	\$14,760.00
PAVEMENT REMOVAL	SQ YD	\$20.00	60	\$1,200.00	60	\$1,200.00
PORTLAND CEMENT CONCRETE PAVEMENT 8"	SQ YD	\$85.00	60	\$5,100.00	60	\$5,100.00
AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	\$25.00	60	\$1,500.00	60	\$1,500.00
GAZEBO REMOVAL	L SUM	\$10,000.00	1	\$10,000.00	1	\$10,000.00
SIDEWALK REMOVAL	SQ FT	\$5.00	1,000	\$5,000.00	1,000	\$5,000.00
PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH	SQ FT	\$20.00	1,000	\$20,000.00	1,000	\$20,000.00
CLASS D PATCHES, TYPE I, 6 INCH	SQ YD	\$75.00	50	\$3,750.00	50	\$3,750.00
DETECTABLE WARNINGS	SQ FT	\$50.00	60	\$3,000.00	70	\$3,500.00
STAMPED ASPHALT CROSSWALK	SQ YD	\$180.00	30	\$5,400.00	25	\$4,500.00
HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	\$5.00	175	\$875.00	300	\$1,500.00
LEVELING BINDER (MACHINE METHOD), IL-4.75, N50, 0.75"	TON	\$200.00	10	\$2,000.00	15	\$3,000.00
HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	\$200.00	15	\$3,000.00	25	\$5,000.00
BITUMINOUS MATERIALS (PRIME COAT)	POUND	\$2.00	150	\$300.00	250	\$500.00
THERMOPLASTIC PAVEMENT MARKING - LINE 4"	FOOT	\$8.00	199	\$1,592.00	185	\$1,480.00
THERMOPLASTIC PAVEMENT MARKING - LINE 6"	FOOT	\$5.00	470	\$2,350.00	488	\$2,440.00
THERMOPLASTIC PAVEMENT MARKING - LINE 12"	FOOT	\$9.00	125	\$1,125.00	125	\$1,125.00
THERMOPLASTIC PAVEMENT MARKING - LINE 24"	FOOT	\$16.00	36	\$576.00	42	\$672.00
THERMOPLASTIC PAVEMENT MARKING - LETTERS AND SYMBOLS	SQ FT	\$4.40	30	\$132.00	82	\$360.80
INLETS, TYPE A, TYPE 1 FRAME, OPEN LID	EACH	\$2,500.00	3	\$7,500.00	3	\$7,500.00
STORM SEWERS, CLASS A, TYPE 1 12"	FOOT	\$75.00	100	\$7,500.00	100	\$7,500.00
RELOCATION OF ELECTRICAL CABINET	EACH	\$40,000.00	0	\$0.00	1	\$40,000.00
MODIFICATIONS TO LIGHTING SYSTEM	EACH	\$25,000.00	1	\$25,000.00	1	\$25,000.00
REMOVE AND RELOCATE EXISTING MONUMENT SIGN	EACH	\$20,000.00	1	\$20,000.00	1	\$20,000.00
TRAFFIC CONTROL AND PROTECTION	L SUM	\$10,000.00	1	\$10,000.00	1	\$10,000.00
MOBILIZATION	L SUM	\$15,000.00	1	\$15,000.00	1	\$15,000.00
CONSTRUCTION LAYOUT	L SUM	\$5,000.00	1	\$5,000.00	1	\$5,000.00

SUBTOTAL =	\$198,090.00	\$248,547.80
CONTINGENCY (20%) =	\$39,618.00	\$49,709.56
CONSTRUCTION TOTAL =	\$237,708.00	\$298,257.36

DESIGN ENGINEERING (7.5%) =	\$17,828.10	\$22,369.30
CONSTRUCTION ENGINEERING (7.5%) =	\$17,828.10	\$22,369.30

TOTAL COST OF IMPROVEMENTS=	\$273,364.20	\$342,995.96
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NOTES:

1. THIS ESTIMATE DOES NOT INCLUDE ROW OR PROPERTY ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING PRIVATE UTILITIES.
2. THIS ESTIMATE ASSUMES 2023 CONSTRUCTION DOLLARS.
3. THIS ESTIMATES ASSUMES ALL MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE COST OF SANITARY SEWER OR WATER MAIN SYSTEM IMPROVEMENTS.
5. THIS ESTIMATE ASSUMES 2" GRIND & OVERLAY RESURFACING FOR DISTURBED PAVEMENT (.075" LEVELING BINDER, 1.5" SURFACE).
6. THIS ESTIMATE ASSUMES NOMINAL DRAINAGE IMPROVEMENTS (3 INLETS, +/- 30 LF OF 12" STORM FOR EACH INLET).

HCS Capacity Analysis Outputs

- Existing Capacity Analysis
- Proposed Alt 1 Capacity Analysis
- Proposed Alt 2 Capacity Analysis

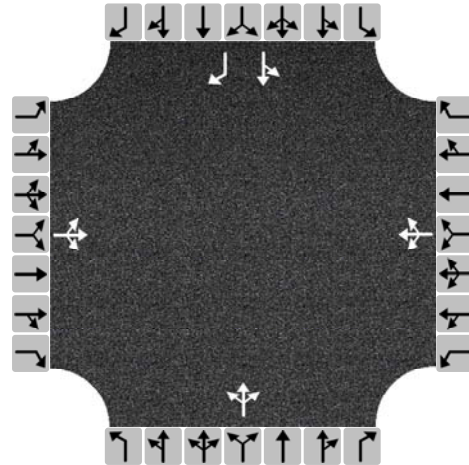
Existing Capacity Analysis

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Existing AM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	130	24	10	4	21	47	17	253	13	10	71	59
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	182			80			314			90	66	
Percent Heavy Vehicles	6			3			4			3	5	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.162			0.071			0.280			0.080	0.058	
Final Departure Headway, h_d (s)	5.42			5.05			5.00			5.69	4.95	
Final Degree of Utilization, x	0.274			0.112			0.436			0.142	0.090	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.42			3.05			3.00			3.39	2.65	

Capacity, Delay and Level of Service

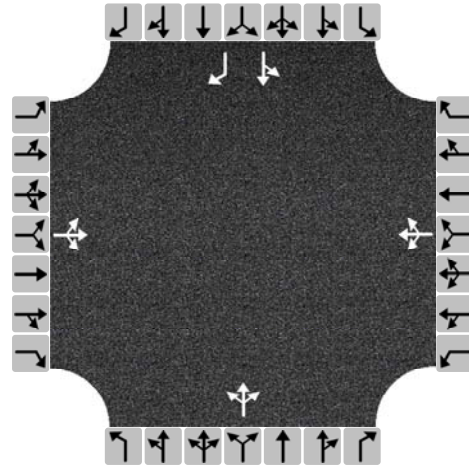
Approach	Eastbound			Westbound			Northbound			Southbound						
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3				
Configuration	LTR			LTR			LTR			LT	R					
Flow Rate, v (veh/h)	182			80			314			90	66					
Capacity (veh/h)	664			712			721			633	727					
95% Queue Length, Q ₉₅ (veh)	1.1			0.4			2.2			0.5	0.3					
Control Delay (s/veh)	10.5			8.7			11.8			9.3	8.1					
Level of Service, LOS	B			A			B			A	A					
Approach Delay (s/veh) LOS	10.5		B		8.7		A		11.8		B		8.8		A	
Intersection Delay (s/veh) LOS	10.5						B									

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Existing PM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	174	35	25	10	28	34	23	101	13	39	186	220
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	260			80			152			250	244	
Percent Heavy Vehicles	0			0			2			1	1	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.231			0.071			0.135			0.222	0.217	
Final Departure Headway, h_d (s)	5.67			5.70			5.68			5.83	5.04	
Final Degree of Utilization, x	0.409			0.127			0.240			0.405	0.342	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.67			3.70			3.68			3.53	2.74	

Capacity, Delay and Level of Service

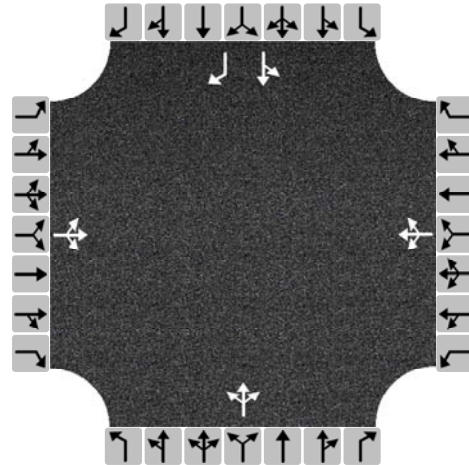
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	260			80			152			250	244	
Capacity (veh/h)	635			632			633			617	715	
95% Queue Length, Q ₉₅ (veh)	2.0			0.4			0.9			2.0	1.5	
Control Delay (s/veh)	12.5			9.5			10.5			12.4	10.3	
Level of Service, LOS	B			A			B			B	B	
Approach Delay (s/veh) LOS	12.5	B		9.5	A		10.5	B		11.4	B	
Intersection Delay (s/veh) LOS	11.4						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Existing Saturday Midday
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.89

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	114	25	28	11	15	25	15	90	2	35	122	130
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	188			57			120			176	146	
Percent Heavy Vehicles	1			2			1			4	1	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.167			0.051			0.107			0.157	0.130	
Final Departure Headway, h_d (s)	5.07			5.01			5.08			5.46	4.59	
Final Degree of Utilization, x	0.264			0.080			0.170			0.268	0.186	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.07			3.01			3.08			3.16	2.29	

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	188			57			120			176	146	
Capacity (veh/h)	710			718			709			659	784	
95% Queue Length, Q ₉₅ (veh)	1.1			0.3			0.6			1.1	0.7	
Control Delay (s/veh)	9.9			8.4			9.1			10.1	8.3	
Level of Service, LOS	A			A			A			B	A	
Approach Delay (s/veh) LOS	9.9		A		8.4		A		9.1		A	
Intersection Delay (s/veh) LOS	9.4						A					

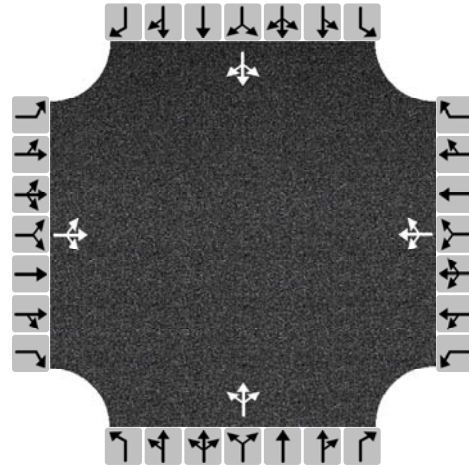
Proposed Alt 1 Capacity Analysis

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 1 - AM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	130	24	10	4	21	47	17	253	13	10	71	59
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	182			80			314			156		
Percent Heavy Vehicles	6			3			4			2		
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.162			0.071			0.280			0.138		
Final Departure Headway, h_d (s)	5.41			5.04			4.88			4.84		
Final Degree of Utilization, x	0.274			0.112			0.426			0.209		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t_s (s)	3.41			3.04			2.88			2.84		

Capacity, Delay and Level of Service

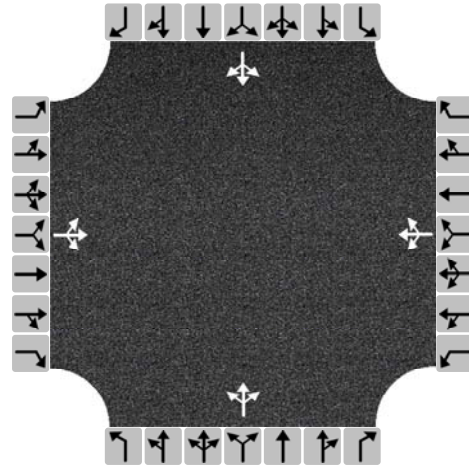
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	182			80			314			156		
Capacity (veh/h)	665			714			738			744		
95% Queue Length, Q ₉₅ (veh)	1.1			0.4			2.1			0.8		
Control Delay (s/veh)	10.4			8.7			11.5			9.1		
Level of Service, LOS	B			A			B			A		
Approach Delay (s/veh) LOS	10.4	B	8.7	A	11.5	B	9.1	A				
Intersection Delay (s/veh) LOS	10.4						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 1 - PM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	174	35	25	10	28	34	23	101	13	39	186	220
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	260			80			152			494		
Percent Heavy Vehicles	0			0			2			2		
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.231			0.071			0.135			0.440		
Final Departure Headway, h_d (s)	5.83			5.88			5.69			4.94		
Final Degree of Utilization, x	0.421			0.131			0.241			0.679		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t_s (s)	3.83			3.88			3.69			2.94		

Capacity, Delay and Level of Service

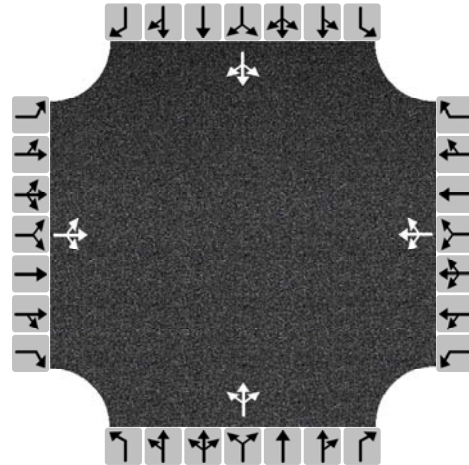
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	260			80			152			494		
Capacity (veh/h)	617			612			632			728		
95% Queue Length, Q ₉₅ (veh)	2.1			0.4			0.9			5.4		
Control Delay (s/veh)	13.0			9.8			10.5			17.7		
Level of Service, LOS	B			A			B			C		
Approach Delay (s/veh) LOS	13.0	B		9.8	A		10.5	B		17.7	C	
Intersection Delay (s/veh) LOS	14.7						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 1 - Saturday Midday
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.89

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	114	25	28	11	15	25	15	90	2	35	122	130
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	188			57			120			322		
Percent Heavy Vehicles	1			2			1			2		
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.167			0.051			0.107			0.287		
Final Departure Headway, h_d (s)	5.09			5.03			4.98			4.50		
Final Degree of Utilization, x	0.265			0.080			0.166			0.403		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, t_s (s)	3.09			3.03			2.98			2.50		

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	188			57			120			322		
Capacity (veh/h)	707			716			723			801		
95% Queue Length, Q ₉₅ (veh)	1.1			0.3			0.6			2.0		
Control Delay (s/veh)	9.9			8.5			9.0			10.5		
Level of Service, LOS	A			A			A			B		
Approach Delay (s/veh) LOS	9.9		A		8.5		A		9.0		A	
Intersection Delay (s/veh) LOS	9.9						A					

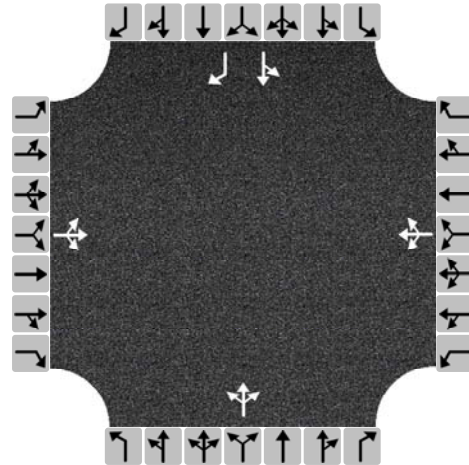
Proposed Alt 2 Capacity Analysis

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 2 - AM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	130	24	10	4	21	47	17	253	13	10	71	59
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	182			80			314			90	66	
Percent Heavy Vehicles	6			3			4			3	5	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.162			0.071			0.280			0.080	0.058	
Final Departure Headway, h_d (s)	5.42			5.05			5.00			5.69	4.95	
Final Degree of Utilization, x	0.274			0.112			0.436			0.142	0.090	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.42			3.05			3.00			3.39	2.65	

Capacity, Delay and Level of Service

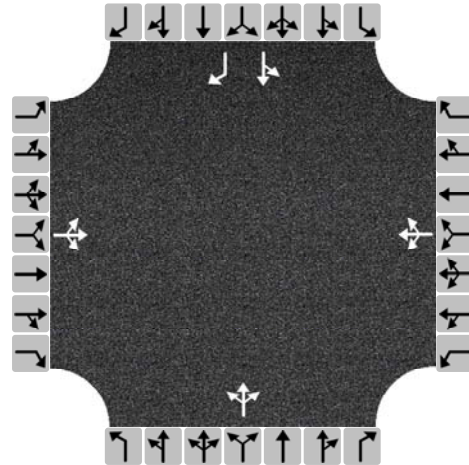
Approach	Eastbound			Westbound			Northbound			Southbound						
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3				
Configuration	LTR			LTR			LTR			LT	R					
Flow Rate, v (veh/h)	182			80			314			90	66					
Capacity (veh/h)	664			712			721			633	727					
95% Queue Length, Q ₉₅ (veh)	1.1			0.4			2.2			0.5	0.3					
Control Delay (s/veh)	10.5			8.7			11.8			9.3	8.1					
Level of Service, LOS	B			A			B			A	A					
Approach Delay (s/veh) LOS	10.5		B		8.7		A		11.8		B		8.8		A	
Intersection Delay (s/veh) LOS	10.5						B									

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 2 - PM Peak
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.90

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	174	35	25	10	28	34	23	101	13	39	186	220
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	260			80			152			250	244	
Percent Heavy Vehicles	0			0			2			1	1	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.231			0.071			0.135			0.222	0.217	
Final Departure Headway, h_d (s)	5.67			5.70			5.68			5.83	5.04	
Final Degree of Utilization, x	0.409			0.127			0.240			0.405	0.342	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.67			3.70			3.68			3.53	2.74	

Capacity, Delay and Level of Service

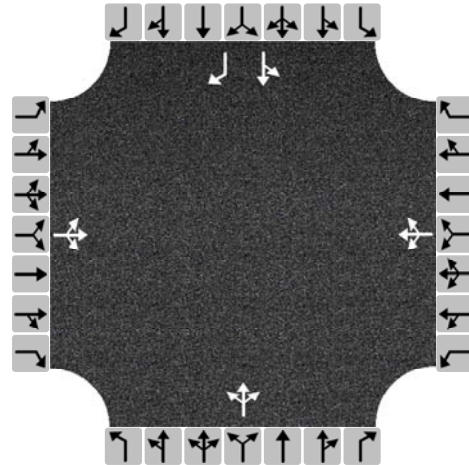
Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	260			80			152			250	244	
Capacity (veh/h)	635			632			633			617	715	
95% Queue Length, Q ₉₅ (veh)	2.0			0.4			0.9			2.0	1.5	
Control Delay (s/veh)	12.5			9.5			10.5			12.4	10.3	
Level of Service, LOS	B			A			B			B	B	
Approach Delay (s/veh) LOS	12.5	B	9.5	A	10.5	B	11.4	B				
Intersection Delay (s/veh) LOS	11.4						B					

HCS All-Way Stop Control Report

General and Site Information

Analyst	Liz Jensen
Agency/Co.	CBBEL
Date Performed	7/22/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	Proposed 2 - Saturday Midday
Project Description	Prospect Avenue, Concept Parking Stu...
Intersection	Prospect Avenue at Park Avenue
Jurisdiction	Clarendon Hills
East/West Street	Park Avenue
North/South Street	Prospect Avenue
Peak Hour Factor	0.89

Lanes



Turning Movement Demand Volumes

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume (veh/h)	114	25	28	11	15	25	15	90	2	35	122	130
% Thrus in Shared Lane												

Lane Flow Rate and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	188			57			120			176	146	
Percent Heavy Vehicles	1			2			1			4	1	
Initial Departure Headway, h_d (s)	3.20			3.20			3.20			3.20	3.20	
Initial Degree of Utilization, x	0.167			0.051			0.107			0.157	0.130	
Final Departure Headway, h_d (s)	5.07			5.01			5.08			5.46	4.59	
Final Degree of Utilization, x	0.264			0.080			0.170			0.268	0.186	
Move-Up Time, m (s)	2.0			2.0			2.0			2.3	2.3	
Service Time, t_s (s)	3.07			3.01			3.08			3.16	2.29	

Capacity, Delay and Level of Service

Approach	Eastbound			Westbound			Northbound			Southbound		
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LT	R	
Flow Rate, v (veh/h)	188			57			120			176	146	
Capacity (veh/h)	710			718			709			659	784	
95% Queue Length, Q ₉₅ (veh)	1.1			0.3			0.6			1.1	0.7	
Control Delay (s/veh)	9.9			8.4			9.1			10.1	8.3	
Level of Service, LOS	A			A			A			B	A	
Approach Delay (s/veh) LOS	9.9		A		8.4		A		9.1		A	
Intersection Delay (s/veh) LOS	9.4						A					