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Project Credit Checklist[1]

School Construction Authority

NYC Green Schools Rating System 2019

		SD	DD	60%	100%	Design	Const
Project:	PS 123A						
Address | Zip Code:	345 Example St	Date last updated:					
LLW #:	123456	Select if interior fit-out[13]				☐	
Design #:	123456						
Architect:	Architect						

Impact Area	BD&C Reference LEED for Schools v4[2]	CHPS Reference	NYC GSG 2019[3]	Credit Name	Credits with 0 Points Required for all projects[5]	Credit with Points Required for all Projects	Required if Feasible	Additional Credits	Regional Priority[6]	Credit submissions required for Design and Construction[7]: Design Phase	Const. Phase
Integrative Process										1 Point	
	IPc1		P1.1R	Integrative Design Process		1				1	
Integrative Process Category Sub-Total:					0NP	1	0	0	0	1	0
Location & Transportation										16 Points	
Site Selection	LTc2		L1.1R	Sensitive Land Protection		1				1	
	LTc3		L1.2	High Priority Site			2		1	2	
	LTc4		L1.3	Surrounding Density			3			2	
	LTc4		L1.4R	Diverse Uses		2				2	
Transportation	LTc5		L2.1R	Access to Quality Transit		2	2			4	
	LTc6		L2.2	Bicycle Facilities			1			1	
	LTc7		L2.3R	Reduced Parking Footprint		1				1	
			L2.4P	Green Vehicles, Charging Station Infrastructure	NP					N	
	LTc8		L2.5A	Green Vehicles, Charging Station Installation				1		0	
Location & Transportation Category Sub-Total:					1NP	6	8	1	1	13	0
Site										11 Points	
Site Assessment	SSpr2		S1.1P	Environmental Site Assessment	NP					Y	
	SSc1		S1.2R	Enhanced Site Assessment		1				1	
Minimize Site Impact	SSpr1		S2.1P	Construction Activity Pollution Prevention	NP						Y
	SSc3		S2.2	Open Space			1			1	
			S2.3P	Green Infrastructure Assessment	NP					Y	
	SSc4		S2.4	Rainwater Management				3	1	0	
	SSc5		S2.5	Heat Island Reduction			2			2	
	SSc6		S2.6	Light Pollution Reduction			1			1	
Facility Use	SS 8	1.1.2	S3.1R	**Joint Use of Facilities,** Community Access		1				1	
	IEQpc78		S3.2	Active Design in a School Environment			1			1	
Site Category Sub-Total:					3NP	2	5	3	1	7	0
Water										10 Points	
Outdoor Systems	WEpr1		W1.1P	**Outdoor Water Use Reduction**, Reduce 30%	NP					Y	
	WEc1		W1.2R	**Outdoor Water Use Reduction,** Reduce Potable 50%-100%		2				2	
Indoor Systems	WEpr2		W2.1P	**Indoor Water Use Reduction**, 20% Reduction	NP					Y	
	WEc2		W2.2R	**Indoor Water Use Reduction,** 25%-50% Reduction		2	1	2		3	
Metering	WEp3		W3.1P	**Water Metering,** Building Level	NP					Y	
	WEc4		W3.2R	**Water Metering,** Advanced		1				1	
Cooling Tower	WEc3		W4.1A	**Cooling Tower Water Use** (only projects with cooling tower)				2		0	
Water Category Sub-Total:					3NP	5	1	4	0	6	0
Energy										35 Points	
Commissioning	EApr1		E1.1P	Fundamental Commissioning & Verification	NP						Y
	EAc1		E1.2A	Enhanced Cx & Monitoring Based Cx				4			0
	EAc1		E1.3A	Envelope Commissioning				2			0
Refrigerant Management	EAp3		E2.1P	Fundamental Refrigerant Management	NP					Y	
	EAc6		E2.2	Enhanced Refrigerant Management			1			1	
Energy Efficiency	EAp2		E3.1P	Minimum Energy Performance	NP					Y	
	EAc2		E3.2R	**Optimize Energy Performance,** 6%-50% New, 4%-48% Renovations [8]		3		15		6	
		3.1.2	E3.3R	**HVAC System Sizing,** Avoid Oversizing	NP					Y	
Energy Management		3.3.5	E4.1R	Energy Management System Controls	NP					Y	
	EAc4		E4.2A	Demand Response				2	1		0
Metering	EApr3	3.3.8	E5.1P	**Energy Metering,** Building Level	NP						Y
	EAc3		E5.2R	**Energy Metering,** Advanced		1					1
Power	EAc5		E6.1P	Feasibility of Renewable Energy	NP					Y	
			E6.2A	Production of Renewable Energy				4			2
	EAc7		E6.3R	Green Power & Carbon Offsets		1		1		1	
Energy Category Sub-Total:					7NP	5	1	28	1	8	3

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Revision II - February 26, 2021

Project Credit Checklist[1]

School Construction Authority

NYC Green Schools Rating System 2019

		SD	DD	60%	100%	Design	Const
Project:	PS 123A						
Address | Zip Code:	345 Example St	Date last updated:					
LLW #:	123456	Select if interior fit-out[13]					
Design #:	123456						
Architect:	Architect						

Credit submissions required for Design and Construction[7]

Impact Area	BD&C Reference LEED for Schools v4[2]	CHPS Reference	NYC GSG 2019[3]	Credit Name	Credits with 0 Points Required for all projects[5]	Credit with Points Required for all Projects	Required if Feasible	Additional Credits	Regional Priority[6]	Design Phase	Const. Phase
Materials										12 Points	
Efficient Material Use	MRpr1		M1.1P	**Storage & Collection of Recyclables**	NP					Y	
	MRpr2		M1.2P	**Construction & Demolition Waste,** Planning	NP						Y
	MRc5		M1.3R	**Construction & Demolition Waste,** 50%- 75% Diversion		1	1				2
				Long-Term Commitment[14]			0			0	
Materials Reporting & Optimization	MRc3		M2.1A	**Material Extraction Reporting**				1			1
	MRc3		M2.2A	**Material Extraction Optimization**				1			0
	MRc2		M2.3	**Material Environmental Reporting**			1				1
	MRc2		M2.4A	**Material Environmental Optimization**				1			0
	MRc4		M2.5	**Material Ingredient Reporting**			1				1
	MRc4		M2.6A	**Material Ingredient Optimization**				1			0
Material Life-Cycle Impacts	MRc1		M3.1A	**Life-Cycle Impact Reduction,** Whole Building LCA[9]				3	1		0
	MRc1		M3.2	**Life-Cycle Impact Reduction,** Building and Material Reuse[10]			0				0
		4.1.1	M4.1R	**Wallboard & Roof Deck Products,** Mold Resistance	NP					Y	
Materials Category Sub-Total:					3NP	1	3	7	1	0	5
Indoor Environmental Quality										16 Points	
Design Indoor Air Quality	IEQpr1		Q1.1P	**Minimum IAQ Performance**	NP					Y	
	IEQc1		Q1.2R	**Enhanced IAQ Source Control**[11]		1			1	2	
	IEQc1		Q1.3A	**Enhanced IAQ Ventilation & Monitoring**[11]				1		0	
Construction Indoor Air Quality	IEQc3		Q2.1R	**Construction IAQ Management Plan**		1					1
	IEQc4		Q2.2R	**Building IAQ Flush-Out**		1					1
Post Construction Indoor Air Quality		5.3.5	Q3.1	**Electric Ignition Stoves**	NP					N	
		6.2.4	Q3.2R	**Post Construction Indoor Air Quality**	NP						Y
Material Emissions	IEQc2		Q4.1	**Low-Emitting Materials,** 3-5 Categories			2				2
	IEQc2		Q4.2A	**Low-Emitting Materials,** 6 Categories				1			0
Thermal Comfort	IEQc5		Q5.1R	**Thermal Comfort**		1				1	
Lighting Quality	IEQc6		Q6.1R	**Interior Lighting,** Control		1				1	
	IEQc6		Q6.2	**Interior Lighting,** Quality			1			1	
		5.2.1	Q6.3R	**Visual Performance,** Artificial Direct-Indirect Lighting	NP					Y	
Daylight and Views	IEQc7		Q7.1	**Daylight,** 55%-75%			3			0	
	IEQc8		Q7.2	**Quality Views**			1			1	
Acoustics	IEQpr3	5.5.1	Q8.1P	**Minimum Acoustical Performance**	NP					Y	
	IEQ 9	5.5.2	Q8.2	**Enhanced Acoustical Performance**			1			0	
IEQ Category Sub-Total:					5NP	5	8	2	1	6	4
Innovation										2 Points	
Accreditation	IDc2		I1.1R	**LEED® Accredited Professional**		1					1
Above & Beyond	IDc1		I1.2A	**Innovation or Pilot Credit**				1		0	
Additional Credits Sub-Total:					0NP	1	0	1	0	0	1
					22NP	26	26	46	5	41	13
LEED® Equivalent Point Total[12]:										103	

1. The NYC GSG requires that all credits be attempted and proof through calculation for those which are not-feasible.
2. LEED reference numbers are based on the order of credits in the LEED for Schools v4 Rating System.
3. Letter prefix indicates credit section (P, L, S, W, E, M, Q, I)
   First number indicates the category within the section
   Second number indicates the specific credit within the section category
   Suffix "P" is added for credits that are LEED® prerequisites and therefore required of all projects
   Suffix "R" is added for credits that are required of all projects
   Suffix "A" indicates credits that are additional and may only be pursued with SCA direction/permission.
4. Select if feasible or not, first, in column F. If feasible complete column G using the drop down options.
5. To be consistent with LEED®, the NYC GSG assigns no point "NP" value to prerequisites or non-LEED® credits.
6. If the referenced Regional Priority Credit is achieved, the project will receive the additional point for "RP".
7. Indicates the submission phase for each credit. Columns will automatically fill with point values for credits being pursued (exception E 3.2 R).
8. This credit requires project-specific energy modeling and can not be achieved by use of proto-typical modeling. Select number of pts pursuing from column F dropdown menu. Since project-specific modeling is based on ASHRAE 90.1-2010 , minimum required threshold is 10%.
9. M3.1A is only applicable to new construction. Regional Priority is earned by achieving either M3.1A or 3.2A.
10. M3.2A is only applicable to renovations/remodels. Regional Priority is earned by achieving either M3.1A or 3.2A.
11. Projects need to achieve both Q1.2R and Q1.3A to earn the Regional Priority point.
12. LL32/16 requires Certified LEED® v4 for Schools or equivalent of a no-less stringent rating system - Minimum 40 Points.
13. Upon selection of interior fit-out, the checklist updates in accordance with Appendix C. Points, drop-down menus and credit applicability update automatically. Long Term Commitment is new credit in the checklist only and applicable to Interior Fit-out projects only.

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Revision II - February 26, 2021

CAPACITY 160

SCA AUTHORIZED OFFICIAL PROGRAM -- DO NOT REVISE LOCKED

DIRECTION to DESIGNER--PLEASE READ BEFORE UPDATING
- Designer to verify program spaces provided meet SCA Design Requirements 1.3.1.3 for 5% tolerance in the individual programmed square footage.
- Designers to enter the number of rooms in the location columns i.e. new units in addition, new units in existing building and existing units to remain within each category.
- Designers to enter the total sf of new units in addition.
- Designers to enter the total sf in the column "renovation in existing building" for those new room that are located in existing building and will require substantial construction work. e.g converting two existing classrooms into a new admin office
- **Note** that there is no need to include area for those existing spacesthat are a) to remain as is o b) those spaces that are relabelled as new rooms but do not require any construction work e.g. renaming an existing first grade CR to a third grade CR.

DO NOT REVISE - LOCKED

Occupant Loads for Ventilation Calculations

Occupant load for rooms of instruction is based on maximum number of students per CR based on UFT regulations. Occupant loads for other spaces is based on greater of seating plan or BC 1004.

DETAILED PROGRAM OF REQUIREMENTS | **DISTRIBUTION OF SPACES & CAPACITY** | **DISTRIBUTION OF SPACES/CORRESPONDING AREA** | **CAPACITY**

ROOM LAYOUT	ROOM TYPE	Unit Area	No of existing units as per current usage of existing building	No of new units added	No of Total units	CAPACITY PER UNIT	CAPACITY ADDED	Program Area	New Units in addition	New Units in existing	Existing Units to remain	Total New Area in addition	Total (net) SF renovated in existing building	Comments	Program areas of renovated spaces located in existing building	Students Per unit	Adults Per unit	Total Total per unit
	GROUP 1- INSTRUCTION																	
1-10	Pre-Kindergarten (w/ toilets)	1,000	0	2	**2**	18	36	2,000								25	2	27
1-11	Kindergarten (w/ toilets@ first fl. If possible)	1,000	0	2	**2**	20	40	2,000								25	2	27
1-35	Typical Classrooms - Grade 1	750	2	0	**2**	20	0	0								32	1	33
1-35	Typical Classrooms - Grade 2	750	2	0	**2**	20	0	0								32	1	33
1-14	Typical Classrooms - Grade 3	750	2	0	**2**	20	0	0								32	1	33
1-15	Typical Classrooms - Grade 4	750	2	0	**2**	28	0	0								32	1	33
1-15	Typical Classrooms - Grade 5	750	2	0	**2**	28	0	0								32	1	33
1-15	Regular Classroom	750	1	0	**1**	28	0	0						Re-purpose main office 150 to an extra classroom		32	1	33
1-30	CSD Special Education Classrooms (must be 500 SF Min)	500	1	0	**1**	12	0	0										25
1-31/32	Reading/Speech Resource Room	375	1	0	**1**	---	---	0						Re-purpose classroom 305 to a resource room	242			19
															242			
	GROUP 2- SPECIALIZED INSTRUCTION																	
2-25	Art Classroom w/ 125 sf storage	1,125	0	1	**1**	28	28	1,125								32	1	33
2-30m	Music classroom w/ instrument storage within CR	875	0	1	**1**	28	28	875								32	1	33
	GROUP 3- SCIENCE																	
3-11,3-13	Science Resource room w/ storage	875	0	1	**1**	28	28	875								32	1	33
	GROUP 4/GROUP 5 - PHYSICAL EDUCATION/ASSEMBLY																	
	PLAYGROUND: 3,000 sf ECC Playground separate from larger yard; Hard-surface General Playground @ 30 sf/student if possible (exclude Pre-K & K count)																	
4-10	Gymnasium	3,000	0	1	**1**			3,000										200
4-55	Gym Instructor Office	150	0	1	**1**			150									2	2
4-53	Gym Storage	100	0	1	**1**			100										0
	Exercise Room		0	0	**1**	---	---	0						Re-purpose existing student dining				
	GROUP 6 - LIBRARY																	
6-13or6-14	Library	900	1	0	**1**	---	---	0						Repurpose classroom 203 back to library		32	1	33
	GROUP 7 - LOBBY																	
7-10	Lobby	750	0	1	**1**	---	---	750										
	GROUP 8 - STUDENT SUPPORT																	
8-10	Guidance/SBST Suite	500	1	0	**1**	---	---							Re-purpose room 103 to a guidance office				5
8-10.1	Guidance Office	100				---	---											
8-30.1	SBST Office	100				---	---											
8-30.2	Interview/Conference Room	150				---	---											
8-10.3	Store Room	50				---	---											
8-10.4	Waiting Room	100				---	---											
8-50	Medical Suite	500	0	1	**1**	---	---	500										5
	GROUP 9 - STORAGE																	
	educational /supply closet- books etc	50	various	3	various			150										0
9-19	Grounds Equipment Storeroom	125	0	1	1	---	---	125										0
9-24	Refuse and Recycling room (w/floor drain and hose bib) (on 1st floor if possible)	450	0	1	**1**		---	450										0
9-21	Audio-Visual/Secure Storeroom	200	0	1	**1**	---	---	150										0
	Bicycle storage	60	0	1	**1**			60										0
																0	0	0
	GROUP 10 - ADMINISTRATION															0	0	0
	Administration Suite	1,025	0	1	**1**	---	---	1,025										
10-11	General Office,Waiting Rm, mail/time/duplicating	500														0	5	5

ROOM LAYOUT	ROOM TYPE	Unit Area	No of existing units as per current usage of existing building	No of new units added	No of Total units	CAPACITY PER UNIT	CAPACITY ADDED	Program Area	New Units in addition	New Units in existing	Existing Units to remain	Total New Area in addition	Total (net) SF renovated in existing building	Comments	Program areas of renovated spaces located in existing building	Students Per unit	Adults Per unit	Total Total per unit
10-13	Principal's Office /Conference	375														0	4	4
10-14	Records Room	150														0	0	0
	Supervisory	150	Various	0	**arious**	---	---	0								0	2	2
10-25	Parents / Community Room	250	0	1	**1**	---	---	0						Re-purpose existing Principal's Office	212	0	3	3
	GROUP 11 - CAFETERIA/STAFF LUNCH															0	0	0
11-10	Students' Dining Area existing area to be reused towards new program space	1,950	-1	1	**1**	130	---	1,950										130
10-24/11-1	Staff work room plus Staff Lunch / Conference Room	500	-1	0	**1**	---	---							Repurpose existing room B2 and B3	500	0	24	24
	GROUP 12 - CUSTODIAL																	
	Custodial Locker	175	0	1	**1**	---	---	175								0	0	0
12-11	Custodian's Office	275	0	1	**1**	---	---	275								0	3	3
12-14,16	Custodian's Storage/workshop -existing	375	1	0	**1**	---	---	0										
	Storage	500	0	1	**1**	---	---	500										
12-17	Janitor's Sink Closet		Various		**Various**	(1 per floor)-in addition										0	0	0
12-22	Shared unsex toilet w/ shower and lockers for Bike users	135	0	1	**1**			135										0
12-25	Telecommunications Room	300		1	**1**	---	---	300										0
12-26	Telecommunications Switch Closet (@ floors w/o tel. room)	100		2	**2**	---	---	200										0
	GROUP K - KITCHEN																	
K1	Kitchen Complex (refer to K1 for gross area)	1,826	0	1	**1**	---	---	1,588						Note kitchen gross should be 1,826 including 15% circulatio			8	8
k2	Cooking area																	
k3	Servery- one serving line																	
	Dietician desk																	
K8	Help Locker Room - M/F				**2**													
	Food Storage (75% may be remote from kitchen)				**2**													
	TOTAL PROGRAMMED AREA (62% Gross)							**18,458**				**0**	**0**					
	Existing Spaces to be repurposed														1,196			
	PROGRAM AREA FOR ADDITION							18,458										
	TOTAL CORE AREA FOR ADDITION (38% Gross)							**11,313**				**0**		(designer input designed net minus actual building gross)				
	TOTAL GROSS AREA FOR ADDITION(100%)							**29,771**	**Addition Gross area**					(designer input sum of all gross floor plan areas)				

TOTAL ADJUSTED CAPACITY: 160

Unadjusted Capacity: 160

TOTAL SF PER PUPIL:

NYC Green Schools Rating System — SCA School Construction Authority

PS 123A

Schematic Design

Project Name:	PS 123A		
Submission Phase:	Schematic Design	Submission Date:	3/1/3021
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	

Building Summary

Building Type	New Construction	Number of Stories above Grade:	4
Number of Buildings within Project Scope:	1	Number of Stories below Grade:	1
Building Total Gross Floor Area (SF):	38,268	Project Phase Cost Estimate	
Instructional Days School Year	180		
Instructional Days Summer	30		

Site Summary

Pre-project Site Condition:	Previously developed	Total Site Area (SF):	44,863
Building Footprint (SF):	11,763	Open Site Area (SF):	33,100
Hardscaped Site Area (SF):	27,341	Parking Area (SF):	800
		Parking Spaces:	25

Space Use Summary (Complete based on attached POR)

New Construction Gross Floor Area (SF):	38,268	(100%)	Regularly Occupied Spaces Total Floor Area:		(0%)
Renovated Gross Floor Area (SF):	0	(0%)	Unoccupied Total Floor Area:		(0%)
Unrenovated Gross Floor Area (SF):	0			Y	N
Date of last POR update	02.25.20		POR Attached	X	

User Summary (Complete based on attached POR)

Students (Unadjusted Capacity):	160	Pre-K student population	36
Transients:	0	Kindergarten student population	40
Staff:	40	1st to 3rd grade student population	0

Utility Summary

Energy Systems		Water Systems	
X	Electricity	X	Municipal Drinking Water
X	Natural Gas	X	Combined Sewage System
	Fuel Oil	X	Rainwater
	Biofuels		Graywater
			Separate Sanitary and Storm Sewage System
	District/Campus Heating	**Renewable Energy Systems**	
	District/Campus Cooling	X	Renewables on Site
			Off-Site

OVERVIEW

PS 123A

Schematic Design

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	

Design Team

ARCHITECT		MEP ENGINEER	
Firm Name:	Architect	Firm Name:	Mechanical, Electrical, Plumbing
Address:	123 Example Street	Address:	123 Example Street
	New York NY		New York NY
Telephone:	123-456-7890	Telephone:	123-456-7890
Email:	example@example.com	Email:	example@example.com

CIVIL ENGINEER		LIGHTING CONSULTANT		LANDSCAPE ARCHITECT	
Firm Name:	Civil	Firm Name:	Lighting	Firm Name:	Landscape
Address:	456 Example Street	Address:	456 Example Street	Address:	456 Example Street
	New York NY		New York NY		New York NY
Telephone:	123-456-7890	Telephone:	123-456-7890	Telephone:	123-456-7890
Email:	example@example.com	Email:	example@example.com	Email:	example@example.com

DESIGN SUSTAINABILITY CONSULTANT		ENERGY MODELER		ACOUSTICAL CONSULTANT	
Firm Name:	Sustainability Consultant	Firm Name:	Energy Modeler	Firm Name:	Acoustical Consultant
Address:	123 Example Street	Address:	456 Example Street	Address:	456 Example Street
	New York NY		New York NY		New York NY
Telephone:	123-456-7890	Telephone:	123-456-7890	Telephone:	123-456-7890
Email:	example@example.com	Email:	example@example.com	Email:	example@example.com

SCA Team

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OVERVIEW

Insert Previous meeting minutes with responses

Project:	PS 123A	Submission Date:	5/8/2018
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456		

P1.1R - Integrative Design Process
This pre-requisite will be met. The IDP Workshop was held on February 15, 2021. The following discoveries were evaluated: energy and daylight-related and water system analysis, preliminary life-cycle assessment, active design, acoustics and climate resiliency analyses. IDP Report was included in Appendix A. Integrative Design Report was revised to include attendance, meeting minutes, design impacts for each discovery and updated IDP report as per meeting minutes.
Supporting Documentation:
P1.1R-Integrative Design Credit Form
Appendix A- IDP Report

L1.1R Sensitive Land Protection
Credit is feasible. Option 1- the development footprint is located on land that has been previously developed. As shown on the aerial map, the area of the project is currently occupied by playground areas located to the east of the existing school.
SCA Design Requirements:
1.1.2.1 Feasibility Study
1.1.3.2. Test Fit/Sketch Studies
Supporting Documentation:
Aerial Map

L1.2 - High Priority Site
Credit is feasible for Option 2 priority designation. Site in not in a historic district & is not a designated brownfield. The site is shown as a Difficult Development Area on the US Dept. of Housing and Urban Development map, qualifying for 1 point. See attached DDA map.
SCA Standards:
02010 Environmental Site Assessment Reports
02090 Environmental Management of Excavated Material
02200 Earthwork
02220 Gas Vapor Barrier (Fluid Applied)
Supporting Documentation:
DDA/QCT Map

L1.3 – Surrounding Density
Credit is feasible. The buildable land area within a 0.25 mile (1,320 SF) radius of the project has sufficient residential unit density and mixed-use and non-residential FAR to achieve 3 points under this credit, as shown in the neighborhood map and tabulation of residential units and lot and building areas below. The buildable land excludes park land, a cemetery, and an LIRR right of way.
SCA Design Requirements:
1.1.2.1 Feasibility Study
Supporting Documentation:
Surrounding Density Credit Form
Density Map
Tabulations of residential, non-residential and mixed use buildings

L1.4R – Diverse Uses
The project complies with the requirements to earn two points for this credit. The following map shows 10 diverse uses, from 4 use categories, and their locations relative to the school. All 10 are less than a 0.5 mile (2,640 ft.) walking distance from the project's main entrance.
SCA Design Requirements:
1.1.2.1 Feasibility Study
1.1.3.2. Test Fit/Sketch Studies
Supporting Documentation:
Diverse Uses Credit Form
Site Vicinity Map
Walking Path Map to each diverse use

L2.1R – Access to Quality Transit
Option 1 will be pursued: There are MTA Subway stations using train line 1. As well as Bus route M100, within the ¼ mile of walking distance from the main entrance and a 'BxM1' Express Bus within the 1/2 mile walking distance from the main entrance (see attached diagram). Subway train station 1 runs every 3 - 6 minutes on the weekdays. During school hours, 7:30am to 3:30pm, there are 38 stops in one direction, for a total of 76 stops. MTA Bus M100 runs every 5 - 8 minutes on the weekdays. During school hours, 7:30am to 3:30pm, there are 54 stops to E Harlem 2 Av-127 St and 52 stops to Inwood 220 St via Amsterdam Via Broadway for a total of 106 stops. MTA Bus BxM1 runs every 16 - 20 minutes on the weekdays. During school hours, 7:30am to 3:30pm, there are 25 stops to one direction, for a total of 50 stops. Based on the above, a total of 232 stops per weekday will earn two (2) credit points.
SCA Design Requirements:
1.1.3.2 Test Fit/ Sketch Studies
Supporting Documentation:
Area Plan
Transit Map
Walking Distance Map to bus stops
Transit Schedules

L2.2 – Bicycle Facilities
Credit is feasible and will be pursued.
The project is located less than 700 yards from MTA train station. The proposed school building is 76,883 square feet. By NYC Zoning, 8 bikes will have to be in a secure area (1 bike per 10,000 sq. ft.). A Bike storage room with a capacity of 9 bikes has been allocated on the cellar floor of the building. The required remaining 16 bikes will be in a covered area outside the building on racks. Two (2) shower rooms have been allocated on the cellar floor of the building. All will be in compliance with DR 1.3.1.12 (storage) and DR 2.3.3 (racks) and Specification Sections 02870 and 05700. See calculations below.
Occupancy Calculation:
Student: (Grade 3 and below students are not part of bicycle user calculation)
No. of typical classrooms (4 to 5th grade): 6, 28 occupants =168
No. of SE classrooms: 2, 12 occupants = 24
No. of DS75 classroom & sp. Ed: 8, 12 occupancy = 96
Art Classroom: 1, 28 occupants =28
Music Classroom: 1, 28 occupants =28
Science Resource Room: 1, 28 occupants =28

Subtotal 372

FT Staff: 65
(2 adults for each Pre-kindergarten, kindergarten & DS75 – 4 pre-kindergarten, 3 kindergarten, & 10 DS75 = 34

1 adult for all instruction rooms other than above: 6 grade 1-2, 3 grade 3, 6 grade 4-5, 2 special ed, 1 reading resource, 1 speech resource, 3 DS75 resources, 1 occupational therapy, 1 physical therapy, 1 art classroom, 1 music classroom, 1 multipurpose rm, 1 science resource, 1 gymatorium, 1 library, and 1 exercise) = 31
5 Adults for Lobby 5
1 Adult for every 100sf in each
office 19 (2 D75 Guidance offices -2, 1- D75 Supervisor -1, 1- Health
instructor -1, 1- Guidance office -1, 1- SBST office -1, 1
interview office -1, 1 General office -5, 1 Principal office -3, 1
Parent's rm - 3, & 1 Custodian office -1)
Aids 17 (2.5% of unadjusted POR 684)
Kitchen Staff 10 (1.5% of unadjusted POR 684)
PT Staff 3 (1 FTE of each 200 student occupants)
Visitors 1 (1 FTE visitor of each 500 student occupants)

Subtotal 120
Total FTE = 492
492x0.05 = 25 total bicycles
Shower > 100 adults= 1+ (regular building occupants -100/150) = 2
SCA Design Requirements:
1.3.1.12 Bicycle Storage
2.3.3 Bicycle Racks
SCA Standard Specifications:
02870 Site and Street Furnishings
05700 Ornamental Metal
SCA Standard Details:
1041119b Bicycle Disclaimer Sign
Supporting Documentation:
Bicycle Facilities Credit Form
Site Plan-Bicycle
Shower/Changing Room Plan
Interior Bicycle Storage Plan

L2.3R – Reduced Parking Footprint
Credit is feasible through Option 1 as no new parking is provided on site.
SCA Design Requirements:
1.1.2.1 Feasibility Study
1.1.3.2. Test Fit/Sketch Studies

L2.4P – Green Vehicles, Charging Station Infrastructure
Credit is not feasible as there is no parking provided on site.

L2.5A – Green Vehicles, Charging Station Installation
Credit is not feasible as there is no parking provided on site.

S1.1P – Environmental Site Assessment
Credit is feasible. Phase I and II ESA were conducted. Executive Summaries are attached with recommendations including soil vapor barrier, minimized dewatering, soil excavation disposal, 2' fill covering of landscaped areas, management of any suspected ACM, LBP, or PCB containing materials, and repair of water damaged materials. Additional site investigation is not recommended.
Supporting Documentation:
ESA Phase I, Executive Summary
ESA Phase II, Executive Summary

S1.2R – Enhanced Site Assessment
Credit is feasible. An Enhanced Site Assessment was performed. Topography, Hydrology, Climate, Vegetation, Soils, Human Use, and Human Health Effects were evaluated.
Supporting Documentation:
Enhanced Site Assessment Credit Form
Site Assessment Summary
Additional Maps and documentation

S2.1P – Construction Activity Pollution Prevention
This credit is feasible and will be pursued. The project site is 115,307 SF in total area. The Civil Engineer on the project, KS Engineers, is responsible for developing the /Erosion and Sedimentation Control Plan. Erosion and sedimentation control plan comply with requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP). Soil Erosion control measure addressed the below mentioned objectives:
• Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
• Prevent sedimentation of stormwater or receiving streams.
• Prevent polluting the air with dust and particulate matter.
Project Strategy:
The area of concern for the erosion and sediment controls for PS5R will be set around the perimeter of the property including
the DEP Bluebelt Property as found near the area of Eylandt Street and the unimproved area of Stecher Street, which currently is found to be heavily wooded. In order to protect this region, the use of heavy duty silt fence and hay bales will be installs enclosing the various work zones. Per standard erosion control measures once there is a buildup of sediment at the fences and barriers, the sediment will be removed and new fence and hay bales put in place. Keeping the same existing drainage pattern, during construction, the existing site condition has the stormwater flowing overland to the street catch basins. Therefore, we will place inlet filters at all catch basins on the three corners of the streets. Well points will be established to keep the various excavations dry. The water will be filtered before leaving the site. With that said, seeing that 4 test pits for percolation were dug at different locations around the property and all found dry, we anticipate only storm surface runoff will be removed from the site and be well under the City's 10,000 gallons a day permitting ceiling. Additionally, there will also be a stabilized construction entrance pad called for at the construction entrance along Kingdom Avenue. Finally, any stock pile of soils on this site we will be protected with hay bale protection.
SCA Standards:
• S01352 Sustainability Requirements
• S01900 Existing Premises Work
• 02200 Earthwork
Supporting Documentation:
• Notification of Intent for SWPPP application

S2.2 – Open Space
Credit is feasible. The site contains more than 30% open space and sufficient vegetated space at the ground plane, as shown on the open space plan. The sidewalks along Lincoln Street and Rockaway Blvd will be replaced (concrete pavement with steel faced concrete curb). A 5' strip of permeable pavers is shown at the sidewalk along both streets. Per Zoning drawing Z-001, proposed FAR for the project is 1.22, permitted FAR is 1.0.
Outdoor space must meet certain criteria (pedestrian or recreation oriented, or a garden space with year round visual interest). Based on 30% of the project area (44,863 sf X 30%) a minimum of 13,459 sf of minimum open space is required of which 25% or 3,365 sf must be vegetated. The hardscape/playground areas are 21,542sf and the vegetated areas total 6,180sf.
SCA Design Requirements:
1.1.2.1 Feasibility Study
1.1.3.2. Test Fit/Sketch Studies
1.3.1.1. Building Location and Orientation
Supporting Documentation:

Planting List/Schedule
Site Plan with Open Space calculations

S2.3P – Green Infrastructure Assessment
Credit is feasible. The Green Infrastructure Study is included in supporting documents. The implementation of green infrastructure practices was determined to be feasible. The proposed design includes both on-site permeable pavers and a subsurface retention system comprised of 8,820cf of precast concrete structures. All stormwater runoff from the site, which previously discharged to the city sanitary sewer, will discharge to the subsurface retention system. This system will retain 100% of stormwater on-site.
SCA Standards Incorporated:
02723 Storm Drainage Systems
02900 Landscaping
Supporting Documentation:
Green Infrastructure Assessment Report

S2.4 Rainwater Management
Credit is not feasible and will not be pursued.
Percolation tests were performed at the site. The samples collected are waiting for lab to open for sieve analysis. Depending upon the results of the percolation test, the design team will explore the use of a Green Roof. The green roof would require the roof structural supporting steel to be heavier or deeper which would have a significant impact on cost. Additionally, the green roof would require maintenance, which would force the owner (DOE) to increase their maintenance budget. This project will utilize an onsite, DEP approved detention system as described below for rainwater/storm water management. The design for rain water management will be per NYC DEP standards as follows:
The total site developed storm flow will be calculated according to NYC DEP guidelines for design and construction of storm water management systems dated July 2012 and LL 97/17. Subsurface system, storage vaults, shall be used for rainwater management. The detention facility (storage vaults) will be designed to provide the maximum volume required for the storm with a 10 year (yr.) return frequency. The allowable flow in cubic feet per second (cfs) is computed in accordance with the Rational Method. The site storm water release rate to the combined sewer will be the greater of 0.25 cfs or 10% of the allowable flow. If allowable flow is less than 0.25 cfs, the storm water release rate shall be the allowable flow. The Design team explored the use of vegetated bio-swales or rain gardens in play yard. The use of bioswales would reduce the size of play area, which is contrary to the gold of providing large recreational spaces to combat obesity in NYC. The rain garden will attract mosquitoes. Mosquitoes require a minimum of 72 hours in standing water for larvae development. Rain gardens are designed to drain in 48 hours or less. If the rain garden does not appear to be drain properly, it will attract mosquitoes. DOE requires regularly to inspect rain garden to prevent the attracting mosquitoes. DOE is responsible for rain garden maintenance. Maintenance crews remove litter, sediment, and weeds from each installation on a regular basis. Crews will also replant the greenery as needed.
This project does not meet all of the NYC DEP requirements to support a full on-site detention system using bio-swales or rain gardens.
SCA Standards Incorporated:
02723 Storm Drainage Systems
02900 Landscaping
Supporting Documentation:
Rainwater Management Credit Form
Civil Engineer Report

S2.5 Heat Island Reduction
Based on current SCA Standards for roof pavers has an SRI of 82. The precast concrete paver will be distributed across the total roof area of 12,890 square feet. The structure of the Photovoltaic panel system will take up roughly 2,532 square feet. We will provide asphalt paving for roughly 9,536 square feet and concrete paving for roughly 641 square feet. The West planting area & Front planting areas will be roughly 4,369 square feet. The West vegetated landscape areas for roughly 2,950 square feet. There is no plan for a vegetated roof.

Supporting Documentation:
Heat Island Reduction Credit Form
Site Plan

S2.6 Light Pollution Reduction
The credit is feasible. The SCA has advised that the lighting zone be determined by code RCNY-5000-01. The building is in a residential area (R-2A) and corresponds with the LZ2 designation for exterior lighting requirements; it will meet the prescriptive requirements for this zone. The project will minimize light trespass from the building and site and reduce the development impact on the local nocturnal environment. The exterior lighting will be provided at the following locations:
• All entrances, exits and walkways including exit discharge
• Building perimeter
Illuminate areas only as required for safety and comfort. This project is in an LZ2 Zone as per RCNY-5000-01 of the New York City Energy Code (All R districts). The design will demonstrate compliance using Option 2 Calculation Method. Light pollution reduction design approach towards meeting this credit include:
• Luminaires will be high efficiency LED.
• Exterior/site/security lighting will be provided around the perimeter of the school for safe passage of students and staff and to deter theft and vandalism.
• Main Entrances and Walkways: 5.0 foot-candle (average). This many times is at odds with the credit requirements for maximum lighting at site boundary, but student safety and security will take precedence although every effort will be made to still earn this credit.
• Building Perimeter: 1.0 foot-candle (average) to a 20-foot depth. This many times is at odds with the credit requirements for maximum lighting at site boundary, but student safety and security will take precedence although every effort will be made to still earn this credit.
• All fixtures will be suitable for exterior use with a hinged and gasketed diffuser/door.
• Lighting Control: All site security lighting will be master controlled by the programmable lighting controller.
SCA Standards Incorporated:
• Design Requirements:
• 7.2.3 Emergency Lighting
• 7.2.5 Exterior/Site/Security Lighting
• Standard Specifications:
• 16145 Lighting Control Devices
• 16520 Illuminated Exit Sign and Emergency Lighting Fixtures
• 16530 LED Site/Security Lighting

S3.1R – Joint Use of Facilities
This project will have a Cafeteria on the first floor, a Gymatorium on the third floor, and a Library on fifth floor that can be used by the public for voting, community meetings, after school activities and similar events. All three spaces are easily accessible by the main stair or elevator. The design will follow Design Requirement 1.3.1.1 Building Location and Orientation and 1.3.5.1 Cafeteria PK to 8th Grade.
SCA Standards Incorporated:
1.3.1.1 Building Location and Orientation
1.3.5.1 Cafeteria PK-8 and HS

S3.2 – Active Design in a School Environment
This project will have a Cafeteria on the first floor, a Gymatorium on the third floor, and a Library on fifth floor that can be used by the public for voting, community meetings, after school activities and similar events. All three spaces are easily accessible by the main stair or elevator. The design will follow Design Requirement 1.3.1.1 Building Location and Orientation and 1.3.5.1 Cafeteria PK to 8th Grade.
SCA Standards Incorporated:
1.3.1.1 Building Location and Orientation
1.3.5.1 Cafeteria PK-8 and HS

W1.1P Outdoor Water Use Reduction, Reduce Total 30%
The credit is feasible. This project will comply with this credit by Option 1: No irrigation required. The planting palette for the Addition has been selected to eliminate the need for any permanent irrigation beyond a 2-year establishment period. The planting schedule includes canopy trees, understory trees, shrubs, sedges and ferns for ground cover plantings. All plantings have been selected from the NYC Parks' Native Species Planting Guide for New York City , 3rd Ed. (2019). Responding to the school administrators' concern over deer-friendly plantings, which may attract deer with deer tics, species from the "Species Least Preferred by Deer" list were selected.
SCA Standards Incorporated:
• 02900 Landscaping
Supporting Documentation
• Native and adaptive species planting schedule
• Landscape plan

W1.2R Outdoor Water Use Reduction, Reduce Potable 50%-100%
The credit is feasible. This project will comply with this credit by Option 1: No irrigation required. The planting palette for the Addition has been selected to eliminate the need for any permanent irrigation beyond a 2-year establishment period. The planting schedule includes canopy trees, understory trees, shrubs, sedges and ferns for ground cover plantings. All plantings have been selected from the NYC Parks' Native Species Planting Guide for New York City, 3rd Ed. (2019). Responding to the school administrators' concern over deer-friendly plantings, which may attract deer with deer tics, species from the "Species Least Preferred by Deer" list were selected.
SCA Standards Incorporated:
• 02900 Landscaping
Supporting Documentation
• Native and adaptive species planting schedule
• Landscape plan

W3.1P Building Level Water Metering
Credit is feasible. The design will include a permanent water meter in accordance with credit requirements. Building level water meter is located within the water meter room on cellar level and submeters are located in Kitchen CW and HW and HVAC makeup water.
SCA Design Requirements
6.1.1 Water Services for Domestic, Sprinkler and Standpipe Systems
SCA Standard Specifications
15417 Cold Water Supply
15418 Hot Water Supply

W3.2R Enhanced Water Metering
Credit is feasible. The design will include water meters for two or more water subsystems, including boilers and domestic hot water. A sub-meter will monitor makeup water to boilers. A sub-meter for DHW will be located on the make-up water line to the heater and will account for 100% of hot water generated for indoor fixtures.
SCA Design Requirements
6.1.1 Water Services for Domestic, Sprinkler and Standpipe Systems
SCA Standard Specifications
15417 Cold Water Supply
15418 Hot Water Supply

W4.1A Cooling Tower Water Use
This credit is not applicable to this project. A cooling tower is not part of the project scope.

E1.1P – Fundamental Commissioning and Verification
Credit is feasible. The project design complies with the requirements of this credit through compliance with SCA/DOE building commissioning policies. See attached current Specification Table of Contents.

SCA STANDARD SPECIFICATIONS
S01352 Sustainability Requirements
S01650 Facility Start-up, Demonstration, and Training
S01660 Supplemental Commissioning Requirements
References to Commissioning throughout specifications
15970 Temperature Control System (BACNET BMS/DDC With School Operating Console)
15992 Cleaning and Testing
15993 Balancing of Systems
Supporting Documentation
Spec Sections Table of Contents

E1.2A – Enhanced Cx and Monitoring Base Cx
This credit is not being pursued as it requires permission from SCA

E1.3A – Envelope Commissioning
This credit is not being pursued as it requires permission from SCA

E2.1P Fundamental Refrigerant Management
Credit is feasible and will be pursued. This project will comply with this credit by not using chlorofluorocarbon (CFC)-based and hydrochlorofluorocarbons (HCFC)-based refrigerants in new heating, ventilation, air conditioning and refrigeration (HVAC&R) systems. The Addition will contain an air-cooled water chiller and indoor evaporator units that utilize refrigerant R-410A and split heat pump units that utilize refrigerant R-410A. Other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound of refrigerant, are exempt.
SCA STANDARD SPECIFICATIONS
02070 Selective Removal and Demolition
11400 Food Service Equipment
11450 Domestic Type Equipment
15660 Packaged Modular Outdoor Chillers
15783 Split Heat Pump System
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)

E2.2 Enhanced Refrigerant Management
The credit is feasible. The Addition will contain an air-cooled water chiller and indoor evaporator units that utilize refrigerant R-410A and split heat pump units that utilize refrigerant R-410A. The Refrigerant Impact Form will be completed at the 60% CD GSG submission to confirm compliance with this credit, including kitchen equipment if refrigerant charge is greater than 0.5 lb.
SCA Standards Incorporated:
• 11400 Food Service Equipment
• 15660 Packaged Modular Chillers
• 15783 Split Heat Pump System
Supporting Documentation
• None

E3.1P - Minimum Energy Performance
This credit is feasible and will be pursued.
For LL32/16 Compliance:
Whole Building Energy Simulation
Demonstrate a 5% improvement for new buildings in the proposed building performance rating compared to the baseline building performance rating per ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. To meet the credit, the design will comply with:
•The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ANSI/ASHRAE/IESNA

Standard 90.1-2010 (with errata but without addenda).
•Will include all the energy consumption and costs within and associated with the building project.
•Will be compared against a baseline building that complies with Appendix G to Standard 90.1-2010 (with errata but without addenda).
•Will document the energy modeling input assumptions for unregulated loads. Unregulated loads will be modeled accurately to reflect the actual expected energy consumption of the building.
For LL31/16 Compliance:
Case C: For new buildings, a source energy use intensity of 70 kBTU/yr per square foot of floor area or lower if possible as per agreement between SCA and Mayor's Office of Sustainability. See attached Preliminary Assessment of Energy Performance prepared by Consulting Engineer indicating the school source EUI is 67.7 kBtu/sf and 35.8 kBtu/sf site energy which is compliance with Local Law 31 (67.9 EUI); 6.5% energy savings compared to the GSG baseline and 14% to 22% savings in regulated energy costs compared with ASHRAE 92.1.2013 Section 11. 5 to 9 points, may be appropriate for this project. This is preliminary and subject to change as the design progresses.

For LL06/16 Compliance:
The Geological and Technical Suitability for geothermal showed combined to be feasible on the IDP report. However, when the Geothermal Feasibility Tool was applied, the results show that none of the systems are feasible. See attached Report.
The design will implement the following features to comply with the above:
o Architectural (The values below may be adjusted as per latest SCA standards):
• Glazing Solar Heat Gain Coefficient (SHGC) fenestration = 0.36 max;
• U center of glass= 0.30 max;
• U window composite with frame = 0.34 max
• Precast concrete panel with R-20 cavity (4" RPS), R10 interior partition (2.5" mineral wool), 5/8" Gypsum: total R-30, U factor =0.033 (proposed ECM, included in SCA standards)
• Roof insulation minimum R-40; U=0.025 (proposed ECM, included in SCA standards)
• Provide 3" Polystyrene insulation under slab (proposed ECM, included in SCA standards)
• Provide demand defrost on Kitchen Freezers (proposed ECM, included in SCA standards)
• Provide 6" insulation on walk-in freezer (proposed ECM, included in SCA standards)
o Mechanical (HVAC): (The values below may be adjusted as per latest SCA standards):
Primary Equipment
• Heating System: Central gas-fired condensing boilers with 89% thermal efficiency when operating in condensing mode; located in Boiler Room serving variable air volume air handling units on roofs and HW finned tube radiators in classrooms; separate hot water pumps will provide perimeter hot water to the fin tube radiators via a plate and frame heat exchanger. Boiler discharge water temperature shall be reset based on outdoor temperature.
• Cooling System; Chilled water will provide cooling for the AHUs. Chiller will consist of an outdoor modular air cooled system that is in compliance with NYC SCA Specification 15660; the chilled water will have a 30% glycol solution for freeze protection and will operate on 42°F supply chilled water temperature. Chiller will be provided with variable speed compressors. VFD compressors are an SCA Standard.
• Classroom Systems Terminal Heating System: Standard Hot water fin tube perimeter radiation heating. With VAV Terminal Units
• Classroom Systems Terminal Cooling System: Non-fan powered VAV boxes for cooling for classrooms and offices. Fan powered VAV boxes with electric re-heat for labs.
• Public Assembly Spaces: Single Zone VAV air handling units with 30% Glycol hot water coils and chilled water coils. And Demand Control Ventilation controls
• Classroom and Gymatorium RTU: RTU shall be provided with total energy recovery wheel and by-pass for economizer mode. RTU heating and cooling coil shall be sized and based on the leaving air temperature at the wheel. RTU supply and exhaust fan shall be provide with VFD. Fans shall modulate to meet building heating and cooling demand. And be equipped with Demand Controlled Ventilation and fans sized to allow for stable fan operation at 15% of total rated volumetric air flow.
• Heating hot and chilled water pumps: shall be provided with VFD. And also critical zone pressure set point reset control.

• Control: building heating and cooling shall be controlled via Building Management System (BMS). The BMS shall control major equipment (boiler, chiller, fans etc.) to meet building minimum heating and cooling load demand.
o Electrical:
• Average Lighting Power Density: Less than 0.5 W/sf using LED lighting throughout.
• Lighting Controls: Lighting control as per SCA DR 7.2.1.
• Occupancy Sensors: In classrooms, offices and gym, restrooms, storage closets
• Daylight harvesting is to be provided in all spaces with windows except when the total lighting power of a daylight zone is less than 100kw or when the total glazing area is less than 20 square feet. Provide manual override of daylight sensors with switches for three lighting levels (on, off, and midlevel) to allow occupant adjustments in classrooms and group spaces. Midlevel lighting should be 30% to 70% of the maximum illumination level.
o Plumbing:
• Water Pumps: VFD on water Pumps
• Hot Water Heater: Service Hot Water heater with min. 80% efficiency and modulating flame controls. Hot water service to toilets will be 90 degrees as per current SCA standard.
• Provide faucets with low flow aerators (proposed ECM)

The SCA Design Standards are:
DR6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
DR6.2.3 Non-Assembly Spaces
DR6.2.4 Public Assembly Spaces
DR6.2.9 Heating and Cooling Design parameters (Load Calculations)
DR6.2.20 Building Management Control System/DOC Control BMS
DR6.2.28 HVAC Design Requirements for Special Spaces
DR6.2.34 Verification of Air System Design
DR7.2.1 Interior Lighting
DR 7.2.5 Exterior Lighting
Applicable SCA Standard Specifications:
SS08524 Aluminum Windows Projected
SS15540 HVAC Pumps
SS15565 Condensing Boilers
SS15783 Packaged Heat Pump System
SS15853 Custom Packaged Rooftop Heating and Cooling Units (VAV)
SS15930 Variable Air Terminals
SS15970 Temperature Control System
SS15973 Facility Management Systems Integration
SS15985 Sequence of Operations
SS15992 Cleaning and Testing
SS15993 Balancing of System
SS16145 Lighting Control Devices
SS16502 LED Interior Building Lighting
SS16530 Site/Security Lighting
Supporting Documentation:
GSG-DD Preliminary level energy model
Geothermal Feasibility Credit Form
SCA Geothermal System Feasibility Report

E3.2 - Optimized Energy Performance
This credit is feasible and will be pursued.
For LL32/16 Compliance:
Whole Building Energy Simulation
Demonstrate a 5% improvement for new buildings in the proposed building performance rating compared to the baseline building performance rating per ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without

addenda) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. To meet the credit, the design will comply with:

•The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda).

•Will include all the energy consumption and costs within and associated with the building project.

•Will be compared against a baseline building that complies with Appendix G to Standard 90.1-2010 (with errata but without addenda).

•Will document the energy modeling input assumptions for unregulated loads. Unregulated loads will be modeled accurately to reflect the actual expected energy consumption of the building.

For LL31/16 Compliance:

Case C: For new buildings, a source energy use intensity of 70 kBTU/yr per square foot of floor area or lower if possible as per agreement between SCA and Mayor's Office of Sustainability. See attached Preliminary Assessment of Energy Performance prepared by Consulting Engineer indicating the school source EUI is 67.7 kBtu/sf and 35.8 kBtu/sf site energy which is compliance with Local Law 31 (67.9 EUI); 6.5% energy savings compared to the GSG baseline and 14% to 22% savings in regulated energy costs compared with ASHRAE 92.1.2013 Section 11. 5 to 9 points, may be appropriate for this project. This is preliminary and subject to change as the design progresses.

For LL06/16 Compliance:

The Geological and Technical Suitability for geothermal showed combined to be feasible on the IDP report. However, when the Geothermal Feasibility Tool was applied, the results show that none of the systems are feasible. See attached Report

The design will implement the following features to comply with the above:

o Architectural (The values below may be adjusted as per latest SCA standards):

• Glazing Solar Heat Gain Coefficient (SHGC) fenestration = 0.36 max;
• U center of glass= 0.30 max;
• U window composite with frame = 0.34 max
• Precast concrete panel with R-20 cavity (4" RPS), R10 interior partition (2.5" mineral wool), 5/8" Gypsum: total R-30, U factor =0.033 (proposed ECM, included in SCA standards)
• Roof insulation minimum R-40; U=0.025 (proposed ECM, included in SCA standards)
• Provide 3" Polystyrene insulation under slab (proposed ECM, included in SCA standards)
• Provide demand defrost on Kitchen Freezers (proposed ECM, included in SCA standards)
• Provide 6" insulation on walk-in freezer (proposed ECM, included in SCA standards)

o Mechanical (HVAC): (The values below may be adjusted as per latest SCA standards):

Primary Equipment

• Heating System: Central gas-fired condensing boilers with 89% thermal efficiency when operating in condensing mode; located in Boiler Room serving variable air volume air handling units on roofs and HW finned tube radiators in classrooms; separate hot water pumps will provide perimeter hot water to the fin tube radiators via a plate and frame heat exchanger. Boiler discharge water temperature shall be reset based on outdoor temperature.
• Cooling System; Chilled water will provide cooling for the AHUs. Chiller will consist of an outdoor modular air cooled system that is in compliance with NYC SCA Specification 15660; the chilled water will have a 30% glycol solution for freeze protection and will operate on 42°F supply chilled water temperature. Chiller will be provided with variable speed compressors. VFD compressors are an SCA Standard.
• Classroom Systems Terminal Heating System: Standard Hot water fin tube perimeter radiation heating. With VAV Terminal Units
• Classroom Systems Terminal Cooling System: Non-fan powered VAV boxes for cooling for classrooms and offices. Fan powered VAV boxes with electric re-heat for labs.
• Public Assembly Spaces: Single Zone VAV air handling units with 30% Glycol hot water coils and chilled water coils. And Demand Control Ventilation controls
• Classroom and Gymatorium RTU: RTU shall be provided with total energy recovery wheel and by-pass for economizer mode. RTU heating and cooling coil shall be sized and based on the leaving air temperature at the wheel. RTU supply and exhaust fan shall be provide with VFD. Fans shall modulate to meet building heating and

cooling demand. And be equipped with Demand Controlled Ventilation and fans sized to allow for stable fan operation at 15% of total rated volumetric air flow.
• Heating hot and chilled water pumps: shall be provided with VFD. And also critical zone pressure set point reset control.
• Control: building heating and cooling shall be controlled via Building Management System (BMS). The BMS shall control major equipment (boiler, chiller, fans etc.) to meet building minimum heating and cooling load demand.
o Electrical:
• Average Lighting Power Density: Less than 0.5 W/sf using LED lighting throughout.
• Lighting Controls: Lighting control as per SCA DR 7.2.1.
• Occupancy Sensors: In classrooms, offices and gym, restrooms, storage closets
• Daylight harvesting is to be provided in all spaces with windows except when the total lighting power of a daylight zone is less than 100kw or when the total glazing area is less than 20 square feet. Provide manual override of daylight sensors with switches for three lighting levels (on, off, and midlevel) to allow occupant adjustments in classrooms and group spaces. Midlevel lighting should be 30% to 70% of the maximum illumination level.
o Plumbing:
• Water Pumps: VFD on water Pumps
• Hot Water Heater: Service Hot Water heater with min. 80% efficiency and modulating flame controls. Hot water service to toilets will be 90 degrees as per current SCA standard.
• Provide faucets with low flow aerators (proposed ECM)

The SCA Design Standards are:

DR6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
DR6.2.3 Non-Assembly Spaces
DR6.2.4 Public Assembly Spaces
DR6.2.9 Heating and Cooling Design parameters (Load Calculations)
DR6.2.20 Building Management Control System/DOC Control BMS
DR6.2.28 HVAC Design Requirements for Special Spaces
DR6.2.34 Verification of Air System Design
DR7.2.1 Interior Lighting
DR 7.2.5 Exterior Lighting

Applicable SCA Standard Specifications:

SS08524 Aluminum Windows Projected
SS15540 HVAC Pumps
SS15565 Condensing Boilers
SS15783 Packaged Heat Pump System
SS15853 Custom Packaged Rooftop Heating and Cooling Units (VAV)
SS15930 Variable Air Terminals
SS15970 Temperature Control System
SS15973 Facility Management Systems Integration
SS15985 Sequence of Operations
SS15992 Cleaning and Testing
SS15993 Balancing of System
SS16145 Lighting Control Devices
SS16502 LED Interior Building Lighting
SS16530 Site/Security Lighting

Supporting Documentation:

GSG-DD Preliminary level energy model
Geothermal Feasibility Credit Form
SCA   Geothermal System Feasibility Report

E3.3 - HVAC System Sizing, Avoid Oversizing

Credit is feasible and will be pursued. This project complies with this credit by the following:
The new HVAC Systems for the new building will be sized per NYCSCA DR 6.2.13 “Arrangement and Sizing of Equipment” and 6.2.9 “Heating and Cooling Design” (Load calculations) and will not be oversized. Ventilation

calculations will be based on New York City Building Code. Documentation demonstrating that cooling load calculations were performed for the maximum dry-bulb conditions will be submitted at 60%.The project team has designed the HVAC system to not only efficiently handle peak and design load conditions, but to operate efficiently during a wide range of partial load conditions, which are the most common operating conditions. The heating loads and cooling loads shall be calculated as per Design Requirement 6.2.13 as follows:
Heating Capacity:
-All boilers (condensing) shall be provided with a reserve capacity equal to that as defined in the Engineering
-Criteria for Fuel Oil Burning Equipment of the NYC Department of Environmental Protection Bureau of Air
-Resources, July, 1973 and SCA Standards. Reserve capacity shall be 25% to account for piping losses and pickup. Boiler capacity shall be based on total connected capacity.
Cooling Capacity:
-The cooling capacity for roof top units shall be increased by 10% to account for duct losses (duct insulation losses, duct air leakage) and general building pull-down. The 10% term (i.e. 1.10 multiplier) shall be applied to all terms (transmission, infiltration, lighting loads, equipment loads, people loads, and solar loads). Cooling loads shall include the sensible loads and the latent dehumidification loads (as per Design Requirements 6.2.3 and 6.2.4).
For E3.2R: The **SCA Design Standards** are:
DR6.2.9 Heating and Cooling Design Parameters (Load Calculations)
DR6.2.13 Arrangement and Sizing of Equipment
DR 6.2.34 Verification of Air System Design
SS15540 HVAC Pumps
SS15565 Condensing Boilers
SS15783 Split Heat Pump System
SS15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)

Credit is feasible and will be pursued. This project will comply with the requirements of this credit by designing and installing an open protocol Building Management System (BMS). The BMS system shall control at a minimum the HVAC (heating, cooling, fans), exterior lighting, and hot water systems. Open protocol systems use published/nonproprietary protocols, open to all manufacturers

SCA STANDARD SPECIFICATIONS
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations

E4.1R – Building Management System Controls
Credit is feasible and will be pursued. This project will comply with the requirements of this credit by designing and installing an open protocol Building Management System (BMS). The BMS system shall control at a minimum the HVAC (heating, cooling, fans), exterior lighting, and hot water systems. Open protocol systems use published/nonproprietary protocols, open to all manufacturers

SCA STANDARD SPECIFICATIONS
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations
Credit is feasible and will be pursued

E4.2A - Demand Response
This credit is not being pursued as it requires permission from SCA

E5.1P – Building Level Energy Metering
Credit is feasible and will be pursued. This project will comply with the requirements of this credit by designing and installing building level energy meters or sub-meters based on SCA standards, that can be aggregated to provide building level data representing total building energy consumption (electricity, natural gas, chilled water). Utility-owned
meters capable of aggregating building-level resource can also be used. All utility meters are to be connected to the building's BMS system.

SCA DESIGN REQUIREMENTS
6.2.20 Building Management Control System/ Direct Digital Control BMS/DDC

SCA STANDARD SPECIFICATIONS
15416 Gas Piping System
15970 Temperature Control System (BMS/DDC With School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations

SCA STANDARD DETAILS
15985 HVAC Standard Detail Series

E5.2R – Advanced Energy Metering
Credit is feasible and will be pursued. This project adheres to NYCECC 2020, Section C405 - Electrical Power and Lighting System. This project will comply with the requirements of this credit by designing and installing advanced energy metering for the following:

• All whole-building energy sources used by the building; and
• Any individual energy end uses that represent 10% or more of the total annual consumption of the building.
• The energy metering systems will require the following characteristics.
• Meters will be permanently installed, record at intervals of one hour or less, and transmit data to a remote location.
• Electricity meters will record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate.
• The data collection system will use a local area network, building automation system, wireless network, or comparable communication infrastructure.
• The system will be capable of storing all meter data for at least 36 months.
• The data will be remotely accessible.
• All meters in the system will be capable of reporting hourly, daily, monthly, and annual energy use.

SCA DESIGN REQUIREMENTS
6.2.20 Building Management Control System/ Direct Digital Control BMS/DDC

SCA STANDARD SPECIFICATIONS
15416 Gas Piping System
15970 Temperature Control System (BMS/DDC With School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations

SCA STANDARD DETAILS
15985 HVAC Standard Detail Series

E6.1P – Renewable Energy Feasibility
Credit is feasible. A study was performed in the SD phase to determine the feasibility of designing and constructing the project as a Net Zero Energy Building as per Local Law 31/16 since it is 3 stories above grade. The solar PV system proposed in the Net Zero Energy Building Feasibility report has been sized to cover the estimated annual electricity demand for the building (323,781 kWh/year) and contains a 119 kW(DC) rooftop mounted array and 150kW(DC) canopy/ground mounted array. The combined generation potential for the two systems is 330,159 kWh/year. A solar PV system capable of generating enough electricity to cover the equivalent amount of natural gas energy would require a significantly larger canopy or ground mounted system. Installation of a solar PV system will result in immediate carbon footprint reductions and potentially maintain the building's compliance with Local

Law 97 of 2019 (LL97/2019) until the mid-2040s. At some point before 2050, the project may need to consider carbon offsets, increased solar PV capacity and/or electrification to mitigate fines due to LL97/2019. Based on the potential for on-site solar PV electricity generation, the project is well placed to pursue credit E6.2 Renewable Energy Production to its highest threshold of 15% of building energy use.
SCA Standards:
13602 Photovoltaic System
Supporting Documentation
Net Zero Energy Building Feasibility report
Onsite Energy Generating Building

E6.2 – Renewable Energy Production
Credit is feasible. A study was conducted in accordance with LL 31/2016 and submitted during the SD phase to determine areas that can be utilized for onsite PV generation. See Roof plan in drawing set, which show proposed areas available for PV array, as part of the sustainable roofing zone as well as annotated mechanical equipment layout with all applicable areas and exceptions as per Local Law 94/19.

Ballasted solar PV panels are proposed. The main roof and elevator bulkhead roof have 3,675 sf available for solar PV panels, excluding clearances for FDNY access (4,830 sf) and mechanical equipment (2,330 sf, including bulkhead door access). The remaining 3,224 sf of usable main roof area (excluding the stair bulkhead), the entry vestibule roof, and other setbacks below the main roof are comprised of spaces unsuitable for solar PV panels because they are too small, narrow, or isolated or because they are occupied by roof fans or vents.
SCA Standards:
SCA STANDARD SPECIFICATIONS 13602 Photovoltaic System
SCA STANDARD DETAILS 13602 Series
Supporting Documentation:
Roof Plan with dimensions

E6.3- Green Power & Carbon Offsets
Credit is feasible for 50%, 1 point. SCA will determine if 100% credit is pursued. The project will provide at least 50% of its energy from green power, carbon offsets, or RECs engaging in at least a five-year renewable energy contract. The allocation of green power will be calculated using the annual consumption from the energy model.

M1.1P Storage & Collection of Recyclables
Credit is feasible. The architect will provide infrastructure to enable recycling for paper, corrugated cardboard, glass, plastic and metal with sufficient space for collection bins, compactors and balers. Additionally, these materials will be collected with bins placed throughout the spaces. The Refuse/Recycling Room will have nine (9) 73” x 34” x 44” (63 cbf total) tilt trucks for centralized collection and easy storage, handling and removal. The cafeteria will have designated bins for recyclables, organic waste, trash and liquid waste. Wall mounted signage will display recycling instructions. The kitchen area will have space for both glass/plastic/metal, organics and trash. There is a Refuse Room located at the ground floor which can also accommodate temporary storage of cardboard to be recycled. The project will also follow school guidelines for the safe collection, storage, and disposal of batteries and electronic waste.
SCA Standards:
• 11172 Waste Handling Equipment
1.3.1.2 Planning Guidelines for New Schools and
Additions
1.3.1.8 Refuse and Recycling Storage
1.3.5.01 Cafeterias PK-8 and HS

M1.2P Construction Waste Management Plan
Credit is feasible. A Construction and Demolition Waste Management Plan will be developed by the Contractor in coordination with the project team for the Addition in accordance with SCA Standard Specifications S01352, S01524, 02060 and 02070. The Plan will identify at least 5 targeted material streams for diversion and outline steps

to achieving a goal diversion rate of 75%. The construction manager and contractor will create the CWM plan which will include the amount and type of construction waste diverted/recycled. Requirements to develop the plan are included in project specifications.

SCA Standards Incorporated:

- S01352 Sustainability Requirements
- S01524 Construction Waste Management
- 02060 Building Demolition
- 02070 Selective Removals & Demolition

M1.3R Construction Waste Management Implementation

Credit is feasible. The construction manager/contractor will implement the construction waste management plan. The minimum amount diverted from landfill will be 50% and the 75% diversion rate will be targeted if feasible. The construction manager will track all major waste streams generated and the percentage of material disposed and diverted from landfill throughout construction administration. Requirements are included in project specifications.

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01524 Construction Waste Management
02060 Building Demolition
02070 Selective Removals & Demolition

M2.1A- Material Extraction Reporting

Credit is not feasible. This credit is optional and may only be pursued with SCA direction.

M2.2A- Material Extraction Optimization

M2.3- Material Environmental Reporting

Credit is feasible. Requires a minimum of 10 products from 3 manufacturers to demonstrate reviewed life cycle information is available. The primary material types contributing to credit compliance are finishes, including Gypsum Wallboard Tile Backer Board, Non-Load-Bearing Steel Framing, Joint Compound and Insulation, Ceramic Wall Tiles, Quarry Floor Tiles, Mosaic Floor Tiles, Ceiling Tiles, Wood Flooring, VCT, Tile Carpeting, Paint. Compliance with this credit will be coordinated with the design approach to credit M2.5; the project design will give preference to products that meet relevant SCA standards and have both an EPD and material ingredient report, where possible.

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

M2.4A- Material Environmental Optimization

Credit is not feasible. This credit is optional and may only be pursued with SCA direction.

M2.5- Material Ingredient Reporting

Credit is feasible. Requires a minimum of 10 products from 5 manufacturers to demonstrate chemical inventory. This can be met through standards including HPD, Cradle to Cradle, ANSI/BIFMA e3 Furniture, and Declare. Products for which HPDs are available include ACT, paint, and carpet tile. Project team will be directed to use resources including the HPD Collaborative Public Repository to find compliant products. Requirements for tracking are included in specifications.

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

M2.6A- Material Ingredient Optimization

Credit is not feasible. This credit is optional and may only be pursued with SCA direction.

Q1.1P – Minimum IAQ Performance
Credit is feasible. Ventilation Systems will be designed to meet requirements of ASHRAE 62.1-2010, Occupancy level per 2014 NYC Building Code table 28.2-1004.11 and air requirements per 2014 NYC Mechanical Code table 403.3. A direct outdoor airflow measurement device will be included for variable air volume systems. For constant volume systems, outdoor airflow will be balanced to design minimum outdoor airflow rate utilizing current transducer on the supply fan, airflow switch, or other monitoring device. Ventilation Rate Procedure calculations will be provided at 60% GSG Submission. An ASHRAE Outdoor Air Assessment was performed for the project site in February 2020. The report is included with S1.2R documentation. The report concludes that a nearby gas station facility warrants "conducting further evaluation of emissions from surrounding sources to determine whether additional design measures beyond the standard NYCSCA requirements should be incorporated into the building's heating, ventilation, and air conditioning (HVAC) system." Alarm will be set if the air flow deviates by more than 15%. MERV-13 filters will be used for HVAC equipment. Air flow measuring station equipment will be used to monitor air flow rates. CFD report is included in the submission.
SCA Design Requirements
6.2.0 General Overview of Heating Ventilation
and Air Conditioning Systems
6.2.1 HVAC Unit Centralization and Coordination
6.2.3 Non-Assembly Spaces
6.2.9 Heating and Cooling Design Parameters
SCA Specification Sections
S01550 Indoor Air Quality Requirements
15852 Air Handling Units
15970 Temperature Control System (BMS/DDC with School Operating Console)
15985 Sequence of Operations
15992 Cleaning and Testing
15993 Balancing of Systems
Supporting Documentation
ASHRAE Outdoor Air Assessment Report
CFD Modeling Report

Q1.2 Enhanced IAQ Source Control
This credit is feasible. This project will comply with the requirement of this credit by designing according to following design requirements:
- 1.3.4.1 Entrance and Exits
- 6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
- 6.2.28 HVAC Design Requirement for special spaces

An entryway 10 feet long foot grille (in the direction of travel) will be provided per Specification Section 12485 at the new main entrances (front and back). A storage room for waste is provided; Janitor's sink closets, Grounds Equipment rooms, General Storage Rooms, and copy rooms will be sufficiently exhausted to create negative air balance with respect to adjacent spaces and will be designed with self-closing doors. The occupied areas will be provided with air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration will be applied to both return and outside air that is to be delivered as supply air.
The following **SCA Standard Specification Sections** will be incorporated in the Contract Documents:
- 12485 Foot Grilles
- SS15540 HVAC Pumps
- SS15565 Condensing Boilers
- SS15783 Split Heat Pump System
- SS157852 Fan Coil Units
- SS15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
- SS15993 Balancing of Systems
- SD15985 HVAC Standard Detail Series

Q1.3-Enhanced IAQ Ventilation & Monitoring

This credit is feasible. The HVAC systems have been designed to meet the requirements of SCA Design Requirements Section 6.2.3, Part A.1.D (nonassembly) and 6.2.4 Part F (assembly), which require that the project incorporate DCV. Carbon Dioxide Monitoring is pursued by the project to meet DR requirements and, in turn, credit requirements. All occupiable spaces in the project will be provided with CO2 detectors for DCV logic and in accordance with SCA Design Requirements 6.2.3, 6.2.4, and 6.2.9. Monitors will be installed in the breathing zone. Therefore, all densely occupied spaces will have CO2 monitoring.

SCA Standards Incorporated:

• 15781 Packaged Heating and Cooling Units
• 15852 Air Handling Units
• 15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
• 15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
• 15855 Commercial Packaged Rooftop Heating and Cooling Units
• 15857 Unit Ventilator
• 15970 Temperature Control System (BACnet BMS/DDC With School Operating Console)
• 15985 Sequence of Operations
• 15985 HVAC Standard Detail Series

Supporting Documentation

• None

Q2.1R Construction IAQ Management Plan

This credit is feasible. The construction of the new building will follow the Sheet Metal and Air-Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Building Under Construction, 2nd Edition 2007, ANSI/ SMACNA 008-2008 (Chapter 3). Specification Section S01550 Indoor Air Quality Requirements requires the development of an Indoor Air Quality Plan. Specification Section S01560 Installation Sequence of Finish Materials requires the Contractor to avoid contamination of absorptive materials. A dust control plan will be implemented by the contractor. If permanently installed air handlers are used
during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) 8 shall be used at each return air inlet (i.e., grilles, registers, openings in ductwork where ceilings are used as return air plenums) as determined by ASHRAE 52.2-2007.

SCA STANDARD SPECIFICATIONS

- S01352 Sustainability Requirements
- S01550 Indoor Air Quality Requirements
- S01560 Installation Sequence of Finish Materials

Q2.2R Building IAQ Flush-Out

Credit is feasible and will be pursued.

Design documents will require the Contractor to follow one of the following alternates for flushing out the building at completion of construction.

Option 1-Flush-out prior to occupancy is the SCA preferred method.

After construction ends, but prior to occupancy and with all interior finishes installed, contractor is to install new filtration media and perform a building full flush-out. Supply the total air volume of 14,000 cubic foot of outdoor air per square foot of floor area prior to occupancy maintaining an internal temperature at least 60ºF dry bulb and relative humidity no higher than 60%. If there is not enough time for full flush-out in the construction schedule, the space may be occupied following delivery of a minimum of 3,500 cubic foot of outdoor air per square foot of floor area to the space. Once the school is occupied, it shall be ventilated at a rate of 0.30 cubic feet per minute per square foot of outside air or the design minimum outside air rate, whichever is greatest. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy and shall continue until a total of 14,000 cubic foot of outside air per square foot of floor area has been delivered to the space. After complying with this requirement, all ventilation systems will operate in normal mode. The following SCA Standard Specification section will be incorporated in Contract Documents:

SCA STANDARD SPECIFICATIONS

- S01352 Sustainability Requirements
- S01550 Indoor Air Quality Requirements

Q3.1R Electric Ignition Stoves
Credit is not feasible. Food service equipment will be all electric; no gas fired cooking appliances are proposed for the project.

Q3.2R – Post Construction Indoor Air Quality
This credit is feasible. The initial equipment selection list provided by DOE/DSF will include two High Efficiency Particulate Arrestor (HEPA) vacuums.

Q4.1 Low Emitting Materials, 3-5 Categories
Credit is feasible. Option 1 Product Category Calculations will be achieved through product selection and specification, and tracked during construction administration. Low-emitting materials in 5 categories (paints and coatings, adhesives and sealants, flooring, composite wood, ceilings, wall, thermal and acoustic insulation) are included in product specifications.
SCA Standard Specifications
References throughout specifications
- G01600 Material and Equipment
- S01352 Sustainability Requirements
- 06100 Rough Carpentry
- 06200 Finish Carpentry
- 06410 Custom Casework
- 07900 Joint Sealers
- 08524 Aluminum Projected Windows
- 08800 Miscellaneous Glazing
- 08921 Aluminum Storefront
- 09310 Ceramic Tile
- 09510 Acoustical Ceilings
- 09659 Resilient Flooring
- 10100 Visual Display Boards
- 10400 Identifying Devices
- 10415 Bulletin Boards, Glazed Display Boards, Display Cabinets and Cases
- 10830 Mirrors
- 11600 Laboratory Equipment
- Div 15 All HVAC and P&D adhesive and sealers

Q4.2A Low Emitting Materials, 6 Categories
This credit is not being pursued as it requires permission from SCA

Q5.1R Thermal Comfort
Credit is feasible. HVAC systems for the building will be designed to comply with the applicable New York City SCA HVAC Design Requirements in order to provide the thermal comfort requirements of ASHRAE 55-2010. All individual classrooms, offices, and assembly areas in the building will be provided with individual thermostats for temperature control. The thermostats in the assembly areas are adjustable by the occupants via the custodian. Note that the design team will need to determine how kitchen can be design to meet ASHRAE requirements.
SCA Design Requirements:
6.2.0 General Overview of HVAC Systems
6.2.1 HVAC Unit Centralization and Coordination
6.2.3 Non-Assembly Spaces (Classrooms, Offices, etc.)
6.2.4 Public Assembly Spaces
6.2.9 Heating and Cooling Design Parameters (Load Calculations)
6.2.22 Kitchen Ventilation
6.2.28 HVAC Design Requirements for Special Spaces
SCA Specification Sections:
15970 - Temperature Control System

15985 - Sequence of Operations

Q6.1R Interior Lighting Control
Credit is feasible and will be pursued
Controllability will be provided as follows:
Administrative Offices and Other Regularly Occupied Spaces
Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences
AND
Provide lighting system controls for all learning spaces including classrooms, chemistry laboratories, art rooms, shops, music rooms, gymnasiums and dance and exercise studios to enable adjustments that meet group needs and preferences.
All interior lighting shall automatically be controlled by a programmable Lighting Control Panel with integral clock except for the emergency lighting. The Lighting Control Panel shall be provided at the Electric Closet and to control all spaces that do not have automatic shutoff and/or Occupant sensors.

The requirements for compliance with this credit will be as follows:
Daylight harvesting is to be provided in all spaces with windows except when the total lighting power of a daylight zone is less than 150kw or when the total glazing area is less than 20 square feet. Provide manual override of daylight sensors with switches for three lighting levels (on, off, and midlevel) to allow occupant adjustments in classrooms and group spaces. Midlevel lighting should be 30% to 70% of the maximum illumination level.
In Spaces without windows: wall mounted vacancy sensor to automatically control lighting with an override switch.
Corridor: emergency lighting controlled from key operated switches located at the main entrance; other lights controlled by control panel on each floor and occupancy sensors. Lights on occupancy sensors are reduced to 50% when not occupied and 100% upon occupancy.
Electrical Closet: toggle switch.
Individual office: wall mounted vacancy sensor to automatically control lighting with an override switch.
Janitor's Closet: wall-mounted vacancy sensor.
Mechanical Areas – Service Areas: toggle switch.
Staff toilets: vacancy sensor.
Stair: emergency lighting controlled from key operated switches located at the main entrance; other lights controlled by occupancy sensors. Lights on occupancy sensors are reduced to 50% when not occupied and 100% upon occupancy.
Storage: vacancy sensor.
Student toilets: key-operated switch. All Lights on occupancy sensors are reduced to 50% when not occupied and 100% upon occupancy.
SCA Design Requirements:
7.2.1 Interior Lighting
SCA Standard Specifications:
- 16140 Wiring Devices
- 16145 Lighting Control Devices

Applicable SCA Standard Details include:
SCA Room Planning Standards (Standard Room Layouts)

Q6.2 Interior Lighting Quality
Credit is feasible.
Color rendering index (CRI) of all lighting specified in the project will be a minimum of 80 or higher.
Luminaire Life: More than 75% of the lighting fixtures shall be rated for L80 at 50,000Hrs.
Direct Overhead Lighting: The total connected load of direct only lighting fixtures does not exceed 25% of the total lighting load in regularly occupied spaces.
Surface Reflectance: Lastly, the area-weighted surface reflectance averages for ceilings, walls and floors are achievable in regularly occupied spaces for the current design. Light-colored paints will be selected for the

classroom and office walls, ACTs will be selected in accordance with SCA Standard Specifications section tiling 09510, which specifies ACTs with light reflectance values in excess of 85%, and floors will be primarily VCT, ceramic tile or other hard. Detailed calculations will be provided at the 60% CD GSG submission once final finishes are selected.

Design Requirements:

• 7.2.1. Interior Lighting

Standard Specifications:

• 16502 LED Interior Building Lighting

Q6.3R Visual Performance

Credit is feasible. All classrooms shall be provided with pendant mounted direct-indirect LED lighting fixtures. The use of this type of lighting fixtures will reduce lighting power density (LPD) and, therefore use less energy while delivering a better quality of light to the space. Typically, the ceiling heights will be a 10 feet. The lighting will be at 8’-6” providing an 18” area for deflection of light.

The construction documents will show the lighting layouts and light fixture schedules. At the 60% Phase the point lighting levels (photometric) calculations for typical and non-typical spaces will be provided.

The **following SCA Standard Specifications and Design Requirements** will be incorporated:

- 16502 Interior LED Lighting
- 7.2.1 Interior Lighting

Q7.1 Daylight

Credit is feasible. Simulation of Spatial Daylight Autonomy Modeling to determine compliance has been performed by the team showing 69.74% sDA for regularly occupied spaces. SCA standards include glazing and manual shades that will control glare are included in the design. Floor plans showing regularly occupied spaces and the Daylight modeling report including geometric plots are included with the supporting documents.

SCA DESIGN REQUIREMENTS

1.3.1.1 Building Location and Orientation

1.3.1.2 Planning Guidelines for New Schools and Additions

SCA STANDARD SPECIFICATIONS

08525 High Performance Aluminum Projected Windows

08800 Miscellaneous Glazing

08921 Aluminum Storefront

12500 Window Shades

12501 Chain and Clutch Operated Window Shades

Supporting Documentation:

SDA Daylight Simulation Modeling

Floor plans

Q7.2 Quality Views

Credit is feasible. Preliminary views analysis of the current design shows compliance with credit requirements; at least 2 quality views were achieved for 91% of the regularly occupied floor area. To determine credit compliance, a full views analysis report was completed assessing the effective quality of views provided by the current design (from architectural drawings shared by LHP on 12/29/20) using Rhino with Grasshopper as a computation and visualization tool. The custom Grasshopper script created an analysis grid with 36” node spacing within each of the regularly occupied areas. It then drew lines from each of these points at 42” above the floor for every 10°. The sight-lines that did not reach a window were eliminated, leaving only those sight-lines/views that are direct lines of sight to glazing. The remaining views were then evaluated for each of the four quality view types. Floor plans showing the results at each node and aggregated performance values for each regularly occupied space for different view types are included in the 30% DD Daylighting and Views Study (Appendix C). These aggregated values capture the results of views calculations for each regularly occupied space. Analysis methodology is described in detail in the report in Appendix C. The current design was found to provide 91% of regularly occupied spaces with scenic views (i.e., flora, fauna, sky and movement) and view factors of at least 3 and 85% with unobstructed views within a distance of 3x the glazing head height. The whole gymatorium (including stage) were excluded from credit calculations, as credit requirements allow for exclusion of gyms and/or auditoriums. The regularly occupied area excluded corridors, columns and other circulation areas within the rooms simulated and throughout the Addition, following the one hour per day per occupant rule-of-thumb in the LEED v4 BD+C Reference Guide.

SCA Standards Incorporated:

• 16502 LED Interior Building Lighting

Supporting Documentation

• 30% DD Daylighting and Views Study- Plans with Views

• Quality Views Credit Form

Q8.1P – Minimum Acoustic Performance

Credit is feasible.

EXTERIOR NOISE

Screening: Commercially available aerial maps of the neighborhood indicate that the MTA elevated 2 and 5 subway lines, along White Plains Road, are located approximately 300-feet (0.05-miles) to the west of he project site. Neighborhood mapping also indicates a significant amount of 6-story residential buildings, between White Plains Road and Cruger Avenue, separating the MTA 2/5 subway lines from the façade of the new Addition. Based on the limited direct line-of-sight between the elevated MTA subway rail lines and the new Addition, the site was screened out of requiring a site-specific environmental noise survey. As noted in DR 1.3.1.9 and DR 4.3.1, the standard SCA glazing assembly for IGU aluminum projected/fixed windows in all classrooms are comprised of the following:

Exterior Glass: 1/4-inch thick laminated [1/8-inch annealed, 60mil PVB interlayer, 1/8-inch annealed]. Airspace: 3/8-inch.

Interior Glass: 1/4-inch thick laminated [1/8-inch annealed, 60mil PVB interlayer, 1/8-inch annealed].

Acoustic modelling suggests the above noted glazing can achieve an approximate STC-40/OITC-33* rating.

*Pursuant to SCA Spec 08524 (Aluminum Projected Windows), a minimum OITC-28 rating is required. AKRF does not anticipate any significant challenges in meeting GSG/DR requirements if the typical SCA window glazing is specified for this project.

Background Noise Levels:

To meet the minimum required acoustic performance in Q8.1P the background noise levels due to mechanical equipment must meet 40 dBA in all core learning spaces. Mechanical systems, ductwork layouts, and noise levels will be evaluated for compliance once drawings have been prepared. Recommendations for noise mitigation in non-compliant areas will be provided in acoustical report for GSG-60% submission. Background noise level requirements provided in the SCA Design requirements section 6.2.25 should be met during design.

Reverberation Time:

The reverberation time of a room is based on the volume and the finishes. Classrooms and core learning Spaces < 20,000 Cubic Feet will include sufficient sound absorptive finishes for compliance with the reverberation time requirement specified in ANSI Standard S12.60-2010, Part 1, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools. The total area of acoustical wall panels, ceiling finishes, and other sound-absorbent finishes equals or exceeds the total ceiling area of the room, excluding recessed lights, diffusers, grilles, and chilled beams. Acoustic materials will have an NRC of 0.70 or higher.

APPLICABLE SCA DESIGN REQUIREMENTS

1.3.1.9 Architectural Acoustics

4.1.1 Building Façade – New Buildings and Additions

4.2.1 Exterior Masonry Wall

4.3.1 Window Types

5.1.1 Typical Room Finishes

5.4.1 Suspended Ceilings

6.2.25 HVAC Acoustical Standards

APPLICABLE ANSI STANDARD

ANSI S12.60-2010

Supporting Documentation:

Site Plan with Exterior Noise Source

Q8.2 Enhanced Acoustical Performance
Credit is not feasible. The acoustical consultant has reviewed the DD documents and determined that the project will have difficulty meeting the requirements to achieve 35 dBa noise levels. There may be significant cost and require increased duct size.

SCA DESIGN REQUIREMENTS
1.3.1.9 Architectural Acoustic Standards
4.1.1 Building Facade - New Buildings and Additions
4.2.1 Exterior Masonry Wall
4.3.1 Window Types
5.4.1 Suspended Ceilings
6.2.25 HVAC Acoustical Standards

SCA STANDARD SPECIFICATIONS
08525 High Performance Aluminum Projected Windows
08110 Steel Doors and Frames
08210 Wood Doors
08800 Miscellaneous Glazing
08921 Aluminum Storefront
09510 Acoustical Ceilings
15891 Metal Ductwork
15910 Duct Accessories
15993 Balancing of Systems

R1.1 Regional Priority - Q1.2R and Q1.3A
Credit is feasible. Compliance with credits Q1.2R and Q1.3A was achieved.

I1.1R – LEED® Accredited Professional
Credit is feasible. [Consultant] from [company] will act as LEED AP for this project. LEED AP BD+ certificate is included.

Supporting Documentation:
LEED AP BD+C Certificate

SUPPORTING DOCUMENTATION

P1.1R-Integrative Design Process

NYC Green Schools Rating System

INTEGRATIVE DESIGN PROCESS

CREDIT FORM

Credit P1.1R

SCA School Construction Authority

RESPONSIBLE PARTY:

NITIAL SUBMISSION PHASE: SD | DD | 60% | 100% | Design | CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	3/30/2021

IDP Workshop

IDP Workshop Report included in this submittal package — Y: [X] N: [ ]

Discovery #1 Energy and Daylight Related Systems

Energy Target (source EUI):	70
Renewable Energy Potential	
Total Roof Area (SF)	12665
Sustainable Roofing Zone (SF)	6,767
Roof Area PV Potential (SF)	5,898
kW of PV	99
kWh/year	141423

Definitions

Roof Area PV Potential (SF) Areas of the roof assembly where solar photolvatic electricity generation system is feasible

Sustainable Roofing Zone (SF) - area that requires a roof assembly where either a solar photovoltaic electricity generating system, a green roof system, or a combination thereof, is installed. Refer to the exceptions noted in Local Law 94 of 2019 for allowable SF exclusions (FDNY access, mechanical equipment and other Code mandated exclusions).

Geothermal System Feasibility Report required — Y: [X] N: [ ]

Provide a brief explanation of how the research and analysis uncovered through discovery influenced the project design and/or changes to the design. If applicable, give reasons for not addressing these topics:

Site Conditions	Heat island mitigation measures are included. Permeable pavers and a subsurface retention system address stormwater. All runoff from the site will discharge to the subsurface retention system. Solar studies indicate South and East Elevations will receive the most sun, playground along north side of site will receive sun mostly in the afternoon
MEP Layout Optimization	The geothermal feasibility tool indicates full system for closed loop, and open loop systems are feasible. A geothermal feasibility study will be performed at DD. Acoustic considerations will impact HVAC design.
Daylight Design Strategies for the School, including Gymnasium	Window head height to be as high as possible to maximize daylighting and views. Framing should be minimized. The gym is located at the second floor with two window walls available (East and West).

Discovery #2 Water Related Systems

Water related system assessment performed — Y: [X] N: [ ]

Indoor Fixture Use, Irrigation, Stormwater Collection

Topics addressed

Discovery #3 Preliminary Life-Cycle Impact Assessment (LCA)

LCA Assessment performed — Y: [X] N: [ ]

Discovery #4 Active Design

Active Design Plan provided — Y: [X] N: [ ]

Discovery #5 Acoustics

Q8.1P and Q8.2 Risk Assessment performed — Y: [X] N: [ ]

Discovery #6 Climate Resiliency

Climate Resiliency discovery analysis provided — Y: [X] N: [ ]

L1.1R – SENSITIVE LAND PROTECTION

L1.1R - Aerial map of previously developed site

L1.2 – HIGH PRIORITY SITE

L1.2 – DDA/QCT Map

Map Options : **Clear** | **Reset** | **Full Screen**

QCT Legend: — Tract Outline | LIHTC Project | 2021 Qualified Census Tracts

SADDA Legend: — FMR Boundary | — ZCTA Boundary | 2021 Small DDA | Part DDA | Non Metro DDA

Hide the overview

The 2021 Qualified Census Tracts (QCTs) and Difficult Development Areas (DDAs) are effective January 1, 2021. The 2021 designations use data from the 2010 Decennial census. The designation methodology is explained in the federal Register notice published September 23, 2020

Map Options

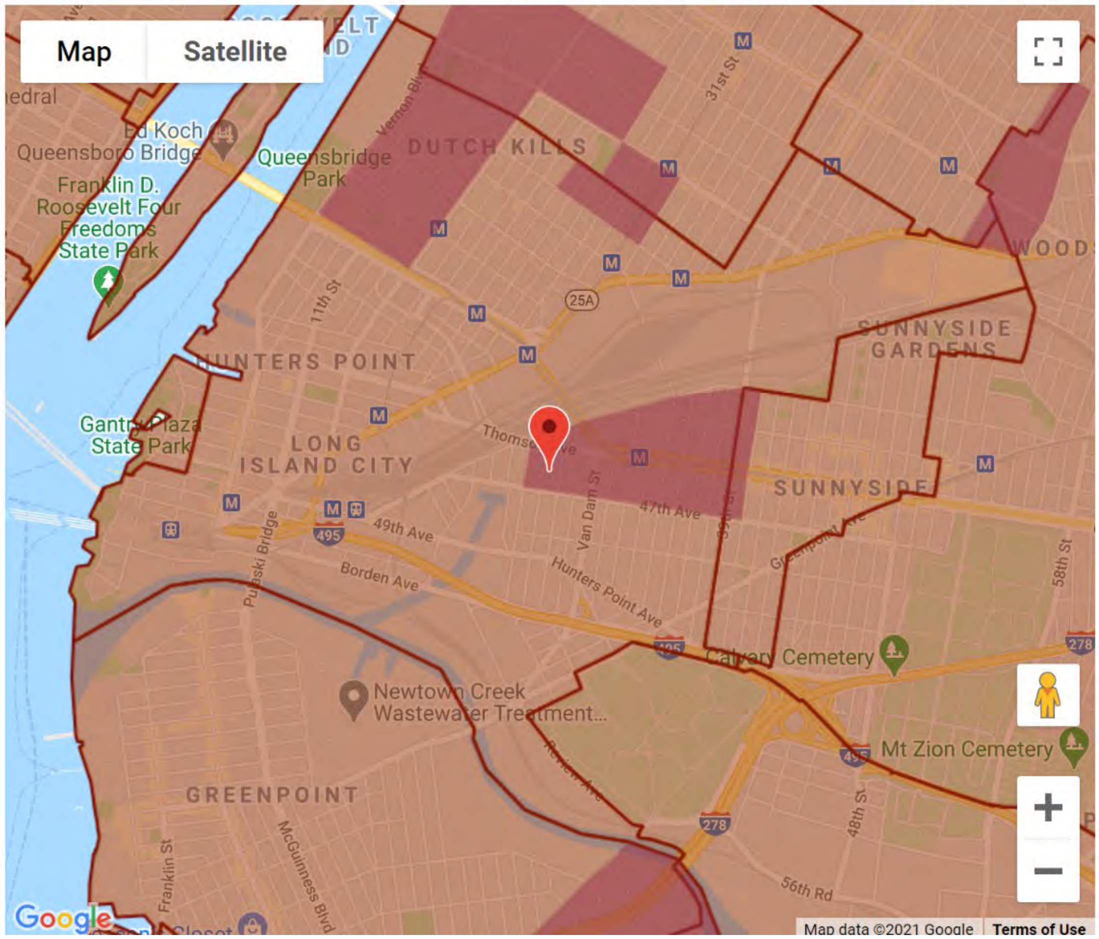
14 Current Zoom Level

- [x] Show Difficult Development Areas (Zoom 7+)
- [x] Color QCT Qualified Tracts (Zoom 7+)
- [ ] Show Tracts Outline (Zoom 11+)
- [ ] Show FMR Outlines (Zoom 4+)
- [ ] Show LIHTC Projects (Zoom 11+)

Click here for full screen map

Select Year

- (•) 2021
- ( ) 2020



L1.3 – SURROUNDING DENSITY

NYC Green Schools Rating System

SCA School Construction Authority

SURROUNDING DENSITY

CREDIT FORM

Credit L1.3

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: SD | DD | 60% | 100% Design | CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	MGA Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	3/30/2021

INSTRUCTIONS:

Designer to select Option 1 or Option 2:

Option 1) The project will document surrounding density with combined residential and nonresidential densities.

Step 1) Insert Total Building Area and Total Buildable Land. Check compliance

Option 2) The project will document surrounding density with separate residential and nonresidential densities.

Step 1) Residential-only Buildings: If there are residential-only buildings, fill in Number of Dwelling Units and Land Area in acres. If there are no residential-only buildings within 1/4 mile enter 0

Step 2) Non-residential Buildings: If there are nonresidential buildings, fill in Building Area in SF and Land Area in acres. If there are no nonresidential buildings within 1/4 mile enter 0

Option 1: Combined Residential and Nonresidential Densities

Complete the table below. Include all buildings and buildable land within 1/4 mile of the project boundary. Exclude the project site area and building(s).

Step 1:

Total building area (SF)	3,399,828
Total buildable land (acres)	132.40
SF per acre of buildable land	25,678
POINTS	2

Option 2: Separate Residential and Nonresidential Densities

Step 1) Complete the table below for all mixed-use buildings (i.e. those with residential and nonresidential components) within 1/4 mile of the project boundary. Exclude the project site area and building.

Step 1: Residential-only Buildings

Number of dwelling units in residential-only buildings	3,171
Land area of residential-only buildings (acres)	129.9

Step 2: Nonresidential Buildings

Nonresidential-only building area (SF)	25,835
Nonresidential-only land area (acres)	2.3

Step 3: Mixed Use Buildings

Mixed-use building area (SF)	Residential SF	3,735
	Nonresidential SF	3,735
Total mixed-use building area (SF)		7,470
Percentage of mixed-use building area (%)	Residential %	50
	Nonresidential %	50
Total mixed-use building land area (acres)		10,844.00
Weighted mixed-use land area (acres)	Residential acres	5,422.00
	Nonresidential acres	5,422.00
Residential dwelling units in mixed-use buildings		4

If there are no mixed-use building within a 1/4 mile, enter 0 for all fields.

Step 2) Complete the tables below for all residential and nonresidential buildings and land within 1/4 mi of the project boundary. Exclude the project site area and building(s).

Summary

Total residential density (DU/acre)	*0.57*
Total nonresidential density (FAR)	*0.00*
POINTS	0

Block 3120
37,497 sf
Block 3104
101,557 sf
Block 3124
97,855 sf
Block 3125
22,199 sf
Carlton Street
64 Road
Block 3122
88,838 sf
Block 3123
60,314 sf
Block 3126
21,173 sf
Asquith Crescent
Block 3154
75,367 sf
Block 3121
61,593 sf
Block 3127
102,739 sf
Block 3152
395,094 sf
Block 3128
65,194 sf
Boelsen Crescent
Block 3116
14,650 sf
Block 3153
27,712 sf
Block 3130
95,582 sf
Block 3129
102,768 sf
Block 3164
32,329 sf
Cromwell Crescent
Dartmouth Street
Block 3132
147,784 sf
Block 3131
121,788 sf
Block 3163
72,616 sf
0.25 mi
1,317'-3"
Block 3136
78,101 sf
Block 3133
191,743 sf
Dieterle Crescent
Block 3151
381,721 sf
Block 3134
Block 3162
36,529 sf
65 Avenue
Block 3137
53,334 sf
Eliwell Crescent
Fleet Street
Block 3135
195,026 sf
65 Road
Block 3138
73,422 sf
65 Drive
Fitchett Street
66 Avenue
Block 3161
32,216 sf
Block 3139
132,022 sf
Block 3143
103,435 sf
66 Road
Block 3160
38,076 sf
Block 3140
116,775 sf
Block 3144
91,054 sf
Block 3150
239,475 sf
67 Avenue
Block 3141
97,856 sf
Block 3145
78,481 sf
Block 3142
39,978 sf
67 Road
Area excluded per GSG
nyc oasis
Legend
Location Report (6)
Site Search
Community Data
Land Use
Show All
Block/Lot Boundaries
(Building footprints in gray)
Land Use
All land use categories
2003 2005 2007 2009 2014 2018
1 & 2 Family Residential
Multi-family Residential
Mixed Use
Open space & outdoor recreation
Commercial
Institutions
Industrial
Parking
Transportation / Utilities
Vacant Lots

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7117	2R	189-15 73 Ave	1,002,000	483,292	516		
7117	3R	188-02 64 Ave	1,370,000	1,228,778	1,201		
7117	6R	194-05 67 Ave	790,500	410,788	410		
7117	7	195-05 69 Ave	99,950	25,835			
7117	8	67-00 192 St	392,900	205,744	215		
7117	20	195-00 67 Ave	59,358	12,470	12		
7117	51R	196-66 69 Ave	217,000	11,000	140		
7117	401R	196-14 69 Ave	225,750	116,000	148		
7117	421	195-02 69 Ave	Project Site Excluded				
7117	537	194-23 73 Ave	4,230	1,500	1		
7117	539	194-15 73 Ave	9,210	3,360	1		
7126	1	67-01 197 St	2,221	1,106	1		
7126	6	67-02 198 St	1,700	1,600	1		
7126	7	67-04 198 St	1,700	1,600	1		
7126	8	67-06 198 St	1,700	1,600	1		
7126	9	67-08 198 St	1,700	1,600	1		
7126	10	67-10 198 St	1,700	1,600	1		
7126	11	67-12 198 St	1,700	1,600	1		
7126	12	67-14 198 St	1,700	1,600	1		
7126	13	67-16 198 St	1,700	1,760	1		
7126	14	67-18 198 St	1,700	1,600	1		
7126	15	67-20 198 St	1,700	1,600	1		
7126	16	67-22 198 St	1,700	1,600	1		
7126	17	67-24 198 St	1,700	1,600	1		
7126	18	67-26 198 St	1,700	1,760	1		
7126	19	67-28 198 St	1,700	1,760	1		
7126	20	67-30 198 St	1,700	1,600	1		
7126	21	67-32 198 St	1,700	1,600	1		
7126	22	67-34 198 St	1,700	1,600	1		
7126	23	67-36 198 St	1,700	1,600	1		
7126	24	67-38 198 St	1,700	1,600	1		
7126	25	67-40 198 St	1,700	1,760	1		
7126	26	67-42 198 St	1,700	1,600	1		
7126	27	67-44 198 St	1,700	1,600	1		
7126	28	67-46 198 St	1,700	1,760	1		
7126	29	67-48 198 St	1,700	1,600	1		
7126	30	67-50 198 St	1,700	1,600	1		
7126	31	67-52 198 St	1,700	1,760	1		
7126	32	67-54 198 St	1,700	1,600	1		
7126	33	67-56 198 St	1,700	1,600	1		
7126	34	67-58 198 St	1,700	1,600	1		
7126	35	67-60 198 St	1,700	1,600	1		
7126	36	67-62 198 St	1,700	1,600	1		
7126	37	67-59 197 St	3,417	1,520	1		
7126	39	67-55 197 St	2,221	1,024	1		
7126	41	67-53 197 St	2,221	1,024	1		
7126	42	67-49 197 St	2,221	1,024	1		
7126	43	67-47 197 St	2,221	1,024	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7126	45	67-45 197 St	2,221	1,024	1		
7126	46	67-41 197 St	2,221	1,024	1		
7126	47	67-39 197 St	2,221	1,024	1		
7126	49	67-35 197 St	2,221	1,024	1		
7126	50	67-33 197 St	2,221	1,024	1		
7126	51	67-31 197 St	2,221	1,024	1		
7126	52	67-29 197 St	2,221	1,024	1		
7126	54	67-27 197 St	2,221	1,024	1		
7126	55	67-25 197 St	2,221	1,024	1		
7126	56	67-21 197 St	2,221	1,024	1		
7126	58	67-19 197 St	2,221	1,184	1		
7126	59	67-17 197 St	2,221	1,088	1		
7126	60	67-15 197 St	2,221	1,152	1		
7126	61	67-11 197 St	2,221	2,016	1		
7126	63	67-09 197 St	2,221	1,174	1		
7126	64	67-05 197 St	2,221	1,024	1		
7126	66	67-03 197 St	2,221	1,204	1		
7127	1	67-01 198 St	1,720	1,925	1		
7127	6	67-02 199 St	2,250	1,136	1		
7127	7	67-04 199 St	2,236	1,024	1		
7127	9	67-06 199 St	2,236	896	1		
7127	10	67-10 199 St	2,236	896	1		
7127	11	67-12 199 St	2,236	896	1		
7127	12	67-14 199 St	2,236	896	1		
7127	14	67-16 199 St	2,236	1,120	1		
7127	15	67-20 199 St	2,236	1,120	1		
7127	16	67-22 199 St	2,236	1,146	1		
7127	18	67-24 199 St	2,236	896	1		
7127	19	67-28 199 St	2,236	896	1		
7127	20	67-30 199 St	2,236	896	1		
7127	22	67-32 199 St	2,236	896	1		
7127	23	67-36 199 St	2,236	896	1		
7127	24	67-38 199 St	2,236	1,024	1		
7127	26	67-40 199 St	2,236	896	1		
7127	27	67-44 199 St	2,236	896	1		
7127	28	67-46 199 St	2,236	896	1		
7127	29	67-48 199 St	2,236	896	1		
7127	31	67-50 199 St	2,236	896	1		
7127	32	67-54 199 St	2,236	896	1		
7127	33	67-56 199 St	2,236	896	1		
7127	35	67-60 199 St	3,633	1,900	1		
7127	37	67-61 198 St	1,713	1,925	1		
7127	38	67-59 198 St	1,713	1,925	1		
7127	39	67-57 198 St	1,713	1,925	1		
7127	40	67-55 198 St	1,713	1,925	1		
7127	41	67-53 198 St	1,708	1,925	1		
7127	42	67-51 198 St	1,713	1,925	1		
7127	43	67-49 198 St	1,713	1,925	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7127	44	67-47 198 St	1,713	1,925	1		
7127	45	67-45 198 St	1,713	1,925	1		
7127	46	67-43 198 St	1,713	1,925	1		
7127	47	67-41 198 St	1,713	1,925	1		
7127	48	67-39 198 St	1,713	1,925	1		
7127	49	67-37 198 St	1,713	1,925	1		
7127	50	67-35 198 St	1,713	1,925	1		
7127	51	67-33 198 St	1,713	1,925	1		
7127	52	67-31 198 St	1,713	1,925	1		
7127	53	67-29 198 St	1,713	1,925	1		
7127	54	67-27 198 St	1,713	1,925	1		
7127	55	67-25 198 St	1,713	1,925	1		
7127	56	67-23 198 St	1,713	1,925	1		
7127	57	67-21 198 St	1,713	1,925	1		
7127	58	67-19 198 St	1,713	1,925	1		
7127	59	67-17 198 St	1,713	1,925	1		
7127	60	67-15 198 St	1,715	1,760	1		
7127	61	67-13 198 St	1,715	1,760	1		
7127	62	67-11 198 St	1,715	1,760	1		
7127	63	67-09 198 St	1,720	1,925	1		
7127	64	67-07 198 St	1,720	1,925	1		
7127	65	67-05 198 St	1,720	1,925	1		
7127	66	67-03 198 St	1,720	1,925	1		
7150	1	69-01 197 St	1,705	1,925	1		
7150	4	69-02 198 St	1,684	1,828	1		
7150	5	69-04 198 St	1,684	1,828	1		
7150	6	69-06 198 St	1,684	1,828	1		
7150	7	69-08 198 St	1,684	1,828	1		
7150	8	69-10 198 St	1,684	1,828	1		
7150	9	69-12 198 St	1,679	1,828	1		
7150	10	69-14 198 St	1,679	1,828	1		
7150	11	69-16 198 St	1,679	1,828	1		
7150	12	69-18 198 St	1,679	1,828	1		
7150	13	69-20 198 St	1,674	1,828	1		
7150	14	69-22 198 St	1,674	1,828	1		
7150	15	69-24 198 St	1,672	1,828	1		
7150	16	69-26 198 St	1,672	1,828	1		
7150	17	69-28 198 St	1,672	1,828	1		
7150	18	69-30 198 St	1,671	1,828	1		
7150	19	69-32 198 St	1,671	1,828	1		
7150	20	69-34 198 St	1,671	1,828	1		
7150	21	69-36 198 St	1,669	1,828	1		
7150	22	69-38 198 St	1,667	1,828	1		
7150	23	69-40 198 St	1,667	1,828	1		
7150	24	69-42 198 St	1,666	1,828	1		
7150	25	69-44 198 St	1,666	1,828	1		
7150	26	69-46 198 St	1,666	1,828	1		
7150	27	69-48 198 St	1,664	1,828	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7150	28	69-50 198 St	1,664	1,828	1		
7150	29	69-52 198 St	1,664	1,828	1		
7150	30	69-54 198 St	1,662	1,828	1		
7150	31	69-56 198 St	1,659	1,828	1		
7150	32	69-58 198 St	1,659	1,828	1		
7150	33	69-60 198 St	1,659	1,828	1		
7150	34	69-62 198 St	1,659	1,828	1		
7150	35	69-64 198 St	1,680	3,045	1		
7150	36	69-63 197 St	1,680	3,045	1		
7150	37	69-61 197 St	1,680	1,925	1		
7150	38	69-59 197 St	1,680	1,925	1		
7150	39	69-57 197 St	1,680	1,925	1		
7150	40	69-55 197 St	1,680	1,925	1		
7150	41	69-53 197 St	1,680	1,925	1		
7150	42	69-51 197 St	1,680	1,925	1		
7150	43	69-49 197 St	1,680	1,925	1		
7150	44	69-47 197 St	1,680	1,925	1		
7150	45	69-45 197 St	1,685	1,925	1		
7150	46	69-43 197 St	1,687	1,925	1		
7150	47	69-41 197 St	1,687	1,925	1		
7150	48	69-39 197 St	1,688	1,925	1		
7150	49	69-37 197 St	1,688	1,925	1		
7150	50	69-35 197 St	1,690	1,925	1		
7150	51	69-33 197 St	1,690	1,925	1		
7150	52	69-31 197 St	1,692	1,925	1		
7150	53	69-29 197 St	1,692	1,925	1		
7150	54	69-27 197 St	1,692	1,925	1		
7150	55	69-25 197 St	1,693	1,925	1		
7150	56	69-23 197 St	1,693	1,925	1		
7150	57	69-21 197 St	1,693	1,925	1		
7150	58	69-19 197 St	1,695	1,925		963	963
7150	59	69-17 197 St	1,700	1,925	1		
7150	60	69-15 197 St	1,700	1,925	1		
7150	61	69-13 197 St	1,700	1,925	1		
7150	62	69-11 197 St	1,700	1,925	1		
7150	63	69-09 197 St	1,700	1,925	1		
7150	64	69-07 197 St	1,703	1,925	1		
7150	65	69-05 197 St	1,703	1,925	1		
7150	66	69-03 197 St	1,705	2,100	1		
7151	1	69-01 198 St	1,756	1,925	1		
7151	2	69-02 199 St	2,333	1,072	1		
7151	5	69-04 199 St	2,261	1,184	1		
7151	6	69-08 199 St	2,236	896	1		
7151	7	69-10 199 St	2,236	896	1		
7151	8	69-12 199 St	2,255	896	1		
7151	10	69-16 199 St	2,240	896	1		
7151	11	69-18 199 St	2,243	1,083	1		
7151	12	69-20 199 St	2,236	896	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7151	13	69-24 199 St	2,236	896	1		
7151	15	69-26 199 St	2,247	896	1		
7151	16	69-28 199 St	2,236	896	1		
7151	17	69-32 199 St	2,249	896	1		
7151	18	69-34 199 St	2,249	1,720	1		
7151	20	69-36 199 St	2,251	1,168	1		
7151	21	69-40 199 St	2,251	896	1		
7151	22	69-42 199 St	2,268	896	1		
7151	23	69-44 199 St	2,268	1,054	1		
7151	25	69-46 199 St	2,270	1,120	1		
7151	26	69-50 199 St	2,270	1,120	1		
7151	27	69-52 199 St	2,262	1,120	1		
7151	28	69-54 199 St	2,262	1,156	1		
7151	30	69-56 199 St	2,284	896	1		
7151	31	69-60 199 St	2,262	896	1		
7151	33	69-62 199 St	2,349	1,208	1		
7151	34	69-63 198 St	1,755	1,925	1		
7151	35	69-61 198 St	1,711	1,828	1		
7151	36	69-59 198 St	1,711	2,294	1		
7151	37	69-57 198 St	1,711	2,294	1		
7151	38	69-55 198 St	1,711	1,828	1		
7151	39	69-53 198 St	1,711	1,828	1		
7151	40	69-51 198 St	1,706	1,828	1		
7151	41	69-49 198 St	1,706	1,828	1		
7151	42	69-47 198 St	1,706	2,294	1		
7151	43	69-45 198 St	1,704	1,828	1		
7151	44	69-43 198 St	1,704	1,828	1		
7151	45	69-41 198 St	1,704	1,828	1		
7151	46	69-39 198 St	1,703	1,828	1		
7151	47	69-37 198 St	1,703	1,828	1		
7151	48	69-35 198 St	1,701	1,828	1		
7151	49	69-33 198 St	1,704	1,828	1		
7151	50	69-31 198 St	1,701	1,828	1		
7151	51	69-29 198 St	1,700	1,828	1		
7151	52	69-27 198 St	1,700	1,828	1		
7151	53	69-25 198 St	1,700	1,828	1		
7151	54	69-23 198 St	1,695	1,828	1		
7151	55	69-21 198 St	1,695	1,828	1		
7151	56	69-19 198 St	1,696	1,828	1		
7151	57	69-17 198 St	1,696	1,828	1		
7151	58	69-15 198 St	1,696	1,828	1		
7151	59	69-13 198 St	1,695	1,828	1		
7151	60	69-11 198 St	1,695	1,828	1		
7151	61	69-09 198 St	1,695	1,828	1		
7151	62	69-07 198 St	1,714	1,828	1		
7151	63	69-05 198 St	1,691	1,828	1		
7151	64	69-03 198 St	1,691	1,828	1		
7186	1	73-03 198 St	2,970	1,848		924	924

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7186	5	73-04 199 St	2,958	1,848	1		
7186	6	73-08 199 St	2,924	1,848	1		
7186	7	73-10 199 St	2,881	1,848	1		
7186	8	73-12 199 St	2,881	1,848	1		
7186	10	73-16 199 St	2,924	1,848	1		
7186	12	73-20 199 St	2,890	1,848	1		
7186	14	73-24 199 St	2,897	1,848	1		
7186	16	73-28 199 St	2,897	1,848	1		
7186	18	73-30 199 St	2,925	1,848	1		
7186	20	73-34 199 St	2,891	1,848	1		
7186	22	73-38 199 St	2,898	1,848	1		
7186	24	73-40 199 St	2,898	1,848	1		
7186	26	73-44 199 St	2,905	1,848	1		
7186	28	73-48 199 St	2,905	1,848	1		
7186	30	73-50 199 St	2,912	1,848	1		
7186	56	73-57 198 St	2,904	1,848	1		
7186	58	73-53 198 St	2,877	1,848	1		
7186	60	73-49 198 St	2,912	1,848	1		
7186	62	73-47 198 St	2,905	1,848	1		
7186	64	73-43 198 St	2,905	1,848	1		
7186	66	73-39 198 St	2,898	1,848	1		
7186	68	73-37 198 St	2,898	1,848	1		
7186	70	73-33 198 St	2,891	1,848	1		
7186	72	73-29 198 St	2,925	1,848	1		
7186	74	73-27 198 St	2,897	1,848	1		
7186	76	73-23 198 St	2,897	1,848	1		
7186	78	73-19 198 St	2,890	1,848	1		
7186	80	73-15 198 St	2,924	1,848	1		
7186	82	73-11 198 St	2,881	1,848	1		
7186	84	73-09 198 St	2,881	1,848	1		
7186	86	73-07 198 St	2,838	1,848	1		
7185	1	73-03 197 St	3,179	1,848		924	924
7185	6	73-04 198 St	2,994	1,848	1		
7185	7	73-08 198 St	2,925	1,848	1		
7185	9	73-10 198 St	2,925	1,848	1		
7185	10	73-14 198 St	2,925	1,600	1		
7185	12	73-18 198 St	2,925	1,848	1		
7185	14	73-20 198 St	2,891	1,864	1		
7185	16	73-24 198 St	2,891	1,864	1		
7185	17	73-28 198 St	2,891	1,864	1		
7185	19	73-30 198 St	2,891	1,848	1		
7185	21	73-34 198 St	2,891	1,848	1		
7185	23	73-38 198 St	2,891	1,848	1		
7185	25	73-40 198 St	2,857	1,848	1		
7185	27	73-44 198 St	2,857	1,864	1		
7185	29	73-48 198 St	2,857	1,864	1		
7185	31	73-50 198 St	2,857	1,848	1		
7185	33	73-54 198 St	2,857	1,848	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7185	35	73-58 198 St	2,857	1,848	1		
7185	37	73-60 198 St	2,857	1,848	1		
7185	39	73-64 198 St	2,822	1,848	1		
7185	41	73-68 198 St	2,822	1,848	1		
7185	48	73-73 197 St	3,089	1,860	1		
7185	50	73-67 197 St	3,089	1,848	1		
7185	52	73-65 197 St	3,089	1,848	1		
7185	54	73-61 197 St	3,089	1,848	1		
7185	56	73-59 197 St	3,089	1,848	1		
7185	58	73-53 197 St	3,089	1,848	1		
7185	60	73-51 197 St	3,089	1,848	1		
7185	62	73-45 197 St	3,089	1,848	1		
7185	64	73-43 197 St	3,089	1,848	1		
7185	66	73-37 197 St	3,089	1,848	1		
7185	68	73-35 197 St	3,089	1,848	1		
7185	70	73-29 197 St	3,089	1,848	1		
7185	72	73-27 197 St	3,089	1,848	1		
7185	74	73-21 197 St	3,089	1,848	1		
7185	76	73-19 197 St	3,089	1,848	1		
7185	78	73-13 197 St	3,089	1,848	1		
7185	80	73-11 197 St	3,089	1,848	1		
7185	82	73-05 197 St	3,089	1,864	1		
7184	1	73-03 196 Pl	5,700	1,910	1		
7184	6	73-04 197 St	2,900	1,848	1		
7184	8	73-06 197 St	3,000	1,848	1		
7184	9	73-10 197 St	3,000	1,848	1		
7184	11	73-12 197 St	3,000	1,848		924	924
7184	12	73-16 197 St	3,000	1,848	1		
7184	14	73-18 197 St	3,000	1,848	1		
7184	15	73-22 197 St	3,000	1,848	1		
7184	17	73-24 197 St	3,000	1,848	1		
7184	18	73-28 197 St	3,000	1,872	1		
7184	20	73-30 197 St	3,000	1,872	1		
7184	21	73-34 197 St	3,000	1,872	1		
7184	23	73-36 197 St	3,000	1,848	1		
7184	24	73-40 197 St	3,000	1,848	1		
7184	26	73-42 197 St	3,000	1,848	1		
7184	27	73-46 197 St	3,000	1,872	1		
7184	29	73-48 197 St	3,000	1,872	1		
7184	30	73-52 197 St	3,000	1,848	1		
7184	32	73-54 197 St	3,000	1,848	1		
7184	33	73-58 197 St	3,000	1,848	1		
7184	35	73-60 197 St	3,000	1,848	1		
7184	36	73-64 197 St	3,000	1,848	1		
7184	38	73-66 197 St	3,000	1,848	1		
7184	39	73-70 197 St	3,000	1,848	1		
7184	41	73-72 197 St	3,000	1,848	1		
7184	42	73-76 197 St	3,000	1,848	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7184	46	73-73 196 Pl	5,500	3,174	1		
7184	49	73-67 196 Pl	6,000	1,737	1		
7184	52	73-61 196 Pl	5,500	1,512	1		
7184	55	73-55 196 Pl	6,000	1,512	1		
7184	59	73-49 196 Pl	5,500	1,512	1		
7184	60	73-45 196 Pl	6,400	1,512	1		
7184	63	73-39 196 Pl	5,500	1,512	1		
7184	66	73-33 196 Pl	5,800	3,235	1		
7184	69	73-27 196 Pl	5,700	2,137	1		
7184	72	73-21 196 Pl	6,000	1,512	1		
7184	75	73-15 196 Pl	5,500	2,750	1		
7184	78	73-09 196 Pl	6,000	1,512	1		
7183	1	73-03 196 St	4,149	1,458	1		
7183	6	73-04 196 Pl	5,625	1,381	1		
7183	9	73-10 196 Pl	6,000	1,357	1		
7183	12	73-16 196 Pl	5,500	3,240	1		
7183	15	73-22 196 Pl	6,000	1,357	1		
7183	19	73-28 196 Pl	5,500	2,747	1		
7183	20	73-34 196 Pl	6,000	1,357	1		
7183	23	73-40 196 Pl	5,500	2,993	1		
7183	26	73-46 196 Pl	5,500	2,993	1		
7183	29	73-50 196 Pl	5,500	2,732	1		
7183	32	73-56 196 Pl	6,000	3,180	1		
7183	36	73-62 196 Pl	5,500	2,916	1		
7183	37	73-68 196 Pl	6,000	1,357	1		
7183	40	196-15 75 Ave	5,500	2,760	1		
7183	44	73-71 196 St	4,000	2,040	1		
7183	46	73-67 196 St	5,177	2,040	1		
7183	51	73-63 196 St	5,000	2,240	1		
7183	52	73-59 196 St	4,000	1,320	1		
7183	54	73-55 196 St	4,000	1,418	1		
7183	56	73-51 196 St	4,000	2,126	1		
7183	58	73-47 196 St	4,000	1,824	1		
7183	60	73-43 196 St	4,000	1,634	1		
7183	62	73-39 196 St	4,000	1,776	1		
7183	64	73-35 196 St	4,000	1,776	1		
7183	66	73-31 196 St	4,000	1,458	1		
7183	68	73-27 196 St	4,000	1,458	1		
7183	70	73-23 196 St	4,000	1,320	1		
7183	72	73-19 196 St	4,000	2,560	1		
7183	74	73-15 196 St	4,000	1,600	1		
7183	76	73-11 196 St	4,000	1,418	1		
7183	78	73-07 196 St	4,000	1,418	1		
7182	1	73-03 195 St	4,100	1,521	1		
7182	6	73-04 196 St	3,900	1,768	1		
7182	8	73-08 196 St	4,000	1,776	1		
7182	10	73-12 196 St	4,000	1,458	1		
7182	12	73-16 196 St	4,000	1,876	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7182	14	73-20 196 St	4,000	2,016	1		
7182	16	73-24 196 St	4,000	1,600	1		
7182	18	73-28 196 St	4,000	1,900	1		
7182	20	73-32 196 St	4,000	1,728	1		
7182	22	73-36 196 St	4,000	1,552	1		
7182	24	73-40 196 St	4,000	1,758	1		
7182	26	73-44 196 St	4,000	1,650	1		
7182	28	73-48 196 St	4,000	1,768	1		
7182	30	73-52 196 St	4,000	1,428	1		
7182	32	73-56 196 St	4,000	1,600	1		
7182	34	73-60 196 St	3,957	1,744	1		
7182	36	73-64 196 St	5,000	1,458	1		
7182	41	73-68 196 St	4,975	2,400	1		
7182	42	73-72 196 St	4,000	2,000	1		
7182	44	73-71 195 St	4,000	2,536	1		
7182	46	73-67 195 St	5,000	1,768	1		
7182	50	73-63 195 St	4,000	1,816	1		
7182	51	73-59 195 St	4,000	1,850	1		
7182	53	73-55 195 St	4,000	1,510	1		
7182	55	73-51 195 St	4,000	1,800	1		
7182	57	73-47 195 St	4,000	1,384	1		
7182	59	73-43 195 St	4,400	1,768	1		
7182	61	73-39 195 St	4,000	1,693	1		
7182	63	73-35 195 St	4,000	1,880	1		
7182	65	73-31 195 St	4,000	1,690	1		
7182	67	73-27 195 St	4,000	1,328	1		
7182	69	73-23 195 St	4,000	1,792	1		
7182	71	73-19 195 St	4,000	1,783	1		
7182	73	73-15 195 St	4,000	1,496	1		
7182	75	73-11 195 St	4,000	1,320	1		
7182	77	73-07 195 St	4,000	1,800	1		
7181	1	73-03 194 St	4,100	1,780	1		
7181	6	73-04 195 St	4,100	1,458	1		
7181	8	73-08 195 St	4,100	1,352	1		
7181	10	73-12 195 St	4,000	2,200	1		
7181	12	73-16 195 St	4,000	2,238	1		
7181	14	73-20 195 St	4,000	1,352	1		
7181	16	73-24 195 St	4,000	1,352	1		
7181	18	73-28 195 St	4,000	1,768	1		
7181	20	73-32 195 St	4,000	1,418	1		
7181	22	73-36 195 St	4,000	2,154	1		
7181	24	73-40 195 St	4,000	1,418	1		
7181	26	73-44 195 St	4,000	1,458	1		
7181	28	73-48 195 St	4,000	1,448	1		
7181	30	73-52 195 St	4,500	1,850	1		
7181	32	73-56 195 St	4,000	1,728	1		
7181	34	73-60 195 St	4,000	1,482	1		
7181	36	73-64 195 St	4,000	1,352	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7181	38	73-68 195 St	4,500	1,828	1		
7181	40	73-72 195 St	4,000	1,716	1		
7181	42	73-71 194 St	4,000	1,418	1		
7181	44	73-67 194 St	4,000	1,408	1		
7181	46	73-63 194 St	4,000	1,600	1		
7181	48	73-59 194 St	4,000	1,352	1		
7181	50	73-55 194 St	4,700	2,800	1		
7181	52	73-51 194 St	4,000	1,352	1		
7181	54	73-47 194 St	4,000	1,418	1		
7181	56	73-43 194 St	4,000	1,352	1		
7181	58	73-39 194 St	4,000	1,352	1		
7181	60	73-35 194 St	4,000	1,424	1		
7181	62	73-31 194 St	4,000	1,985	1		
7181	64	73-27 194 St	4,000	1,720	1		
7181	66	73-23 194 St	4,000	1,770	1		
7181	68	73-19 194 St	4,000	1,418	1		
7181	70	73-15 194 St	4,000	1,458	1		
7181	72	73-11 194 St	4,000	1,996	1		
7181	74	73-07 194 St	4,000	1,424	1		
7180	1	73-03 193 St	3,700	1,418	1		
7180	6	73-04 194 St	4,000	1,600	1		
7180	8	73-08 194 St	4,000	1,652	1		
7180	10	73-12 194 St	4,000	1,852	1		
7180	12	73-16 194 St	4,000	1,134	1		
7180	14	73-20 194 St	4,000	2,348	1		
7180	16	73-24 194 St	4,000	1,670	1		
7180	18	73-28 194 St	4,000	2,052	1		
7180	20	73-32 194 St	4,000	1,643	1		
7180	22	73-36 194 St	4,000	1,424	1		
7180	24	73-40 194 St	4,000	1,568	1		
7180	26	73-44 194 St	4,000	1,720	1		
7180	28	73-48 194 St	4,300	1,754	1		
7180	30	73-52 194 St	4,000	1,683	1		
7180	32	73-56 194 St	4,000	1,432	1		
7180	34	73-60 194 St	4,000	1,492	1		
7180	36	73-64 194 St	4,000	1,470	1		
7180	38	73-68 194 St	4,000	1,772	1		
7180	40	73-72 194 St	4,000	1,720	1		
7180	42	73-71 193 St	4,000	1,544	1		
7180	44	73-67 193 St	4,000	1,408	1		
7180	46	73-63 193 St	4,000	1,418	1		
7180	48	73-59 193 St	4,000	1,422	1		
7180	50	73-55 193 St	4,000	1,538	1		
7180	52	73-51 193 St	4,000	1,395	1		
7180	54	73-47 193 St	4,000	1,800	1		
7180	56	73-43 193 St	4,000	1,072	1		
7180	58	73-39 193 St	4,000	1,772	1		
7180	60	73-35 193 St	4,000	1,418	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7180	62	73-31 193 St	4,000	1,072	1		
7180	64	73-27 193 St	4,000	1,418	1		
7180	66	73-23 193 St	4,000	1,720	1		
7180	68	73-19 193 St	4,000	1,760	1		
7180	70	73-15 193 St	4,000	1,992	1		
7180	72	73-11 193 St	4,000	1,775	1		
7180	74	73-07 193 St	4,000	1,352	1		
7179	1	73-03 192 St	4,000	1,760	1		
7179	6	73-04 193 St	3,700	1,560	1		
7179	8	73-08 193 St	3,942	1,560	1		
7179	10	73-12 193 St	3,942	1,560	1		
7179	12	73-16 193 St	3,942	2,048	1		
7179	14	73-20 193 St	3,942	1,643	1		
7179	16	73-24 193 St	3,942	1,392	1		
7179	18	73-28 193 St	3,942	1,768	1		
7179	20	73-32 193 St	3,942	1,208	1		
7179	22	73-36 193 St	3,942	1,608	1		
7179	24	73-40 193 St	3,942	1,418	1		
7179	26	73-44 193 St	3,942	1,482	1		
7179	28	73-48 193 St	3,942	1,643	1		
7179	30	73-52 193 St	3,942	1,208	1		
7179	32	73-56 193 St	3,942	1,728	1		
7179	34	73-60 193 St	3,942	1,418	1		
7179	47	73-55 192 St	4,000	1,200	1		
7179	49	73-51 192 St	4,000	1,872	1		
7179	51	73-47 192 St	4,300	1,560	1		
7179	53	73-43 192 St	4,000	1,623	1		
7179	55	73-39 192 St	4,000	1,688	1		
7179	57	73-35 192 St	4,000	1,196	1		
7179	59	73-31 192 St	4,000	1,208	1		
7179	61	73-27 192 St	4,000	1,648	1		
7179	63	73-23 192 St	4,000	1,460	1		
7179	65	73-19 192 St	4,500	2,106	1		
7179	67	73-15 192 St	4,100	1,600	1		
7179	69	73-11 192 St	4,200	1,658	1		
7179	71	73-07 192 St	4,000	2,520	1		
7178	1	73-03 190 St	4,300	2,316	1		
7178	7	73-02 192 St	4,300	2,500	1		
7178	9	73-06 192 St	4,000	1,568	1		
7178	11	73-10 192 St	4,000	1,724	1		
7178	13	73-14 192 St	4,000	1,540	1		
7178	15	73-18 192 St	4,000	1,920	1		
7178	17	73-22 192 St	4,000	2,012	1		
7178	19	73-26 192 St	4,000	1,611	1		
7178	21	73-30 192 St	4,000	1,392	1		
7178	23	73-34 192 St	4,000	1,772	1		
7178	25	73-38 192 St	4,400	2,164	1		
7178	61	73-27 190 St	4,000	1,800	1		

Block	Lot #	Address	Lot Area	Bldg Area	Units	Mixed Resid	Mixed Comm
7178	63	73-23 190 St	4,000	1,560	1		
7178	65	73-19 190 St	4,000	2,016	1		
7178	67	73-15 190 St	4,000	2,366	1		
7178	69	73-11 190 St	4,000	1,560	1		
7178	71	73-07 190 St	4,000	1,144	1		
7212	1	75-03 196 St	4,000	1,912	1		
7212	6	75-04 196 Pl	5,667	1,392	1		
7212	76	75-07 196 St	4,500	1,945	1		
7211	1	75-03 195 St	5,000	1,924	1		
7211	6	75-02 196 St	4,000	1,680	1		
7211	8	75-06 196 St	4,000	1,476	1		
7211	73	75-07 195 St	4,000	1,600	1		
7210	1	75-03 194 St	4,000	1,998	1		
7210	6	75-04 195 St	4,000	1,864	1		
			5,767,542	3,399,828	3,171	3,735	3,735
		Resid-Only	5,656,748	3,366,524			
		Mixed	10,844	7,469			
		Commercial	99,950	25,835			

L1.4R – DIVERSE USES

NYC Green Schools Rating System

School Construction Authority

DIVERSE USES

CREDIT FORM

Credit L1.4R

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: SD | DD | 60% | 100% | Design | CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	MGA Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	

INSTRUCTIONS:
Step 1) Complete the table below with Diverse Uses within 1/2 mile (2,640 feet) walking distance and accessible by pedestrian access.
Step 2) Fill in eight or more uses. **Ten services are required to attain Credit L.2.2.**
Step 3) No more than one use in each Use Type may be counted toward compliance (except restaurants which may be listed up to twice).
Step 4) Services must be from at least three of the five Category Types.
Step 5) Submit site plan with basic service locations matching the numbering in the table below.

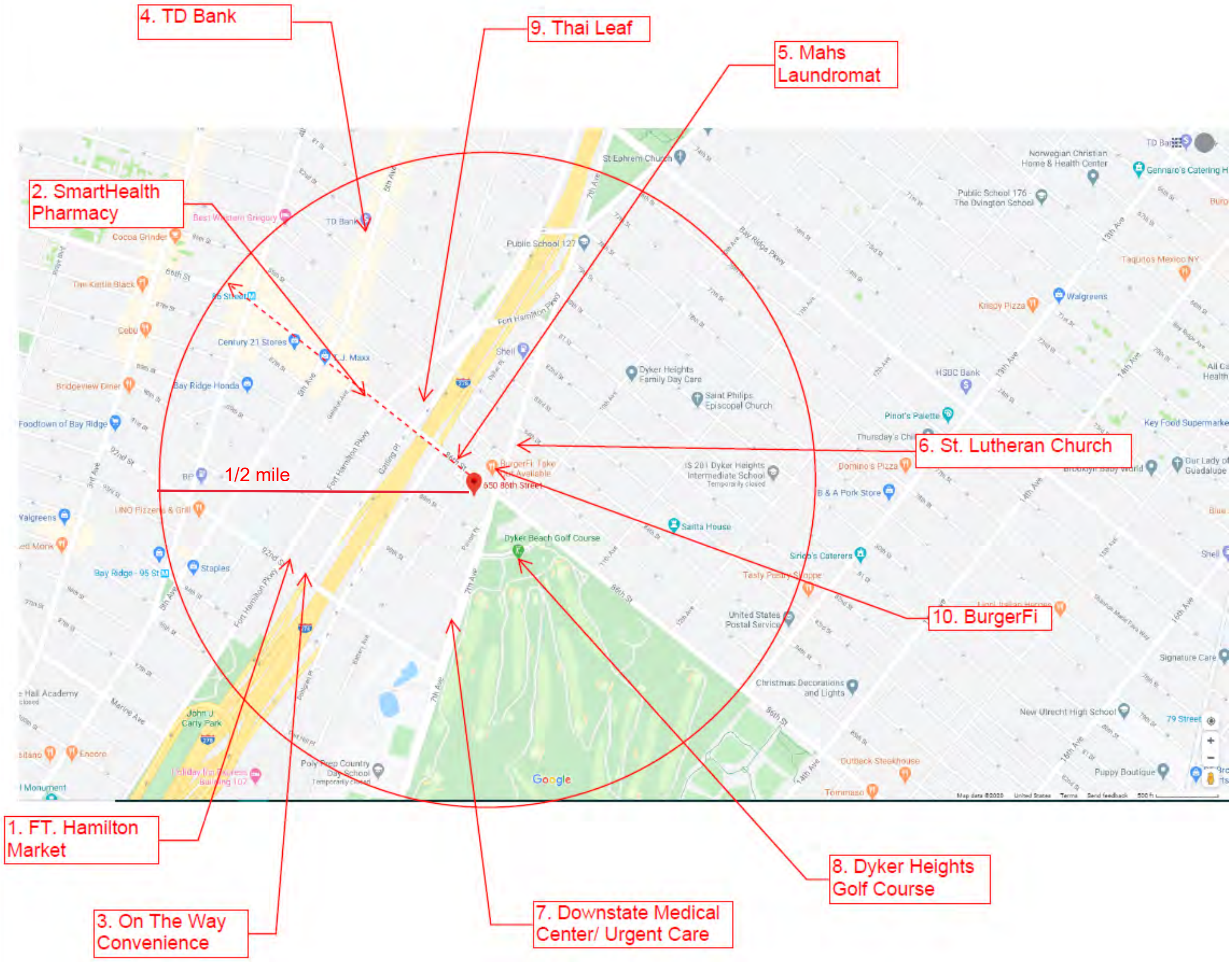
Step 1: Input business name and type

Plan Key	Business Name	Category Type	Use Type
1	US Post Service	Civic_Community_Facilities	Post office
2	Queens Public Library at Fresh Meadows	Civic_Community_Facilities	Library
3	AMC Cinema	Services	Theater
4	CITI Bank	Services	Bank
5	Fresh MeadoVll"S Community Center	Civic_Community_Facilities	Community center
6	Walgreens Pharmacy	Community_Service_Retail	Pharmacy
7	Public School 0040	Civic_Community_Facilities	Another School or University
8	IOG Supermarket	Food_Retail	Supermarket
9	Kowloon Café	Services	Restaurant
10	Cunningham Park	Civic_Community_Facilities	Park
TOTALS	10	4	
	# of unique businesses	# of category types	

Points: **2**

Table 1: Use Types and Categories

Category	Food Retail	Community Service Retail	Services	Civic & Community Facilities	Community Anchor
Use Type	Supermarket	Convenience store	Bank	Senior care facility	Commercial office
	Grocery with produce	Hardware store	Theater	Day care	
		Pharmacy	Fitness center	Community center	
			Hair care	Place of worship	
			Laundry	Another school or university	
			Restaurant	Medical/Dental	
			Entertainment venue	Cultural arts facility	
			Sports	Fire station	
				Library	
				Post office	
				Park	

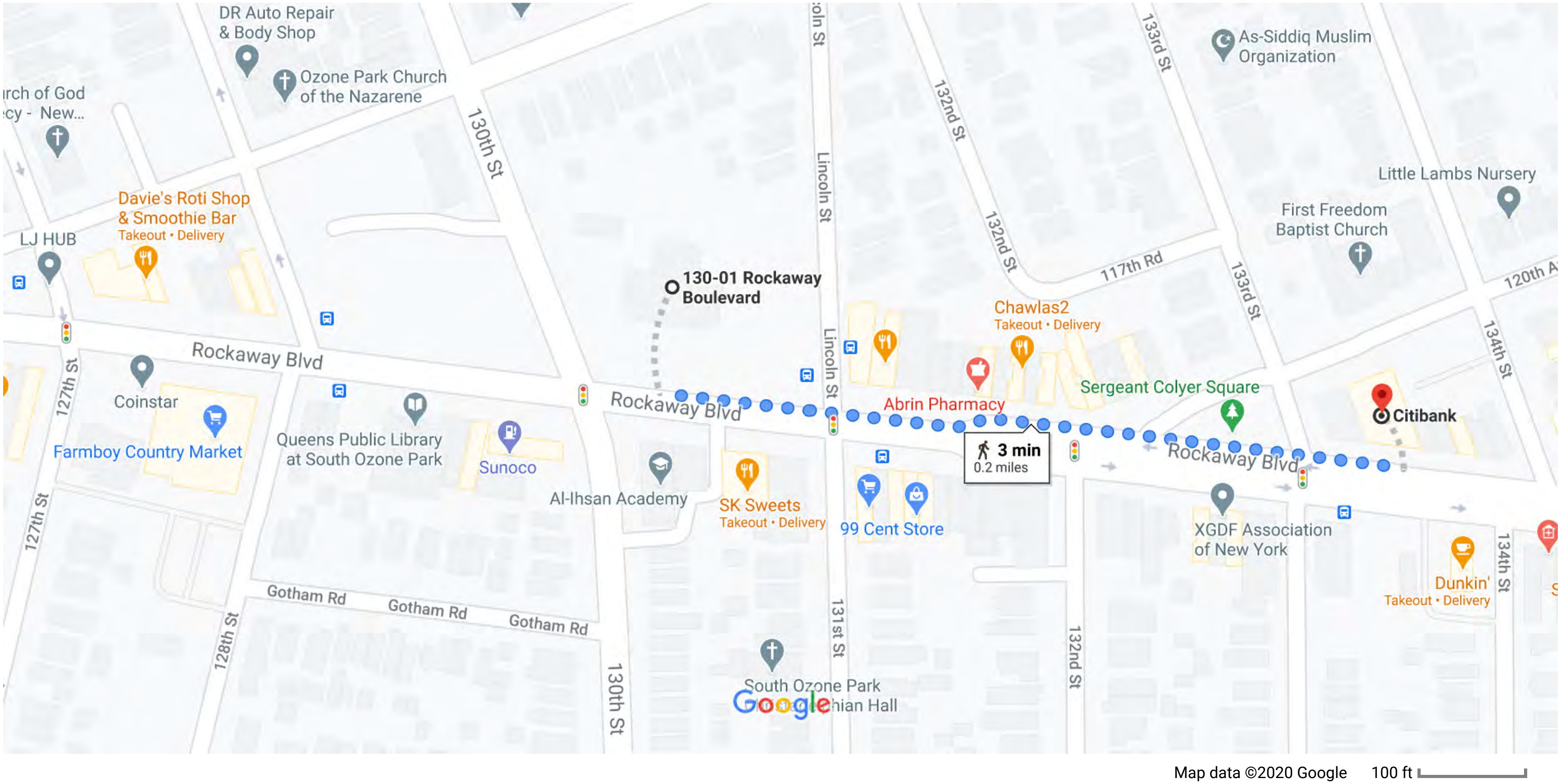


4. TD Bank
9. Thai Leaf
5. Mahs Laundromat
2. SmartHealth Pharmacy
1/2 mile
6. St. Lutheran Church
10. BurgerFi
1. FT. Hamilton Market
8. Dyker Heights Golf Course
3. On The Way Convenience
7. Downstate Medical Center/ Urgent Care

Google Maps

Rockaway Boulevard, Queens, NY to Citibank

Walk 0.2 mile, 3 min



via Rockaway Blvd 3 min

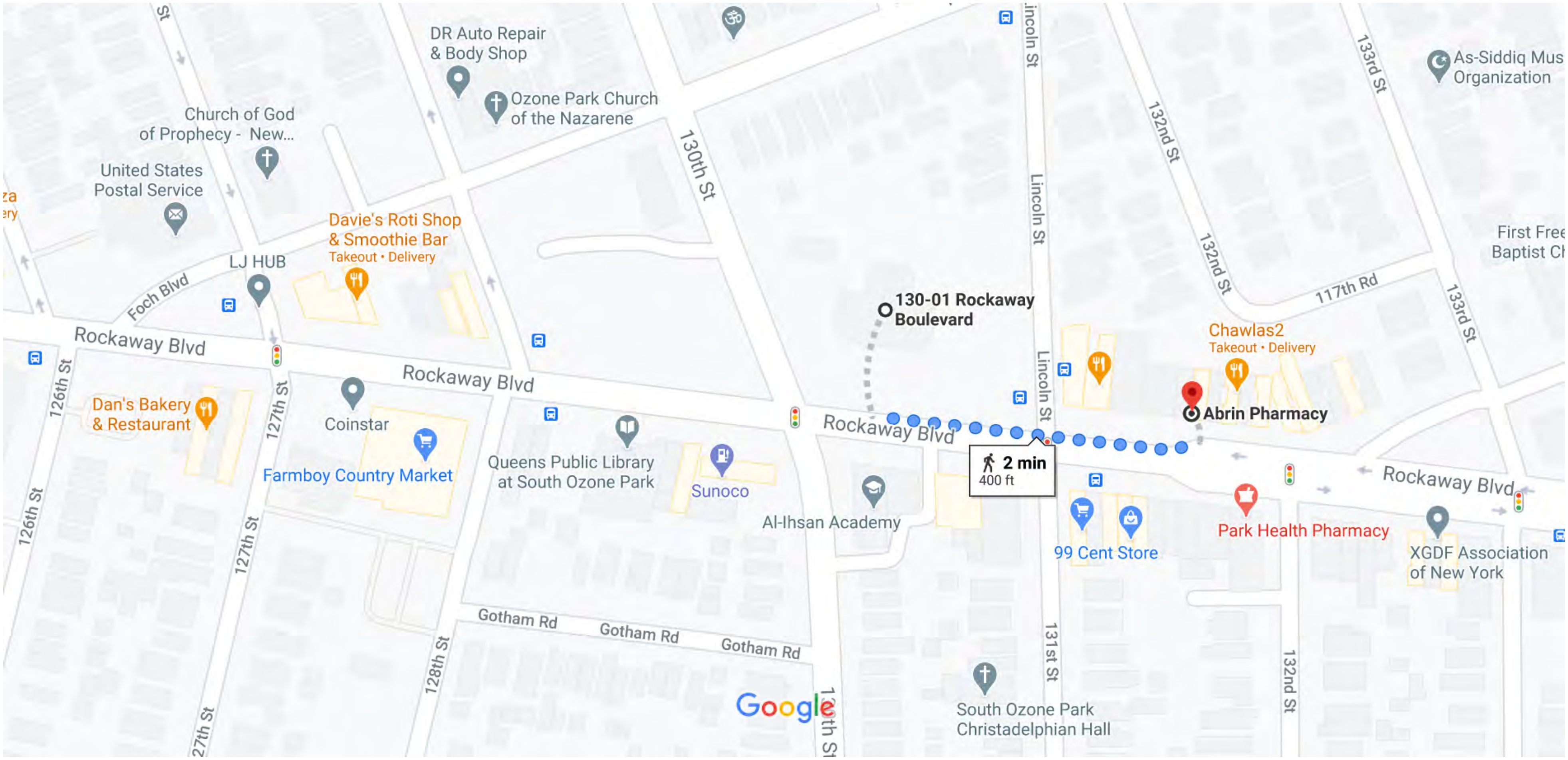
0.2 mile

Mostly at

Google Maps

Rockaway Boulevard, Queens, NY to Abrin Pharmacy

Walk 404 ft, 2 min



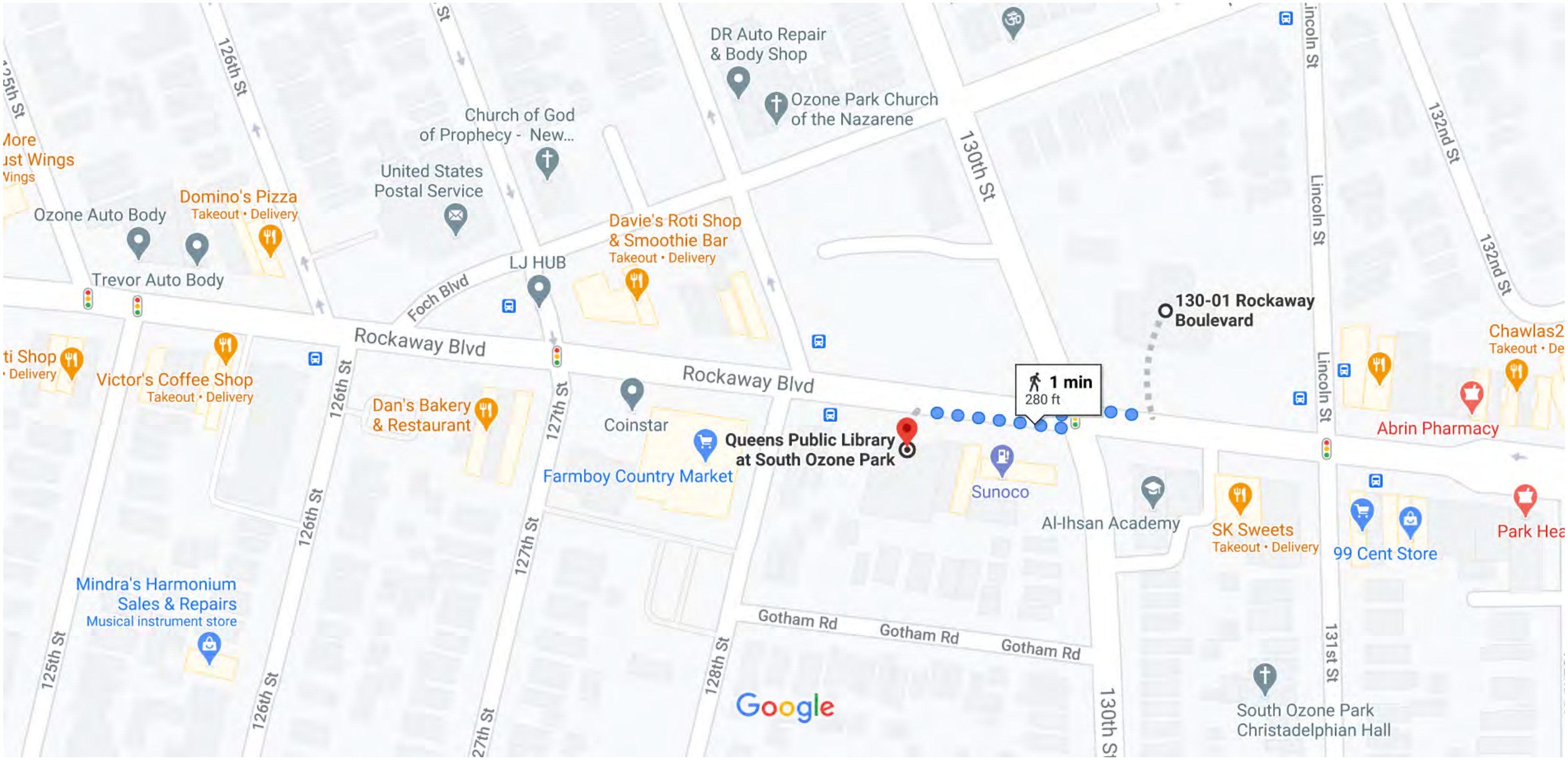
Map data ©2020 Google 100 ft

via Rockaway Blvd 2 min

404 ft

Mostly at

Google Maps Rockaway Boulevard, Queens, NY to Queens Public Library at South Ozone Park Walk 282 ft, 1 min



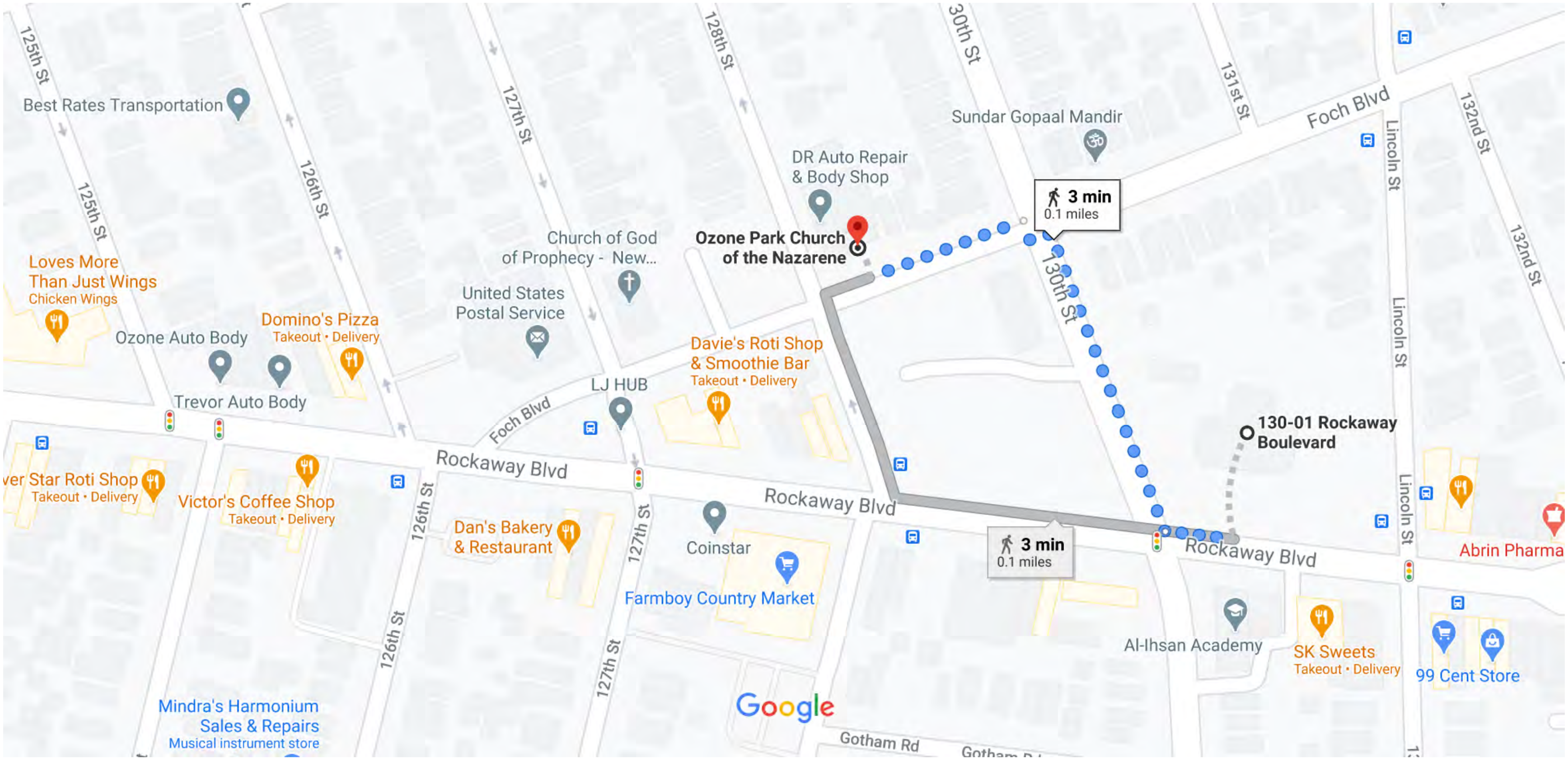
Map data ©2020 Google 100 ft

via Rockaway Blvd 1 min

282 ft

Mostly at

Google Maps Rockaway Boulevard, Queens, NY to Ozone Park Church of the Nazarene Walk 0.1 mile, 3 min

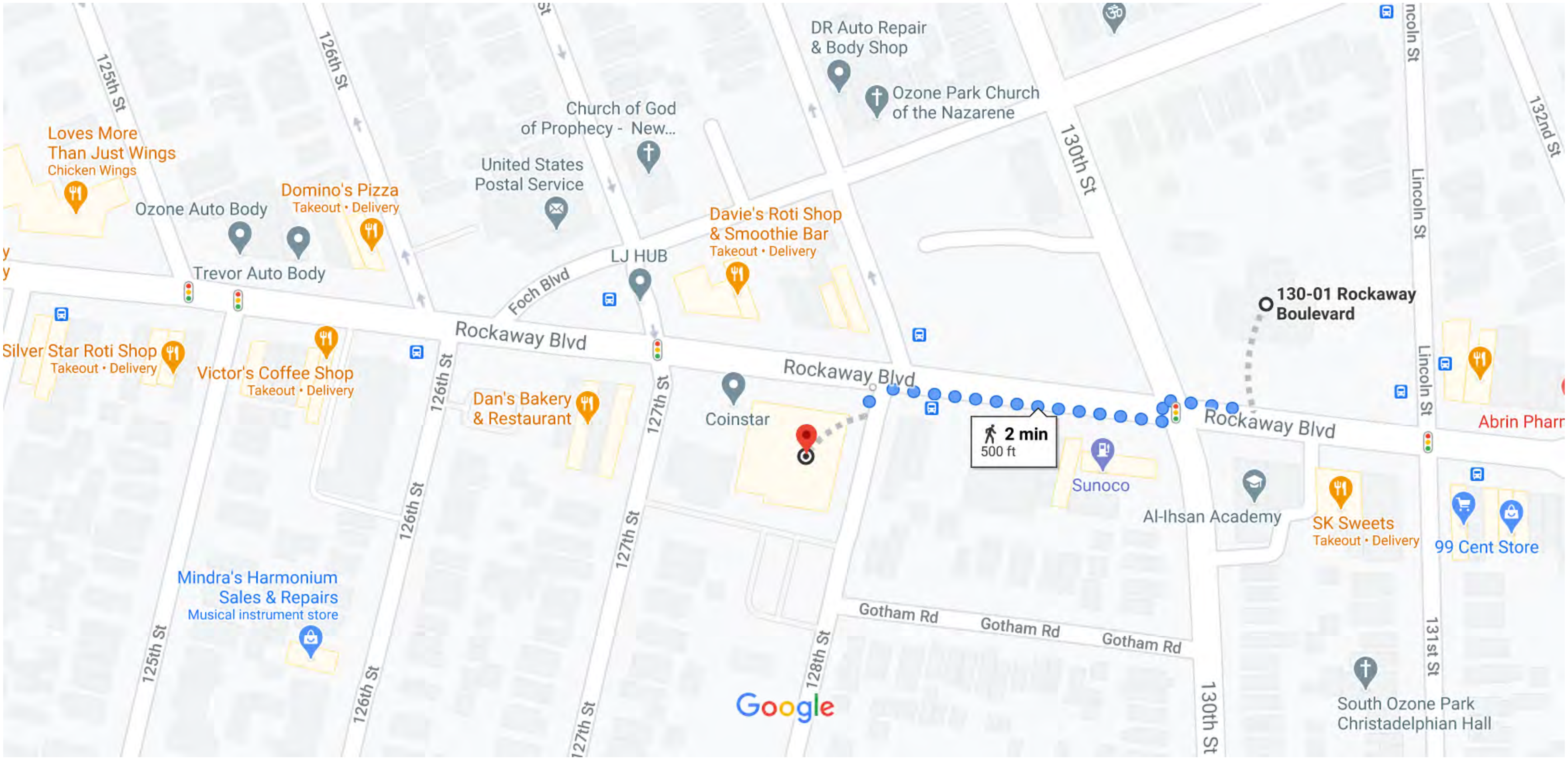


Map data ©2020 Google 100 ft

via 130th St and Foch Blvd 3 min 0.1 mile

via Rockaway Blvd and 128th St 3 min 0.1 mile

Google Maps Rockaway Boulevard, Queens, NY to Farmboy Country Market Walk 495 ft, 2 min



Map data ©2020 Google 100 ft

via Rockaway Blvd 2 min

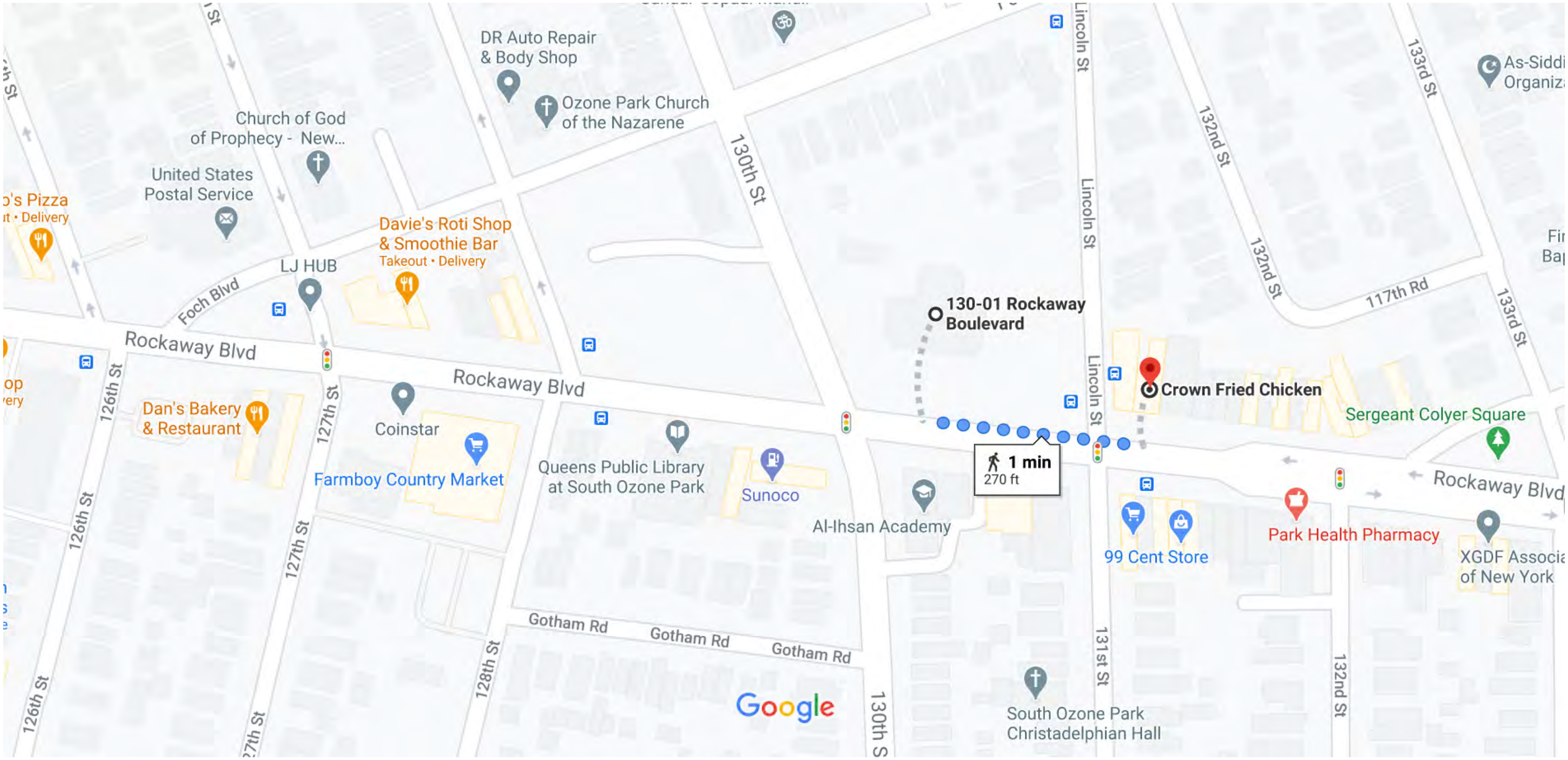
495 ft

Mostly at

Google Maps

Rockaway Boulevard, Queens, NY to Crown Fried Chicken

Walk 266 ft, 1 min



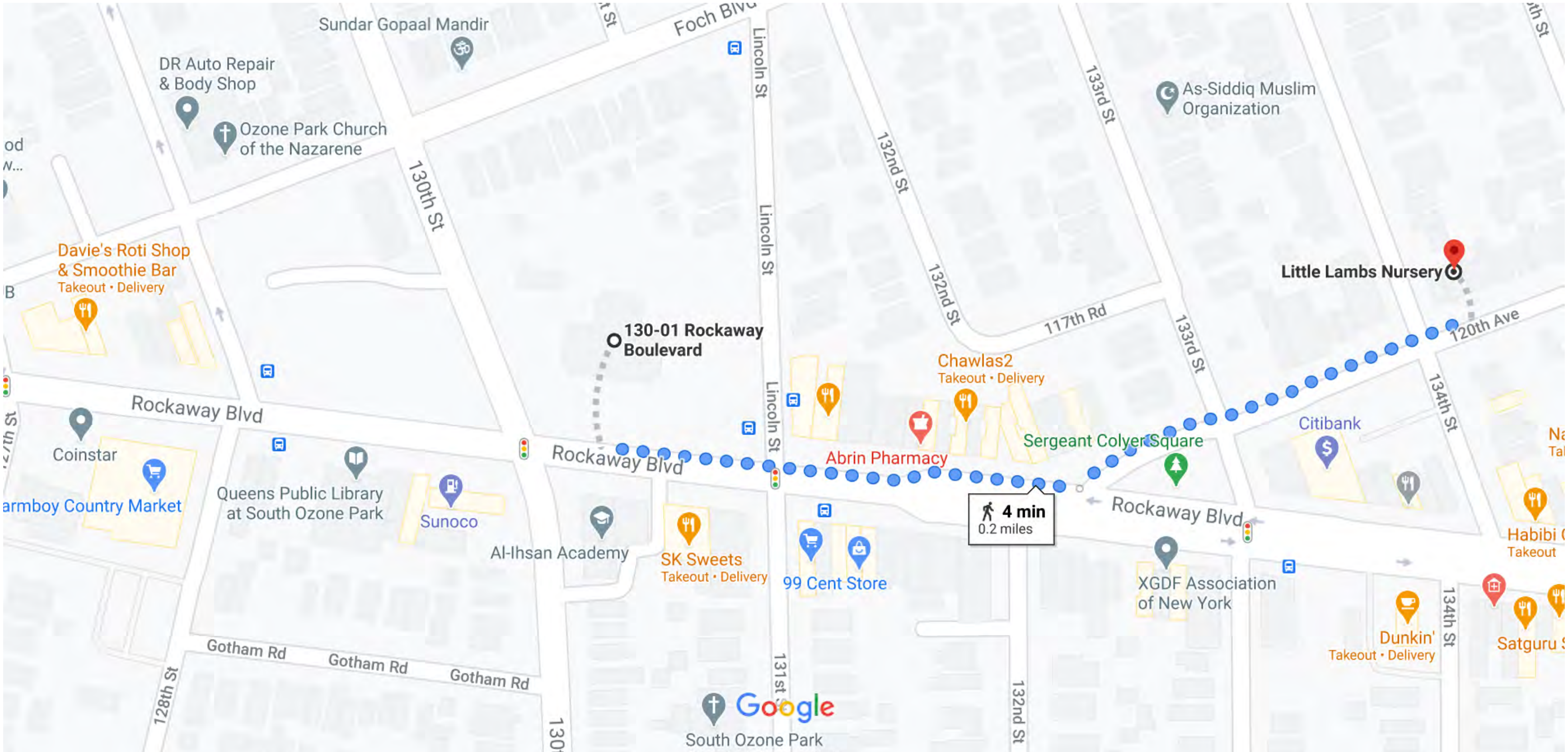
Map data ©2020 Google 100 ft

via Rockaway Blvd 1 min

266 ft

Mostly at

Google Maps Rockaway Boulevard, Queens, NY to Little Lambs Nursery Walk 0.2 mile, 4 min

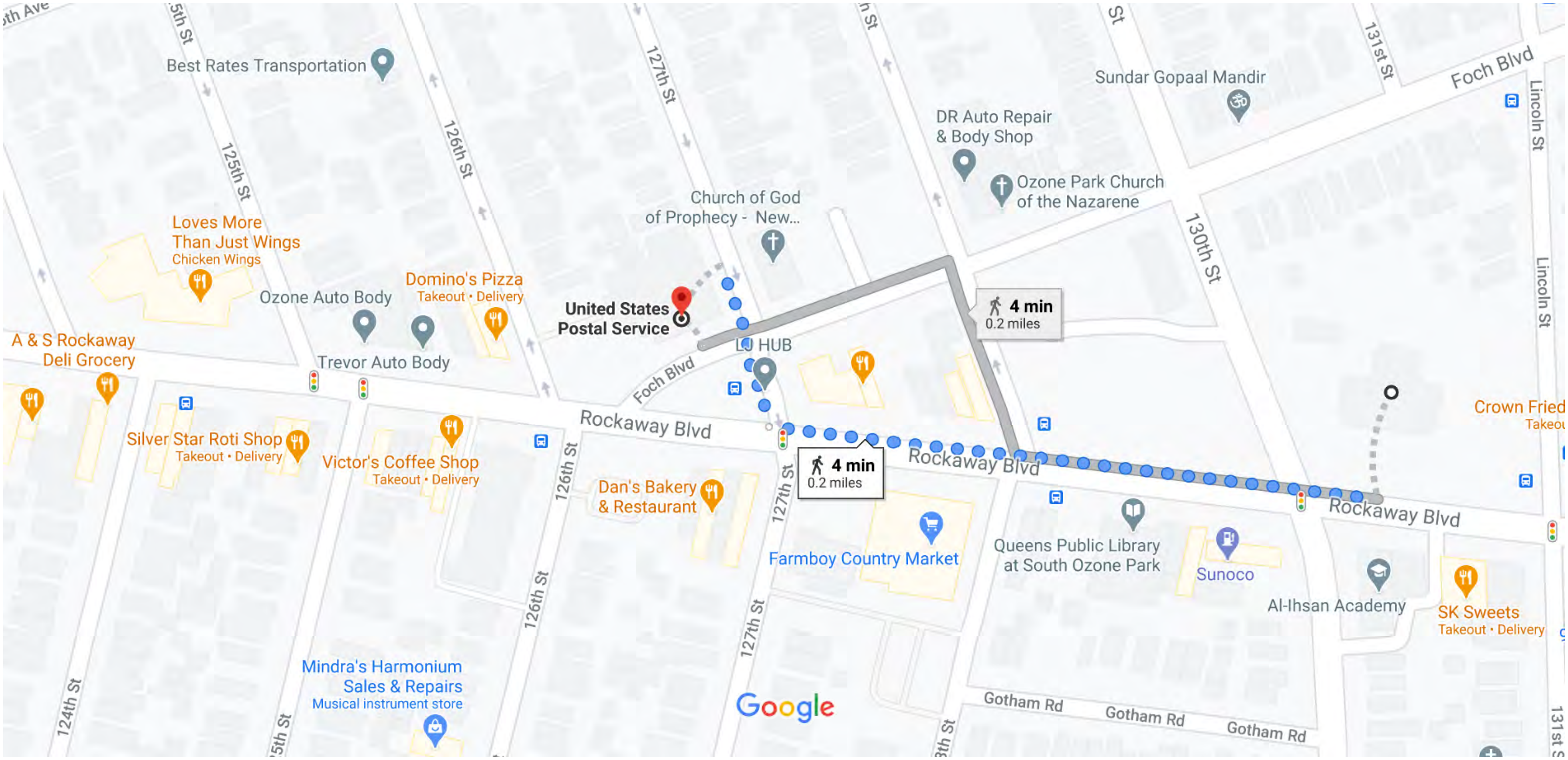


via Rockaway Blvd and 120th Ave 4 min

0.2 mile

Mostly at

Google Maps Rockaway Boulevard, Queens, NY to United States Postal Service Walk 0.2 mile, 4 min



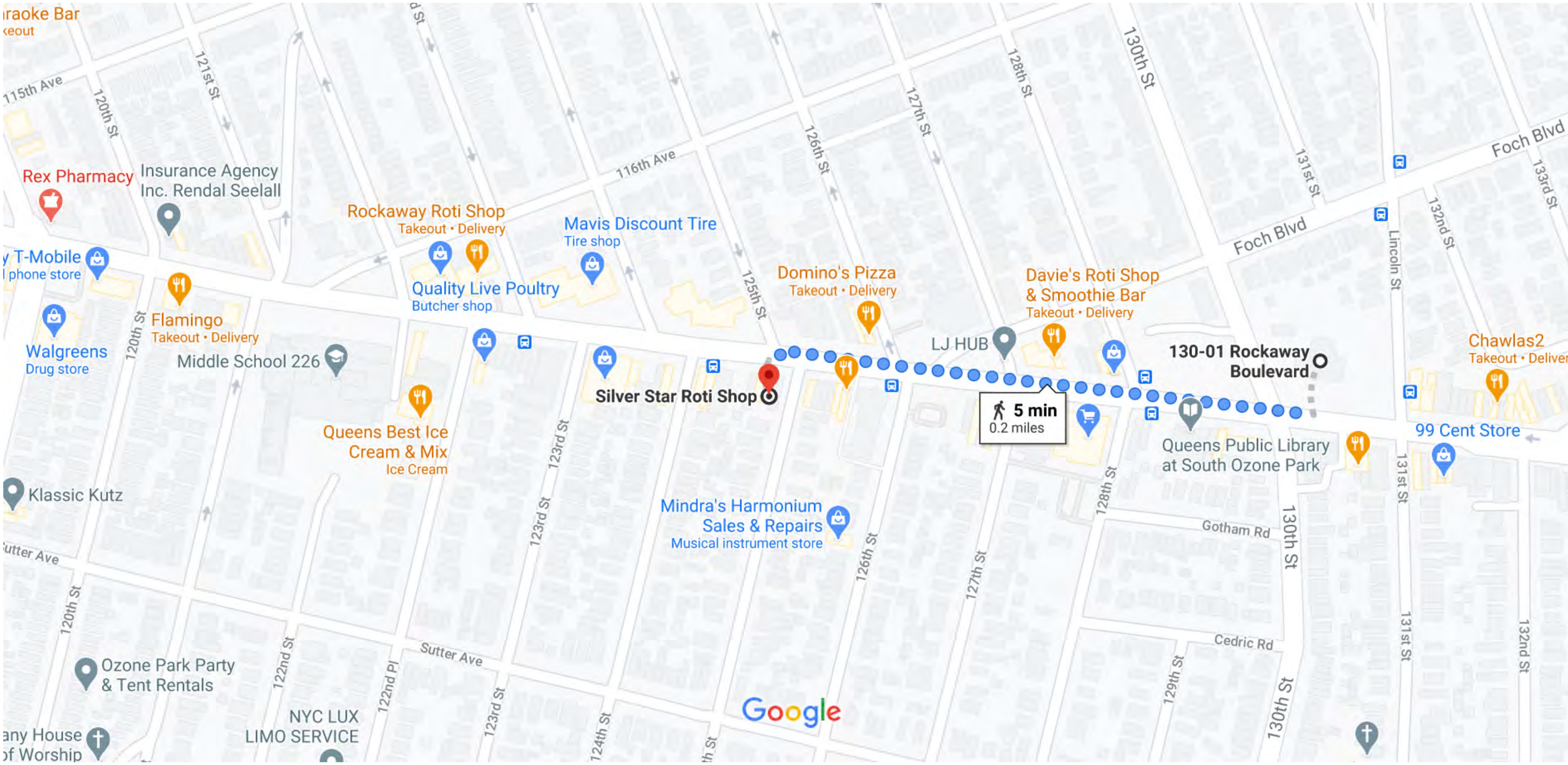
Map data ©2020 Google 100 ft

	via Rockaway Blvd	4 min 0.2 mile
	via Rockaway Blvd, 128th St and Foch Blvd	4 min 0.2 mile

Google Maps

Rockaway Boulevard, Queens, NY to Silver Star Roti Shop

Walk 0.2 mile, 5 min



Map data ©2020 Google 200 ft

via Rockaway Blvd 5 min

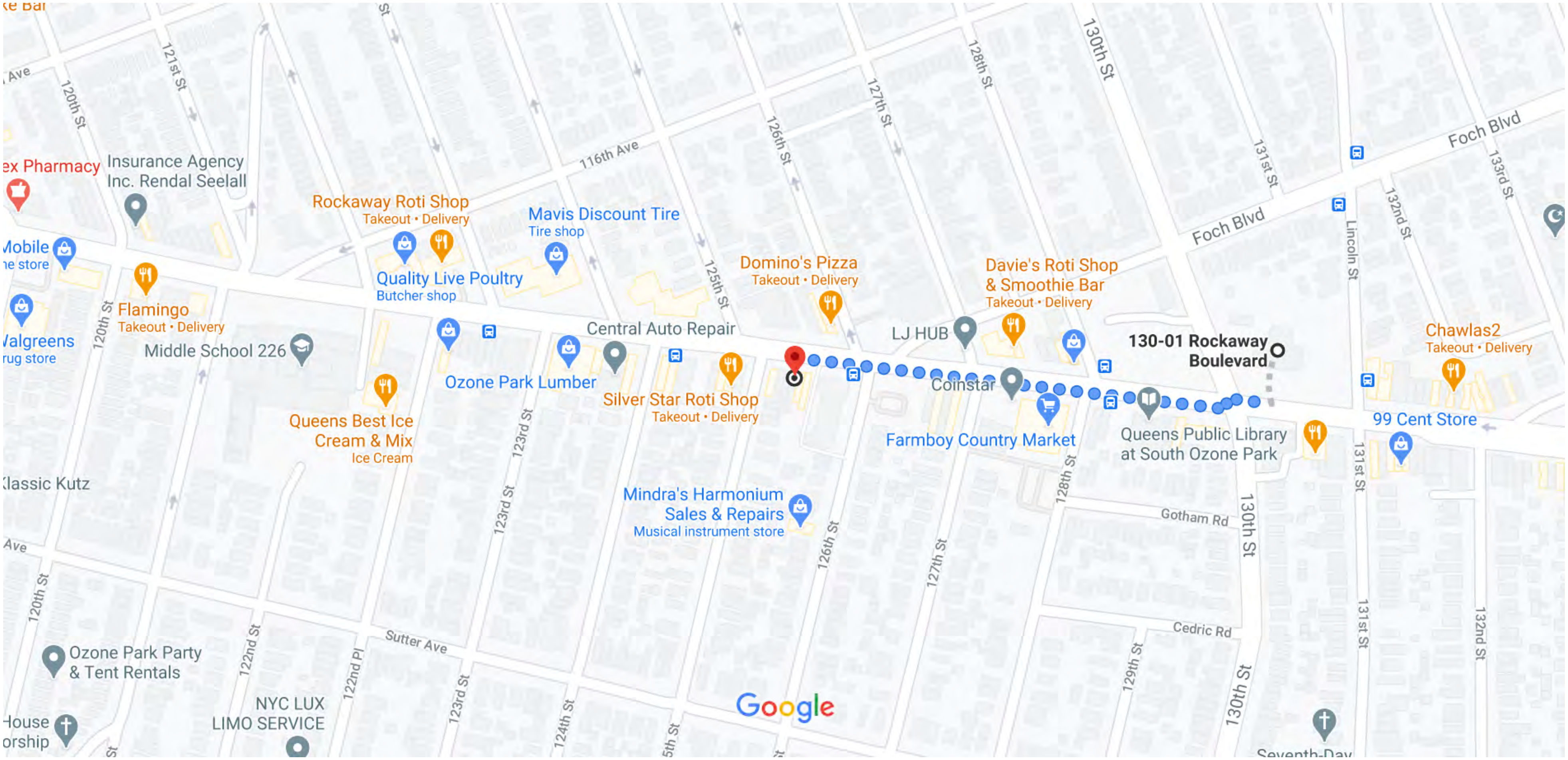
0.2 mile

Mostly at

Google Maps

Rockaway Boulevard, Queens, NY to J & D Laundromat

Walk 0.2 mile, 5 min



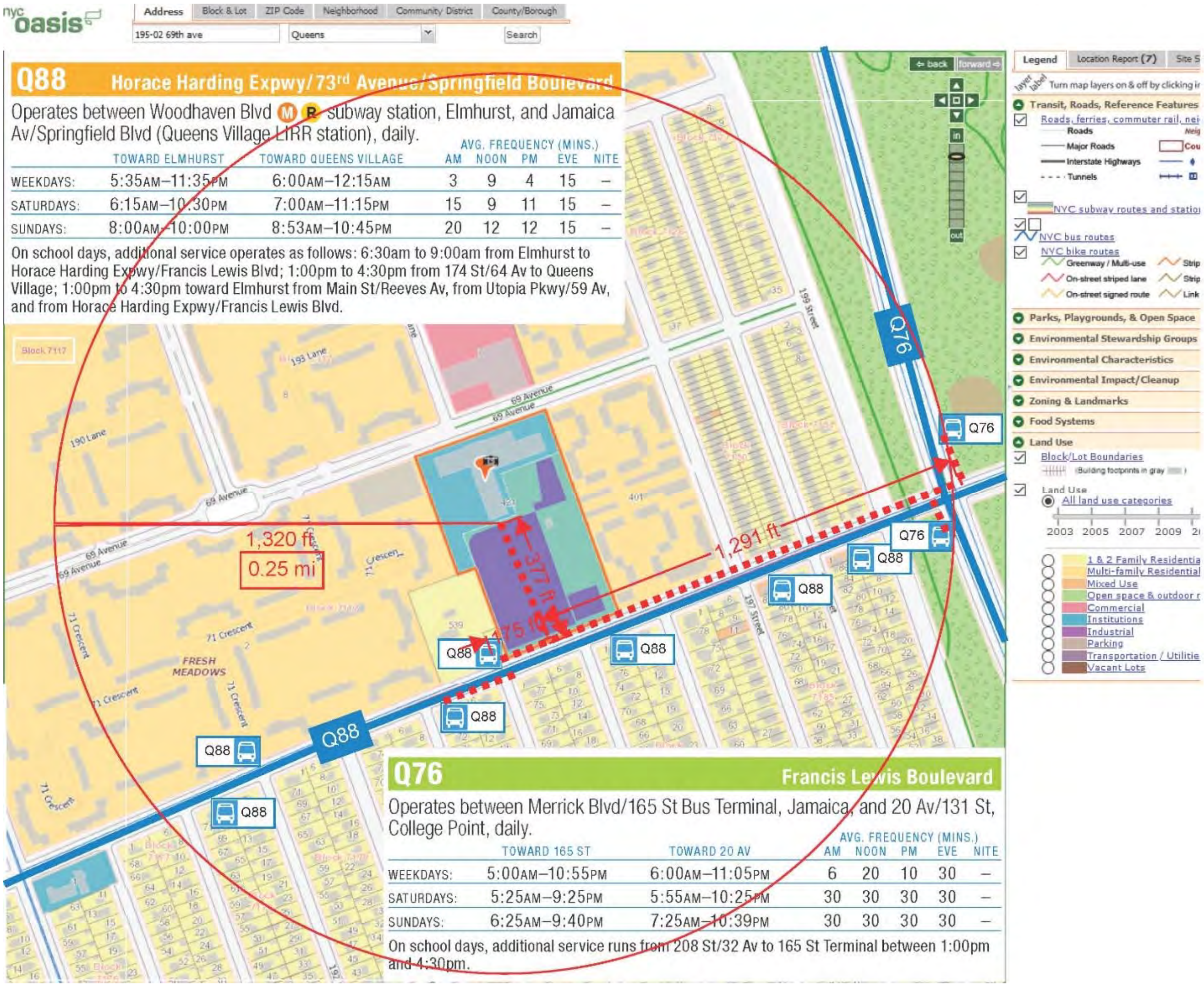
Map data ©2020 Google 200 ft

via Rockaway Blvd 5 min

0.2 mile

Mostly at

L2.1R – ACCESS TO QUALITY TRANSIT



Q88 Horace Harding Expwy/73rd Avenue/Springfield Boulevard

Operates between Woodhaven Blvd M R subway station, Elmhurst, and Jamaica Av/Springfield Blvd (Queens Village LIRR station), daily.

	TOWARD ELMHURST	TOWARD QUEENS VILLAGE	AM	NOON	PM	EVE	NITE
			AVG. FREQUENCY (MINS.)				
WEEKDAYS:	5:35AM–11:35PM	6:00AM–12:15AM	3	9	4	15	–
SATURDAYS:	6:15AM–10:30PM	7:00AM–11:15PM	15	9	11	15	–
SUNDAYS:	8:00AM–10:00PM	8:53AM–10:45PM	20	12	12	15	–

On school days, additional service operates as follows: 6:30am to 9:00am from Elmhurst to Horace Harding Expwy/Francis Lewis Blvd; 1:00pm to 4:30pm from 174 St/64 Av to Queens Village; 1:00pm to 4:30pm toward Elmhurst from Main St/Reeves Av, from Utopia Pkwy/59 Av, and from Horace Harding Expwy/Francis Lewis Blvd.

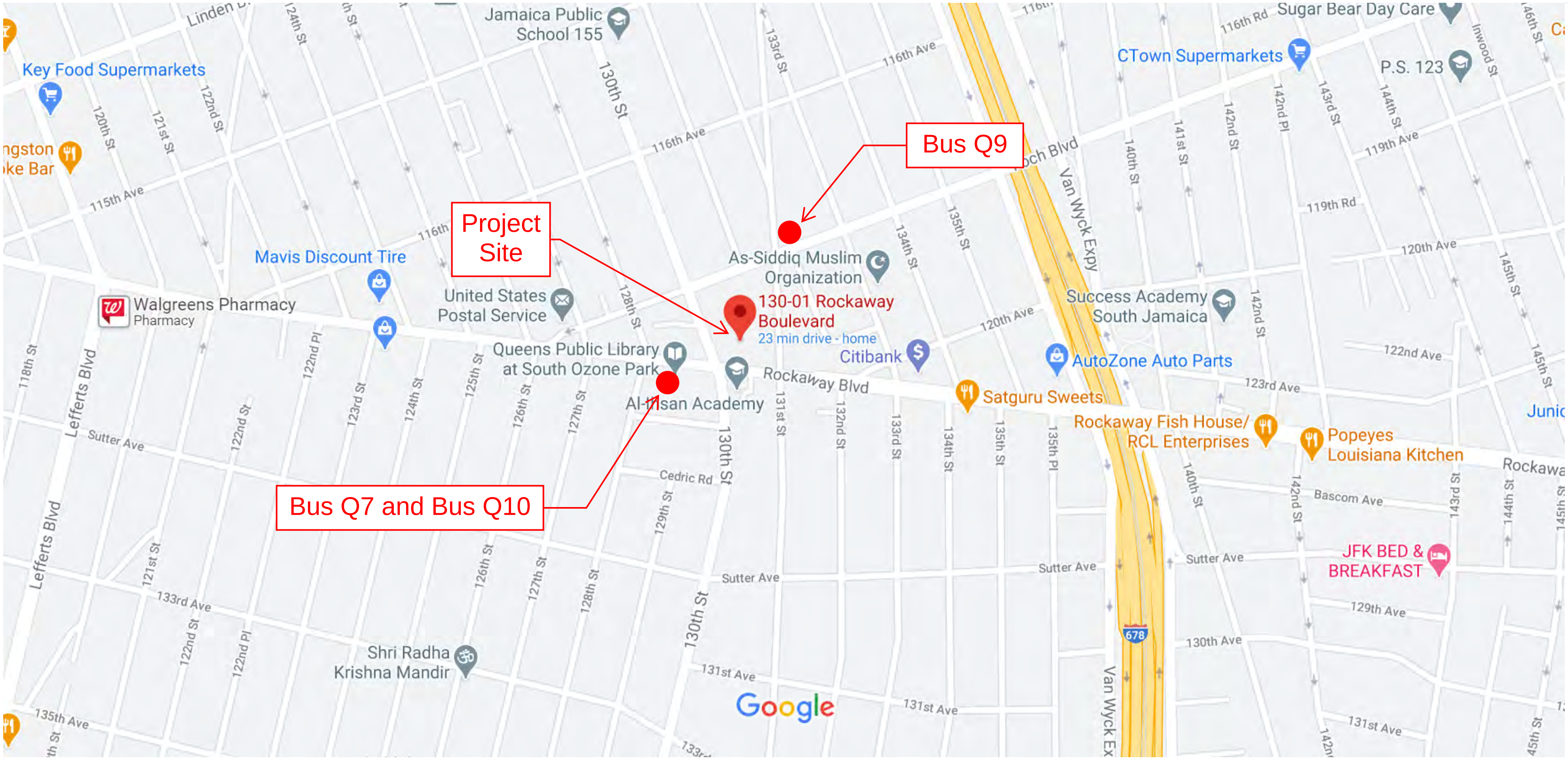
Q76 Francis Lewis Boulevard

Operates between Merrick Blvd/165 St Bus Terminal, Jamaica, and 20 Av/131 St, College Point, daily.

	TOWARD 165 ST	TOWARD 20 AV	AM	NOON	PM	EVE	NITE
			AVG. FREQUENCY (MINS.)				
WEEKDAYS:	5:00AM–10:55PM	6:00AM–11:05PM	6	20	10	30	–
SATURDAYS:	5:25AM–9:25PM	5:55AM–10:25PM	30	30	30	30	–
SUNDAYS:	6:25AM–9:40PM	7:25AM–10:39PM	30	30	30	30	–

On school days, additional service runs from 208 St/32 Av to 165 St Terminal between 1:00pm and 4:30pm.

Google Maps Rockaway Blvd



Map data ©2020 500 ft

Q7
Weekday Trips = 81
Q10
Weekday Trips = 198
Q9
Weekday Trips = 82

TOTAL TRIPS
Weekday = 361

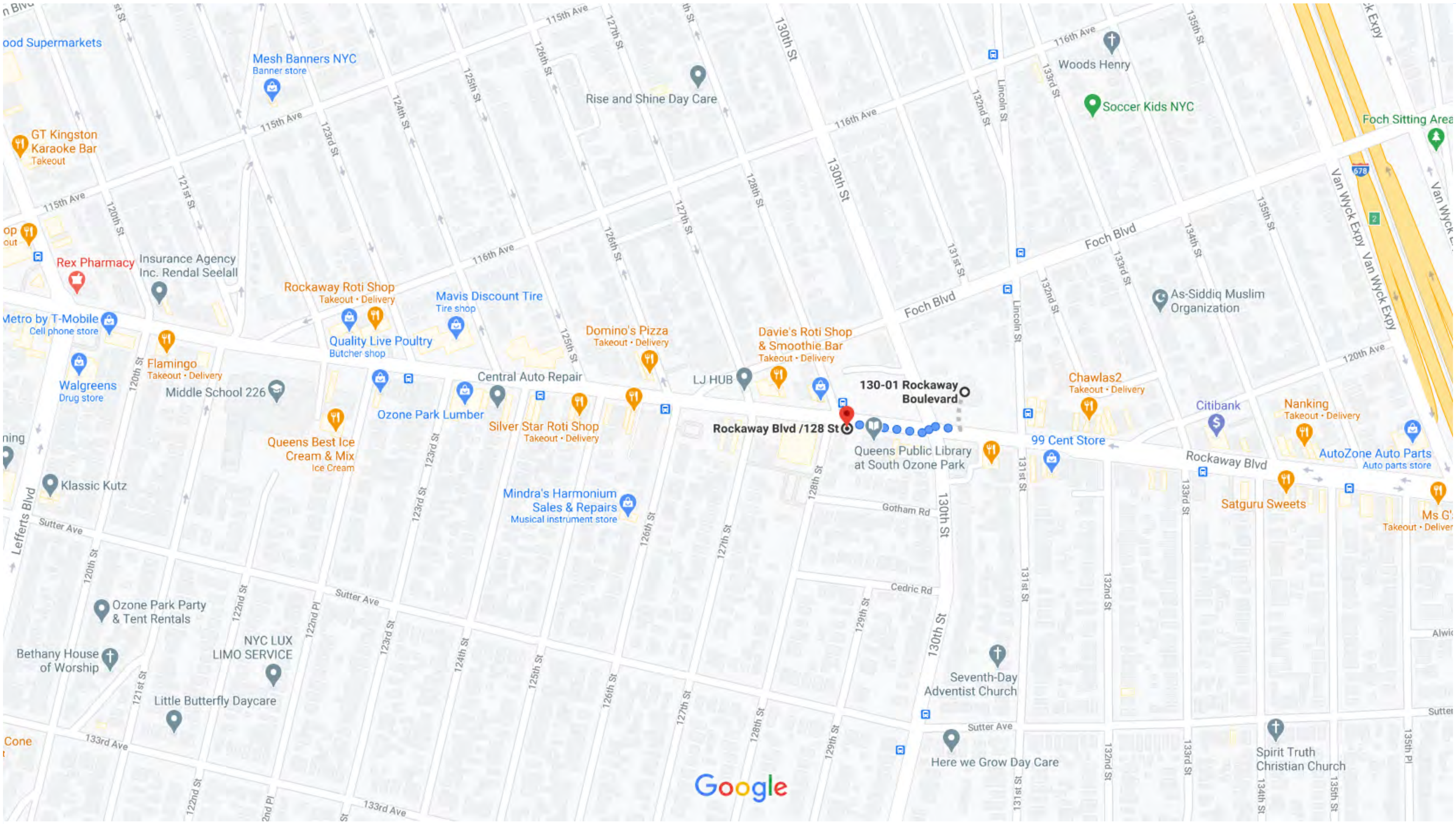
Note that this credit should take into account the operating schedule (inclusive of staff time before and after school hours).

Google Maps

Rockaway Boulevard, Queens, NY to Rockaway Blvd /128 St, Queens, NY 11420

Walk 384 ft, 2 min

Q7 & Q10



Map data ©2020 Google 200 ft

via Rockaway Blvd 2 min

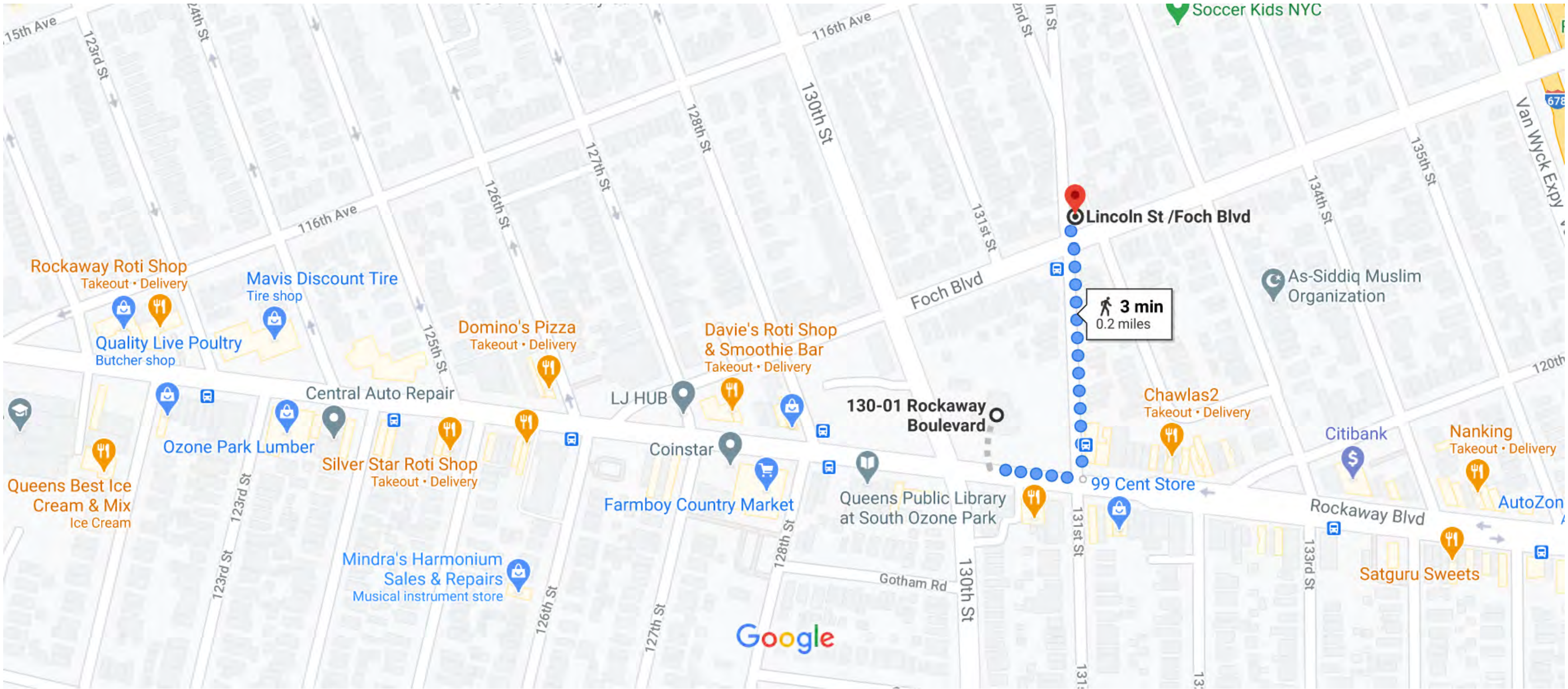
384 ft

Google Maps

Q9

Rockaway Boulevard, Queens, NY to Lincoln St /Foch Blvd, Queens, NY 11420

Walk 0.2 mile, 3 min



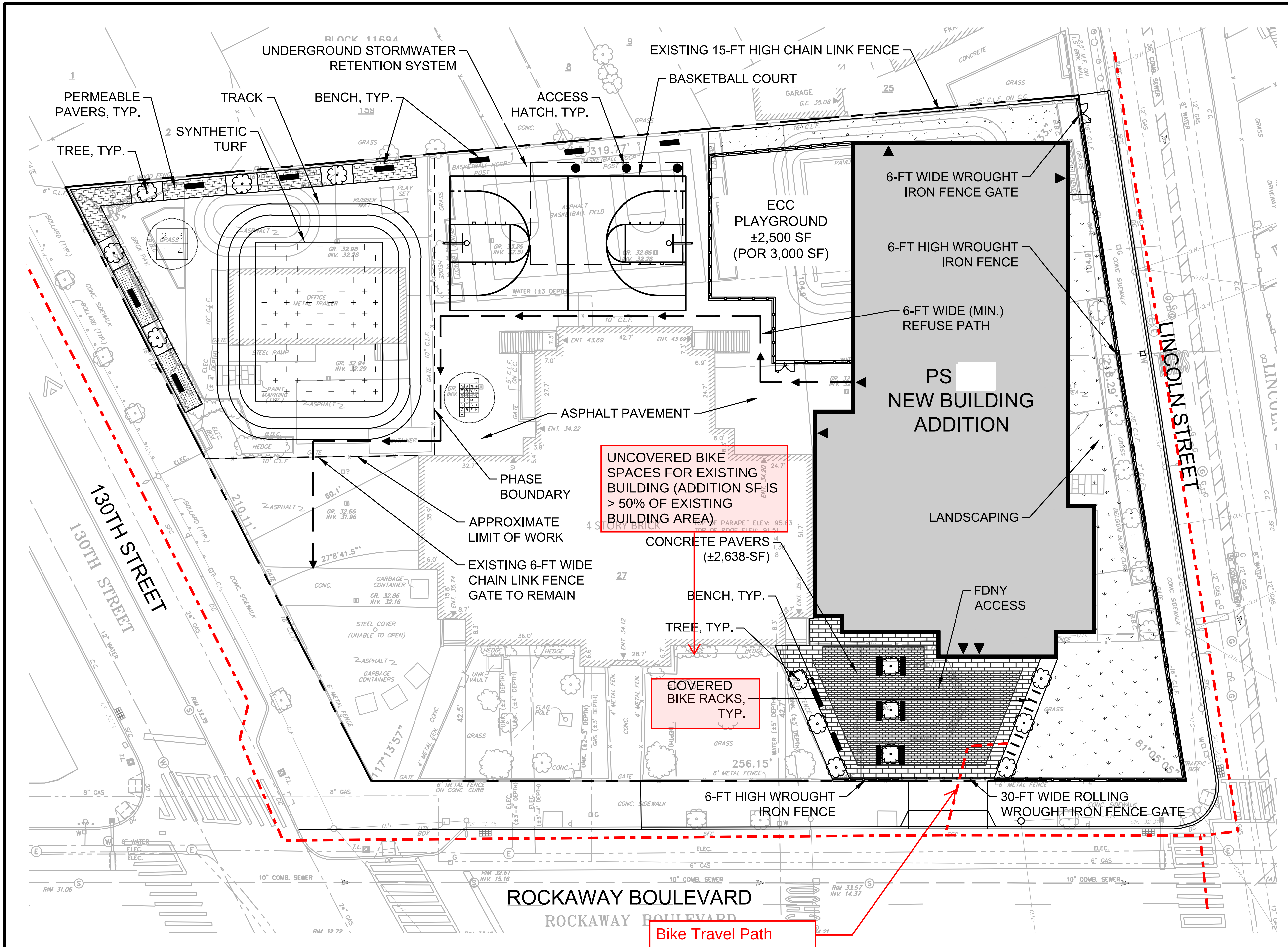
Map data ©2020 Google 200 ft

via Lincoln St 3 min

0.2 mile

Mostly at

L2.2 – BICYCLE FACILITIES



DATE: 17 NOVEMBER 2020

DRAWN BY / CHECKED BY: NB/VS

SCALE: 30 0 15 30

SCALE IN FEET

PROJECT:

PS Q ADDITION

130-01 ROCKAWAY BLVD, QUEENS, NY 11420

PROJECT NUMBER:

TITLE:

SCHEMATIC SITE PLAN

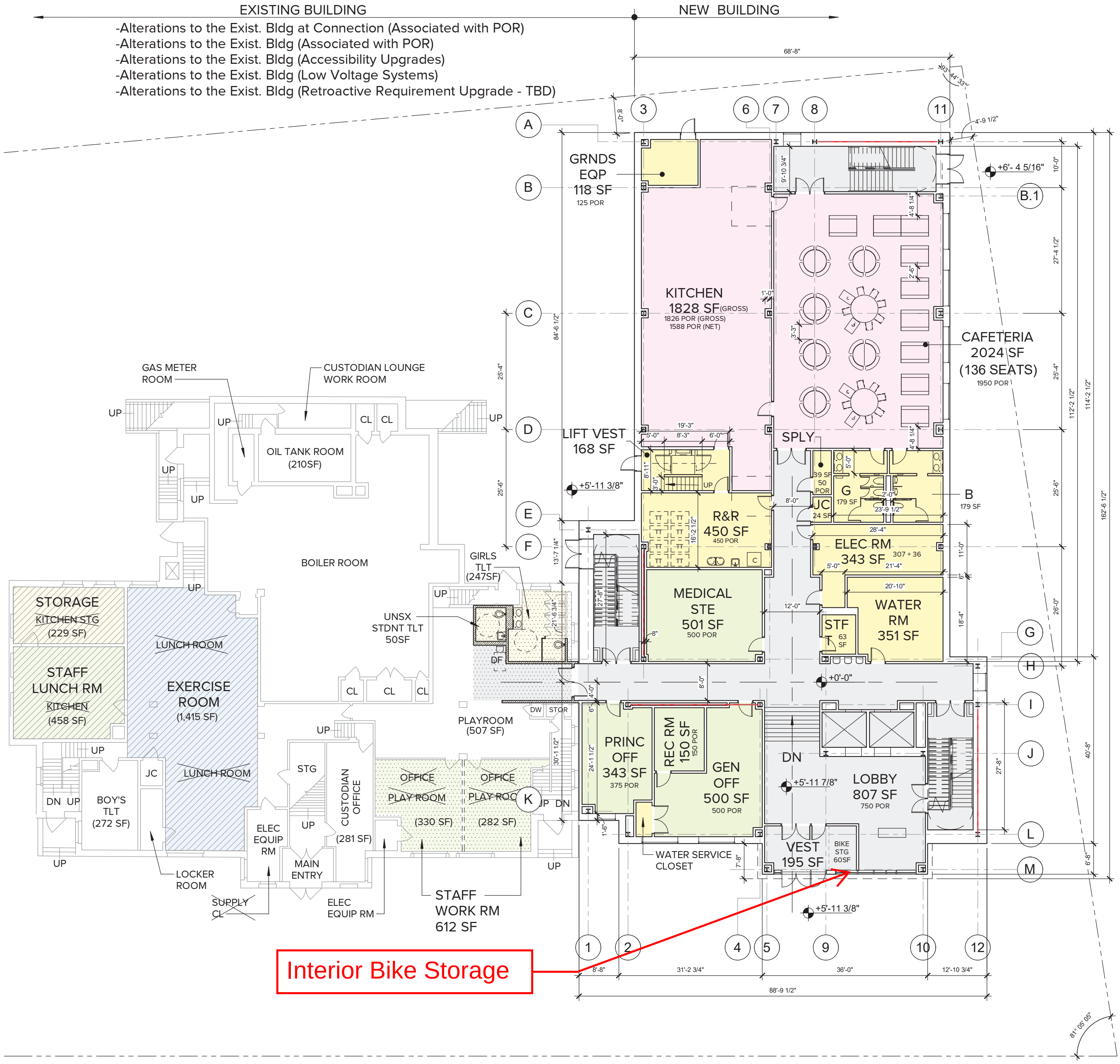
C001.00

EXISTING BUILDING WORK

- ALTERATIONS TO THE EXISTING BUILDING AT CONNECTION (ASSOCIATED WITH POR)
- ALTERATIONS TO THE EXISTING BUILDING (ASSOCIATED WITH POR)

BUILDING ADDITION

- INSTRUCTIONAL
- PHYSICAL EDUCATION
- ADMIN/SUPPORT
- CAFETERIA/KITCHEN
- MEP/CUST/TLT/STG
- CIRCULATION



1/32"=1'-0"

BASEMENT (12,059 SF)

SCHEME B.1

EXISTING BUILDING WORK

- ALTERATIONS TO THE EXISTING BUILDING AT CONNECTION (ASSOCIATED WITH POR)
- ALTERATIONS TO THE EXISTING BUILDING (ASSOCIATED WITH POR)

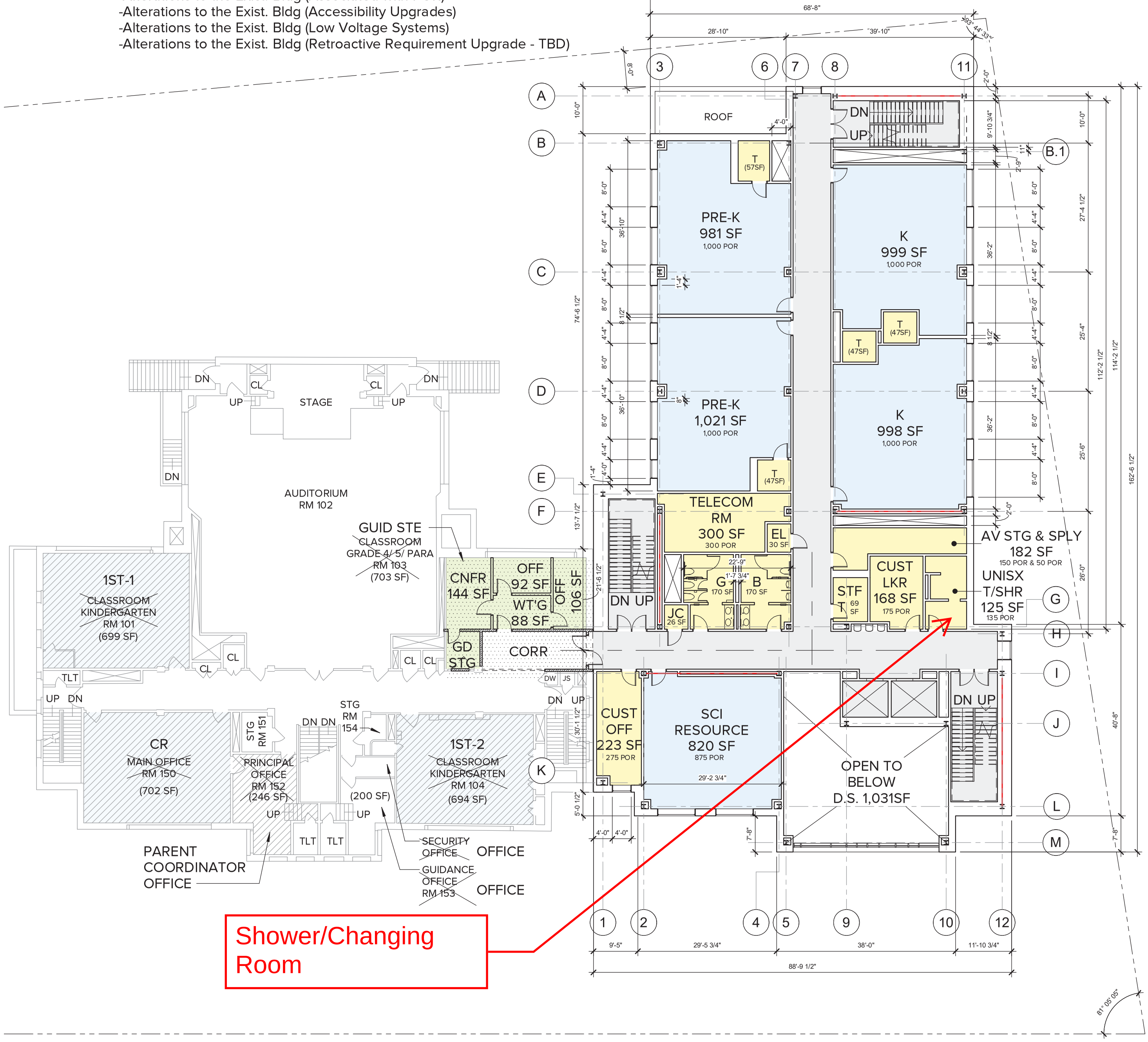
BUILDING ADDITION

- INSTRUCTIONAL
- PHYSICAL EDUCATION
- ADMIN/SUPPORT
- CAFETERIA/KITCHEN
- MEP/CUST/TLT/STG
- CIRCULATION

EXISTING BUILDING

NEW BUILDING

-Alterations to the Exist. Bldg at Connection (Associated with POR)
-Alterations to the Exist. Bldg (Associated with POR)
-Alterations to the Exist. Bldg (Accessibility Upgrades)
-Alterations to the Exist. Bldg (Low Voltage Systems)
-Alterations to the Exist. Bldg (Retroactive Requirement Upgrade - TBD)



1/32"=1'-0"

FIRST FLOOR (10,769 SF)

SCHEME B.1

Listed below are sample values. Project-specific values should be utilized.

NYC Green Schools Rating System

School Construction Authority

BICYCLE FACILITIES

CREDIT FORM

Credit L2.2

RESPONSIBLE PARTY:	
INITIAL SUBMISSION PHASE:	SD / DD / 60% / 100% / Design / CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	

INSTRUCTIONS:
Step 1) For schools under 30,000 SF, enter staff and students 4th grade and above, and number of covered bike storage spaces provided.
For schools over 30,000 SF, enter gross area, number of interior spaces provided, number of covered spaces provided. Note that interior spaces required per zoning count towards covered spaces required per GSG.
Step 2) Calculation for student capacity 4th grade and above should be based on POR. Designer should substruct PK-3rd grade capacity from total unadjusted capacity listed in POR.
Step 3) Enter number of shower facilities.
Step 3) Attach required vicinity and site maps to this form and submit package. Include floor plan with shower locations in the submission.

Step 1: Covered Bike Storage

Staff and students (4th grade and above, specialized spaces)	599
Indicate if project is an addition (filed as an addition)	Yes
Gross Area of existing building (if current project is addition).	51,000
Is addtion SF> 50% of existing building SF	Yes
If SF of addition is >=50% of existing SF, enter staff and students for existing building (4th grade & above	315
Area of building (gross area)	35,000
Interior Bike Storage (to meet Zoning Resolution)	
Number of interior spaces **required** per zoning	4
Number of interior spaces **provided** (Must be equal or greater than required per zoning)	4
Bike Storage (to meet GSG Credit)	
Total required **interior and exterior** covered spaces within 100 ft of any main entrance for the new building/addition or annex SF (minimum 4)	30
Required Spaces within 100 ft of any main entrance for existing building **(based on existing building staff and students 4th grade and above)**	16
Required spaces within 100 ft of any main entrance excluding interior spaces **(based on new building staff and students 4th grade and above)**	26
Provided covered spaces within 100 ft of any main entrance excluding interior spaces (based on new building **capacity**)	27
Provided **Exterior** spaces for **Existing Building**	16
Compliance Achieved	***Yes***

Step 2: Showers

Staff (excluding all students)	249
Number of showers with changing facilities required	2
Number of showers with changing facilities provided	2

Step 3: Required Documentation

	Y	N
Vicinity map showing bicycle network provided	x	
Site plan showing bicycle storage location and walking distance from entrance	x	
Floor plan with shower and changing facility location	x	

S1.1P – ENVIRONMENTAL SITE ASSESSMENT

PHASE I ENVIRONMENTAL SITE ASSESSMENT UPDATE

OF

PROPOSED ADDITION TO PUBLIC SCHOOL (X)
BLOCK 4288, PORTION OF LOT 1
BRADY AVENUE
BRONX, NEW YORK 10462

SCA LLW NO.
SCA CONTRACT NO.

PROJECT NO.

JANUARY 3, 2020

Prepared by:

Prepared for:

NYCSCA

30-30 Thomson Avenue
Long Island City, NY 11101-3045
Phone: (718) 472-8502
Fax: (718) 472-8500
Attn: Ms. Lee Guterman

1.0 EXECUTIVE SUMMARY

At the request of the Industrial and Environmental Hygiene (IEH) Division of the New York City School Construction Authority (NYCSCA), (conducted a Phase I Environmental Site Assessment (ESA) Update for a portion of the property located at Brady Avenue, Bronx, New York 10462 (hereafter referred to as the Site). The legal description for the Site is Block 4288, portion of Lot 1. The Site is located in an area primarily characterized by institutional, residential, and commercial properties, and public open space. understands that the New York City School Construction Authority (NYCSCA) is considering the construction of a building addition to the adjacent X105 school building. A Test Fit Study or conceptual design for the proposed building addition has not yet been provided.

The approximately 54,200 square foot (sf) Site is comprised of an exterior asphalt-paved recreational yard, two single-story temporary classroom unit (TCU) buildings, and peripheral landscaped areas. Primary access to the Site is via pedestrian gates in the perimeter fencing along Cruger and Holland Avenues (the eastern and western adjoining streets). The elevation of the Site is approximately 10 feet lower than the Holland Avenue right-of-way; and approximately 5 feet higher than the Cruger Avenue right-of-way. Concrete retaining walls are present at the eastern and western Site boundaries.

The Site is bounded to the north by two six-story multiple-family residential buildings; to the east by Holland Avenue followed by two six-story multiple-family residential buildings; to the south by the X105 school building followed by Brady Avenue and a six-story multiple-family residential building; and to the west by Cruger Avenue followed by three six-story multiple-family residential buildings.

Based on a review of environmental database records, historical Fire Insurance Maps, aerial photographs, and United States Geological Survey (USGS) topographic maps, the Site lot was initially developed in 1930 with the U-shaped four-story X105 school building, adjoining the Site to the south. The Site was paved circa 1950. By 2002, the two TCUs were placed on the Site, along with peripheral landscape areas and painted recreational play areas.

The main objective of the Phase I ESA Update is to identify recognized environmental conditions (RECs) and environmental concerns that may affect the suitability of the Site for use as an early childhood education facility. RECs are defined in ASTM International's (ASTM) Standard Practice E 1527-13 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or, (3) under conditions that pose a material threat of a future release to the environment. Note that controlled recognized environmental conditions (CRECs) are considered to be RECs and are listed in the Executive Summary and Conclusions of this Phase I ESA Update. Additionally, vapor encroachment conditions (VECs) were evaluated as per ASTM E 2600-10.

Other environmental concerns that, in the opinion of the *environmental professional* conducting the assessment, would not be considered RECs are identified in this assessment. These may include *historical RECs (HRECs)* and *de minimis* conditions. The Phase I ESA Update also includes a preliminary evaluation of specific potential environmental issues or conditions that are, according to ASTM E 1527-13, considered non-scope considerations. These issues include radon, asbestos-containing material (ACM), polychlorinated biphenyl (PCB)-containing light ballasts and caulking materials, exterior lead-based paint (LBP), chemical storage, wetlands, regulatory compliance issues, dry cleaner and other industrial emissions, mold, biological agents, electromagnetic fields, and methane. The Phase I

ESA Update included a review of federal, state, and local records, previous reports (if available) and historical documents; visual observation of the Site and adjoining properties; and interviews with selected Site representatives.

The assessment requested by the NYCSCA is intended to identify conditions that have the potential to impact the value of the Site or the development and use of the Site as a school facility. The assessment was also conducted for purposes of environmental due diligence to qualify for the innocent landowner, bona fide prospective purchaser or contiguous property owner defense under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Phase I ESA Update included evaluation of the following: current and historical Site usage; current and historical usage of adjoining properties; regulatory agency records review; on-site solid waste management and disposal practices; on-site hazardous materials and petroleum products management; chemical storage; ACM, PCBs and exterior LBP management; wetlands; regulatory compliance issues; dry cleaner and other industrial emissions; radon; mold and moisture intrusion; biological agents; electromagnetic fields; and potential for methane generating materials.

Summary of RECs, VECs and Environmental Concerns

A Phase I ESA was completed in March 2009 by). The Phase I ESA did not identify any on-site RECs. The following off-site RECs were identified in the March 2009 STV Phase I ESA and confirmed as part of this assessment:

- A gasoline service station, which formerly contained a greasing shed;
- A historical dress manufacturer (circa 1950); and
- Environmental regulatory database listings including two Resource Conservation Recovery Act (RCRA) generators, six New York Spills/ Leaking Tanks (NY Spills/LTANKs) listings, six Petroleum Bulk Storage (PBS) listings, and two registered drycleaners.

completed a Phase II Environmental Site Investigation (ESI) in June 2009 to investigate the findings of their March 2009 Phase I ESA.

This Phase I ESA Update, which included a review of the June 2009 Phase II ESI, revealed the following new RECs, VECs, and potential environmental concerns associated with the Site:

<u>On-site RECs/VECs:</u>

- Historic fill of unknown origin may have been imported to the Site during construction of PS 105 structures (circa 1930). Findings from the June 2000 Geotechnical Investigation and the June 2009 Phase II ESI confirm the presence of historical fill beneath the Site; and
- Presence of chromium and lead in soil above New York State Department of Environmental Conservation (NYSDEC) Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Unrestricted Use Soil Cleanup Objectives (SCOs) and petroleum-related volatile organic compounds (VOCs) and tetrachloroethene (PCE) in soil vapor.

<u>Off-site RECs/VECs:</u>

- A historical sign and printing shop (circa 1978 to 1983)
- Two additional RCRA generators, two additional NY Spills/LTANKs listings, two additional PBS listings, six historical dry cleaners, and one historical automotive facility

Potential Environmental Concerns:

- The potential presence of ACM, PCB, and LBP-containing material in existing structures and historic fill. ACM, PCB-, and LBP-containing material should be verified through visual inspection.

Recommendations

Based on the findings of the Phase I ESA Update, recommends that a Phase II Environmental Site Investigation (ESI) be performed, consisting of a geophysical survey, soil vapor, soil, and groundwater samples to determine whether the identified RECs and/or VECs have affected the suitability of the Site for use as a public school facility. also recommends an inspection of previously inaccessible areas on-site to determine if additional RECs/VECs or environmental concerns are present. also recommends that any suspect ACM, PCB, and LBP-containing material in existing structures and historic fill be identified and properly managed in accordance with all applicable regulations and NYCSCA policies and procedures.

PHASE II ENVIRONMENTAL SITE INVESTIGATION

OF

PROPOSED ADDITION TO PUBLIC SCHOOL ( )
BLOCK 4288, PORTION OF LOT 1
BRADY AVENUE
BRONX, NEW YORK 10462

SCA LLW NO.
SCA SERVICE ID NO.

May 20, 2020

Prepared by:

NYCSCA
IEH Division, HazMat Unit
30-30 Thomson Avenue
Long Island City, NY 11101-3045
Phone:

Attn: Ms.

Prepared for:

NYCSCA
Capital Planning Department
30-30 Thomson Avenue
Long Island City, NY 11101-3045
Phone:

Attn:

EXECUTIVE SUMMARY

At the request of the Capital Planning Department of the New York City School Construction Authority (NYCSCA), the Industrial & Environmental Hygiene Division (IEH) of NYCSCA conducted a Phase II Environmental Site Investigation (ESI) of the proposed new addition site located at PS , Brady Avenue, Bronx, New York 10462 (hereafter referred to as the Site). The legal description for the Site is Block 4288, a portion of Lot 1. The Site is located in an area primarily characterized by institutional, residential, and commercial properties, and public open space. The NYCSCA is considering redevelopment of the Site with a building addition to the adjacent X105 school building. The December 30, 2019 Test Fit Study provided by NYCSCA Architecture & Engineering Division includes conceptual design plans for a 15,000-square-foot, four-story building addition with a partial cellar level, fronting Cruger Avenue.

The approximately 54,200 square foot (sf) Site is currently comprised of an exterior asphalt-paved recreational yard with two single-story temporary classroom unit (TCU) buildings and peripheral landscaped areas. Primary access to the Site is via pedestrian gates in the perimeter fencing along Cruger and Holland Avenues (the eastern and western adjoining streets). The elevation of the Site is approximately 10 feet lower than the Holland Avenue right-of-way; and approximately 5 feet higher than the Cruger Avenue right-of-way. Concrete retaining walls are present at the eastern and western Site boundaries.

The Site is bounded to the north by two six-story multiple-family residential buildings; to the east by Holland Avenue followed by two six-story multiple-family residential buildings; to the south by the X105 school building followed by Brady Avenue and a six-story multiple-family residential building; and to the west by Cruger Avenue followed by three six-story multiple-family residential buildings.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) performed a Phase I Environmental Site Assessment (ESA) Update of the Site for the NYCSCA. The January 3, 2020 Phase I ESA Update identified on-site and off-site Recognized Environmental Conditions (RECs) and/or Vapor Encroachment Concerns (VECs). On-site RECs and VECs identified in the Phase I ESA Update: 1) historic fill of unknown origin may have been imported to the Site during the construction of X105 in 1930. Findings from the June 2000 Geotechnical Investigation Report (performed by Langan) and the June 2009 Phase II ESI (performed by STV Inc. [STV]) confirm the presence of historic fill on the Site. 2) Findings from the 2009 STV Phase II ESI identified the presence of chromium and lead in soil above New York State Department of Environmental Conservation (NYSDEC) Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Unrestricted Use Soil Cleanup Objectives (SCOs) and petroleum-related volatile organic compounds (VOCs) and tetrachloroethene (PCE) in soil vapor. Off-site RECs and VECs identified in historical records and database records included a historical dress manufacturer, a historical sign and printing shop, a gasoline service station that formerly contained a greasing shed, four hazardous waste generator listings, eight spill listings, eight Petroleum Bulk Storage (PBS) listings, six historical dry cleaner listings (two of which are also registered drycleaners), and one historical automotive station. Other environmental concerns associated with the Site include the potential presence of polychlorinated biphenyls (PCB), asbestos containing material (ACM), and lead based paint (LBP) in on-site structures and historic fill beneath the Site.

The purpose of the Phase II ESI was two-fold: 1) to determine if the RECs and VECs identified in the January 3, 2020 Phase I ESA Update require special consideration and/or affect the suitability of the Site for use as a public school facility, and 2) to preliminarily characterize the environmental condition of soil anticipated to be excavated for construction of a building addition to the adjacent X105 school building.

The Phase II ESI field activities were performed by Langan on March 7 and 8, 2020, which included performance of a geophysical survey to locate subsurface anomalies and clear proposed boring locations;

advancement of 5 soil borings to depths of 12 to 15 feet bgs and collection of 11 soil samples (including 1 duplicate); and the installation of 5 soil vapor probes to 5 feet bgs and collection of 5 soil vapor samples. The results of the Phase II ESI indicate the following:

- The geophysical survey did not identify any anomalies consistent with underground storage tanks (USTs) or subsurface structures. Several sewer and electrical utility lines were identified on the Site and marked in the field.

- Historic fill was identified in each soil boring from immediately below the surface cover to depths varying from approximately 2 to 9 feet bgs, and primarily consisted of brown fine-grained sand with varying amounts of coarse-grained sand, silt, asphalt, glass, concrete, wood, coal, and brick fragments. The historic fill was underlain by native material consisting of fine-grained sand with varying amounts of clay, silt, and fine gravel. No visual or olfactory evidence of contamination or photoionization detector (PID) readings indicating impacts were encountered while screening soil in any boring.

- Groundwater was not encountered during the ESI. Based on a review of previous reports (2009 Phase II ESI, performed by STV) and available published information, groundwater is assumed to be encountered at about 30 feet bgs and within the underlying bedrock.

- Five soil vapor samples were collected and analyzed for VOCs. Six petroleum-related VOCs (1,2,4-trimethylbenzene [TMB], 1,3,5-TMB, benzene, ethylbenzene, o-xylene, and p/m-xylene) were detected in soil vapor at concentrations that exceed the range of background levels in one or more soil vapor samples. Detected VOCs in soil vapor did not exceed the New York State Department of Health (NYSDOH) Air Guidance Values (AGVs) or Decision Matrix Values. The VOCs detected in soil vapor are attributed to off-site sources.

- A total of eleven soil samples (including one duplicate sample) were collected and analyzed for VOCs, semivolatile organic compounds (SVOCs), metals including hexavalent chromium and cyanide, pesticides, herbicides, and PCBs. A soil sample was collected from the historic fill layer in each boring; these samples were also analyzed for total petroleum hydrocarbons (TPH) gasoline and diesel range organics (GRO/DRO) and Resource Conservation and Recovery Act (RCRA) characteristics.

    - VOCs, Pesticides, PCBs, and herbicides were not detected above the NYSDEC General Fill Criteria (Table 2 of 6 NYCRR Part 360.13(f)) (GFC), and/or CP-51 Soil Cleanup Levels (SCLs).

    - Three SVOCs (benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene) were detected above their applicable GFC and/or SCLs in two soil samples collected. The detected SVOCs are attributed to the presence of historic fill.

    - One metal (chromium) was detected above its applicable GFC in one soil sample collected. In addition, lead was detected in one soil sample collected at a concentration that exceeds the 20 times rule, a benchmark for evaluating potential RCRA characteristic toxicity. The sample was submitted for additional toxicity characteristic leaching procedure (TCLP) analysis; results of which indicate that hazardous concentrations of lead was not detected. The detected metals in soil samples are attributed to the presence of historic fill at the Site.

- In support of pre-design waste characterization, the five soil samples of historic fill were analyzed for TPH-GRO, TPH-DRO, and RCRA Characteristics - ignitability, reactivity, and corrosivity. All soil samples were analyzed for cyanide and hexavalent chromium. Detections of TPH-GRO range from an estimated concentration of 0.64 milligrams per kilogram (mg/kg) to 1.6 mg/kg. Detections of TPH-DRO range from concentrations of 56 mg/kg to 1,300 mg/kg. There are no applicable regulatory comparison criteria for TPH. Results for RCRA characteristic testing in all samples were below criteria for ignitability, corrosivity, and reactivity. Hexavalent chromium was detected in 4 of the 11 soil samples at concentrations ranging from 0.178 mg/kg to 0.469 mg/kg, below its applicable GFC. Cyanide was not detected in soil samples. The detected concentrations of TPH and hexavalent chromium in soil samples are attributed to historic fill.

Based on the results of the Phase II ESI, the following remedial actions and/or engineering controls are recommended for the Site to be suitable for use as a public school facility:

- Based on historical evidence of elevated soil vapor impacts on-site, an active sub-slab depressurization system (SSDS) and a soil vapor barrier should be integrated into the new building design, including integration with any proposed damp-proofing or waterproofing components.

- All material excavated during construction activities should be properly characterized and disposed of off-site, if required, by the contractor-selected solid waste management facilities.

- Although not anticipated based on the inferred depth to groundwater and depth of proposed construction, any dewatering necessary during school construction activities must be performed in accordance with applicable local, state and federal regulations. Dewatering required during construction should be designed to minimize the influx of potentially contaminated water from off-site sources toward the Site.

- If landscaped areas are incorporated into the development of the Site, any exposed ground surfaces should be covered by a minimum two-foot thick layer of environmentally clean fill.

- Suspect ACM, LBP, PCB-containing materials that are disturbed by Site development should be properly managed during construction activities in accordance with applicable regulations and NYCSCA policies and procedures.

Based on the Phase II ESI results, additional investigation is not recommended for the Site.

S1.2R – ENHANCED SITE ASSESSMENT

S1.2R Enhanced Site Assessment

Narrative

Summaries have been provided below which cover all site features outlined in this credit. The provided credit form details how the assessment influenced project design.

For this project, it was noted that a Test Fit/Sketch Study was initiated and issued June 20, 2018 for the project in lieu of a Feasibility Study (SCA Design Requirements 1.1.3.1).

Topography

The topography of Staten Island ranges from steep hills to flat terrain. A hilly spine trends from about N60°E in the southwestern half of the Island to about N40°E in the northeastern part. The maximum land-surface altitude in the southwest part is about 150 ft above sea level; in the northeast part, where the slopes are steepest, it is about 405 ft. The 405-ft altitude is on Todt Hill, the highest spot on the eastern seaboard that is within 2.5 miles of the Atlantic Ocean. The hilly spine of the Island is flanked by a flat plain ranging from less than 0.1 miles wide at the Island's northern and southern ends to as much as about 2 miles wide in the northwestern part.

The immediate project site is fairly level. Based on the survey provided by the SCA, the high point occurs at the northeast corner of the lot and the low point is at the southwest corner, approximately a 2.79' delta over a distance of 575'.
See site surveys in supporting documentation.

Hydrology

The site is not within a NYS DEC regulated wetland area and is in an area of minimal flood hazard - "Zone X". Preliminary results indicated a high-water table and will require some additional observation wells to confirm. The elevation of the water table will determine the requirements for waterproofing and the feasibility of having a cellar level.

See DEC Determination Letter and Flood Maps in supporting documentation. Further details are also provided in credits S2.3P, S2.4 Green Infrastructure & Rainwater Management.

Climate

In Staten Island, the summers are warm and humid, the winters are very cold and windy, and it is wet and partly cloudy year-round. Over the course of the year, the temperature typically varies from 28°F to 86°F and is rarely below 14°F or above 94°F. The hot season lasts for 3.5 months, from May 31 to September 16, with an average daily high temperature above 77°F. The hottest day of the year is July 20, with an average high of 86°F and low of 71°F.

The cold season lasts for 3.3 months, from December 2 to March 11, with an average daily high temperature below 49°F. The coldest day of the year is January 30, with an average low of 28°F and high of 40°F. A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Staten Island varies throughout the year. The wetter season lasts 4.8 months, from March 31 to August 25, with a greater than 29% chance of a given day being a wet day. The chance of a wet day peaks at 35% on July 31. The drier season lasts 7.2 months, from August 25 to March 31. The smallest chance of a wet day is 22% on October 27.

The most common form of precipitation throughout the year is rain alone, with a peak probability of 35% on July 31. Rain falls throughout the year in Staten Island. The most rain falls during the 31 days centered around July 29, with an average total accumulation of 3.8 inches. The least rain falls around February 7, with an average total accumulation of 2.3 inches.

The snowy period of the year lasts for 4.0 months, from November 26 to March 27, with a sliding 31-day liquid-equivalent snowfall of at least 0.1 inches. The most snow falls during the 31 days centered around January 23, with an average total liquid-equivalent accumulation of 0.5 inches.

The snow-less period of the year lasts for 8.0 months, from March 27 to November 26. The least snow falls around July 24, with an average total liquid-equivalent accumulation of 0.0 inches.

The average hourly wind speed in Staten Island experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 6.4 months, from October 12 to April 25, with average wind speeds of more than 8.4 miles per hour. The windiest day of the year is February 26, with an average hourly wind speed of 10.4 miles per hour. The calmer time of year lasts for 5.6 months, from April 25 to October 12. The calmest day of the year is July 31, with an average hourly wind speed of 6.3 miles per hour.

The predominant average hourly wind direction in Staten Island varies throughout the year. The wind is most often from the south for 5.0 days, from May 16 to May 21 and for 3.1 months, from June 24 to September 28, with a peak percentage of 38% on July 27. The wind is most often from the west for 1.1 months, from May 21 to June 24 and for 7.6 months, from September 28 to May 16, with a peak percentage of 35% on June 23.

Vegetation

The area of the site where the addition will be constructed is primarily pre-developed hardscape with small areas of grass covering and some existing trees lining Stecher Street. The existing trees include Norway Maple, Japanese Zelkova, White Oak, Swamp White Oak, Ash and Cherry Plum. The New York Natural Heritage Program indicates that the site does not contain any critical habitats. The site is not adjacent to a river or coastline.

Supporting documentation includes an except from the New York City Tree Map and the New York Natural Heritage Program.

Soils

Site soils as shown in the supporting documentation are listed as UGAI, Urban land-Greenbelt Complex, 0 to 3% slopes, low impervious surface and GUA – Greenbelt, Urban Land Complex 0 to 3% slopes. Most of the development will occur in the UGAI soil areas.

Urban soils typically exhibit a high rate of runoff due to development. No rating is listed for the UGAI soils. The Greenbelt soils, if undisturbed, are in Hydraulic Soil Group (HSG) B which have a lower rate of runoff. Soils in HSG B are suitable for infiltrative practices such as basins or dry wells. Specific to the GUA soil are listed significant amounts of fine particles which indicate possibly poor conditions for infiltration of stormwater and septic tank effluent.

Human Use

The site for the new addition is currently in the open area to the east of the existing three story 45,830 SF school being expanded, PS 005 Richmond. The location for the school addition currently contains a playground. The length of the proposed addition will most likely push the development into to open grass field previously use as a septic field. An existing ± 5,000 SF 1-story annex attached to the south west corner of the existing PS005R building, will remain in place. The existing ECC play area and general playground will be relocated and expanded into the existing grass field. The site of the new school addition is located within a residential neighborhood of predominately one to two story single family residences.

Residential buildings are across the street from the school along Kingdom Avenue to the West, Deisius Street to the North and Stecher Street to the East. Arbutus Woods Park is located adjacent to the school's grass covered field.

Human Health Effects

The project site is approximately 0.5 miles from Huguenot Beach and Wolfe's Pond Park Tennis Courts where healthy outdoor activities can be enjoyed. Immediately adjacent to the site is Arbutus Woods Park where visitors can take long strolls. Several other parks are also a short distance from the site. The site also contains a large field that creates opportunities for outdoor play. As this site was selected due to the project being an addition to the existing school building, the availability of this adjacent physical activity space was not a determining factor for the site selection, however, will become a benefit for the users of this new facility.

Any site-specific risks to human health have been assessed and addressed as outlined in the Phase I ESA, Phase I ESA and the Outdoor Air Assessment. Details can be found in the S1.1P Environmental Site Assessment and Q1.1P Min IAQ Performance sections of this submission.

SCA Standards Incorporated:

- None

Supporting Documentation

- S1.2R Enhanced Site Assessment credit form (Page 33)
- Maps/reports documenting features in topography, hydrology, climate, vegetation, soils, human use and human health effects categories (Pages 34-55)
- Shade Study (Appendix A)

NYC Green Schools Rating System

School Construction Authority

ENHANCED SITE ASSESSMENT

CREDIT FORM
Credit S1.2R

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: SD | DD | 60% | 100% | Design | CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	MGA Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	3/30/2021

INSTRUCTIONS:
Step 1) Indicate that SCA Design Requirements have been fulfilled and ASHRAE Air Assessment has been received.
Step 2) Provide a narrative in the space provided describing how the site assessment influenced project design. If site assessment excludes parts of requested information, provide reasons why.
Step 3) List required and supporting documentation such as drawings, reports, or attachments to this form.

	Y	N
SCA Design Requirements 1.1.3.1 Feasibility Study performed	X	
SCA Design Requirements 1.1.3.2 Test Fit performed	X	
ASHRAE Outdoor Air Assessment Report received	X	

Required Documentation

Site Assessment includes the following information:

	Y	N
Topography	X	
Hydrology	X	
Climate	X	
Vegetation	X	
Soils	X	
Human Use	X	
Human Health Effects	X	

Provide a brief explanation of how the information gathered influenced the project design. If applicable, give reasons for not addressing these topics.

The site survey shows topographic information and the existing vegetation (street trees).
The site slopes from the northeast corner of the lot on 23rd Road to the southwestern corner of the lot at the intersection of 29th Street and 24th Avenue.
Hydrology is discussed in the civil engineer's geotechnical design narrative, included in the Pre-Schematic Design Report.
Site visits and aerial photos allowed the team to assess human use factors such as views, usage of adjacent properties, and public transportation access.
OAA report determined there is no proximity to major air pollution sources. Solar exposure, prevailing winds, and building massing were explored as part of the box modeling exercise for the IDP. Because this is an addition to an existing school building on a relatively small site, many of these factors were limited by existing conditions.

List required and supporting documentation included in the submission. (Provide required documentation such as drawings, reports, or attachments.)

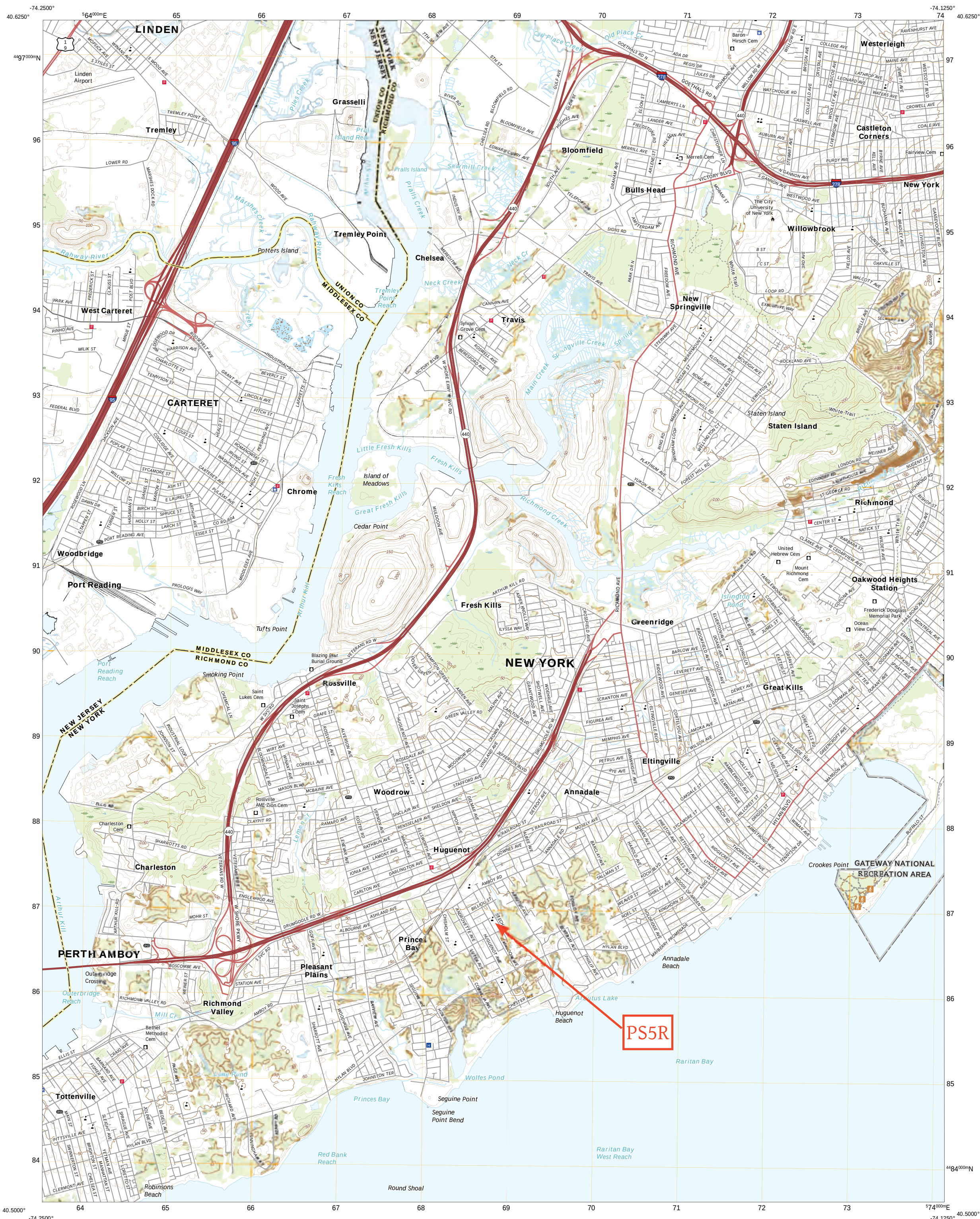
Maps/reports documenting features in topography, hydrology, climate, vegetation, soils, human use and human health effects categories have been provided in the S1.2R Enhanced Site Assessment section of the GSG SD submission.

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

ARTHUR KILL QUADRANGLE
NEW YORK - NEW JERSEY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 18T
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery ... NAIP, July 2015 - December 2017
Roads ... U.S. Census Bureau, 2016
Names ... GNIS, 1979 - 2019
Hydrography ... National Hydrography Dataset, 1899 - 2018
Contours ... National Elevation Dataset, 2013
Boundaries ... Multiple sources; see metadata file 2017 - 2018
Wetlands ... FWS National Wetlands Inventory 2007 - 2011

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

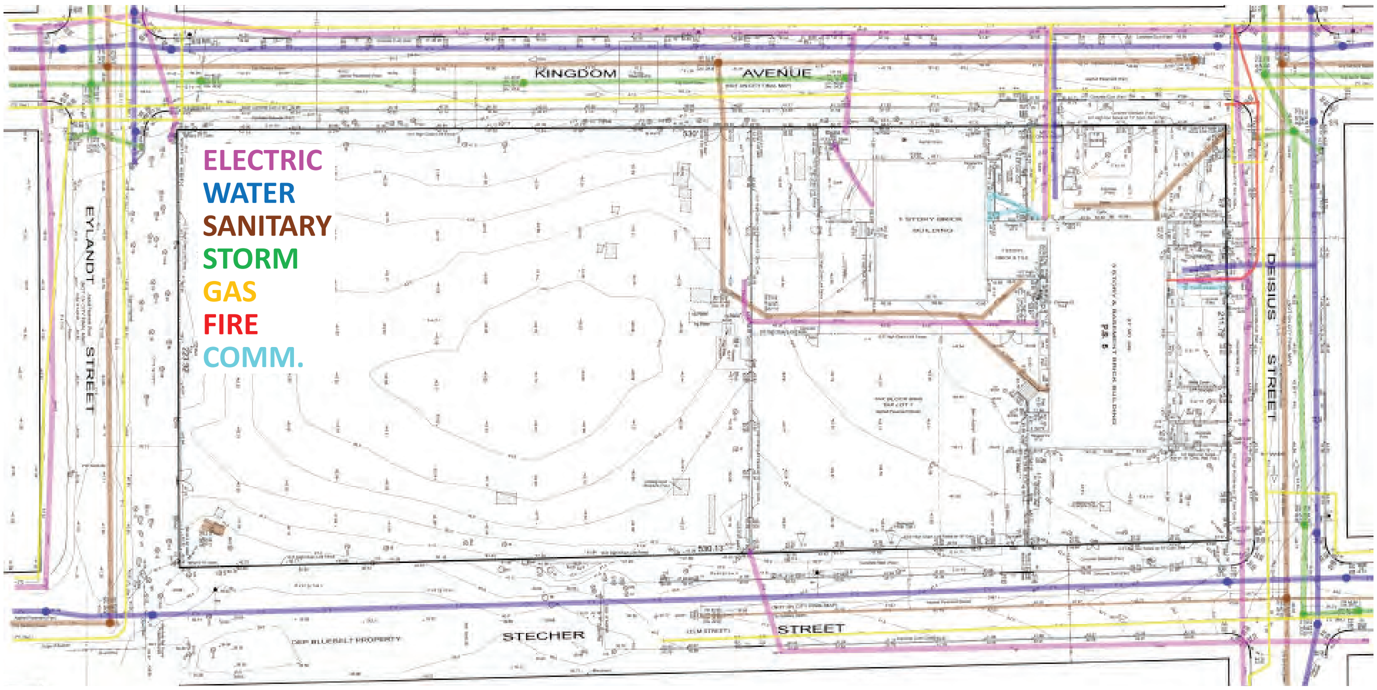
CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

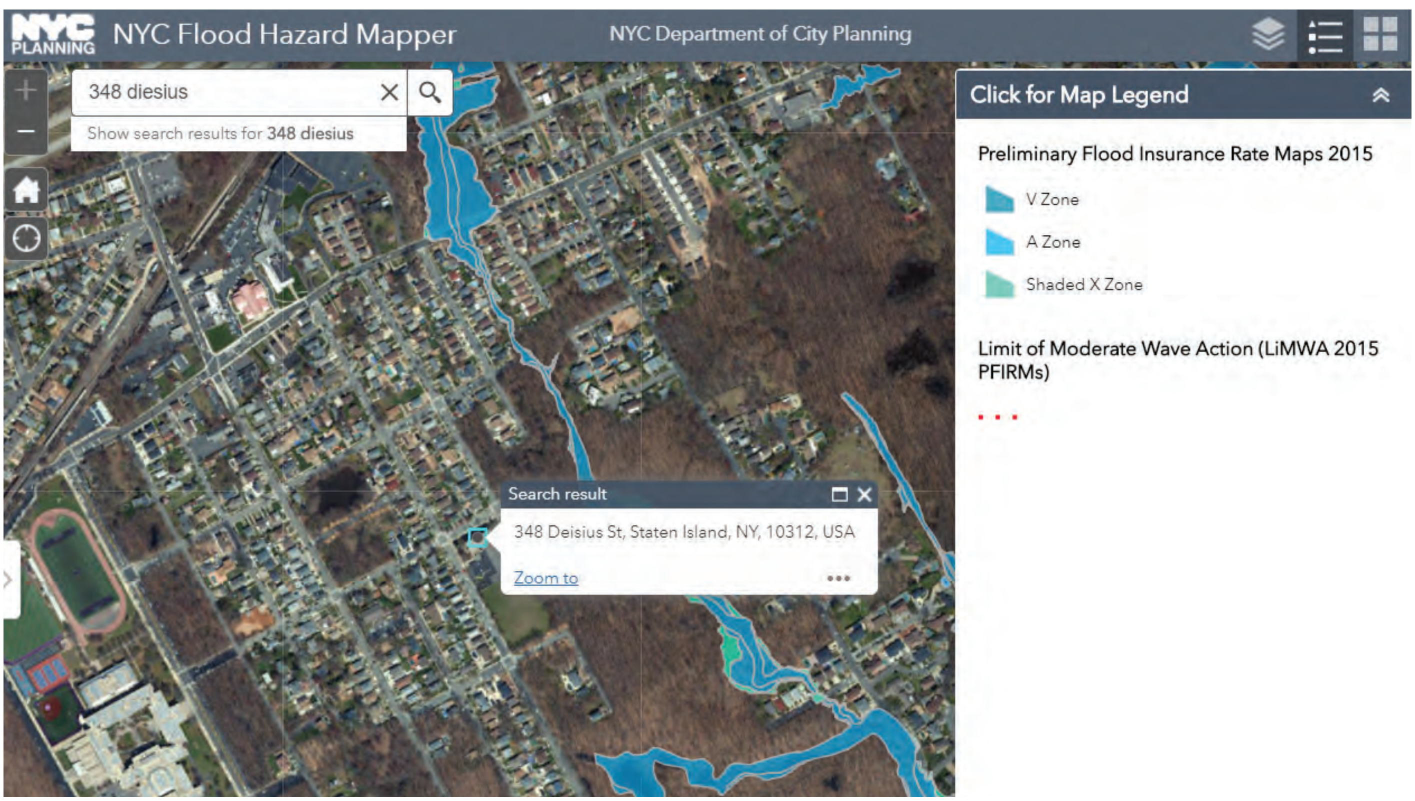
This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

ROAD CLASSIFICATION

ADJOINING QUADRANGLES
1 Roselle
2 Elizabeth
3 Jersey City
4 Perth Amboy
5 The Narrows
6 South Amboy
7 Keyport
8 Sandy Hook West

ARTHUR KILL, NY, NJ
2019


ELECTRIC
WATER
SANITARY
STORM
GAS
FIRE
COMM.
KINGDOM
AVENUE
EYLANDT STREET
DEISIUS STREET
STECHER
STREET


NYC PLANNING
NYC Flood Hazard Mapper
NYC Department of City Planning
348 diesius
Show search results for 348 diesius
Click for Map Legend
Preliminary Flood Insurance Rate Maps 2015
V Zone
A Zone
Shaded X Zone
Limit of Moderate Wave Action (LiMWA 2015 PFIRMs)
Search result
348 Deisius St, Staten Island, NY, 10312, USA
Zoom to

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 2
47-40 21st Street, Long Island City, NY 11101
P: (718) 482-4997 | F: (718) 482-4975
www.dec.ny.gov

March 3, 2020

12 West 37th St, 8th Floor
New York, NY 10018

Re: DEC Wetlands Jurisdictional Determination 64-10057
Block: 6566 Lot(s): 1
Staten Island, NY

Dear ,

The property referenced above is not within the jurisdiction of DEC under the Freshwater Wetlands Act (Article 24 of the Environmental Conservation Law), the Tidal Wetlands Act (Article 25 of the Environmental Conservation Law) or the Coastal Erosion Hazard Areas (Article 34 of the Environmental Conservation Law). Therefore, a DEC freshwater wetlands, tidal wetlands or coastal erosion hazard areas permit is not required to alter or develop this property.

If you have any further questions, please call this office at the above telephone number.

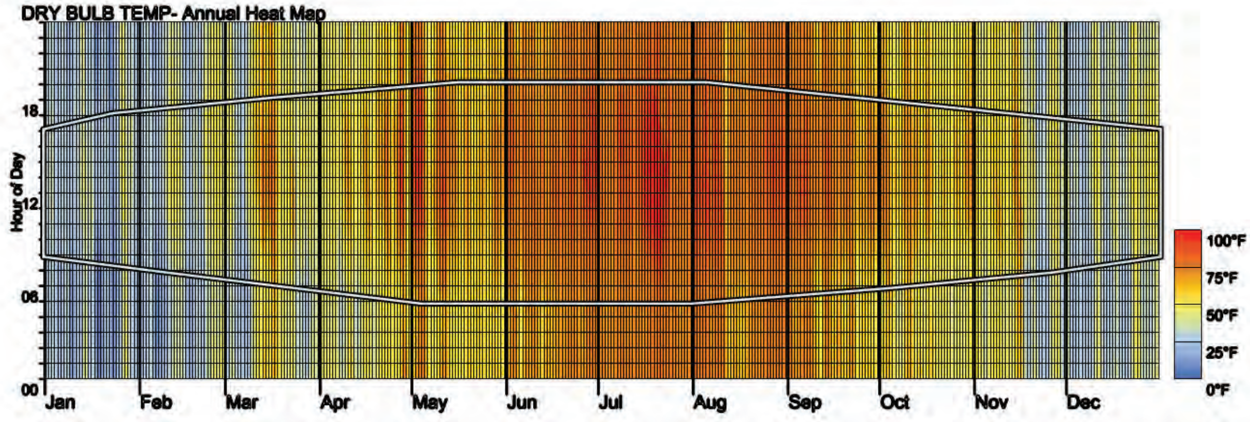
Very truly yours,

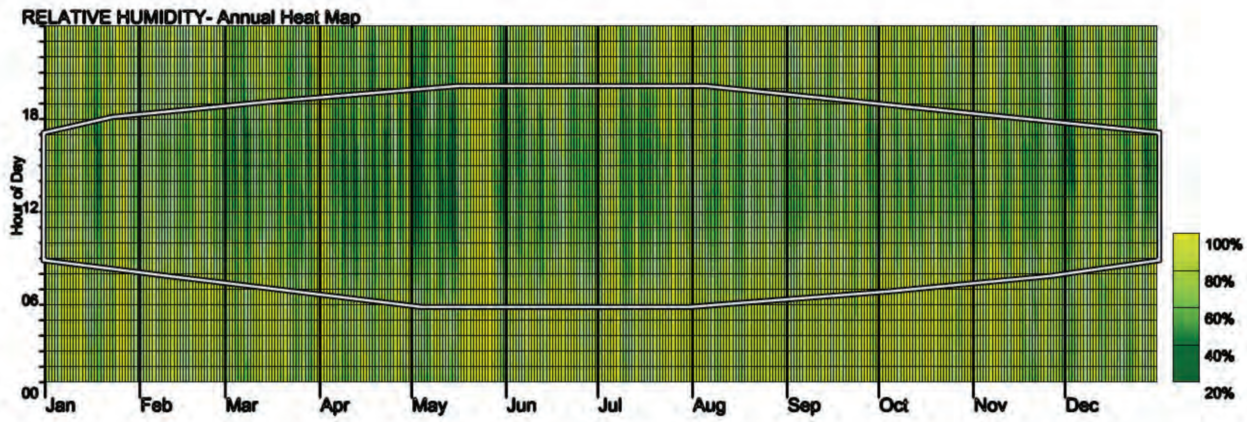
Regional Permit Administrator

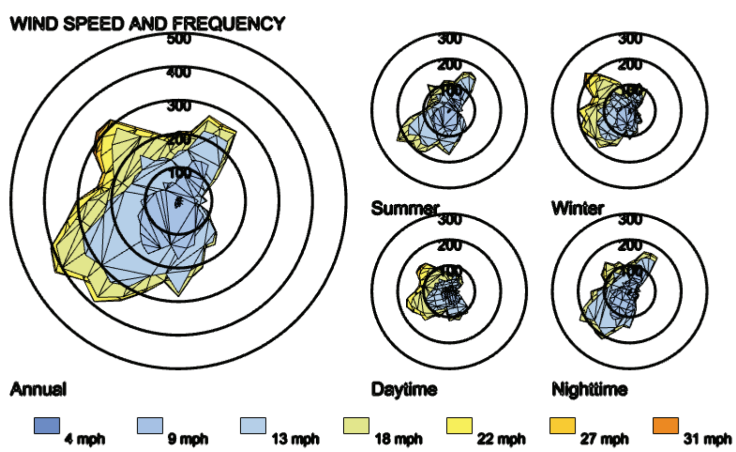
Climate Analysis

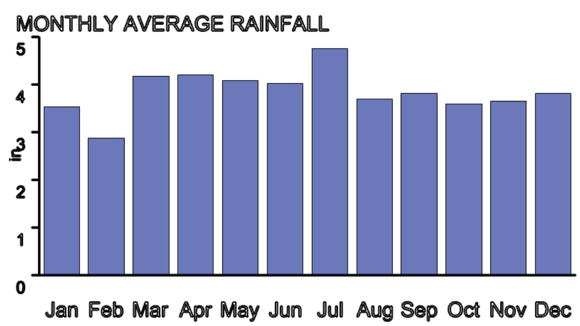
SD Scheme A

Weather Station: Newark Int'l AP
Source: EnergyPlus







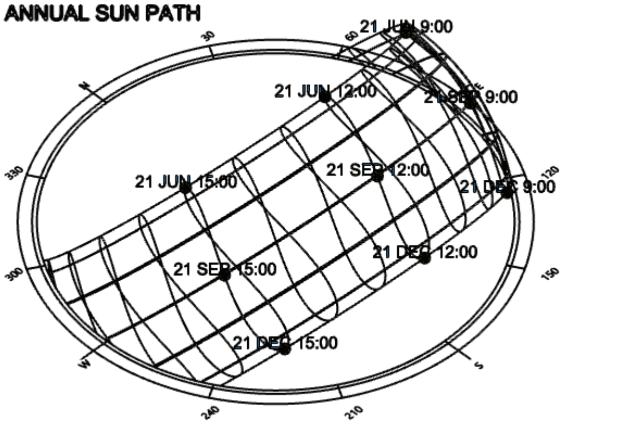


SD Scheme A

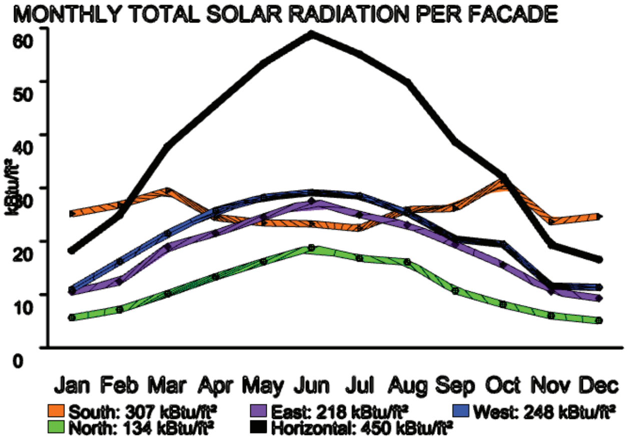
Weather Station: Newark Int'l AP
Source: EnergyPlus

Date and Time	Altitude	Azimuth	Altitude	Azimuth
21 JUN 9:00	49°	101°	49°	101°
21 JUN 12:00	73°	181°	73°	181°
21 JUN 15:00	48°	260°	48°	260°
21 SEP 9:00	34°	125°	34°	125°
21 SEP 12:00	50°	184°	50°	184°
21 SEP 15:00	31°	239°	31°	239°
21 DEC 9:00	14°	139°	14°	139°
21 DEC 12:00	26°	181°	26°	181°
21 DEC 15:00	13°	223°	13°	223°

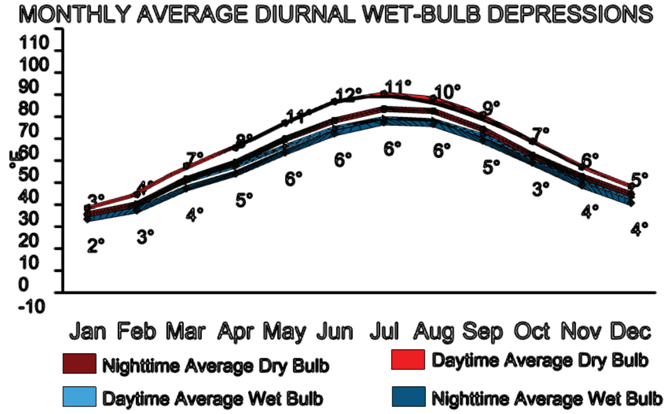
ANNUAL SUN PATH



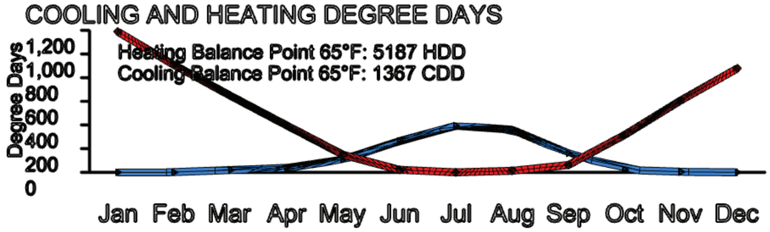
MONTHLY TOTAL SOLAR RADIATION PER FACADE



MONTHLY AVERAGE DIURNAL WET-BULB DEPRESSIONS

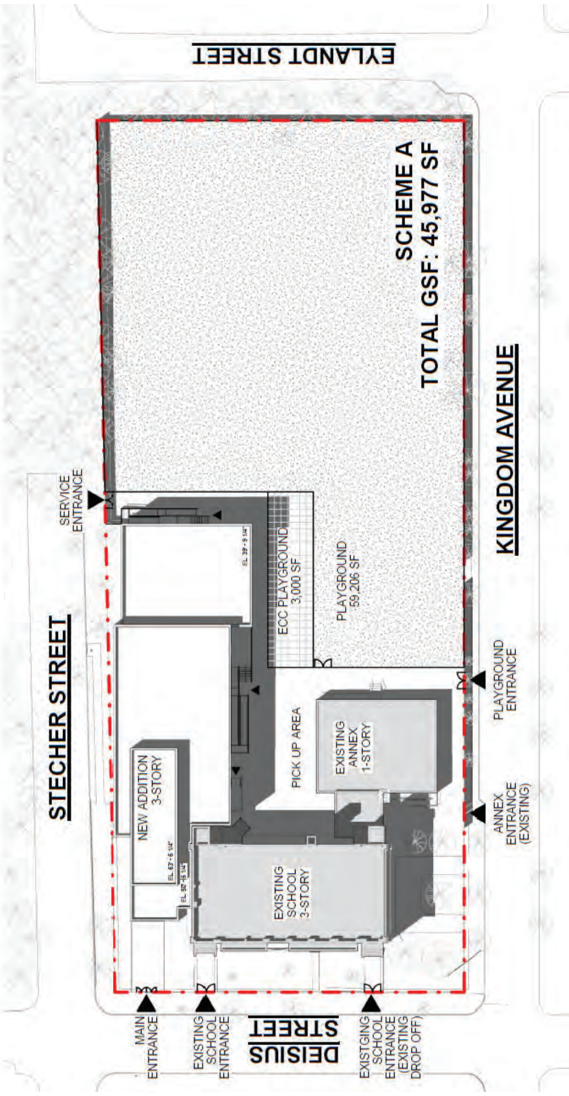


COOLING AND HEATING DEGREE DAYS

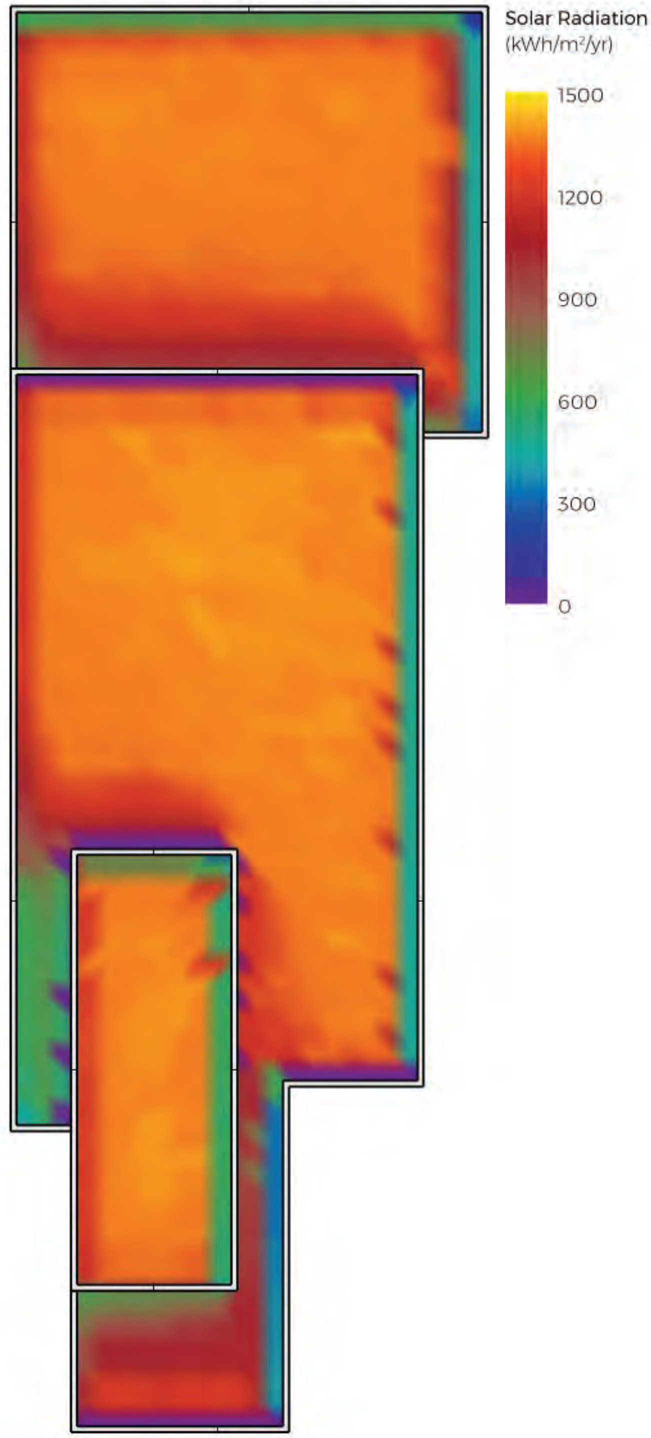


Climate Analysis
SD Scheme A

Solar Radiation Analysis



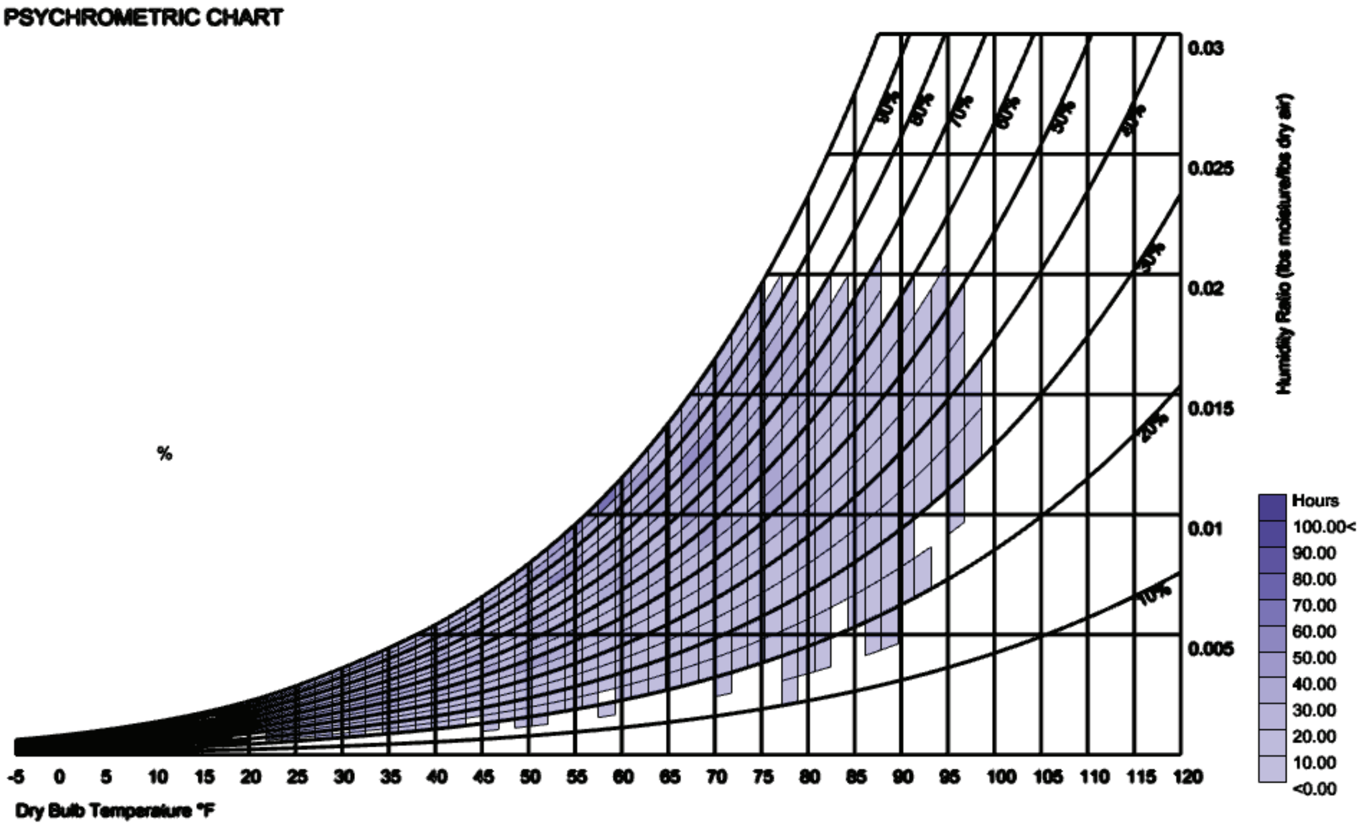
Site Plan, courtesy LHP Architects, 11/2/20

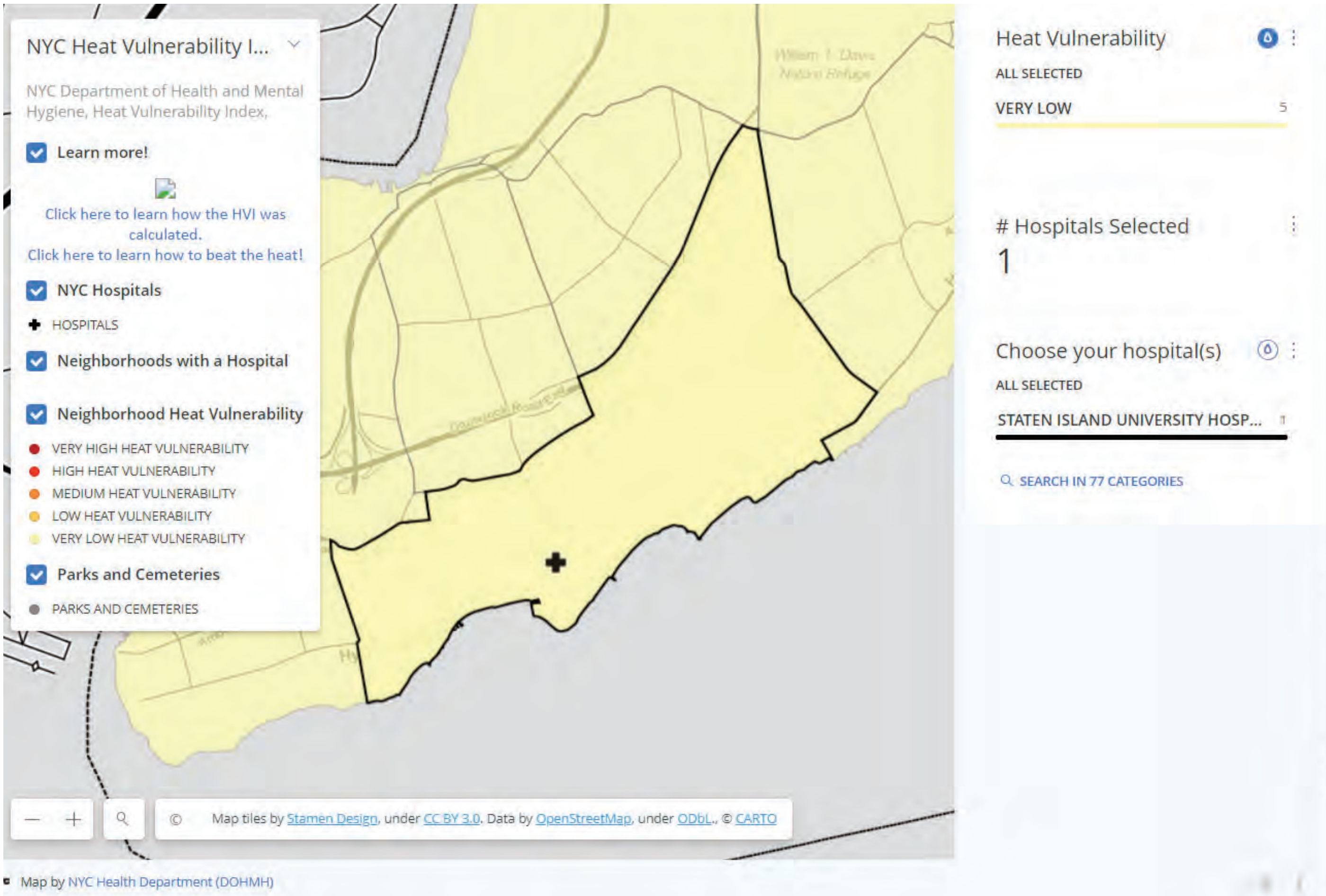


Climate Analysis

SD Scheme A

Weather Station: Newark Int'l AP
Source: EnergyPlus





NYC Heat Vulnerability I...
NYC Department of Health and Mental Hygiene, Heat Vulnerability Index.
Learn more!
Click here to learn how the HVI was calculated.
Click here to learn how to beat the heat!
NYC Hospitals
HOSPITALS
Neighborhoods with a Hospital
Neighborhood Heat Vulnerability
VERY HIGH HEAT VULNERABILITY
HIGH HEAT VULNERABILITY
MEDIUM HEAT VULNERABILITY
LOW HEAT VULNERABILITY
VERY LOW HEAT VULNERABILITY
Parks and Cemeteries
PARKS AND CEMETERIES
Map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL. © CARTO
Heat Vulnerability
ALL SELECTED
VERY LOW 5
Hospitals Selected
1
Choose your hospital(s)
ALL SELECTED
STATEN ISLAND UNIVERSITY HOSP... 1
SEARCH IN 77 CATEGORIES
Map by NYC Health Department (DOHMH)

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Richmond County, New York

Local office

Long Island Ecological Services Field Office

📞 (631) 286-0485
📠 (631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

New York Natural Heritage Program

Search...

Guide types: A Animals C Ecological Communities P Plants

Show 10 entries

Filter records:

Type	Common Name	Scientific Name
A	Eastern Mud Turtle	*Kinosternon subrubrum*
A	Fence Lizard	*Sceloporus undulatus*
A	Least Bittern	*Ixobrychus exilis*
A	Northern Harrier	*Circus hudsonius*
A	Northern Long-eared Bat	*Myotis septentrionalis*
A	Peregrine Falcon	*Falco peregrinus*
A	Pied-billed Grebe	*Podilymbus podiceps*
A	Short-eared Owl	*Asio flammeus*
A	Upland Sandpiper	*Bartramia longicauda*

Showing 1 to 9 of 9 entries

Previous 1 Next

Map Scale: 1:7,130 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 300, 600, 1200, 1800

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Richmond County, New York
Survey Area Data: Version 11, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2019—Jul 30, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BHBu	Boonton-Haledon complex, 0 to 8 percent slopes	Farmland of statewide importance	13.7	7.1%
BmB	Boonton loam, moderately well drained, 3 to 8 percent slopes	All areas are prime farmland	9.4	4.8%
BtB	Boonton loam, 3 to 8 percent slopes	All areas are prime farmland	8.5	4.4%
BtC	Boonton loam, 8 to 15 percent slopes	Farmland of statewide importance	4.8	2.5%
GbB	Greenbelt loam, 3 to 8 percent slopes	Not prime farmland	0.1	0.0%
GUA	Greenbelt-Urban land complex, 0 to 3 percent slopes	Not prime farmland	5.3	2.7%
GUB	Greenbelt-Urban land complex, 3 to 8 percent slopes	Not prime farmland	1.1	0.6%
HaA	Hasbrouck silt loam, 0 to 3 percent slopes, frequently ponded	Not prime farmland	15.9	8.2%
HHA	Haledon-Hasbrouck complex, 0 to 3 percent slopes, frequently ponded	Not prime farmland	18.1	9.4%
NaA	Natchaug muck, 0 to 2 percent slopes	Not prime farmland	0.4	0.2%
NoA	North Meadow sandy loam, 0 to 3 percent slopes	Not prime farmland	5.7	2.9%
UGAl	Urban land-Greenbelt complex, 0 to 3 percent slopes, low impervious surface	Not prime farmland	64.7	33.5%
UGB	Urban land-Greenbelt complex, 3 to 8 percent slopes	Not prime farmland	2.3	1.2%
UGBl	Urban land-Greenbelt complex, 3 to 8 percent slopes, low impervious surface	Not prime farmland	37.1	19.2%
UtA	Urban land, till substratum, 0 to 3 percent slopes	Not prime farmland	4.0	2.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
UtB	Urban land, till substratum, 3 to 8 percent slopes	Not prime farmland	1.9	1.0%
Totals for Area of Interest			**193.1**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Zoning and Land Use

Tax Lots ☐

- One & Two Family Buildings
- Multi-Family Walk-Up Buildings
- Multi-Family Elevator Buildings
- Mixed Residential & Commercial Buildings
- Commercial & Office Buildings
- Industrial & Manufacturing
- Transportation & Utility
- Public Facilities & Institutions
- Open Space & Outdoor Recreation
- Parking Facilities
- Vacant Land
- Other

Basemaps

Subways

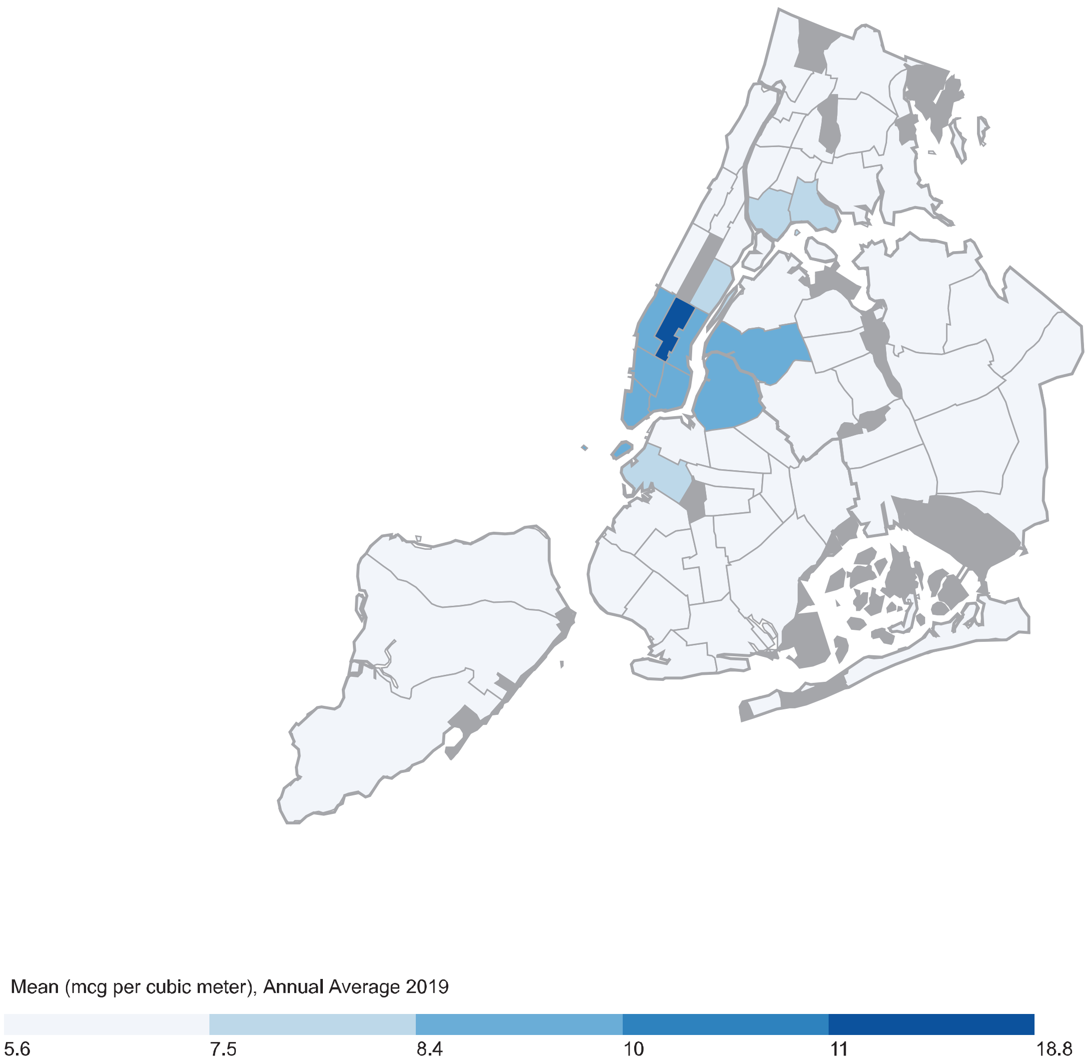
Building Footprints ☐

Aerial Imagery

◉ 2016	○ 2014	○ 2012
○ 2010	○ 2008	○ 2006
○ 2004	○ 2001-2	○ 1996
○ 1951	○ 1924	

Environment & Health Data Portal

Neighborhood Air Quality: Fine Particulate Matter ($PM_{2.5}$) - Mean (mcg per cubic meter), Annual Average 2019, Neighborhood (Community District)



About the Indicators

Fine particles are emitted by vehicles, building boilers, and other combustion - and are a major form of air pollution that harms health.

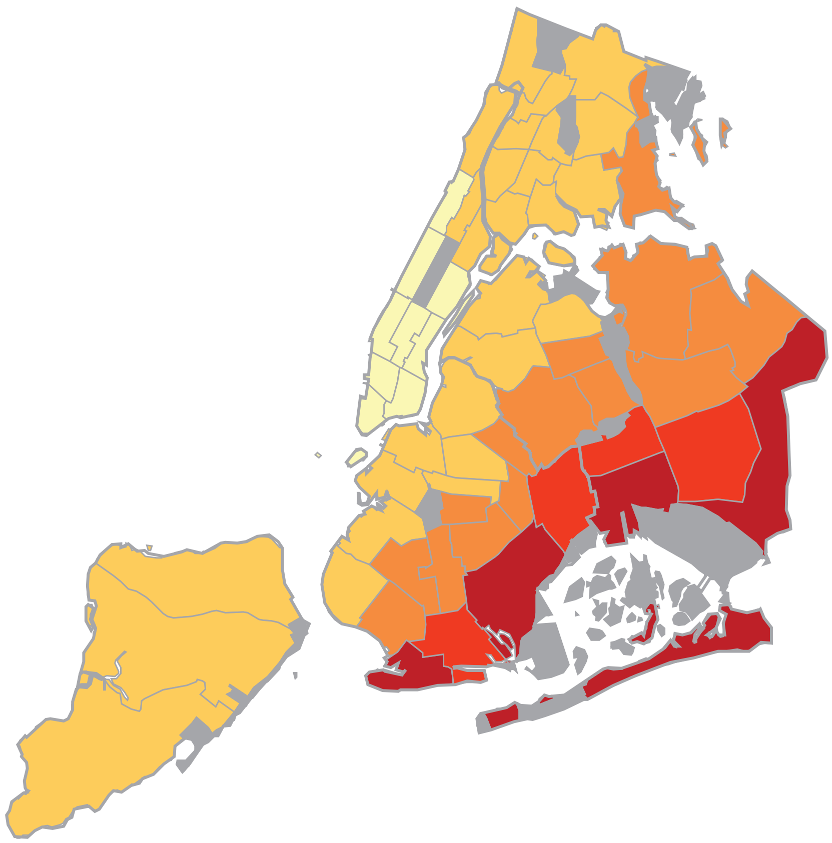
Name: Fine Particulate Matter (PM2.5) **Measure:** Mean **How Calculated:**
Air samples collected at specific NYCCAS monitoring sites along with information about emissions sources were incorporated into a statistical model that predicted pollutant concentrations at all locations in NYC for the specified time period. The results were then assigned to the appropriate NYC neighborhood and averaged. In NYC, fine particulate matter is measured in units of micrograms per cubic meter of air.

Source(s): New York City Community Air Survey

NYC Health

Environment & Health Data Portal

Neighborhood Air Quality: Ozone (O3) - Mean (ppb), Summer 2019, Neighborhood (Community District)



Mean (ppb), Summer 2019

About the Indicators

Ozone is a common air pollutant that can harm breathing and worsen asthma and other respiratory conditions.

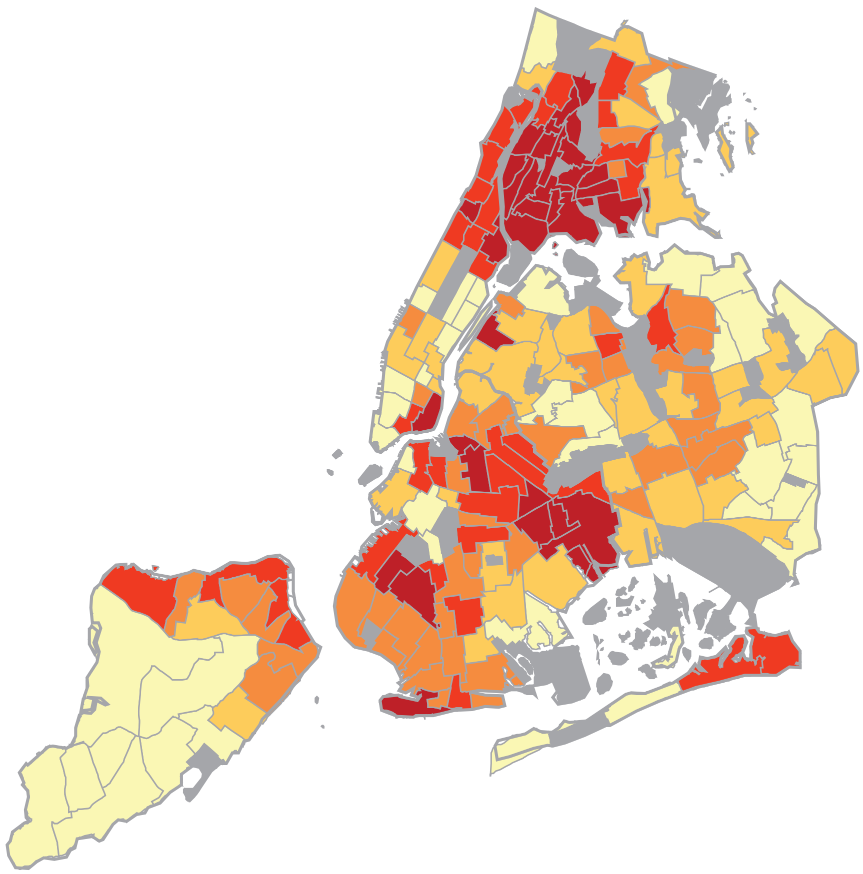
Name: Ozone (O3) **Measure:** Mean **How Calculated:**
Air samples collected at specific NYCCAS monitoring sites along with information about emissions sources were incorporated into a statistical model that predicted pollutant concentrations at all locations in NYC for the specified time period. The results were then assigned to the appropriate NYC neighborhood and averaged. In NYC ozone is measured in units of parts per billion (ppb).

Source(s): New York City Community Air Survey

NYC Department of Health and Mental Hygiene
Environment & Health Data Portal
More information can be found at: ***http://nyc.gov/health/tracking***
Accessed November 06, 2020

Environment & Health Data Portal

Poverty - Percent , 2013-17, Neighborhood (NTA)



Percent , 2013-17

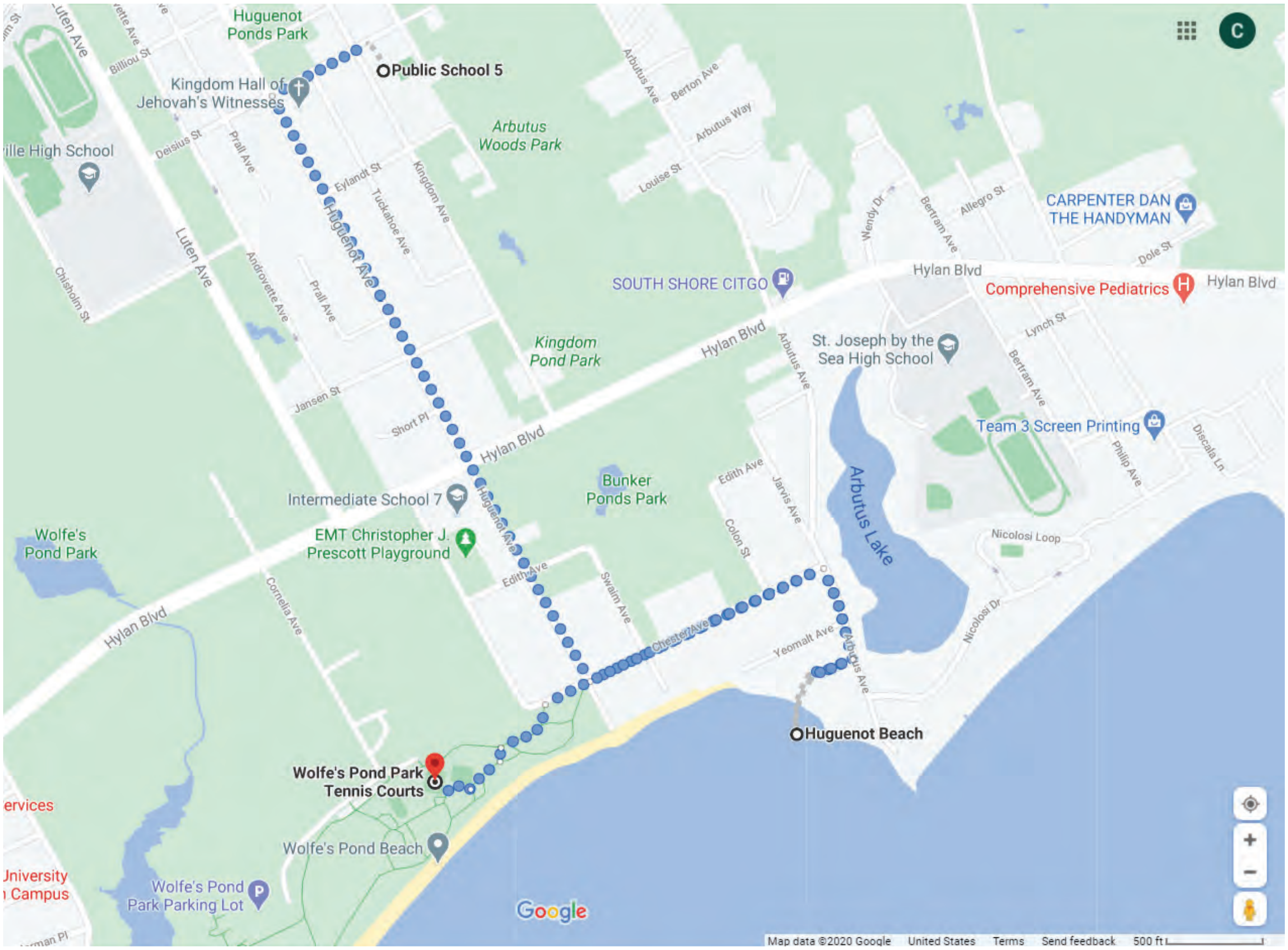
4.3% | 9.9% | 14.2% | 20.6% | 29% | 57.8%

About the Indicators

Neighborhood poverty is a major determinant of health, since poverty deprives people of access to health and safety resources.

Name: Poverty **Measure:** Percent **How Calculated:** Estimated number of people for whom poverty status is determined, whose annual income falls below 100% c federal poverty level, divided by the number of people for whom poverty status is determined; expressed as percent. **Source(s):** American Community Survey

NYC Department of Health and Mental Hygiene
Environment & Health Data Portal
More information can be found at: ***http://nyc.gov/health/tracking***
Accessed November 06, 2020


Huguenot Ponds Park
Public School 5
Kingdom Hall of Jehovah's Witnesses
Arbutus Woods Park
CARPENTER DAN THE HANDYMAN
SOUTH SHORE CITGO
Hylan Blvd
Comprehensive Pediatrics
Kingdom Pond Park
St. Joseph by the Sea High School
Team 3 Screen Printing
Bunker Ponds Park
Intermediate School 7
Arbutus Lake
Wolfe's Pond Park
EMT Christopher J. Prescott Playground
Huguenot Ave
Luten Ave
Huguenot Beach
Wolfe's Pond Park Tennis Courts
Wolfe's Pond Beach
Wolfe's Pond Park Parking Lot
Google
Map data ©2020 Google
United States
Terms
Send feedback
500 ft

S2.1P – Construction Activity Pollution Prevention

If project site does not discharge to a separate storm sewer system and the area of disturbance is less than 1 acre, SWPPP is not required.

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR (for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-20-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE
OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
NYC SCA

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address
30-30 Thomson Avenue

City
Long Island City

State
NY

Zip
11101 -

Phone (Owner/Operator)
718 - 472 - 8000

Fax (Owner/Operator)
 - -

Email (Owner/Operator)
scaowner-s@nycsca.org

FED TAX ID
 - (not required for individuals)

Project Site Information

Project/Site Name
PS School Addition

Street Address (NOT P.O. BOX)
Deisius Street

Side of Street
○ North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Staten Island

State	Zip	County	DEC Region
NY	10312 -	Richmond	2

Name of Nearest Cross Street
Kingdom Avenue

Distance to Nearest Cross Street (Feet)
30

Project In Relation to Cross Street
○ North ○ South ● East ○ West

Tax Map Numbers
Section-Block-Parcel
3609-16

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site. To do this, go to the NYSDEC Stormwater Interactive Map on the DEC website at:

https://gisservices.dec.ny.gov/gis/stormwater/

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located the centroid of your project site, go to the bottom right hand corner of the map for the X, Y coordinates. Enter the coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)	**Y Coordinates (Northing)**
-7 4 1 8 7 6 4	4 0 5 2 9 6 3
Ex. -73.749	**Ex.** 42.652

2. What is the nature of this construction project?

○ **New Construction**

● **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ● INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION — Number of Lots
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ● INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
2.7	2.1	0.5	1.5

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ● **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	**B**	**C**	**D**
%	%	%	100 %

7. Is this a phased project? ○ **Yes** ○ **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date 09/01/2021 - **End Date** 05/15/2024

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

Wolfe's Pond

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ● Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001? ○ Yes ● No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001? ● Yes ○ No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ○ Yes ● No
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ Yes ● No
If Yes, what is the acreage to be disturbed?

.

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ Yes ● No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ● **Yes** ○ **No** ○ **Unknown**

16. What is the name of the municipality/entity that owns the separate storm sewer system?

New York City DEP

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ **Yes** ● **No** ○ **Unknown**

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ **Yes** ● **No**

19. Is this property owned by a state authority, state agency, federal government or local government? ● **Yes** ○ **No**

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ **Yes** ● **No**

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● **Yes** ○ **No**

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? **If No, skip questions 23 and 27-39.** ● **Yes** ○ **No**

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● **Yes** ○ **No**

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
KS Engineering

Contact Name (Last, Space, First)
Meidhof, Charles

Mailing Address
2 Riverfront Plaza

City
Newark

State: NJ Zip: 07102-

Phone: 973-623-2999 Fax: 973-242-2955

Email
cmeidhof@kseng.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name CHARLES **MI** P

Last Name MEIDHOF

Signature

Date / /

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ○ Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ● Storm Drain Inlet Protection
- ● Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ○ Mulching
- ● Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ● Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ○ Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ● Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ○ **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ○ **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ○ All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

0.245 **acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

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Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)	.	and/or	.
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	.	and/or	.
○ Tree Planting/Tree Pit (RR-3)	.	and/or	.
○ Disconnection of Rooftop Runoff (RR-4)	.	and/or	.
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			.
○ Rain Garden (RR-6)			.
○ Stormwater Planter (RR-7)			.
○ Rain Barrel/Cistern (RR-8)			.
○ Porous Pavement (RR-9)			.
○ Green Roof (RR-10)			.
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			.
○ Infiltration Basin (I-2)			.
○ Dry Well (I-3)			.
○ Underground Infiltration System (I-4)			.
○ Bioretention (F-5)			.
○ Dry Swale (O-1)			.
Standard SMPs			
○ Micropool Extended Detention (P-1)			.
○ Wet Pond (P-2)			.
○ Wet Extended Detention (P-3)			.
○ Multiple Pond System (P-4)			.
○ Pocket Pond (P-5)			.
○ Surface Sand Filter (F-1)			.
○ Underground Sand Filter (F-2)			.
○ Perimeter Sand Filter (F-3)			.
○ Organic Filter (F-4)			.
○ Shallow Wetland (W-1)			.
○ Extended Detention Wetland (W-2)			.
○ Pond/Wetland System (W-3)			.
○ Pocket Wetland (W-4)			.
○ Wet Swale (O-2)			.

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
● Hydrodynamic	2.10
○ Wet Vault	.
○ Media Filter	.
○ Other	.

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name VORTECHS STORMWATER TREATMENT

Manufacturer CONTECH

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

2.10 **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

● **Yes** ○ **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

. **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

○ **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

[ ][ ][ ].[ ][ ][ ] **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). [ ][ ][ ].[ ][ ][ ]

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ○ **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

[ ][ ][ ].[ ][ ][ ] **acre-feet**

CPv Provided

[ ][ ][ ].[ ][ ][ ] **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

● Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

10.72 **CFS**

Post-development

[ ][ ][ ].[ ][ ][ ] **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

18.74 **CFS**

Post-development

[ ][ ][ ].[ ][ ][ ] **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?

● **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

NYCDOE

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

Per percolation test no infiltration, 0.0 in/hr was recorded. As such, all runoff is collected, sent to vortechs water quality devices, then to a detention tank From there the water release rate will be metered by a control structure M.H.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP NYR
- ○ Other
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. .

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ Yes ● No

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. NYR

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name **MI**

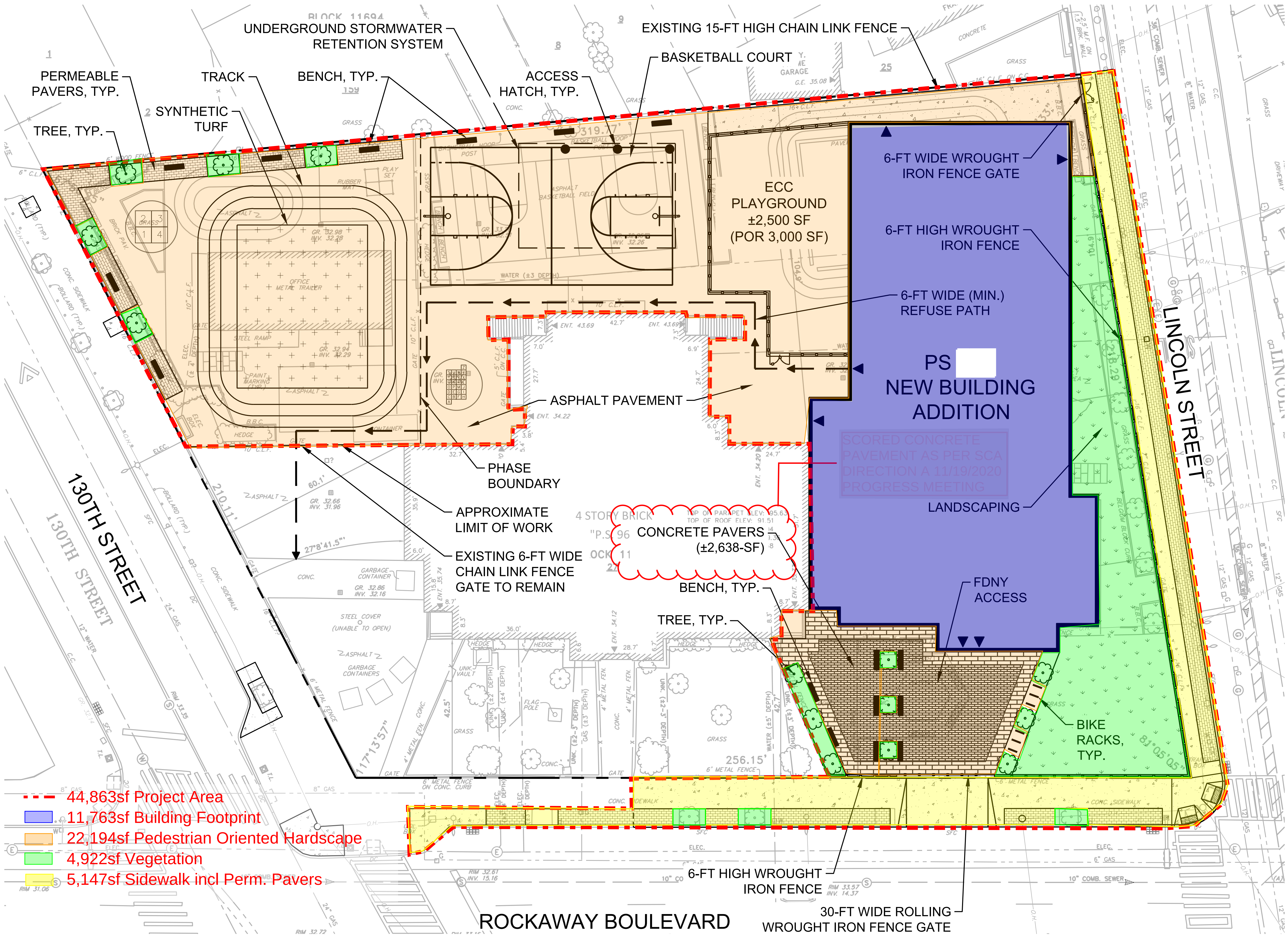
Print Last Name

Owner/Operator Signature

Date

/ /

S2.2 – OPEN SPACE



Hartland Engineering, DPC
152 Edgar Street, 2nd Floor
Weehawken, NJ 07086
347.899.4710

DATE: 17 NOVEMBER 2020

DRAWN BY / CHECKED BY: NB/VS

SCALE: 30 0 15 30 SCALE IN FEET

PROJECT:

PS ADDITION

ROCKAWAY BLVD, QUEENS, NY 11420

PROJECT NUMBER: 1

TITLE:

SCHEMATIC SITE PLAN

C001.00

CD Planting Schedule

PLANTING SCHEDULE*									
CANOPY TREES									
QTY	**SYMB**	**SCIENTIFIC NAME**	**COMMON NAME**	**SIZE*** **	**ROOT**	**SPACING**	**DEER RESISTANT**	**NATIVE**	**HABIT**
3	PO	*Platanus occidentalis*	American Sycamore	5" - 6" cal	B & B	As per plan	Y	Y	Strong Central Leader, Limb up to 6' ht.
13	AR	*Acer rubrum*	Red Maple	5" - 6" cal	B & B	As per plan	Y	Y	Strong Central Leader, Limb up to 6' ht.
1	AS	*Acer saccharum*	Sugar Maple	5" - 6" cal	B & B	As per plan	Y	Y	Strong Central Leader, Limb up to 6' ht.
UNDERSTORY TREES									
3	AA	*Amelanchier arborea*	Common Serviceberry	7'-8' ht.	B & B	As Shown	Y	Y	Multi-stem, bird habitat,
SHRUBS									
14	RA	*Rhus aromatica* 'Gro-low'	Gro-low Fragrant Sumac	24" - 30"	#3 cont	36" O.C.	Y	Y	Native-Hybrid
GROUNDCOVER, PERENNIAL & FERN MIX**									
365	CS	*Carex stricta*	Tussock Sedge	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
365	CP	*Carex pennsylvanica*	Pennsylvania Sedge	1 quart	Cont.	14" O.C.	Y	Y	Native low-growing, fine textured Sedge
365	DP	*Dennstaedtia punctilobula*	Hay Scented Fern	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
365	OC	*Osmundastrum cinnamomea*	Cinnamon Fern	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
365	AC	*Asarum canadense*	Wild Ginger	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast

NOTE:

* TREE SPECIES CHOSEN FROM NYC PARKS NATIVE PLANT GUIDE 2019
Species least preferred by deer pages 79-83

** ALTERNATE TO GROUND COVER MIX
Low Grow Fescue, shade tolerant turf
2150 sf total

*** SCA requires 5"-6" caliper Major Tree
DCP requires 3-1/2"-4" caliper Canopy Tree

REVISED : 2.26.21

S2.3P, S2.4 – GREEN INFRASTRUCTURE ASSESSMENT AND RAINWATER MANAGEMENT

For S2.3/S2.4, submit plans depicting site conditions and GI or LID strategies, highlighting topography, soil qualities, direction of water flow, and area of site that each facility addresses.

For projects where S2.4- Rainwater Management is feasible, calculations for volume of rainwater managed by GI or LID strategies shall be included.

NYC Green Schools Rating System

School Construction Authority

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: | SD | DD | 60% | #### | Design | CA |

RAINWATER MANAGEMENT
CREDIT FORM
S2.4

Project:		Submission Phase:	DD Submission
Address:	130-17 Rockaway Blvd	Architect:	
LLW #:		Preparer:	
Design #:		Form Revision Date:	2/22/2021

INSTRUCTIONS:
Step 1) Select NOAA Weather File Site nearest to the project. Then select Percentile Rain Event the project is pursuing.
Step 2) List all low-impact development (LID) and green infrastructure (GI) strategies used to manage runoff on-site. The runoff volume must be calculated for the entire developed site. Include the amount of volume managed per strategy. The combination of strategies listed must meet or exceed the runoff volume required to be managed on site.
Step 3) Check compliance.

Step 1: Historical Data

Nearest NOAA Weather File Site	JFK	
Percentile Rainfall Event	95	th percentile

Step 2: List all low-impact development (LID) and green infrastructure (GI) strategies used to manage runoff on-site

LID or GI Strategy Description	Runoff Volume Managed (cu ft)	Percent Runoff Volume Managed (%)
Stormwater Retention System	*8,820*	100%

Step 3: Compliance

Site Area	58,754	SF
Percentile Rainfall Event	1.58	inches
Runoff volume required to be managed on site	7,736	cu ft
Runoff planned to be managed on site	**8,820**	cu ft

SCHEMATIC DESIGN

EXISTING SITE CHARACTERISTICS

TOPOGRAPHY/GEOLOGY/SOILS

Subsurface Conditions (based on historic borings & field data):

Based on the available geotechnical information, the subsurface materials at the site consists of medium dense sand, followed by very stiff Silt and dense sand.

The upper-medium dense sand layer is about 10-ft thick, consisting of red-brown, coarse to fine sand with varying amounts of gravel and Silt.

Very stiff Silt is present below the medium dense sand layer. The thickness of this layer is about 35 feet. This layer consists of red-brown Silt with varying amounts of gravel and Silt.

Below the silt layer at about 45-ft from the ground surface, a dense layer of sand is present. This layer consists of red-brown, coarse to fine sand with varying amounts of gravel and Silt.

Below dense sand layer at about 72-ft from the ground surface, a hard layer of clayey Silt and silty clay with pockets of fine sand is present. This layer consists of yellow-white to gray clayey Silt and silty clay with varying amounts of fine sand.

Based on the existing borings, groundwater is likely to occur at about 12-ft below ground surface, or approximately at elevation 29.0. (*The Elevations refer to Richmond High Water Datum, which is 3.19 feet above United States Coast and Geodetic Survey Datum at Sandy Hook.)*

Topography

The topography of Staten Island ranges from steep hills to flat terrain. A hilly spine trends from about N60°E in the southwestern half of the Island to about N40°E in the northeastern part. The maximum land-surface altitude in the southwest part is about 150 ft above sea level; in the northeast part, where the slopes are steepest, it is about 405 ft. The 405-ft altitude is on Todt Hill, the highest spot on the eastern seaboard that is within 2.5 miles of the Atlantic Ocean. The hilly spine of the Island is flanked by a flat plain ranging from less than 0.1 miles wide at the Island's northern and southern ends to as much as about 2 miles wide in the northwestern part.

Geology

Staten Island is underlain by consolidated rocks (bedrock) and unconsolidated deposits. The bedrock structure is complex, and rock types differ significantly within the Island's 60 square mile area. The Island is underlain by igneous, metamorphic, and sedimentary rocks that range from Upper Proterozoic to Lower Jurassic age. These bedrock units are the Manhattan Schist, serpentine; the Newark Supergroup, undivided; and the Palisade Diabase.

The rocks are directly overlain by unconsolidated deposits of the Upper Cretaceous Raritan Formation, undivided, or by upper Pleistocene deposits of Wisconsinan glacial drift, except in several bedrock-outcrop areas.

Soil

Site soils as shown in Figure 1 below are listed as UGAI, Urban Land-Greenbelt Complex, 0 to 3% slopes, low impervious surface and GUA – Greenbelt, Urban Land Complex 0 to 3% slopes. Most of the development will occur in the UGAI soil areas.

Urban soils typically exhibit a high rate of runoff due to development. No rating is listed for the UGAI soils. The Greenbelt soils, if undisturbed, are in Hydraulic Soil Group (HSG) B which have a lower rate of runoff. Soils in HSG B are suitable for infiltrative practices such as basins or dry wells. Specific to the GUA soil are listed significant amounts of fine particles which indicate possibly poor conditions for infiltration of stormwater and septic tank effluent. However, the location of existing septic systems on the site indicate the soils may be acceptable for these purposes. Soil testing will be required to determine the permeability rate for the site soils to verify that these practices are viable on site provided that no such practice is within setbacks required by the city code. The USDA shows the depth to groundwater is >200 cm. The seasonal high water table would have to be verified by monitoring wells with readings from January through March.

Note that SCA historic soil borings provided indicate the B soils are present in this zone with some areas of silt prevalent.

Seismic Design Parameters

Based on the available SPT data (blow counts), the site falls within a **Site Class D** – soil profile. Seismic Design Category and Peak Ground Acceleration (PGA) for this site is B and 0.156, respectively, based on the International Building Code (IBC) – 2015.

Figure 1 - Soils

BORING ANALYSIS RESULTS

Six (6) borings, designated B-1(OW) to B-6, in the vicinity of the proposed addition, and Three (3) borings, designated SB-1 to SB-3, for pavement design, were drilled at the site between October 10, 2020 and October 18, 2020. The borings were advanced to depths varying between 22 feet and 102 feet below the existing ground surface. Three (3) observation wells were installed within the test borings B-1(OW), B-3, and B-5 to obtain direct measurements of groundwater levels.

A summary of the results of the boring analysis is as follows:

Surface Layer

An approximately 4-inch thick layer of topsoil was encountered in the Borings B-1(OW) and B-2. These borings are located on the northeast corner of the site. An about 4 to 6-inch thick asphalt layer was encountered in the Borings B-3(OW), B-4, and B-5(OW). These borings are located in the playground area on the south side of the existing school building.

Miscellaneous Fill Layer

An approximately 2 to 7 feet thick layer of loose to medium dense miscellaneous fill material was encountered in all the borings. The fill generally consists of brown Silt and coarse to fine Sand with various amounts of Silt and miscellaneous construction debris such as brick. SPT N-values ranged from 3 to 91 with average N-values 26 within this layer. The fill layer is classified as NYCBC Class 7 Material – Uncontrolled Fill.

Loose to Medium Dense Sand Layer

This layer consists of loose to medium dense, coarse to fine Sand with various amounts of Gravel and silt, extending to depths ranging from about 15 feet to 70 feet below the ground surface. SPT N-values ranged from 2 to 30 with average N-values 16 within this layer. The looser sands are classified as NYCBC Class 6 Material- Nominally Unsatisfactory Bearing Material, and the denser sands are classified as NYCBC Class 3b Material – Granular Soils.

Dense Sand Layer

Dense to very dense silty sand was encountered beneath the loose to medium dense sand layer, at depth of about 2 feet to 70 below the existing ground surface. SPT N-values ranged from 31 to 89 with average N-values 44 within this layer. The dense sands are classified as NYCBC Class 3a Material - Granular Soils.

Groundwater Measurements

The static groundwater (GW) levels measured at the time of drilling in the test borings were between about 5 ft and 12 ft below ground surface. Groundwater readings are also measured in the three monitoring wells installed and the table below summarizes the groundwater elevations as measured in these monitoring wells:

Date Measured	Time Measured	Depth to GW (ft +/-)	GW Elevation (ft +/-)	Depth to GW (ft +/-)	GW Elevation	Depth to GW (ft +/-)	GW Elevation

		B-1(OW)	B-1 (OW)	B-3(OW)	(ft +/-) B-3(OW)	B-5(OW)	(ft +/-) B-5(OW)
10/17/20	1:00 PM	14.2	26.8	17.5	22.5	-	-
10/18/20	8:30 AM	14.2	26.8	17.5	22.5	-	-
10/18/20	11:00 AM	14.2	26.8	17.5	22.5	-	-

Foundation Support

Based on the recent investigation performed by KSE, a layer of existing fill is present at the surface throughout the site, underlain by loose to medium dense sand material. Based on the Standard Penetration Test (SPT) "N-Value" results, the compactness of the fill and natural sand material varied from medium to dense and medium to very dense for fill and natural sand, respectively.

The recommended basic allowable bearing pressure on the natural material below the fill is up to 4,000 psf (2 tsf) and the recommended minimum footing width is 3 ft. We recommend that the footings be supported on natural material at a minimum embedment depth of 3.5 ft below the adjoining ground or pavement surface for protection from frost heave. Footing bearing surfaces should be level and clear of debris, standing or frozen water, and other deleterious materials. It is anticipated that total settlements of properly designed and constructed foundations should be less than 1- inch, and differential settlements would be about ½-inch.

After excavating to footing base elevation, the resulting subgrades should be compacted with a large (10-Ton) vibratory roller. Any soft or otherwise unsuitable subgrade soils revealed by the proof rolling should be removed and replaced with controlled compacted fill or clean crushed stone. Controlled-fill if used should be placed in 10-inch maximum thick layers to the design foundation bottom elevation. Each layer of controlled fill should be compacted to at least 95% of Maximum Modified Proctor density.

Slabs on Grade and Pavements

Slabs on grade and pavements can be supported on the existing fill materials, after proof rolling subgrades and removing and replacing any soft spots with controlled fill, as previously described. It is recommended that concrete slabs be directly underlain by at least six inches of compacted, ¾-inch size clean crushed stone or as otherwise required by the design structural engineer. A modulus of subgrade reaction equal to 100 PCI may be used to design slabs-on-grade supported by properly prepared subgrades.

Controlled Fill and Backfill

Controlled compacted fill and backfill material should consist of environmentally clean, well-graded sand and gravel, with a maximum particle size of 2 inches, and less than 12% (by weight) of non-plastic fines (material passing the No. 200 sieve). The fill material should not contain unsuitable matter, such as organic or other deleterious matter, frozen clods, construction debris, etc. The fill should be placed in even horizontal lifts, not exceeding 10 inches loose thickness before compaction. It may be necessary to utilize thinner lifts at locations where compaction is performed using hand-operated equipment. Each lift should be compacted to at least 95% of Maximum Modified Proctor density (ASTM D1557) below foundations or concrete slabs, and 92% of Maximum Modified Proctor density in non-structural areas. The moisture content of the fill material should be uniform and should be in a range of plus/minus two percent of optimum. Existing on-site fill materials can be used as controlled fill, provided that they conform to the above gradation requirements, and can be properly compacted.

EXISTING UTILITIES

Kingdom Avenue (reporting from west to east running longitudinally along roadway)

- 2” gas is reported to be found in the westerly sidewalk
- Electric primary and secondary lines and street lights are on a pole line along the westerly sidewalk,
- Communications and CTV line are found on this same pole line
- Secondary lines cross the roadway feeding an above ground transformer on school property
- 8” DIP water main found in the street near the west curb line
- 10” sanitary sewer line west of center line, with an exsting school building connection mid-block into an existing manhole
- 18” storm sewer beginning at a manhole mid-block and traveling southerly towards Eylandt Street, right of center line of the roadway, with catch basins found in Kingdom Avenue and at the corners of Eylandt street and Deisius Street
- 2” retired gas line is reported near the easterly curb line in the street

Deisius Street (reporting from north to south running longitudinally along the roadway)

- 8” DIP water main found in the street near the northerly curb line
- 30” Storm Sewer north of center line of the roadway, with catch basins found at the corner of Stecher Street and Deisius Street
- 10” sanitary sewer found near the centerline of the roadway
- 2” gas main running near the southerly curb line
- Fire Communications lines run from the school underground in the street and into a manhole at the corner of Kingdom and Deisius. A pull box also feeds in the manhole and runs up a pole on the south west corner of the intersection of Kingdom and Deisius
- Electric primary and secondary lines and street lights are on a pole line along the southerly sidewalk. Service wires were found to run down the pole and to a property box at the property line of the school
- Communications and CTV line are found on this same pole line
- Found in our walk-through the existing school collects some of its site storm water run-off, directs it to the basement and a sump pump discharges to a catch basin at the south east corner of Deisius Street and Kingdom Avenue.

Stecher Street (reporting from east to west running longitudinally along roadway)

- Stecher Street road improvements end approximately ¾ way down the street. It is reported that the remainder is DEP Blue Belt Property
- Electric secondary lines and street lights are on a pole line along the easterly sidewalk

- Communications and CTV line are found on this same pole line
- 2" gas main running near the easterly curb line which ends at the Blue Belt Property
- 10" sanitary sewer line running at the center line of the street, ending at a manhole near the dead end of the street
- 8" DIP water main found in the street near the westerly curb line. Past the street limit the 8" pipe is reported to be cast iron.

PERMITS:

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NYCDEP):

Connection permits will be required for water and fire protection services. A connection permit for the sanitary sewers will be required. A storm water permit will be required for conection to the separete storm sewer system or for on site retention using infitratration pracitices.

NYCDEP has separate departments for Blue Belt, MS 4 (Figures 3 & 4) and Stormwater connections. Submittals may be required to all three or may be waived to a submittal to the connection permits department if the on-site retention of stormwater is available through infiltration. NYCDEP usually requires the retention of the volume for the 5-year storm with a duration of 60 minutes and a Time of concentration. Tc = 6 minutes, rainfall intensity, I = 5.95 inches per hour.

The site is located in the Staten Island Blue Belt Region. (Figure 2)

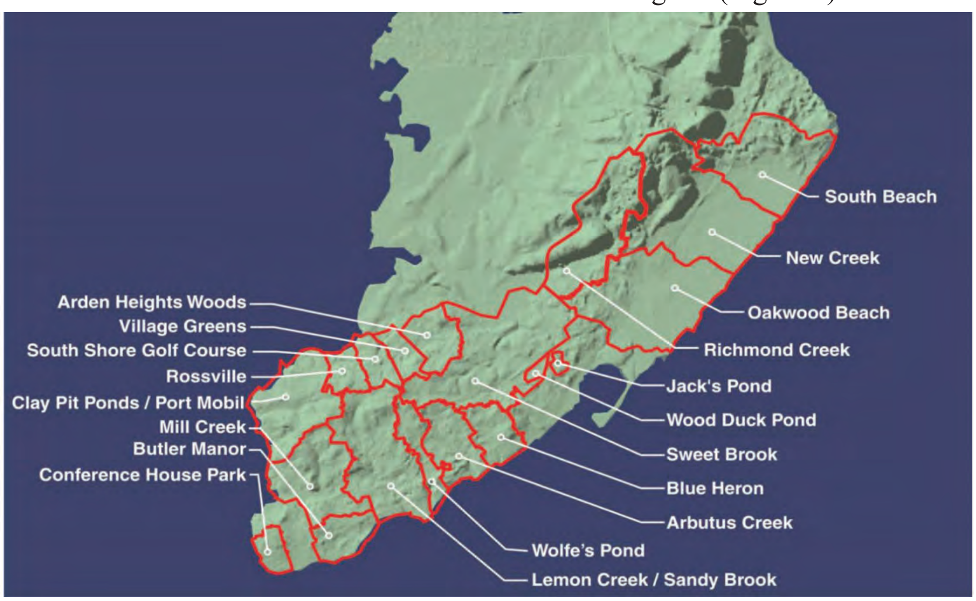


Figure 2. Staten Island Blue Belt

The project is located in either the Wolfe's Pond basin or Artibus Creek basin of the Staten Island Bluebelt.

NYCDEP states "The Staten Island Bluebelt is an award winning, ecologically sound and cost-effective stormwater management system for approximately one third of Staten Island's land area. The program preserves natural drainage corridors, called Bluebelts, including streams, ponds, and other wetland areas. Preservation of these wetland systems allows them to perform their functions of conveying, storing, and filtering stormwater. In addition, the Bluebelts provide important community open spaces and diverse wildlife habitats. The Bluebelt program saves tens of millions of dollars in infrastructure costs when compared to providing conventional storm sewers for the same land area. This program demonstrates how wetland preservation can be economically prudent and environmentally responsible.

The current Bluebelt system drains 15 watersheds clustered at the southern end of the Island, plus the Richmond Creek watershed. The combined area of these 16 watersheds totals approximately 10,000 acres.

This system of strategically placed wetlands over 14,000 acres temporarily stores and filters 350,000 gallons of stormwater—up to 1.75 inches of rain per hour. By protecting and beefing up natural drainage corridors, such as streams and ponds, Staten Island is saving more than $80 million in sewer costs.

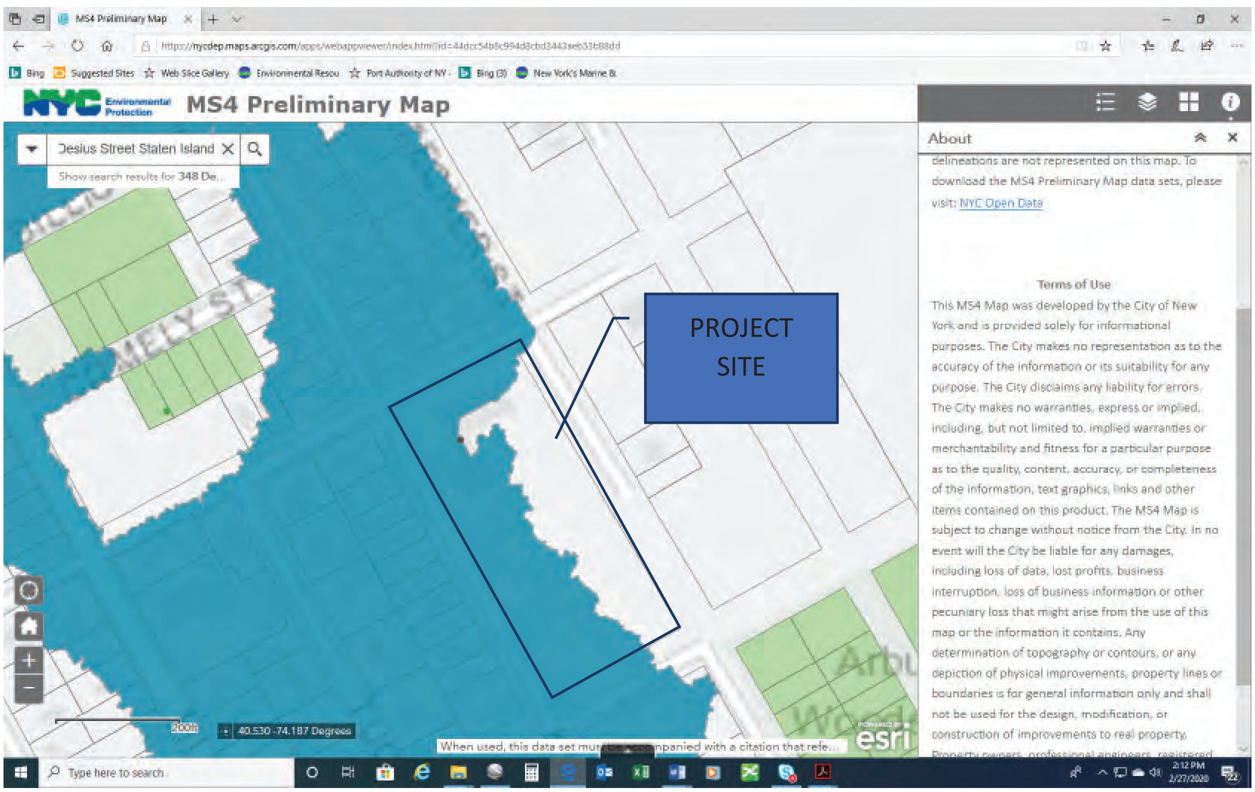


Figure 3 – MS4 Zone

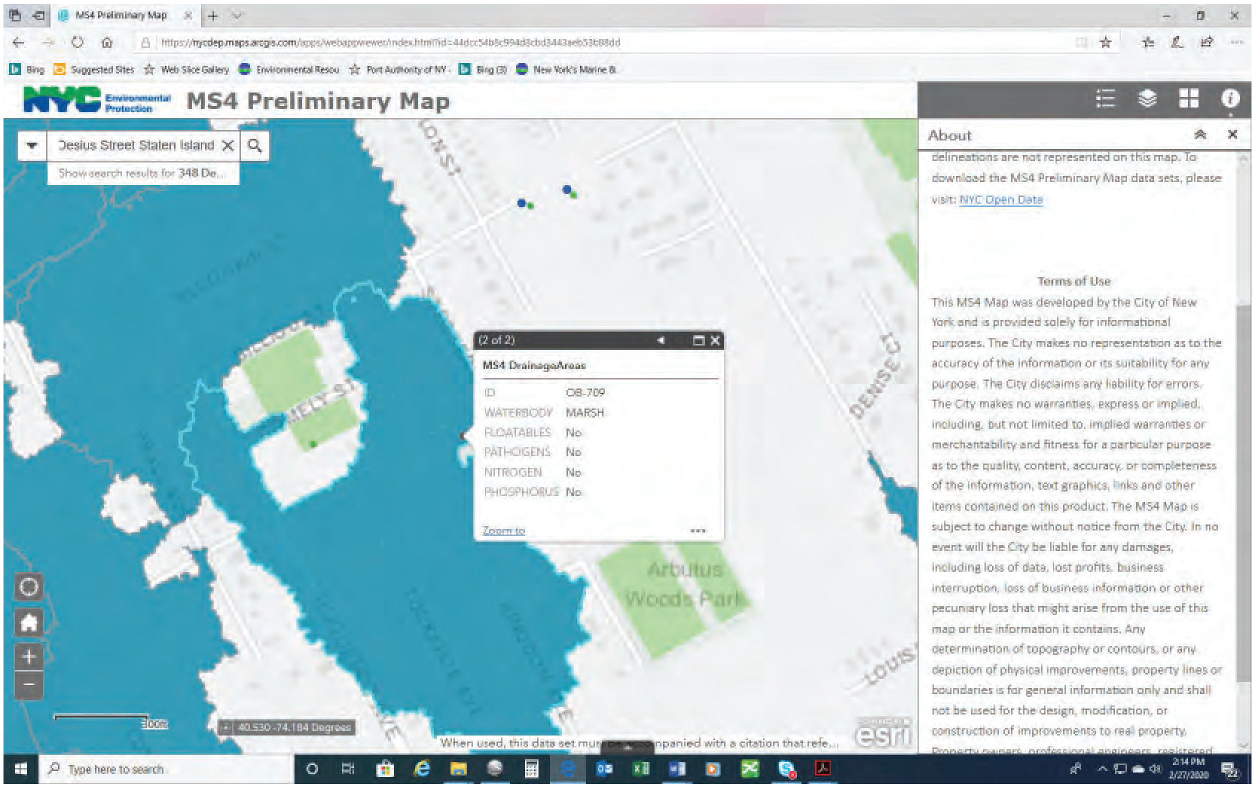


Figure 4 – MS4 Zone

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC).

Construction Activity Permit GP-0-15-002

Site disturbances of one or more acres of land with no impervious cover, 40,000 square feet (0.918 acres) or more require the submittal of a Storm Water Pollution Prevention Plan (SWPPP). Note that the disturbance is on a cumulative basis from existing conditions at the site for any currently proposed and future work. NYSDEC requires a more detailed stormwater analysis for a variety of storms (90th Percentile water quality,

The location of the site in the Richmond County areas discharging to Grassmere, Arbitus and Wolfe Lakes requires design in accordance with the New York State Strom Water Management Design manual as per Appendix E of GP-0-15-002.

A Notice of Intent (NOI) must be filed electronically with the SWPPP to be kept on site during and after construction with the required reporting. Confirmation of filing is required.

PROPOSED SCHOOL AND SITE PLAN

The proposal is to a new five story addition (including basement) on the east side of the school. A new Early Childhood Center (ECC) playground will be constructed directly behind the new building. The existing grass field to the south of the school will be converted into a multi-use playground. The playground area will include new basketball courts, individual games centers, and a track with a grass infield. A new 12-foot chain link fence will be installed around the playground from the end of Stecher Street south to Eylandt Street continuing west to Kingdom Avenue and then north on Kingdom Avenue ending at the entrance to the playground. The balance of the school will be protected by a six-foot high iron picket fence. A new four-foot high chain link fence will be constructed to separate the school from the playground area.

New utility connections will be required the school addition. The following utilities are located on Stecher Street:

- Stecher Street road improvements end approximately ¾ way down the street. It is reported that the remainder is DEP Blue Belt Property
- Electric secondary lines and street lights are on a pole line along the easterly sidewalk
- Communications and CTV line are found on this same pole line
- 2" gas main running near the easterly curb line which ends at the Blue Belt Property
- 10" sanitary sewer line running at the center line of the street, ending at a manhole near the dead end of the street
- 8" DIP water main found in the street near the westerly curb line. Past the street limit the 8" pipe is reported to be cast iron.

Water, sanitary, gas, and electric service connections will be from Stecher Street.

<u>Sidewalk/Roadway Design</u>

The existing grass area adjacent to the sidewalk along Stecher Street will be replaced with permeable pavers and trees. A new sidewalk meeting the current ADA standards will be constructed with a new handicap ramp located in the southwest corner of Stecher Street/Deisius Street. A new sidewalk will also be constructed on Kingdom Avenue from the entrance to the playground south to Eylandt Street with a new handicap ramp located in the northeast corner of Kingdom Avenue/Eylandt Street. The existing remaining sidewalk and trees will remain in their current condition.

<u>Landscaping</u>

The playground area and the area inside the track will be grass and landscaped. The landscape band will be approximately 15 feet wide beginning at the ECC Playground's chain link fence and then continuing clockwise around the perimeter of the site up. Area drain inlets will be placed within the landscaped area connecting to the detention basin. The number of drain inlets will be determined during the preparation of Design Development documents.

<u>Stormwater Runoff Design</u>

Borings that have been taken showing that the existing soils do not allow water to percolate down through the soils. Therefore, the initial design option to construct a series of infiltration basins to manage stormwater runoff will not be feasible. Therefore, a new detention basin will be located under the play area and designed in accordance with NYCDEP/MS4 and Blue Belt regulations. There is an existing 18-inch storm sewer located in the Kingdom Avenue. The new detention basin comprised on HDPE piping, a water quality structure, and control structure will be connected to the existing storm sewer in Kingdom Avenue. The amount of flow that will be permitted to leave the site and connection point to the existing storm sewer on Kingdom Avenue will be determined after we meet with NYCDEP in accordance with the Blue Belt regulations.

School Construction Authority
Architecture & Engineering

GREEN INFRASTRUCTURE ASSESSMENT REPORT

☒GREEN SCHOOLS GUIDE 2019 SUBMISSION

☐MS4 AREA CAPACITY PROJECTS NOT SUBJECT TO GSG

School Name/Building ID:

PS Queens / Q0

LLW No. :

Project Description:

PS Q Addition

Prepared For:

NYC School Construction Authority

3030 Thomson Avenue

Long Island City, NY 11101

Prepared By:

25 November 2020 (revised 12/16/20)

School Construction Authority
Architecture & Engineering

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A. Site Plan
B. References
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1.0 OVERVIEW

Project Location	Rockaway Boulevard South Ozone Park, Queens, NY
Project Type	New Building Addition
Site Area (SF)	58,754sf
GSG Project Boundary (SF)	39,884sf
Building Footprint (SF)	12,060sf (Addition)
Total Impervious Area (SF)	51,213sf
Project Scope	The project includes a proposed new building addition, along with the removal of the existing temporary classroom building, and exterior improvements including the redevelopment of the existing play yard to the north and east of the existing building. The proposed redevelopment will seek to reduce the total existing impervious area and provide new green infrastructure.

Green Infrastructure Strategies Summary

Strategy	Feasible	Non-Feasible	Ranking	Magnitude of Cost
Permeable Pavers	X		2	$
Precast porous concrete		NA	-	
Rain garden/vegetated bioretention/bioswale		NA	-	
Rain Barrels and Cisterns		NA	-	
Extensive green roof		NA	-	
Subsurface retention chambers/drywells	X		1	$
Subsurface retention pipe***	X		3	$

***However, the footprint area required for the pipe runs will not be practical.

Systems Meeting DEP Site Detention Requirements Summary

Strategy	Feasible	Non-Feasible	Ranking	Magnitude of Cost
Precast box culverts	X		2	$
Precast detention tanks	X		1	$
Roof Detention		NA	-	

2.0 EXISTING SITE CONDITIONS

2.1 TOPOGRAPHY AND DRAINAGE

The 58,754 square-foot project site is located on the southern half of the city block bordered by Foch Boulevard to the north, 131st Street to the east, Rockaway Boulevard to the south, and 130th Street to the west (Block 11694, Lot 27). The existing site is relatively flat with grades generally ranging from about el 33 to el 34.

Stormwater from the entirety of the site is collected by a system of storm inlets and pipe, which combines with the existing sanitary and storm sewers for the building at the rear of the site, and discharges via a single connection to the 36-inch sanitary sewer in Lincoln Street. There is currently no stormwater management system on site, nor are there any existing green infrastructure practices.

The project site is in an MS4 area, however all fronting sewers are either sanitary or combined. NYC DEP record maps indicate no sewer present in 130th Street, a 36-inch sanitary sewer in Lincoln Street, a 10-inch sanitary sewer in Rockaway Boulevard, and a 12-inch sewer in Rockaway Boulevard which is a sanitary sewer from a point midblock to the east and is a combined sewer from a point midblock to the west.

2.2 GEOTECHNICAL ANALYSIS

A subsurface exploration program was developed and performed by Hartland Engineering in March 2020. The generalized subsurface profile encountered during the subsurface explorations consists of a layer of uncontrolled miscellaneous fill overlying brown sand. Though not encountered during the subsurface exploration, bedrock is known to exist at a depth greater than about 600 feet below ground surface. The depth to groundwater was measured at about 24 feet below grade, corresponding to about el 10. A series of percolation tests were performed at two locations on-site (P1 and P2), and at depths of 5 and 10 feet. A summary of the average test results is presented below in Table No. 1.

Table 1: Percolation Test Results

Boring ID	Test Depth	USCS	Average Field K (in/hr)
P1	5	SP	1.2
P1	10	SP	0.9
P2	5	SP	1.7
P2	10	SP	2.1

All percolation rates exceed the minimum allowable rate of 0.5in/hr, therefore on-site green infrastructure practices are feasible for this project.

3.0 GREEN INFRASTRUCTURE ASSESSMENT

3.1 GREEN INFRASTRUCTURE STRATEGIES

The following narrative describes the feasibility and non-feasibility of various green infrastructure strategies, outlined in 1.0 Overview above, which were considered for this project.

Permeable Pavers

As indicated in section 2.2 above, infiltration rates for the site allow for the implementation green infrastructure practices, which includes the use of permeable pavers. Sufficient space is also available for the application of permeable pavers on-site. Permeable pavers are both relatively easy to maintain as well as cost effective.

The use of permeable pavers can reduce stormwater runoff and therefore provide a reduction in stormwater storage volume required, however they are not sufficient to manage stormwater from the entire site. Therefore, while use of permeable pavers is feasible, this strategy would have to be used in conjunction with other stormwater management strategies.

Permeable pavers will be provided on-site within the play yard, and also as a 5-ft wide strip within the right-of-way.

Precast porous concrete

Per SCA A&E direction, precast porous concrete will not be pursued.

Rain garden/vegetated bioretention/bioswale

Per SCA A&E direction, rain garden, vegetated bioretention or bioswale practices will not be pursued.

Rain Barrels and Cisterns

Per SCA A&E direction, rain barrels and cisterns will not be pursued.

Extensive green roof

Per SCA A&E direction, extensive green roof will not be pursued.

Subsurface retention chambers/drywells

As indicated in section 2.2 above, infiltration rates for the site allow for the implementation green infrastructure practices, which includes the use of subsurface retention chambers/drywells. The existing school building along with proposed addition, comprise only slightly over one third of the site area. Therefore, sufficient space is available in the play yard, to the north and west of these buildings, for the installation of subsurface retention chambers/drywells.

One of the primary advantages to a subsurface retention chamber/drywell system, is it's capability to provide the storage volume required to manage stormwater from the entire site. While the cost is significant for this strategy, it is comparable to the cost of other strategies which can handle the stormwater management volumes required for this project.

Due to its capability to manage stormwater for the entire site, a subsurface retention chamber system will be provided on-site within the play yard.

Subsurface retention pipe

Similar to the subsurface retention chamber/drywell strategy mentioned above, a subsurface retention pipe system can provide the storage volume required to manage stormwater from the entire site. However, a much larger footprint is required for a pipe system when compared to the chamber/drywell strategy. Therefore, a subsurface retention pipe systems will not be implemented, in favor of a subsurface retention chamber system instead.

3.2 HYDROLOGIC AND HYDRAULIC ANALYSIS

Hydrologic and hydraulic analysis was performed in accordance with NYC DEP and NYC DOB requirements. The runoff rate was calculated using the Rational Method, based on the total site area, rainfall intensity (5.95 in/hr), and the site’s surface coverage, per DEP criteria. The developed flow from the site was determined to be 6.54cfs.

The sizing requirements for a subsurface retention chamber strategy indicated previously, were calculated per NYC DOB requirements. Based on the developed site flow (Q=6.54cfs) given above, and a proposed footprint area of 1,260sf within the play yard for the stormwater disposal system, the maximum required storage volume for a subsurface retention system was calculated to be 8,669cf. This system would be sufficient to manage all on-site stormwater, i.e. 100% of stormwater would be retained on-site.

3.3 COMPARISON OF GREEN INFRASTRUCTURE AND SITE DETENTION

Given the developed site flow (Q=6.54cfs) indicated previously, and using NYC DEP criteria for detention facility design, the maximum allowable release rate from the site is 0.32cfs. Based on DEP requirements, the required detention volume for a facility with a variable outflow is 6,632cf. However, the entirety of this detention requirement can be removed through the use of green infrastructure practices.

As outlined in section 3.2 above, a 8,669cf subsurface retention system would be sufficient to manage all on-site stormwater. Along with the implementation of on-site permeable pavers, a subsurface retention system comprised of 8,820cf of precast concrete structures will be provided to retain 100% of stormwater on-site.

4.0 GREEN SCHOOLS GUIDE CREDIT FEASIBILITY

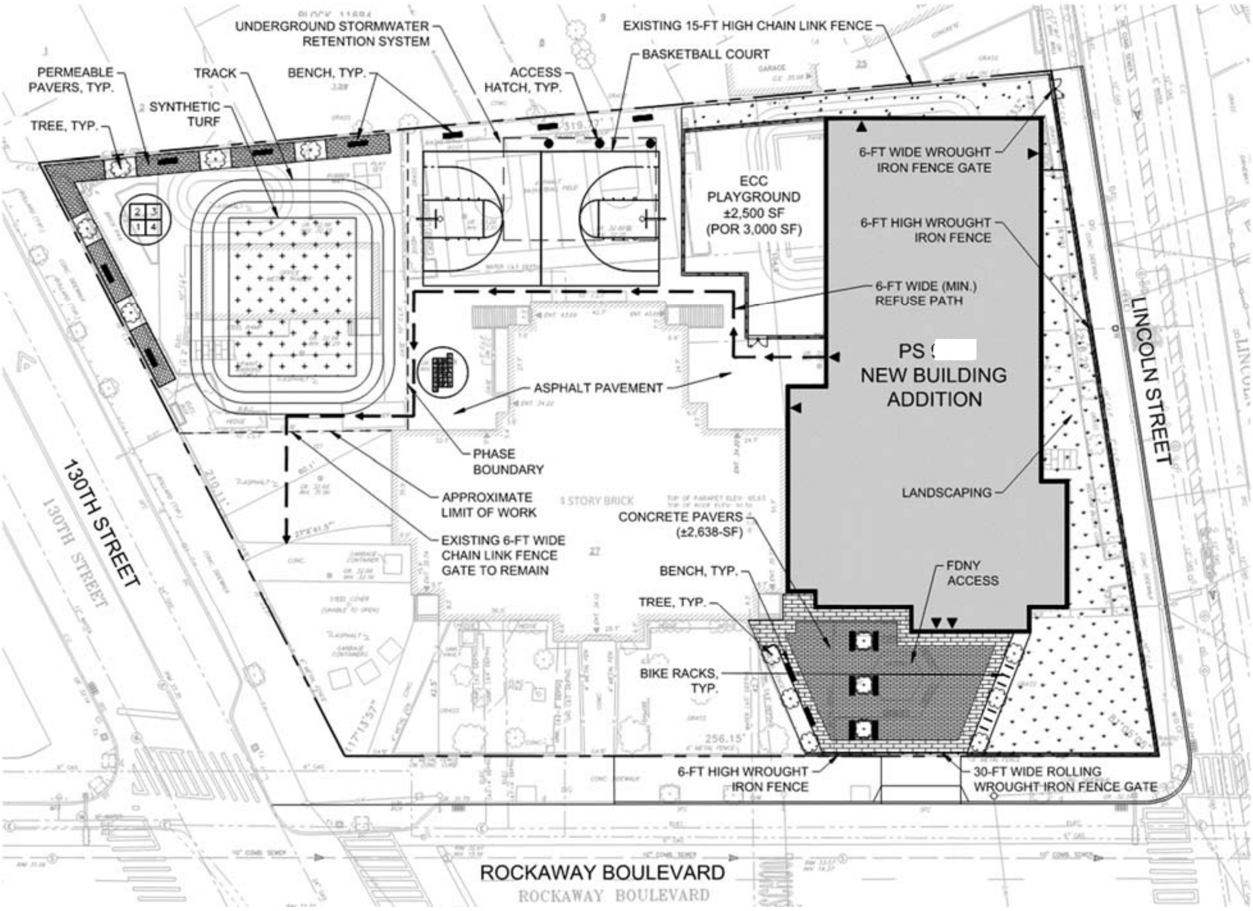
The implementation of green infrastructure practices was determined to be feasible.

Under existing conditions, all stormwater and sanitary flow from the site discharges via a single connection to the 36-inch sanitary sewer in Lincoln Street. There is currently no stormwater management system on site, nor are there any existing green infrastructure practices.

The proposed design includes the implementation of green infrastructure practices including both on-site permeable pavers and a subsurface retention system comprised of 8,820cf of precast concrete structures. All stormwater runoff from the site, which previously discharged to the city sanitary sewer, will now discharge to the subsurface retention system. This system will retain 100% of stormwater on-site.

5.0 APPENDICES

APPENDIX A - SITE PLAN



APPENDIX B - REFERENCES

1. NYC Green Infrastructure On-site Design Manual: https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/nyc-green-infrastructure-onsite-design-manual-v1.pdf
2. Green Infrastructure Assessment Feasibility Flow Chart http://scan/Departments/ArchitectureEngineering/DesignStandards/PPGHDocuments/GreenInfrastructureFlowchart.pdf
3. MS4Permit: https://www1.nyc.gov/html/dep/pdf/water_sewer/spdes-ms4-permit.pdf
4. NYC Stormwater Management Program: https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/ms4/nyc-swmp-plan-full.pdf
5. 2012 DEP Guideline for the Design and Construction of Stormwater Systems https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/stormwater-design-construction-guidelines-2012-final.pdf

S2.5 – Heat Island Reduction

NYC Green Schools Rating System

SCA School Construction Authority

HEAT ISLAND REDUCTION

CREDIT FORM

Credit S2.5

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE:

SD	DD	60%	100%	Design	CA

Project:		Submission Phase:	DD Report Submission
Address:	Rockaway Blvd	Architect:	Architects, PC
LLW #:	116480	Preparer:	
Design #:		Form Revision Date:	3/9/2021

INSTRUCTIONS:
Step 1) Enter Nonroof Strategies: Complete the table for all nonroof measures contributing to lowering the heat island effect on the project. If one or more strategies were not used, enter "0" for these rows.
Step 2) Enter High-Reflectance Roof strategies: Complete the table for all high-reflectance roof materials used on the project, as applicable.
Step 3) If applicable, enter Vegetated Roof SF.
Step 4) Check compliance.

Step 1: Enter Non-Roof Strategies

	Material Description	SR	Initial or 3-Year Aged	SR Weighted Area (SF)	Area (SF)
Architectural shading structure or device				0	
Paving material 1	Concrete Sidewalk	0.38	Initial	7,911	6,870
Paving material 2	Asphalt paving	0.08	Initial	3,097	12,774
Paving material 3	Turf/Athletic Surface	0.40	Initial	5,370	4,430
Paving material 4	Permeable Paver	0.38	Initial	2,543	2,208
Area shaded by plant canopy within 10 years of planting and/or vegetated planters (SF)					0
Area shaded by structures with energy generation systems (SF)					0
Area shaded by vegetated structures (SF)					0
Area covered by open-grid pavement systems (SF)					0
Total standard area of qualifying nonroof measures (SF)					13,508
Total weighted area of qualifying nonroof measures (SF)					18,920

Notes

Materials must have a 3-year aged SR (Solar Reflectance) value of at least 0.28 or an initial SR value of at least 0.33 in order to count toward standard area of qualifying nonroof measures. Materials with a lower SR will contribute to weighted area.

Step 2: Enter High-Reflectance Roof

Roof Slope	Material Description	SRI	Initial or 3-Year Aged	SRI Weighted Area (SF)	Area (SF)
Low	Concrete Paver	82.00	Initial	5,364	5,364
Low				0	
Low				0	
Steep				0	
Total standard area of qualifying roof measures (SF)					5,364
Total weighted area of qualifying roof measures (SF)					5,364

Notes

Low-sloped roof must have a 3-year aged SRI (Solar Reflectance Index) value of at least 64 or an initial SRI value of at least 82 in order to count toward total standard are of qualifying high-reflectance roof. Steep-sloped roof must have a 3-year aged SRI value of at least 32 or an initial SRI value of at least 39 in order to count. Materials with a lower SRI will contribute to weighted area.

Step 3: Complete Vegetated Roof

Total area of vegetated roof (SF)	0

Step 4: Complete and review summary of Heat Island Reduction Measures

Site area and roof area

Total project paving area (SF)	26,282
Total project roof area (SF)	5,364
Sum of project paving and roof area (SF)	31,646

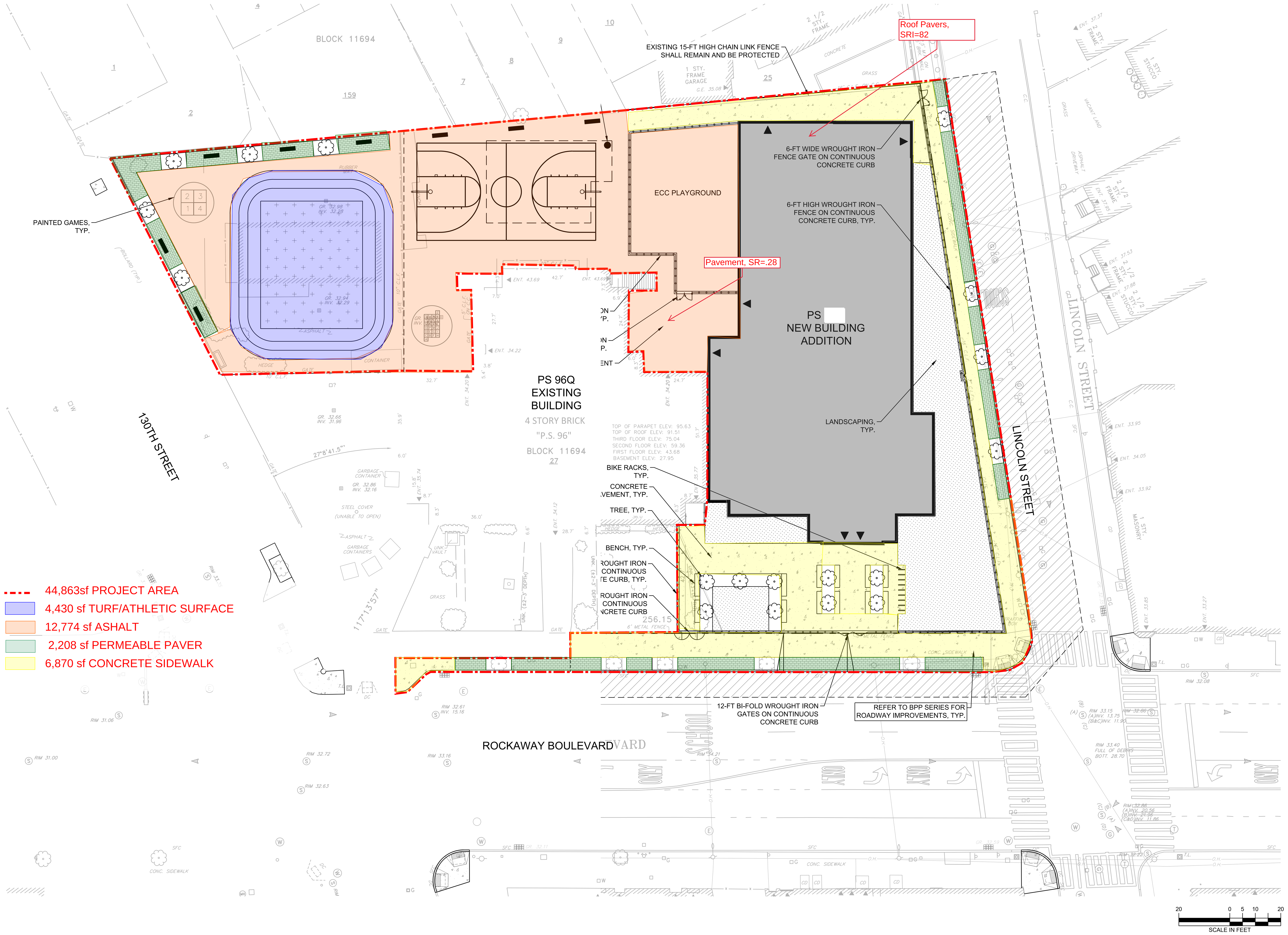
Weighted nonroof or roof calculation equation

$$\frac{\left(\text{Area of high reflectance nonroof A} \times \frac{\text{SR of high reflectance nonroof A}}{\text{Required SR}}\right)^{1}}{0.5} + \frac{\text{Area of other nonroof measures}}{0.5} + \frac{\left(\text{Area of high reflectance roof A} \times \frac{\text{SRI of high reflectance roof A}}{\text{Required SR}}\right)^{2}}{0.75} + \frac{\text{Area of vegetated roof}}{0.75} \geq \text{Total Site Paving Area} + \text{Total Roof Area}$$

1. Summed for all high-reflectance nonroof areas.
2. Summed for all high-reflectance roof areas.

Combined roof and nonroof strategies	Standard Area (SF)	SRI Weighted Area (SF)	Compliance with weighted nonroof and roof calculation equation
Contributing nonroof measures (Step 1)	13,508	18,920	37,840
Contributing high-reflectance roof (Step 2)	5,364	5,364	7,152
Vegetated roof (Step 3)	0	Not weighted	0
Total	24,284	18,872	**44,992**

Compliance	**Yes**



LEGEND:

PROPERTY LINE
APPROXIMATE LIMITS OF PROPOSED ADDITION
CONCRETE PAVEMENT
ASPHALT PAVEMENT
STEEL FACED CONCRETE CURB

NYC School Construction Authority

Dominick DeAngelis, AIA, Vice President
Aileen del Prado, P.E. LEED AP BD+C,Senior Director,Design Consultant Management
María A. Gómez, P.E., LEED A.P., Senior Director, A&E In-House Design
George D. Roussey, P.E., LEED A.P., Senior Director, Technical Standards
Stacey Spann-Thom, Director, Operations Support

Consultants:

Architect:

Structural Engineer:

MEP Engineer:

Civil Engineer:

Elevator Consultant:

Acoustical Consultant:

Food Service Consultant:

Sustainability Consultant:

Environmental Consultant to SCA:

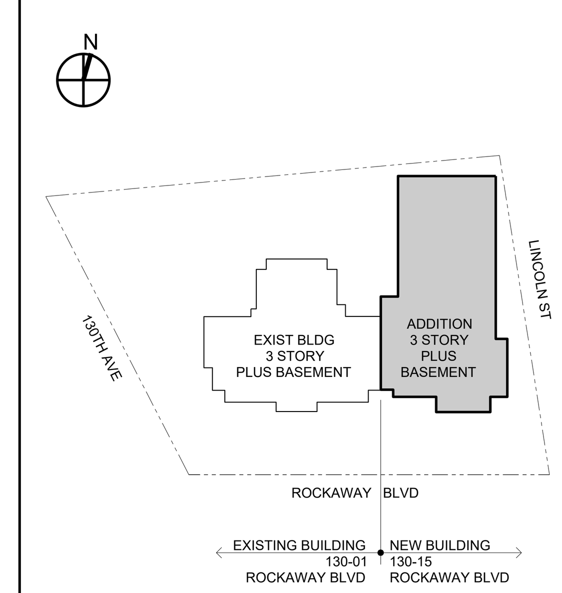
NOTE: Drawing may be printed at reduced scale

ARCHITECT'S DWGS: IT IS A VIOLATION OF THE STATE EDUCATION DEPARTMENT, REGULATIONS OF THE COMMISSIONER PART 69 FOR ANY PERSON TO ALTER AN ITEM IN ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ARCHITECT, AND THE ARCHITECT STAMPS SUCH CHANGES

ENGINEER'S DWGS: IT IS A VIOLATION OF THE STATE EDUCATION LAW SECTION 7209 (2) FOR ANY PERSON TO ALTER AN ITEM IN ANY WAY UNLESS SUCH PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, AND THE ENGINEER STAMPS SUCH CHANGES

No.	Date	Revision
	2/23/2021	30% CD SUBMISSION

Key Plan:



Block No. 11694

Lot No. 27

SCA Design Manager:

Project Architect/Engineer:

Discipline Lead:

Designer:

Drawn by:

Checked by:

LLW No.:

Facility Code:

Date: 7/22/2021

Project:

P.S. - QUEENS ADDITION

Address:

New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:

SITE IMPROVEMENTS PLAN

Drawing No.:

C020.00

Sheets in Contract Set:
of

Sheets in DOB Set:
of

E1.1P – FUNDAMENTAL COMMISSIONING & VERIFICATION

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
STANDARD SPECIFICATIONS FOR
PS Q ADDITION

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05710 - STEEL STAIRS
05810 - PREFABRICATED EXPANSION JOINT COVERS

DIVISION 6 - WOOD AND PLASTICS

06100 - ROUGH CARPENTRY
06200 - FINISH CARPENTRY
06410 - CUSTOM CASEWORK

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07110 - SHEET MEMBRANE WATERPROOFING (TBD)
07115 - SHEET MEMBRANE WATERPROOFING FOR FOUNDATIONS (TBD)
07147 - CRYSTALLINE WATERPROOFING
07211 - PERIMETER FOUNDATION INSULATION
07212 - MISCELLANEOUS BUILDING INSULATION
07250 - SPRAYED FIRE-RESISTIVE MATERIALS
07270 - FIRESTOPPING/SMOKE SEALS
07520 - ROOF FLASHING AND RELATED ROOF REPAIR WORK
07560 - FLUID-APPLIED PROTECTED MEMBRANE ROOFING
07600 - FLASHING AND SHEET METAL
07720 - ROOF ACCESSORIES
07900 - JOINT SEALERS

DIVISION 8 - DOORS AND WINDOWS

08110 - STEEL DOORS AND FRAMES
08210 - WOOD DOORS
08305 - ACCESS DOORS
08524 - ALUMINUM PROJECTED WINDOWS
08662 - SECURITY SCREENS/BARRIERS
08710 - FINISH HARDWARE
08730 - THRESHOLDS, WEATHERSTRIPPING AND SEALS
08800 - MISCELLANEOUS GLAZING
08920 - ALUMINUM CURTAIN WALLS
08921 – ALUMINUM STOREFRONT (NEW)

DIVISION 9 - FINISHES

09205 - FURRING AND LATHING (TBD)
09210 – PLASTER (TBD)
09260 - GYPSUM BOARD ASSEMBLIES
09310 - CERAMIC TILE
09410 - TERRAZZO - PORTLAND CEMENT
09510 - ACOUSTICAL CEILINGS
09626 - RESILIENT ATHLETIC FLOORING
09650 - RESILIENT FLOORING
09675 – FLUID-APPLIED EQUIPMENT ROOM FLOORING
09860 - GRAFFITI RESISTANT COATINGS (TBD)
09900 - PAINTING

DIVISION 10 - SPECIALTIES

10100 - VISUAL DISPLAY BOARDS
10151 - TOILET COMPARTMENTS
10214 - STATIONARY METAL WALL LOUVERS (TBD)
10400 - IDENTIFYING DEVICES
10415 - BULLETIN BOARDS, GLAZED DISPLAY BOARDS, DISPLAY CABINETS AND CASES
10505 - METAL LOCKERS (TBD)
10522 - FIRE EXTINGUISHERS AND CABINETS
10605 - WIRE MESH WORK
10675 - METAL STORAGE SHELVING
10720 - WINDOW GUARDS
10810 - TOILET AND BATH ACCESSORIES
10830 - MIRRORS
10840 - GRAB BARS

DIVISION 11 - EQUIPMENT

11481 - EXERCISE ROOM PADDING

DIVISION 12 - FURNISHINGS

12485 – FOOT GRILLES
12501 – CHAIN AND CLUTCH OPERATED WINDOW SHADES
12545 – DRAPERIES (TBD)

DIVISION 14 - CONVEYING SYSTEMS

14211 - GEARED TRACTION PASSENGER ELEVATORS

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DIVISION 15 - MECHANICAL

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15301 – GENERAL PROVISIONS FOR FIRE PROTECTION SYSTEMS WORK
15304 – VIBRATION ISLATION, FIRE PROTECTION SYSTEMS
15332 - COMBINATION MANUAL WET STANDPIPE/SPRINKLER SYSTEM
15333 – SPRINKLER BOOSTER PUMP

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15404 - VIBRATION ISOLATION, PLUMBING AND DRAINAGE SYSTEMS
15410 - PLUMBING PIPING
15411 - HANGERS AND SUPPORTS
15412 - VALVES
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15504 - VIBRATION ISOLATION, HVAC SYSTEMS
15510 - HVAC PIPING
15511 - VALVES (HVAC)
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15940 - AIR OUTLETS AND INLETS
15970 - TEMPERATURE CONTROL SYSTEM (BACnet BMS/DDC WITH SCHOOL OPERATING CONSOLE)
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COVER & GENERAL NOTES **TITLE** **DATE**

DWG. NO.

ARCHITECTURAL

DWG. NO. **TITLE** **DATE**

STRUCTURAL

DWG. NO. **TITLE** **DATE**

PLUMBING

DWG. NO. **TITLE** **DATE**

HVAC

DWG. NO. **TITLE** **DATE**

ELECTRICAL

DWG. NO. **TITLE** **DATE**

END OF LIST OF DRAWINGS

* * *

E3.1P – MINIMUM ENERGY PERFORMANCE/ E3.2R – OPTIMIZE ENERGY PERFORMANCE

Insert DD-level preliminary energy model

If Full System Feasibility does not indicate "Yes" in either Open Loop, Closed Loop or Standing Column Well in NYC Geothermal Pre-Feasibility Tool, SCA Geothermal System Feasibility Report is not required.

GEOTHERMAL SYSTEM FEASIBILITY REPORT

P.S. SCHOOL ADDITION – STATEN ISLAND

DEISIUS STREET

STATEN ISLAND, NY

NYC SCHOOL CONSTRUCTION AUTHORITY

Completed by

&

NEW YORK, NY *PINEBROOK, NJ*

Report Date: January 18, 2021

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1.0 Background

SCA *Geothermal System Feasibility Tool* analyzes the feasibility of a geothermal system for a major renovation/addition to Public Schools within New York City. The Proposed Design of & is the renovation/addition of P.S. R which is a 3 story, 50,664 ft² existing school. The building includes classrooms, offices, cafeteria, and a gymnatorium. The geothermal system feasibility assessment is based on the Schematic Design drawing set dated January 19th, 2021.

2.0 Heating and Cooling System Design

The SCA standard heating system design chosen for this building is gas fired condensing boiler serving fin tube radiation, AHU preheat coils and VAV reheat coils throughout the building.

The SCA standard cooling system chosen for this building is an air-cooled modular chiller system serving AHU cooling coils throughout the building.

3.0 Heating and Cooling System Capital Costing

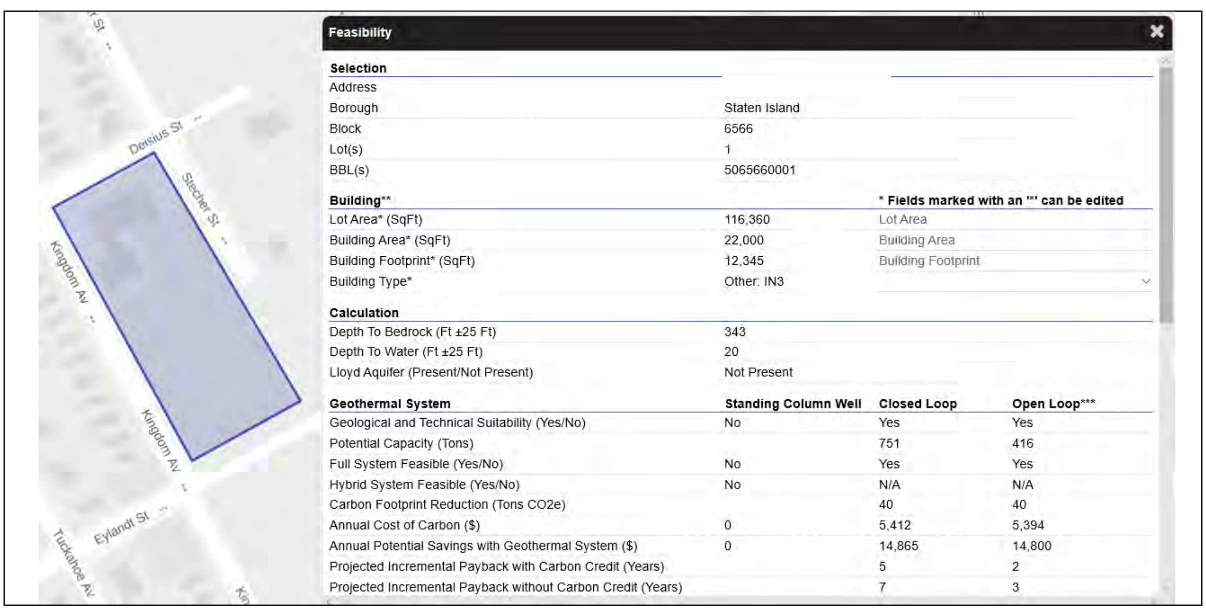
The costing for the heating and cooling system was found to be in line with the ranges noted in the SCA Geothermal System Feasibility Tool. It is believed that the costing for the boiler and chiller systems on this project will fall in the lower end of this range.

4.0 Geothermal Pre-feasibility Tool

The online geothermal pre-feasibility tool developed by the NYC Mayor's Office of Sustainability and NYC DDC was used to determine the geological, and to a basic extent technical feasibility of a geothermal system. The project building was located within the *NYC Geothermal Pre-feasibility Tool* (link below) by searching for the project site.

NYC Geothermal Pre-feasibility Tool:	https://www1.nyc.gov/assets/ddc/geothermal/geothermalTool.html

The project specific building site information (Lot Area, Building Area, Building Footprint) was entered into the screening tool under the "Building" category (see Figure 1). The screening tool determined that the building site has Geological and Technical Suitability for closed loop and/or open loop. For the project building, closed loop and/or open loop were determined to be recommended for a Full System Feasibility Study (see Figure 1).



Selection			
Address			
Borough	Staten Island		
Block	6566		
Lot(s)	1		
BBL(s)	5065660001		
Building**		* Fields marked with an "*" can be edited	
Lot Area* (SqFt)	116,360	Lot Area	
Building Area* (SqFt)	22,000	Building Area	
Building Footprint* (SqFt)	12,345	Building Footprint	
Building Type*	Other: IN3		
Calculation			
Depth To Bedrock (Ft ±25 Ft)	343		
Depth To Water (Ft ±25 Ft)	20		
Lloyd Aquifer (Present/Not Present)	Not Present		
Geothermal System	**Standing Column Well**	**Closed Loop**	**Open Loop*****
Geological and Technical Suitability (Yes/No)	No	Yes	Yes
Potential Capacity (Tons)		751	416
Full System Feasible (Yes/No)	No	Yes	Yes
Hybrid System Feasible (Yes/No)	No	N/A	N/A
Carbon Footprint Reduction (Tons CO2e)		40	40
Annual Cost of Carbon ($)	0	5,412	5,394
Annual Potential Savings with Geothermal System ($)	0	14,865	14,800
Projected Incremental Payback with Carbon Credit (Years)		5	2
Projected Incremental Payback without Carbon Credit (Years)		7	3

Figure 1. NYC Geo Pre-Feasibility Tool Map

Based on the results in Figure 1, the project site is recommended for a Full Feasibility study and these results were entered into the *SCA Geothermal Feasibility Tool,* as outlined in Section 5.0.

5.0 Geothermal Feasibility Tool

Since the *NYC Geothermal Pre-feasibility* Tool indicated “Yes” for closed loop and/or open loop geothermal system type Full System Feasibility, these results were be entered into the SCA Geothermal System Feasibility Tool. The Building Site Information table (i.e. project name, project address, building area, number of floors, and lot size) was entered into Table A of the tool, shown below.

Table A: Building Site Information

Building Site Information	
Project Name	PS School Addition - Staten Island
Project Address	, Staten Island
Building Area (ft²)	45,837
No. of Floors	3
Lot Area (ft²)	115,307
Depth to Bedrock (ft)	343

The screening tool determined that the building site has Geological and Technical Suitability for closed loop and/or open loop. These results were entered into Table 1 within the SCA Geothermal Feasibility Tool, shown below.

Table 1: SCA Geothermal Feasibility Tool Results

	Geothermal System	Standing Column Well	Closed Loop	Open Loop
1	Geological and Technical Suitability (Yes/No)	No	Yes	Yes
	Is a Geothermal Feasibility Study Required	Yes		

For the project building, closed loop and/or open loop were determined to be recommended for a Full System Feasibility Study. This information was entered into Table 2 within the SCA Geothermal Feasibility Tool, shown below.

Table 2: SCA Geothermal Feasibility Tool Results Continued

	Geothermal System	Standing Column Well	Closed Loop	Open Loop
1	Potential Capacity (Tons)		751	416
2	Full System Feasibility (Yes/No)	No	Yes	Yes
3	Carbon Footprint Reduction (Tons CO2e)		40	40
4	Annual Cost of Carbon ($)		$5,412	$5,394

Within Table C of the tool, the Baseline Cooling System Type was selected as air-cooled modular chiller and the Baseline Heating System Type was confirmed to be Hot Water Condensing Boilers. The Cooling Load was entered as 400 ft2/ton and the Heating Load was entered as 25 Btu/ft2, per the design, shown below. These peak cooling loads and heating loads were confirmed to be input as loads prior to any equipment safety factors or redundancy requirements.

Table C: SCA Standard HVAC Baseline System

Baseline Cooling System Chiller Type	Cooling Load (ft²/ton)	Cooling Load (tons)	Baseline Heating System Type	Heating Load (Btuh/ft²)	Heating Load (MBH)
Air-cooled	400	115	Hot Water Condensing Boiler	25	1,146

Once all this information was entered, the SCA Geothermal Feasibility Tool determined that a geothermal system is not required for this project under both low and high cost assumptions, indicated in Table 3 of the tool, shown below.

Table 3: SCA Geothermal Feasibility Study Results

Type of Systems Studied	Capital Cost Estimate (Plant)		Yearly Maintenance Cost		Fuel/Electric Cost (Yearly)	Cost of Carbon (Year)	Cost of Carbon (Site Cost)	System Life Expectancy			Net Present Value		Lowest Net Present Value?	
	Low	High	Low	High							Low	High	Low	High
SCA Standard HVAC System (air-cooled/HW cond. boiler)	$1,145,925	$1,833,480	$3,000	$5,000	$30,790	2019	$9,343	20	To	25	$1,834,525	$2,619,636	Yes	Yes
SCA Standard HVAC System (water-cooled/HW cond. boiler)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	To	N/A	N/A	N/A	N/A	N/A
Geothermal Closed Loop	$2,004,910	$3,896,145	$1,000	$1,500	$35,417	2019	$5,671	15	To	19	$2,676,835	$4,637,979	No	No
Geothermal Standing Column	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	To	N/A	N/A	N/A	N/A	N/A
Geothermal Open Loop	$1,367,891	$4,010,738	$20,000	$40,000	$31,184	2019	$4,986	15	To	19	$2,264,635	$5,337,536	No	No

Is a Geothermal System Required	No	No
	(Low)	(High)

Section 7.0 provides further reference information on the calculations/assumptions for each of these tabs in the tool.

6.0 Findings and Next Steps

Based on the results in the SCA Geothermal Feasibility Tool, the design cooling system cooling plant and the design heating system heating plant type were determined to have the lowest net present value and therefore be favorable over that of the closed and open loop geothermal system. Therefore, in proceeding into Construction Documents phase, this project will continue to be designed for an air-cooled modular chiller cooling plant and Hot Water Condensing Boilers heating plant system types.

7.0 SCA Geothermal Feasibility Tool – References

7.01 Assumptions

The Assumptions tab within the *SCA Geothermal Feasibility Tool* lists the cooling and heating systems performance data consisting of calculations derived from operating data entered in the Baseline Systems tab which are based on NYC SCA requirements, ASHRAE 90.1, or industry standards.

7.02 Baseline Systems

The baseline systems utilized in this tool are based on NYC SCA eQuest Input Summary, NYC Green Schools Guide 2016, SCA Design Requirements Document, and ASHRAE 90.1 – 2010/2016.

The cooling system types under the Baseline Systems tab are based on ASHRAE 90.1 – 2013 for the air-cooled chillers (Full load = 1.22 kW/ton, IPLV = 0.88 kW/ton) and water-cooled chiller (Full load = 0.68 kW/ton, IPLV = 0.56 kW/ton).

The boiler performance data was based on SCA eQuest Input Summary (see Figure 10).

7.3 Boiler

The prototypical boilers are condensing so their efficiency will depend on the design return water temperature from the FTR, reheat coils, and preheat coils.

<table>
<tr><th></th><th>Design</th><th colspan="2">LL86 Baseline</th><th colspan="2">GSG Baseline</th></tr>
<tr><td>Boiler Type</td><td>Modulating Condensing w/ 30% propylene glycol solution in primary loop</td><td colspan="2">Gas Fired, spark ignition, Hot Water</td><td colspan="2">Gas Fired, Hot Water</td></tr>
<tr><td rowspan="4">Full Load Rated Efficiency</td><td rowspan="4">AHRI Rating Conditions: 97% (80°F RWT)
Design Conditions: 93% (@120 F return)86% (@140 F return)</td><td colspan="2">Per ASHRAE 90.1-2013 Table 6.8.1-6</td><td colspan="2">Per ASHRAE 90.1-2010 Table 6.8.1F</td></tr>
<tr><td><300 kBTU</td><td>82% AFU</td><td><300 kBTU</td><td>80% AFU</td></tr>
<tr><td><2500kBTU</td><td>80% E_t</td><td><2500kBTU</td><td>80% E_t</td></tr>
<tr><td>>2500kBTU</td><td>82% E_c</td><td>>2500kBTU</td><td>82% E_c</td></tr>
<tr><td>Water Temp. Reset Controls</td><td>Outdoor air – return water temp reset. 140 °F water @ 20 °F and below, 120 °F water @50 °F and above</td><td colspan="2">Outdoor air – supply water temp reset. 180 °F water @ 20 °F and below, 150 °F water @50 °F and above</td><td colspan="2">Outdoor air – supply water temp reset. 180 °F water @ 20 °F and below, 150 °F water @50 °F and above</td></tr>
<tr><td>Loop DT</td><td>Primary Loop : 40° F (180°F LWT, 140°F RWT)
Secondary Loops:
FTR – 20° F
DIU – 7° F</td><td colspan="2">50°F</td><td colspan="2">50°F</td></tr>
</table>

Figure 10. SCA Boiler Performance Requirements

The geothermal systems data performance indicated in the Geothermal Systems table under the Baseline Systems tab is based on experience and manufacturer's efficiency data.

7.03 Energy Consumption

The Energy Consumption tab within the *SCA Geothermal Feasibility Tool* displays the BIN analysis calculations performed based on Central Park, NY weather data from the BinMaker software tool to calculate the total energy consumption of each system type studied. BIN hours were separated into average school occupied hours and average school unoccupied hours, based on an occupied schedule of an average of 4.5 days per week, 7am-6pm on full days. From this, heating and cooling load profiles were developed for both occupied and unoccupied periods.

Annual kWh and annual therms are calculated for each system type based on load, hours, and equipment efficiencies. Energy usage for the heat pumps, chillers, boilers (burner electrical load and gas loads), pumps, and heat rejection systems were evaluated. Geothermal heat pump efficiencies were compensated for assumed heat exchangers for standing column and open well systems with manufacturer's heat pump efficiency data. The geothermal system types were calculated with the assumption that these are variable flow well water systems.

7.04 Energy Demand

The Energy Demand tab within the *SCA Geothermal Feasibility Tool* displays the monthly and annual cooling electric demand, monthly and annual heating electric demand and total plant monthly and annual electric demand calculated for each system studied based on the values inputted in the Summary tab and the Baseline Systems tab. With current monthly demand costs being high this had a negative effect on geothermal heat pump heating energy. The current baseline condensing gas boilers have a relatively low monthly demand throughout the heating season.

7.05 Energy Cost

The Energy Cost tab within the *SCA Geothermal Feasibility Tool* calculates the total energy cost of each system studied based on the total energy consumption calculated in the Energy Consumption tab and the total demand calculated in the Energy Demand tab along with the utility rates entered in the Summary tab.

7.06 Capital Cost

The capital cost for each heating and cooling plant system type is variable depending on the particular system design and project bidding conditions. With the proposed design for geothermal equipment within the building being variable and assuming institutional level equipment being used the majority of the cost difference between the geothermal options and baseline systems is in the well field or well water systems. The construction cost ranges for the various geothermal options include parameters such as the amount of well casing required for the particular site specific drilling conditions along with heat exchangers and pumping systems for standing column/ open loop systems. Well field construction costs were developed with the help of well field contractors familiar with installing various well field systems within the 5 boroughs.

An assumption was made that air handling systems within the building would meet SCA standards and have load reducing strategies such as energy recovery and demand control ventilation which is critical for reducing plant equipment and well field capacities.

The tool also assumes that SCA requirements for a perimeter radiation heating system is included in all system types in order to reduce off hours fan energy usage. Building fan energy usage is assumed to be similar for each system type and will be based on actual design.

7.07 Annual Maintenance Cost

The Annual Maintenance Cost tab indicates the incremental low and high maintenance costs for each system studied per year. The air-cooled chiller maintenance costs were based on annual cleaning of the air-cooled condenser. The water-cooled chiller maintenance costs were based on the annual cleaning of the cooling tower and annual condenser water chemical treatment. The geothermal closed loop maintenance costs were based on minor water treatment required annually. The geothermal standing column system maintenance costs were based on heat exchanger and well pump maintenance costs. The geothermal open loop system maintenance costs were based on heat exchanger, water filtration, and well pump maintenance costs. The tool indicates a significant variance in maintenance costs for both standing column and open loop systems due to site specific water quality and actual system installation.

7.08 Carbon Impact

The Carbon tab within the spreadsheet tool indicates the annual carbon dioxide emissions cost per system type studied. This is determined by using Energy Star's CO_2 emission rates for natural gas and electricity. In addition, LL6 dollar value per metric ton of carbon dioxide equivalent per year was used to determine this cost estimate.

7.09 System Life Expectancy

The System Life Expectancy tab within the spreadsheet tool indicates the estimated low and high life expectancies of each system type studied. These values were taken from ASHRAE's Life Expectancy Chart while the life expectancy on the geothermal heat pump systems were based on industry standards. NPV analysis for all systems are currently based on 20 years in the tool per LL6, so this specific system information is not yet factored into analysis. Factoring this in would further disadvantage geothermal systems.

7.10 Net Present Value (Low)

The NPV (Low) tab within the SCA Geothermal Feasibility Tool spreadsheet indicates the low net present value analysis on each system type studied. The net present value calculations are based on the initial costs (capital costs) of each system type, the total annual costs (utility cost, maintenance cost, and carbon cost) of each system type, along with an assumed discount/interest rate of 5%.

7.11 Net Present Value (High)

The NPV (High) tab within the *SCA Geothermal Feasibility Tool* spreadsheet indicates the high net present value analysis on each system type studied. The net present value calculations are based on the initial costs (capital costs) of each system type, the total annual costs (utility cost, maintenance cost, and carbon cost) of each system type, along with an assumed discount/interest rate of 5%. The high NPV calculations were developed using risk or lack of risk between the ystems studied.

Table A: Building Site Information

Building Site Information	
Project Name	Addition - Staten Island
Project Address	Staten Island
Building Area (ft²)	45,837
No. of Floors	3
Lot Area (ft²)	115,307
Depth to Bedrock (ft)	343

Table B: Utility Rates

Utility Rates	
Electricity (non-demand) Usage $/kWh (avg)	$0.0545
Electricity Demand $/kW	$30.25
Fuel Usage $/therm *(equivalent)*	$1.1117
Oil $/Gallon	
Natural Gas $/therm	$1.1117

ELECTRICITY RATES (NEW YORK POWER AUTHORITY):

	Production *		Delivery			
Service Classification	Energy (¢/kWh) Summer (**Pk**/Off-Pk) *Winter (**Pk**/Off-Pk)*	Demand ($/kw)	Energy (¢/kWh)	Demand Low Ten., ($/kW) Summer *Winter*	Demand High Ten., ($/kW) Summer *Winter*	Facility Points ($/Point)
General Small (062)	5.572 *5.227*	na	19.73	na	na	na
General Large, Conventional (069)	4.465 *4.121*	6.18	na	25.91	19.77	na
General Large, TOD (069)	**5.431**/3.666 ***4.630**/3.682*	7.50	na	48.56 *18.32*	26.88 *11.47*	na
Street Lighting	4.432	0.72	na	25.91	19.77	11.05
Pub. Buildings, Conventional (091)	4.397 *4.053*	6.73	na	25.91	19.77	na
Pub. Buildings, TOD (091)	**5.416**/3.613 ***4.598**/3.630*	8.77	na	48.56 *18.32*	26.88 *11.47*	na
All-Elec Schools, Conventional (093)	4.450 *4.109*	4.34	na	25.91	19.77	na
WPCP, Conventional (098)	4.490 *4.146*	2.75	na	25.91	19.77	na
WPCP, TOD (098)	**5.464**/3.699 ***4.663**/3.715*	6.07	na	48.56 *18.32*	26.88 *11.47*	na

* Add an additional 1.17 cents per kwh ($0.0117) to calculate full rate charged; do not include when calculating savings from energy efficiency projects (this covers certain fixed charges and is invariant to usage; identified here as a kwh rate to capture full costs).
- Production energy rates listed here include 0.33 cents per kwh levied in statewide Clean Energy Standard 'ZEC' (zero emissions) surcharges
- Production energy rates are subject to a monthly Energy Charge Adjustment to cover unexpected fluctuations.
- Power factor charge of $1.41/kvar for billable reactive power, based on facility size, for facilities with power factor < 95%.
- TOD: Energy On-Peak, 8:00am to 10:00pm Monday to Friday; Demand On-Peak, 8:00am - 6:00pm Monday to Friday; other times are Off-Peak.
- Summer: June through September; Winter: October through May

The natural gas rate for NYPA Gas, Firm-heating is $1.1117/therm. (LL86 gas rate for FY

NYC Geothermal Pre-feasibility Tool: https://www1.nyc.gov/assets/ddc/geothermal/geothermalTool.html

Table 1: SCA Geothermal Feasibility Tool Results

	Geothermal System	Standing Column Well	Closed Loop	Open Loop
1	Geological and Technical Suitability (Yes/No)	No	Yes	Yes

Is a Geothermal Feasibility Study Required Yes

Table 2: SCA Geothermal Feasibility Tool Results Continued

	Geothermal System	Standing Column Well	Closed Loop	Open Loop
1	Potential Capacity (Tons)		751	416
2	Full System Feasibility (Yes/No)	No	Yes	Yes
3	Carbon Footprint Reduction (Tons CO2e)		40	40
4	Annual Cost of Carbon ($)		$5,412	$5,394

Table 3: SCA Geothermal Feasibility Study Results

Type of Systems Studied	Capital Cost Estimate (Plant)		Yearly Maintenance Cost		Fuel/Electric Cost (Yearly)	Cost of Carbon (Year)	Cost of Carbon (Site Cost)	System Life Expectancy			Net Present Value		Lowest Net Present Value?	
	Low	High	Low	High							Low	High	Low	High
SCA Standard HVAC System (air-cooled/HW cond. boiler)	$1,145,925	$1,833,480	$3,000	$5,000	$30,790	2019	$9,343	20	To	25	$1,834,525	$2,619,636	Yes	Yes
SCA Standard HVAC System (water-cooled/HW cond. boiler)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	To	N/A	N/A	N/A	N/A	N/A
Geothermal Closed Loop	$2,004,910	$3,896,145	$1,000	$1,500	$35,417	2019	$5,671	15	To	19	$2,676,835	$4,637,979	No	No
Geothermal Standing Column	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	To	N/A	N/A	N/A	N/A	N/A
Geothermal Open Loop	$1,367,891	$4,010,738	$20,000	$40,000	$31,184	2019	$4,986	15	To	19	$2,264,635	$5,337,536	No	No

Is a Geothermal System Required	No	No
	(Low)	*(High)*

Table C: SCA Standard HVAC Baseline System

Baseline Cooling System Chiller Type	Cooling Load (ft²/ton)	Cooling Load (tons)	Baseline Heating System Type	Heating Load (Btuh/ft²)	Heating Load (MBH)
Air-cooled	400	115	Hot Water Condensing Boiler	25	1,146

NYC Green Schools Rating System

GEOTHERMAL FEASIBILITY

CREDIT FORM

Credit E3.1R

School Construction Authority

RESPONSIBLE PARTY:

FORM SUBMISSIONS: SD | DD | 60% | #### | Design | CA

Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Resubmission Date: (complete only if resubmitted)	

INSTRUCTIONS:

Step 1) Indicate results of using the NYC Geothermal Pre-feasibility Tool in Table 1
Step 2) Complete Table 2 using the completed project specific SCA Geothermal Feasibility Study results.
Step 3) Indicate if a Geothermal System is required.
Step 4) Submit the full SCA Geothermal Feasibility Study Report as backup documentation if required.

Table 1: NYC Geothermal Pre-Feasibility Tool Results Cont.

	Geothermal System	Standing Column Well	Closed Loop	Open Loop
1	Geological and Technical Suitability (Yes/No)			
2	Potential Capacity (Tons)			
3	Full System Feasibility (Yes/No)			
4	Hybrid System Feasibility (Yes/No)			
5	Carbon Footprint Reduction (Tons CO_2e)			
6	Annual Cost of Carbon ($)			

SCA Geothermal Feasibility Study required Y ☐ N ☐

Table 2: SCA Geothermal Feasibility Study Results

Type of Systems Studied	Capital Cost Estimate	Yearly Maintenance Cost	Fuel/ Electric Cost (Yearly)	Funding Assistance Offset	Cost of Carbon (Year)	Cost of Carbon (Cost)	System Life Expect.	Lowest Net Present Value
	$	$	$	$	2019-21	$	15 or 20	Yes/No
SCA Standard HVAC*								
Geothermal Standing Column								
Geothermal Closed Loop								
Geothermal Open Loop								

** Note: VAV/AHU/Modular Chillers. Estimates based on 30% CD Project submission.*

Geothermal System required Y ☐ N ☐

E6.1P – RENEWABLE ENERGY FEASIBILITY

(Net Zero Energy Building Feasibility, no more than 3 stories above grade)

This reporting template is to be utilized for projects that are 3 stories or less

School Construction Authority
Architecture & Engineering

LOCAL LAW 31/16 RENEWABLE ENERGY PRODUCTION REPORT

☒ NET ZERO ENERGY BUILDING FEASIBILITY

[Local Law 31/16 compliant projects that are three stories above grade or less must complete a net zero energy building feasibility study. This form is to be included in the Green Schools Guide Schematic Design submission for E6.1P requirements and for Local Law 31 reporting purposes.]

School Name/Building ID: PS

LLW No. : 112019

Project Description: Addition

Prepared For:

NYC School Construction Authority

3030 Thomson Avenue

Long Island City, NY 11101

Prepared By:

December 18th, 2020

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4.3 Benefits of Renewable Energy Production…………………………...…..8

5.0 APPENDICES……………………………………………………9

A. Site Plan

B. Production Results

1.0 OVERVIEW

Project Type *[Indicate per the following categories: Capacity: New Construction- New Building, Addition, Annex* *Substantial Reconstruction of Existing Building including Substantial Work on Building Envelope]*	Addition
Site Area (SF)	115,306
Building Area (SF)	Floor area: 48,965 Footprint: 15,618
Potential Available Roof Space for Renewable Energy System (SF)	6,331
Potential Available Site Space for Renewable Energy System (SF)	10,000

2.0 RENEWABLE ENERGY SOURCES

Strategy	Feasible	Non-Feasible	Ranking	Magnitude of Cost
Solar energy	x		1	$
Wind		x		
Closed-loop biomass*		x		
Open-loop biomass*		x		
Geothermal energy**		x		
Small irrigation power*		x		
Municipal solid waste*		x		
Qualified hydropower production*		x		

**These renewable energy strategies are not typically implemented for SCA projects. These measures will be evaluated on a project by project basis. Investigate the applicability of these strategies to the project.*

***Ground source heat pumps do not qualify as a geothermal energy strategy.*

[Rank the feasibility (from most technically feasible to least technically feasible) of the above qualified energy resources, as defined in section 45 of title 26 of the United States code. Denote NA in spaces that were not investigated for the project as not appropriate to the type of project. Provide a magnitude of cost for each of the items based on typical construction values.]

3.0 NET ZERO ENERGY BUILDING LOAD MANAGEMENT STRATEGIES

ENERGY CONSERVATION MEASURES

Include any ECMs that are not part of the SCA Standard Design Requirements and that can be considered to offset energy consumption.

ECM	EUI REDUCTION
Gearless Elevators with Regenerative Drives	0.6
Wall Thermal Upgrades (R-30)	2.65
Foundation Additional Insulation	0.01
Window and Storefront Lower U-Value (0.18)	2.02
Insulated Infill Panel Upgrade	0.09
Thermal Bridging Mitigation	2.39
Insulated Light Dispersion Panels (R-13)	0.43
Oversized Ductwork & Piping	2.1
Overvoltage Control Device	1.1
Ground Source Heat Pump	*NYC Geothermal Pre-Feasibility Tool results are included in SD GSG submission.*
TOTAL EUI REDUCTION	11.39

4.0 RENEWABLE ENERGY ASSESSMENT

4.1 GENERATION TARGETS

Low Energy Intensity Building Target	65 kBTU/SF/yr (Source EUI)
Projected Annual Energy Usage	873,004 kWh/yr

Net Zero Energy Building Energy Feasibility Study Target Production (Equal to Energy Usage)	873,004 kWh/yr
Onsite Energy Generating Building Energy Feasibility Study Target Production (10% of Energy Usage)*	87,300 kWh/yr

Each project subject to Local Law 31 of 2016 shall consider the feasibility of designing and constructing such project as an onsite energy generating building.

4.2 COST ANALYSIS

[Provide construction costs attributable to complying with the net zero energy building requirements. Provide a magnitude of cost for renewable energy costs and load reduction costs based on typical construction values.]

RENEWABLE ENERGY AND LOAD REDUCTION COSTS

ITEM DESCRIPTION	ORDER OF MAGNITUDE COST
RENEWABLE ENERGY COSTS	$ (roof mount) $ (canopy/ground mount)
LOAD REDUCTION COSTS	-
TOTAL COST	$

LIFECYCLE COST ANALYSIS

Parameter	Cost
Annual Cost Savings with Renewable Energy System ($/year)	$
Payback Period for Renewable Energy System (years)	12.36
Annual Cost of Carbon ($/year)	*The project will fall under the LL97 CO2 emissions limits until 2030. Without the solar PV system, the project will pay $ /year in fines between 2030 and 2034. Emissions limits beyond 2034 are not set, however, assuming a steady CO2 limit reduction, fines could increase to $9,162/year between 2035 and 2040.*

4.3 BENEFITS OF RENEWABLE ENERGY PRODUCTION

The project has many opportunities for both roof-mounted and ground-mounted solar PV systems due to its large site area. The south-west orientation or the new building will maximize solar exposure for rooftop mounted systems, while the low-rise surrounding buildings will limit shading of canopy/ground-mounted systems. Solar PV is very suitable for use in a school building because the peak generation and peak electricity demand coincide, meaning the project can directly consume its generated electricity before selling it to the grid. Additionally, a canopy mounted PV system can act as a shading device for walkways, improving thermal comfort during summer.

Solar PV systems result in reduced environmental impacts through the following:

- *Zero operational emissions of greenhouse gases which cause global warming*
- *Zero particulate emissions (unlike energy generated via combustion)*
- *Reduced noise pollution (also evident with energy generated via combustion)*
- *Reduced urban heat island effect via shading of roof surfaces and hardscape*

Economic benefits of solar PV include a return on investment, low operation and maintenance costs due to fewer moving parts and long lifespan of equipment and components, avoiding fluctuating utility prices, as well as net metering benefits.

Energy benefits of solar PV include a potential for surplus electricity production that can be used to charge on-site batteries (for use overnight) or produce ice for cooling air in HVAC systems. Solar PV is also a stable and reliable source of energy that lowers the strain on the city's power grid.

The solar PV system proposed in this feasibility report has been sized to cover the estimated annual electricity demand for the building (323,781 kWh/year) and contains a 119 kW(DC) rooftop mounted array and 150kW(DC) canopy/ground mounted array.. The combined generation potential for the two systems is 330,159 kWh/year. Further generation details can be found in Appendix B. A solar PV system capable of generating enough electricity to cover the equivalent amount of natural gas energy would require a significantly larger canopy or ground mounted system.

Installation of a solar PV system will result in immediate carbon footprint reductions (as shown below) and potentially maintain the building's compliance with Local Law 97 of 2019 (LL97/2019) until the mid-2040s. At some point before 2050, the project may need to consider carbon offsets, increased solar PV capacity and/or electrification to mitigate fines due to LL97/2019.

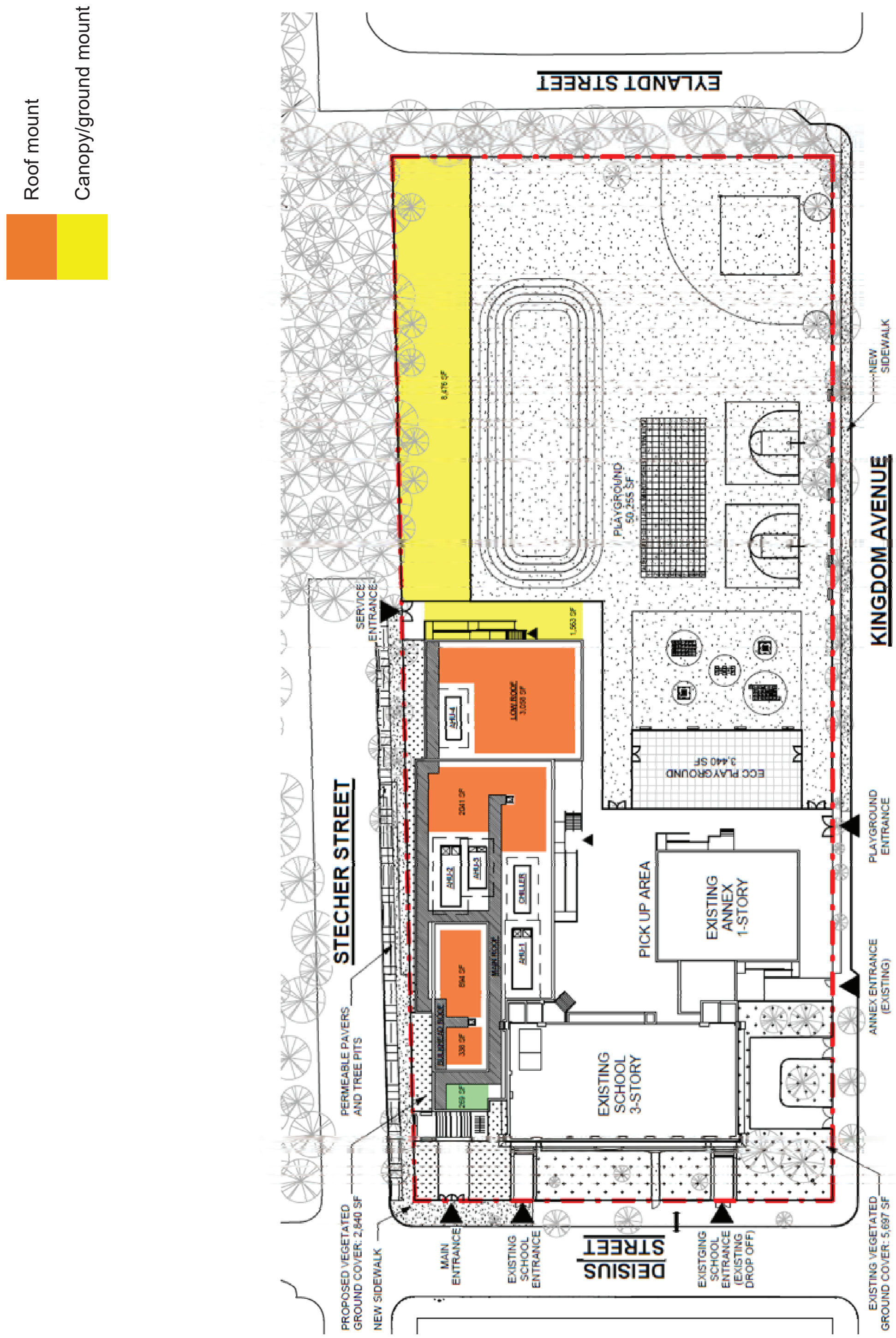
Parameter	Savings
Annual Carbon Footprint Reduction (MTCO2e)	47

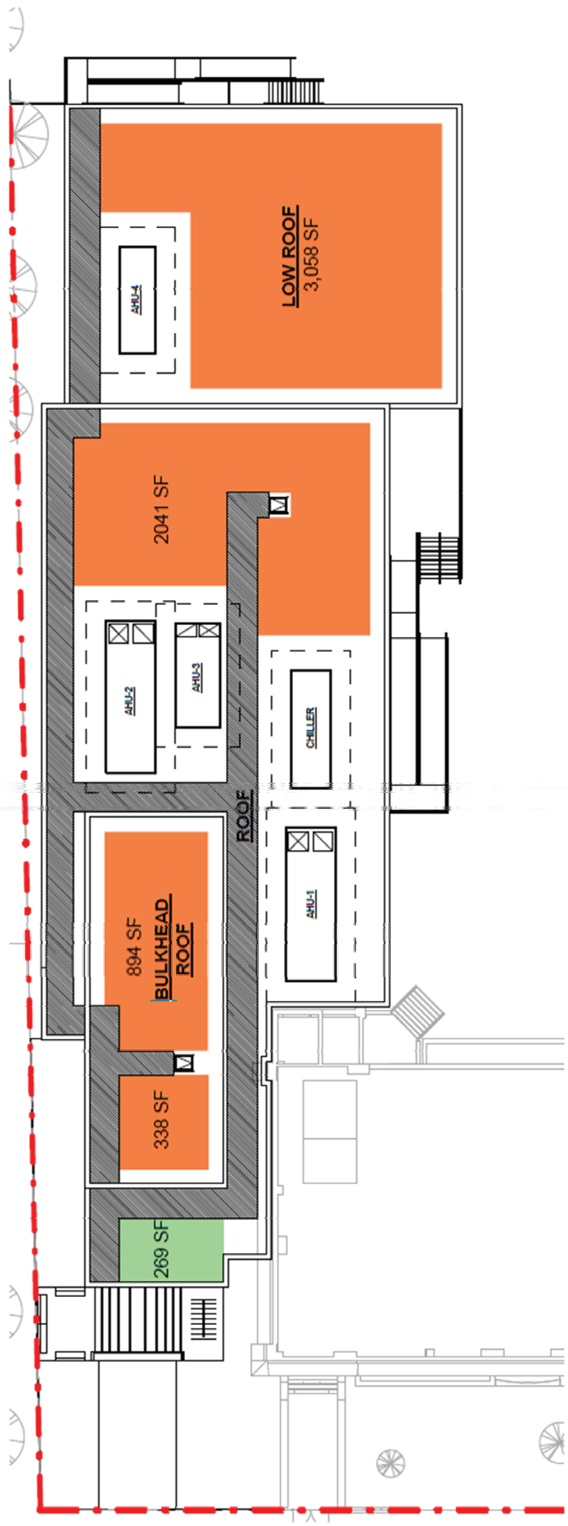
Project teams are to multiply projected annual energy usage (kWh/yr) by the DCAS factor of .000288962 to determine the annual carbon footprint reduction.

5.0 APPENDICES

APPENDIX A – SITE AND ROOF PLAN

[Provide a site and/or roof plan to denote location of feasible renewable energy strategies.]




LOW ROOF
3,058 SF
AHU-4
2041 SF
AHU-2
AHU-3
CHILLER
ROOF
AHU-1
894 SF
BULKHEAD ROOF
338 SF
269 SF

10

APPENDIX B – PRODUCTION RESULTS

Please find NREL PVWatts Calculator output data on the following pages.

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at https://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

141,423 kWh/Year*

System output may range from 136,035 to 148,141 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	2.24	6,811	787
February	3.20	8,706	1,006
March	4.15	12,379	1,430
April	5.11	14,093	1,628
May	5.82	16,237	1,875
June	6.06	16,189	1,870
July	6.31	17,138	1,979
August	5.59	15,126	1,747
September	4.75	12,673	1,464
October	3.26	9,287	1,073
November	2.44	6,860	792
December	2.00	5,923	684
Annual	**4.24**	**141,422**	**$ 16,335**

Location and Station Identification

Requested Location	348 Deisius St, Staten Island, NY 10312
Weather Data Source	Lat, Lon: 40.53, -74.18 0.4 mi
Latitude	40.53° N
Longitude	74.18° W

PV System Specifications *(Commercial)*

DC System Size	119 kW
Module Type	Premium
Array Type	Fixed (roof mount)
Array Tilt	10°
Array Azimuth	240°
System Losses	14.08%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2

Economics

Average Retail Electricity Rate	0.116 $/kWh

Performance Metrics

Capacity Factor	13.6%

RESULTS

188,736 kWh/Year*

System output may range from 181,545 to 197,701 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	2.47	9,616	1,111
February	3.47	12,039	1,390
March	4.39	16,661	1,924
April	5.26	18,496	2,136
May	5.89	20,962	2,421
June	6.17	20,976	2,423
July	6.38	22,082	2,550
August	5.75	19,833	2,291
September	4.99	16,933	1,956
October	3.52	12,768	1,475
November	2.70	9,720	1,123
December	2.28	8,649	999
Annual	**4.44**	**188,735**	**$ 21,799**

Location and Station Identification

Requested Location	348 Deisius St, Staten Island, NY 10312
Weather Data Source	Lat, Lon: 40.53, -74.18 0.4 mi
Latitude	40.53° N
Longitude	74.18° W

PV System Specifications *(Commercial)*

DC System Size	150 kW
Module Type	Premium
Array Type	Fixed (open rack)
Array Tilt	10°
Array Azimuth	180°
System Losses	14.08%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2

Economics

Average Retail Electricity Rate	0.116 $/kWh

Performance Metrics

Capacity Factor	14.4%

E6.1P – RENEWABLE ENERGY FEASIBILITY

(ONSITE ENERGY GENERATING BUILDING FEASIBILITY, more than 3 stories above grade)

This reporting template is to be utilized for projects that are more than 3 stories

School Construction Authority
Architecture & Engineering

LOCAL LAW 31/16 RENEWABLE ENERGY PRODUCTION REPORT

☒ ONSITE ENERGY GENERATING BUILDING FEASIBILITY

School Name/Building ID:

PS Queens /

LLW No. :

Project Description:

PSQ Addition

Prepared For:

NYC School Construction Authority

3030 Thomson Avenue

Long Island City, NY 11101

Prepared By:

, Inc.

December 18, 2020

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3.3 Benefits of Renewable Energy Production………………..………..…7

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A. Roof Plan

B. Production Results- PV Watts

C. Sun and Shade Study

1.0 OVERVIEW

Project Type	New Construction- Addition
Site Area (SF)	39,363sf (Project Boundary)
Building Area (SF)	38,268sf
Potential Available Roof Space for Renewable Energy System (SF)	3,340sf
Potential Available Site Space for Renewable Energy System (SF)	0 sf

2.0 RENEWABLE ENERGY SOURCES

Strategy	Feasible	Non-Feasible	Ranking	Magnitude of Cost
Solar energy	X		1	$
Wind		X		
Closed-loop biomass*		X		
Open-loop biomass*		X		
Geothermal energy**		X		
Small irrigation power*		X		
Municipal solid waste*		X		
Qualified hydropower production*		X		

3.0 RENEWABLE ENERGY ASSESSMENT

3.1 GENERATION TARGETS

Low Energy Intensity Building Target	**70 kBTU/SF/yr** **(Source EUI)**
Projected Annual Energy Usage	**208,780 kWh/yr**

Onsite Energy Generating Building Energy Feasibility Study Target Production **(10% of Energy Usage)**	**20,878 kWh/yr**

3.2 COST ANALYSIS

RENEWABLE ENERGY COSTS

ITEM DESCRIPTION	ORDER OF MAGNITUDE COST
RENEWABLE ENERGY COSTS	$ (per RS Means)
TOTAL COST	$ (per RS Means)

LIFECYCLE COST ANALYSIS

Parameter	Cost
Annual Cost Savings with Renewable Energy System ($/year)	$ (PV Watts Value)
Payback Period for Renewable Energy System (years)	14.4
Annual Cost of Carbon ($/year)	

3.3 BENEFITS OF RENEWABLE ENERGY PRODUCTION

Due to its location in a neighborhood with low-rise buildings to prevent shading and availability of building SF for rooftop installations, the project is able to benefit from onsite rooftop PV array. A shading study was prepared by the architect to determine the best location of the array.

Environmental impacts include less pollution emitted to the environment due to the use of a natural and clean source of energy and less reliance on fossil fuels that generate harmful emissions, less noise pollution, and the offset of carbon emissions produced by a non-renewable energy sources.

Economic benefits include a return on investment, low operation and maintenance costs, less dependency on fluctuating utility costs, and net metering benefits. Additionally, an alternate source of electricity during peak demand will drive the project away from higher energy costs at this time.

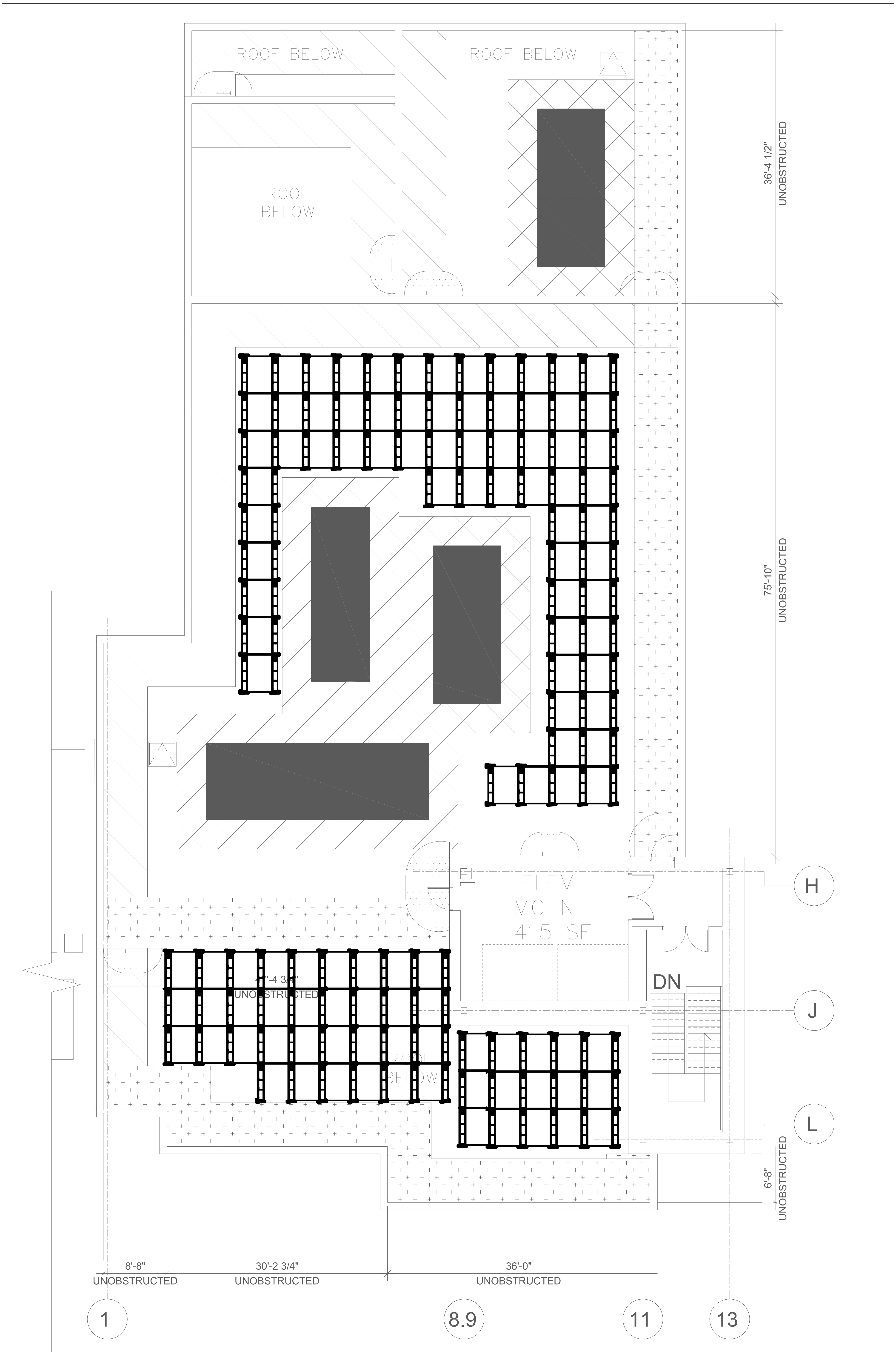
Energy benefits include a potential for surplus production of energy that is used to meet electricity demand, high efficiency system, a reliable source of energy, and less strain on the city's power grid thereby avoiding blackouts.

By installing a rooftop PV array, the project assists in compliance with Local Law 97/2019 due to annual reductions in greenhouse gas emissions and will support New York City's goals of installing 100 MW of solar capacity. The installation will also assist in compliance with Local Law 94/2019 to maximize sustainable roofing.

Parameter	Savings
Annual Carbon Footprint Reduction (MTCO2e)	38.4 metric tons (per EPA GGE calculator)

Project teams are to multiply projected annual energy usage (kWh/yr) by the DCAS factor of .000288962 to determine the annual carbon footprint reduction.

4.0 APPENDICES



PROPOSED ROOF PV SYSTEM LAYOUT

SCALE: 1/8"=1'-0"

0 4' 12' 28'

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at https://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

54,336 kWh/Year*

System output may range from 52,157 to 56,157 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	2.57	2,761	319
February	3.52	3,366	389
March	4.28	4,486	518
April	5.38	5,291	611
May	6.22	6,202	716
June	6.52	6,171	713
July	6.59	6,352	734
August	6.06	5,873	678
September	5.23	5,016	579
October	3.69	3,698	427
November	2.77	2,772	320
December	2.26	2,349	271
Annual	**4.59**	**54,337**	**$ 6,275**

User Comments

PS96Q

Location and Station Identification

Requested Location	130-01 Rockaway Blvd Queens, NY 11430
Weather Data Source	Lat, Lon: 40.69, -73.82 1.2 mi
Latitude	40.69° N
Longitude	73.82° W

PV System Specifications *(Commercial)*

DC System Size	41 kW
Module Type	Premium
Array Type	Fixed (open rack)
Array Tilt	10°
Array Azimuth	180°
System Losses	14.08%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2

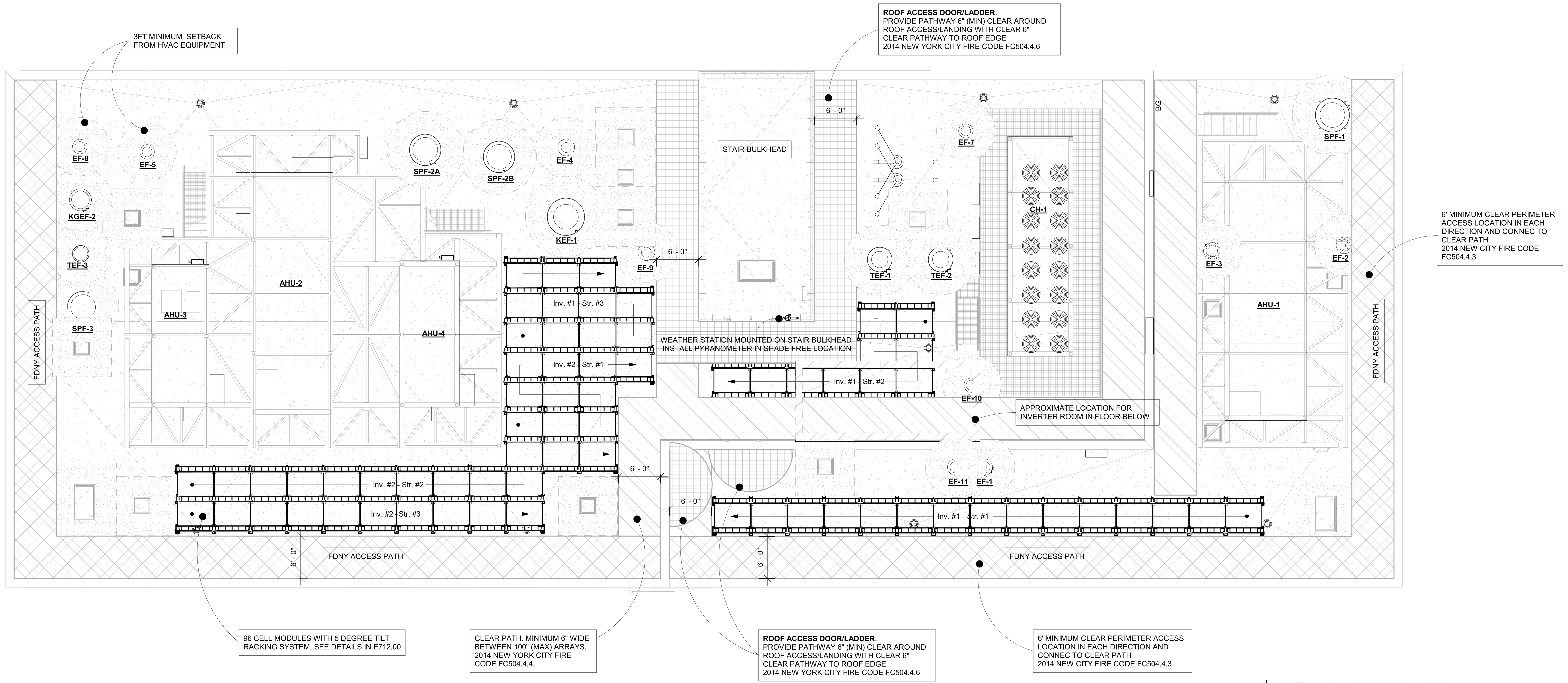
Economics

Average Retail Electricity Rate	0.116 $/kWh

Performance Metrics

Capacity Factor	15.1%

E6.1P – RENEWABLE ENERGY FEASIBILITY/ E6.2 – RENEWABLE ENERGY PRODUCTION



1 PP07_ROOF - PV Panel Layout
E006.00 SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN FULL ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND SHALL BE UNDERWRITERS LABORATORIES (UL) LABELED. THE CONTRACTOR SHALL PROCURE ALL NECESSARY CERTIFICATIONS FOR ALL WORK INSTALLED, PAY ALL FEES AND CHARGES CONNECTED THEREWITH AND DELIVER ALL CERTIFICATES AND INSPECTION APPROVALS TO THE SCHOOL CONSTRUCTION AUTHORITY THROUGH THE ENGINEER, BEFORE HIS WORK WILL BE FINALLY ACCEPTED.
2. THE GENERAL NOTES APPLY TO ALL DRAWINGS UNDER THE CONTRACT. REFER TO INDIVIDUAL DRAWINGS FOR ADDITIONAL NOTES.
3. DRAWINGS ARE DIAGRAMS AND INDICATE GENERAL ARRANGEMEMNT OF SYSTEMS AND WORK. FOLLOW DRAWINGS IN LAYING OUT OF WORK AND CHECK DRAWINGS OF OTHER TRADES TO VERIFY SPACE CONDITIONS. MAINTAIN HEADROOM, SPACE CONDITIONS, AND REQUIRED CLEARANCES.
4. PV SYSTEM CONTRACTOR SHALL COORDINATE ALL THE WORK WITH THE ENGINEER, THE CONSTRUCTION MANAGER AND ALL OTHER CONTRACTORS TO INSURE THAT THE PV SYSTEM IS INSTALLED AS SPECIFIED IN THESE DRAWINGS.
5. ALL INVERTERS SHALL BE IEEE 929 COMPLIANT AND SHALL BE INSPECTED BY LOCAL UTILITY BEFORE COMMISSIONING, TESTING AND OPERATION OF THE SYSTEM.
6. All PV MODULES SHALL BE RATED ACCORDING TO IEC 61730 CLASS A.
7. POWER OPTIMIZERS SHALL BE IP68/NEMA6P RATED. MOUNT THE OPTIMIZERS DIRECTLY TO THE MODULE OR MODULE FRAME, BEFORE INSTALLATION CONSULT THE MODULE MANUFACTURER FOR GUIDANCE REGARDING THE MOUNTING LOCATION AND THE IMPACT ON MODULE WARRANTY. DRILLING HOLES IN THE MODULE FRAME SHOULD BE DONE ACCORDING TO THE MODULE MANUFACTURER INSTRUCTIONS.
8. SOLAR SYSTEM EQUIPMENT SHALL HAVE AN INTERRUPT RATING (kAIC) GREATER THAN OR EQUAL TO THE EQUIPMENT THAT INSTALLED IN THE SWITCHBOARD ROOM.
9. UNFORESEEN OBSTRUCTIONS ON THE ROOF MAY NECESSITATE A CHANGE IN THE LAYOUT. ANY CHANGES TO THE RACKING LAYOUT SHOULD BE REPORTED TO THE ENGINEER. CHANGES IN UP TO 5% OF THE MODULES SHOULD BE ANTICIPATED. CHANGES TO THE ARRAY LAYOUT SHOULD BE MADE AS TO NOT IMPACT THE NUMBER OF MODULES ON A COMBINER BOX OR INVERTER.
10. ARC FLASH HAZARD WARNING LABELS SHALL BE PROVIDED AND MOUNTED ON EVERY COMBINER BOX, TERMINAL BOX, INVERTER, AC AND DC SWITCH, TRANSFORMER, AND SWITCHGEAR.

MANNER OF INSTALLATION

1. ALL WORK SHALL BE INSTALLED IN A FIRST CLASS, NEAT AND WORKMANLIKE MANNER BY MECHANICS SKILLED IN THE TRADE INVOLVED. ALL DETAILS OF THE INSTALLATION SHALL BE MECHANICALLY AND ELECTRICALLY CORRECT.
2. TORQUE AND MARK ALL RACKING AND MECHANICAL LUGS.

CONDUCTORS AND CONDUCTOR INSTALLATION

1. PV SYSTEM CONDUCTORS SHALL BE MARKED AND IDENTIFIED PER NEC 690.31(B).
2. CONDUCTORS SHALL HAVE 600 VOLT RATED INSULATION AND SHALL BE OF SOFT-ANNEALED-UNCOATED COPPER OF 98% CONDUCTIVITY. COPPER CLAD AND ALUMINUM CONDUCTORS ARE NOT ACCEPTABLE.
3. ALL TERMINAL LUGS AND BOLTS SHALL BE 98% SILICON BRONZE COPPER.
4. INSTALL WIRE AND CABLE IN ACCORDANCE WITH THE NEC AND AS HEREINAFTER SPECIFIED. USE THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION'S "STANDARD OF INSTALLATION", THE MANUFACTURER'S WRITTEN INSTRUCTIONS, UNLESS SUPERSEDED BY THIS CONTRACT SPECIFICATIONS. IN ALL CASES THE INSTALLATION SHALL BE IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES.
5. THE USE OF WIRE SPLICES AT ANY POINT IN THE INSTALLATION IS STRICTLY PROHIBITED.
6. THE USE OF WIRE LUBE IS REQUIRED FOR ALL WIRE PULLS THROUGH CONDUIT RUNS OF 20' OR LONGER, OR WITH BENDS IN 180° OR MORE. WIRE LUBE IS REQUIRED EVEN WHEN USING SELF LUBRICATING CABLES SUCH AS SOUTHWIRE 'SIMPULL'.
7. STRING WIRING & HOMERUNS SHALL BE SECURED TO UNDERSIDE OF THE RACKING & MODULES USING ZIP TIES OUTDOOR RATED FOR UV. HELLERMAN TYTON PA66UV OR EQUAL. TRANSITION TO EMT OUTSIDE OF ARRAY.

CONDUITS AND RACEWAYS

1. DRAWING SHOW RACEWAY LOCATIONS DIAGRAMMATICALLY. CONTRACTOR SHALL ADJUST ROUTING TO SUIT FIELD LOCATIONS. ANY CHANGES TO PROPOSED ROUTING SHALL BE SUBMITTED TO ENGINEER FOR REVIEW AND APPROVAL.
2. FURNISH AND INSTALL ALL FITTINGS AND SPECIAL DEVICES NECESSARY FOR THE PROPER INSTALLATION, CONNECTION AND OPERATION OF THE SYSTEM. CONDUIT ELBOW SHALL BE OF THE SAME MAKE, QUALITY AND FINISH AS THE CONDUIT USED.
3. EMT CONDUIT SHALL BE COMPRESSION RAINTIGHT CONNECTORS, FACTORY STAMPED RAINTIGHT WITH COMPONENTS PROPERLY INSTALLED.
4. THE USE OF ROOFTOP CROSSING CONDUITS AT ANY POINT IN THE INSTALLATION IS STRICTLY PROHIBITED.

GROUNDING

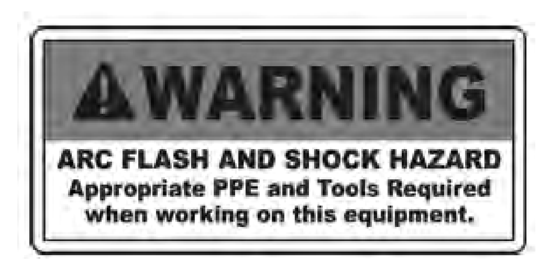
1. THE CONTRACTOR SHALL FURNISH AND INSTALL GROUNDING NECESSARY IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

TESTS

1. FINAL TESTS AND INSPECTION SHALL BE HELD IN THE PRESENCE OF SCA'S REPRESENTATIVES AND TO THEIR SATISFACTION.
2. MEGGER ALL: STRING WIRING, COMBINER BOX OUTPUT FEEDERS, AND AC FEEDERS. SUBMIT RESULTS TO OWNER FOR REVIEW.
3. IV CURVE TRACES OF STRINGS SHALL BE GENERATED USING THE SOLMETRIC PV ANALYZER (OR EQUIVALENT DEVICE) AND SUBMITTED TO OWNER FOR APPROVAL.

SOLAR SYSTEM LABELS:

1. LETTERING ON SIGNS SHALL BE CAPITAL LETTERS, MINIMUM SIZE OF 3/16" HIGH FOR GENERAL TEXT. HEADINGS SHALL BE MINIMUM 1/2" HIGH. LETTERING SHALL BE REFLECTIVE RED ON WHITE BACKGROUND OR VICE VERSA.
2. CLEARLY LABEL ALL CIRCUIT BREAKERS IN THE PANELBOARD. THE LABEL SHALL INDICATE THE NAME OF THE DEVICE IT SERVICES.



OUTDOOR RATED ARC FLASH STICKER MOUNTED ON ALL THE EQUIPMENT

DANGER: HIGH VOLTAGE KEEP AWAY
WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL "WARNING PHOTOVOLTAIC POWER SOURCE" SHALL BE PERMANENTLY AFFIXED ON ALL DC EXPOSED RACEWAYS, CABLE TRAYS, PULL BOXES, AND JUNCTION BOXES. LABELS SHALL BE REFLECTIVE RED BACKGROUND WITH WHITE CAPITAL LETTERS AT LEAST 3/8" TALL LABELS SHALL BE SPACED NO GREATER THAN 10 FEET APART AND SUITABLE FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.

PER 2014 NEC 690.31(B)(1). PV SOURCE CIRCUITS SHALL BE IDENTIFIED AT ALL POINTS OF TERMINATION, CONNECTION, AND SPLICES.
A. STRING HOMERUNS AT ARRAY.
B. DC INPUT TERMINALS OF COMBINER BOX.
C. DC INPUT TERMINALS OF STRING INVERTER. (WHERE APPLICABLE)

PER 2014 NEC 690.31(B)(2).THE CONDUCTORS OF PV OUTPUT CIRCUITS AND INVERTER INPUT AND OUTPUT CIRCUITS SHALL BE IDENTIFIED AT ALL POINTS OF TERMINATION, CONNECTION, AND SPLICES.
A. DC OUTPUT TERMINALS OF COMBINER BOX.
B. DC INPUT TERMINALS OF INVERTER.
C. AC OUTPUT TERMINALS OF INVERTER.
D. AC INPUT & OUTPUT TERMINALS OF EACH SUCCESSIVE DEVICE. (WHERE APPLICABLE)

Consultants:

ARCHITECT, STRUCTURAL, MEPFP ENGINEERS:
NYC SCHOOL CONSTRUCTION AUTHORITY A&E IN-HOUSE DESIGN STUDIO
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ACOUSTICAL: CERAMI & ASSOCIATES
404 FIFTH AVE, NEW YORK, NY 10018

VERTICAL TRANSPORTATIONS: VERTICAL SYSTEMS ANALYSIS
307 WEST 36TH STREET 8TH FLOOR NEW YORK, NY 10018

ENERGY MODEL: OLA CONSULTING ENGINEERS, PC
12 EAST 49 STREET, 11TH FLOOR NEW YORK, NY 10017

ENVIRONMENTAL & SSDS: LANGAN ENGINEERING
21 PENN PLAZA, 360 WEST 31ST STREET, 8TH FLOOR, NEW YORK, NY 10001

GEOTECHNICAL: LANGAN ENGINEERING
21 PENN PLAZA, 360 WEST 31ST STREET, 8TH FLOOR, NEW YORK, NY 10001

SURVEY: TECTONIC ENGINEERING, DPC
PO BOX 37, 70 PLEASANT HILL RD. MOUNTAINVILLE, NEW YORK 10953

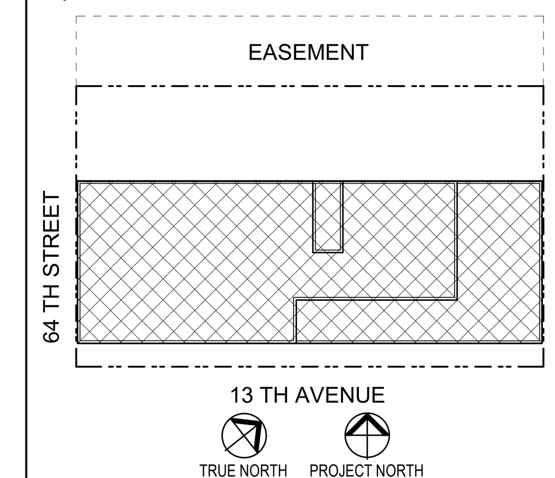
FOOD SERVICE: ROMANO GATLAND
1 HUNTINGTON QUADRANGLE SUITE 2C03, MELVILLE, NY 11747

Preliminary
Not For Construction

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
1	2/2/2021	100% CD SUBMISSION

Key Plan:



Block # 5739 Lot # 2

SCA Design Manager: SCA Design Mgr
Project Architect/Engineer: PA-PE
Discipline Lead:
Designer:
Drawn by:
Checked by: USSEIN MOHAMED P.E.
LLW No.: Facility Code: K Date: 03/19/2021

Project:
P.S. @ - BROOKLYN
NEW BUILDING
Address:
6312 13TH AVENUE, BROOKLYN, NY 11219

Drawing Title:
ROOF PLAN - PV PANEL LAYOUT

Reserved For
DOB NOW Job#

Drawing No.:
E006.00

Sheets in Contract Set:
OF 0

Sheets in DOB Set:
OF Page 0 192

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Q1.1P – MINIMUM IAQ PERFORMANCE

SCA – Outdoor Air Intake Quality for GSG Prerequisite Q1.1P and LEED v4 EQp1

March 15, 2021

Prepared for: New York City School Construction Authority
Prepared by:

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Summary

SCA PS is a proposed addition to a public-school building being designed for the New York City School Construction Authority (NYC SCA), to be located at Rockaway Blvd, Queens, New York 11420. The proposed addition will have 3 floors. The purpose of this analysis is to investigate whether the outdoor air being delivered to the new building occupants meets the minimum requirements of the following documents:

a) Section 4 of ASHRAE 62.1-2007, as required by 2016 Green Schools Guide (GSG) Prerequisite Q1.1P, "Minimum IAQ Performance", and
b) Section 4 of ASHRAE 62.1-2010, as required by LEED Building Design and Construction v4 (LEED) Prerequisite EQp1, "Minimum IAQ Performance".

Other requirements of the prerequisite are not part of this scope. The model is not intended to predict actual pollutant levels on site.

Per the prerequisite requirements, the SCA's Indoor and Environmental Health (IEH) Unit conducted a site investigation and research during Design Development. For this project, NYC SCA retained XXXXX to prepare an ASHRAE Outdoor Air Assessment Report. The assessment consisted of a qualitative evaluation of regional and local air quality, and did not include air sampling, modeling, or other detailed analysis.

Based on the ASHRAE Outdoor Air Assessment dated February 11, 2020[1], the SCA would like to assess whether emissions from the following nearby sources will bring the air quality in the school into non-compliance with the above-referenced standards:

- 128 Rockaway Motors (Sunoco Service Station), located approximately 200 feet southwest from the site.

Vidaris identified the following as a potential source of pollutants:

- DR Auto Repair and Body Shop, located approximately 400 feet northwest from the site.

XXXXX was retained by NYC SCA to conduct computational fluid dynamics (CFD) modeling to estimate the concentrations of pollutants at the outdoor air intake of the HVAC units to be installed at the school due to the above-mentioned sources. The model results will be used to determine compliance with GSG and LEED criteria[2]. To this end, the pollutant concentrations are compared to the EPA criteria, per ASHRAE 62.1-2007.

[1] ASHRAE Outdoor Air Assessment for Proposed PS96Q by AECOM. Included in Appendix A.

[2] The NYC SCA Green Schools Guide 2016 specifies that the SCA/IEH Unit conducts site investigation and research during Design Development. It is the responsibility of the architect of record or the engineer of record to submit an IEH outdoor air analysis report, and a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents. The proposed ventilation system design is to be described, noting any special considerations relating to compliance.

Results

XXXXX modeled the benzene emissions from the gas service station and VOC emissions from the autobody shop.

Based on the CFD modeling, the concentration of benzene and VOC at the outside air intakes is below the maximum LEED limit.

Recommendation

PS Q is located within 200 feet of the gas service station. The California Air Resources Board (CARB) has the following advisory[3]:
"Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities." Sensitive land use includes schools.

A 2018 study published in Science of the Total Environment "Vent pipe emissions from storage tanks at gas stations: Implications for setback distances" by Hilbert et al[4] found that CARB recommendations should be revised since the amount of benzene from the gas stations appear to be higher than previously thought.

The Sunoco gas station is open 24 hours/day and 8 cars can fill up simultaneously. It is possible that the total output of the gas station is 3.6 million gallons per year or greater.

Due to the above reasons, we recommend installing filters for benzene at the OA intakes of all AHUs. Activated carbon filters is the most common technology used for such filtration. This is a cautious recommendation based on California Office of Environmental Health Hazard Assessment's (OEHHA) maximum exposure level of 0.008 ppm for benzene. The CFD model indicates 0.003 ppm at the outside air intakes as maximum concentration.

[3] https://ww3.arb.ca.gov/ch/handbook.pdf
[4] https://www.aridtech.com/ARID-Columbia-Hopkins-Article.pdf

EPA Non-Attainment Areas and Impact on HVAC Design

The first step in considering the effect of site conditions is to check for the status of air quality under the Clean Air Act, as determined by the EPA.

The project is located in Queens, New York City. In August 2019, the EPA classified New York City as a "Serious non-attainment for Ozone" area having 8-hour ozone design value concentrations between 0.093 and 0.105 parts per million (ppm). This is less than the 0.107 ppm level above which LEEDv4 currently recommends employment of air filtration/cleaning to address ozone. Thus, for LEED v4 purposes, special carbon/sorbent filters are not required for ozone mitigation.

According to the ASHRAE Outdoor Air Assessment, the project is **not** located in an area classified by the EPA as Non-Attainment for Particulate Matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide, sulfur dioxide or lead.

Based on the EPA status (that does not consider local pollutant sources) for this project region, no special filtration is required to meet the requirements of ASHRAE 62.1-2007.

Local Pollutant Review

128 Rockaway Motors (Sunoco Service Station)

The proposed site is located opposite to a Sunoco gas Service station. At gas stations, fuel vapors containing benzene are released into the atmosphere from storage tanks through vent pipes.

To estimate the amount of benzene emissions from the gas station, Vidaris used a 2018 study published in *Science of the Total Environment* - "Vent pipe emissions from storage tanks at gas stations: Implications for setback distances" by Hilbert et al[5]. The findings from the study are presented below:

Table 1: Mean benzene emission rates for two gas stations studied

	Medium size gas station	Large size gas station
Sales Volume (gal/month)	450,000	700,000
Total benzene emissions (mg/s)	1.67	2.90

128 Rockaway Motors is open 24/day hours and 8 cars can fill up simultaneously. The gas station is located in a residential neighborhood, in an urban setting. Assuming 66 cars with a tank capacity of 15 gallons fill up during the peak hour at the gas station, the total sales volume is 720,000 gallons per month. Using Table 1, the rate of benzene emissions at 128 Rockaway Motors was calculated as 2.98 mg/s. Benzene emissions from the traffic on Rockaway Blvd is calculated on Page 5.

DR Auto Repair and Body Shop

The proposed site is located approximately 400 feet an auto body shop. Auto body shops emit volatile organic compounds (VOCs) that are present in the paint solvents and thinners. Emissions from the auto body shops were calculated based on reviewing the materials used to paint vehicles.

Based on common body color brands (i.e., Nexa[6]), Vidaris selected a combination of typical primer, basecoat and clear coat to determine amount of VOCs present. An average car requires 3 quarts of primer, 3 quarts of basecoat and 2 quarts of clearcoat. Vidaris assumed that all three coats are applied in one hour. This assumption is conservative since, in reality, this process takes several hours. Please see Appendix B for detailed technical specifications of the paints and calculations for VOCs. Vidaris contacted the body shop to determine the number of paint booths. The autobody shop did not respond. Based on the area and the number of doors at the facility, Vidaris estimated a maximum of 8 paint booths. For this analysis, it was assumed that all 8 booths were used simultaneously.

New York State Department of Environmental Conservation requires that filters achieving 98% capture efficiency be installed on the exhaust of all spray operations. This analysis assumes that 98% filtration efficiency.

[5] https://www.aridtech.com/ARID-Columbia-Hopkins-Article.pdf

[6] https://uk.nexaautocolor.com/en/products/car/ (assumed – 0.5 gal NEXA autocolor 2k clear coat mix, 0.75 gal 2k basecoat standard mix, 0.75 gal autocolor P565-2910 primer-surfacer).

Rockaway Boulevard

The proposed site for the school is also located adjacent to the Rockaway Blvd which is a 4-lane road. Emissions from vehicles were calculated using California's Emissions Factor Inventory (EMFAC2014)[7] and NYSERDA's Inventory of Light Vehicles on New York Roads in 2015. The rate of emissions increases with a reduction in vehicle speed. Moreover, at lower speed the car density is higher, because the vehicles can keep a smaller distance from one another.

To find the average low speed for vehicles, data from NYC DOT was used. The speed limit on the road is 25 mph[8]. To account for heavier vehicle traffic during peak hours from 7 AM to 10 AM and 5 PM to 8 PM, a conservative vehicle speed of 5 mph was modeled.

Based on 340 feet road length, 4 lanes and vehicle spacing at 5 mph, a total vehicle population of 61 was calculated. Using the NYSREDA inventory, 304 Vehicle Miles Traveled was obtained for a total population of 61 vehicles. This was combined with the EMFAC2014 data to get the rate of pollution. Additional information about the pollutant sources and calculations is given in Appendix C.

To estimate benzene emissions, a study[9] of cars from 1986 was used. This is a conservative approach since modern cars have lower emissions.

Using these calculations, the average pollution rate from Rockaway Blvd, by pollutant type, is summarized below:

Table 2: Rate of Emissions from Rockaway Blvd

Pollutant	Emissions from Rockaway Blvd (g/hr)
ROG/VOC	100
Benzene	2
CO	1,125
CO2	320,158
PM10	4
PM2.5	4

[7] EMFAC2014 gives data on emissions factors (ROG, TOG, CO, NOX, CO2, PM10, PM2.5) based on vehicle speed and type.
[8] http://www.nyc.gov/html/dot/downloads/pdf/current-pre-vision-zero-speed-limit-maps.pdf
[9] https://pubs.acs.org/doi/pdf/10.1021/es00017a003

Ambient Pollution

The pollution in the ambient air was modeled as below, using data from NYSDEC and NOAA (see footnotes).

Table 3: Pollution in Ambient Air

Pollutant			
ROG/VOC[10]	12.94	ppb	Summation of maximum concentration of all VOCs that may occur at a time. Latest available data from 2017.
Benzene	0.378	ppb	Maximum concentration of benzene that may occur at a time. Latest available data from 2017.
CO[11]	3.5*	ppm	Highest one-hour average concentration in a year for NYC. Latest available data from 2018.
PM10[11]	38**	$\mu g/m^3$	Highest concentration in a 24-hour period in a year for Queens. Latest available data from 2018.
PM2.5[11]	10.4	$\mu g/m^3$	Annual mean. Latest available data from 2018.
CO2[12]	407.4	ppm	Global average. Latest available data from 2018.

Target chemicals such as formaldehyde and others listed in CDPH Standard Method v1.1, Table 1-4 were not modeled individually.

*The highest CO concentration of 3.5 was chosen as a conservative estimate. The annual CO average is 0.475 ppm. The highest daily mean in winter is 1.5 ppm.

**The highest PM10 concentration of 38 $\mu g/m^3$was chosen as a conservative estimate. The annual PM10 average is 13.3 μg/m3. The highest daily mean in winter is 27 $\mu g/m^3$.

[10] https://www.dec.ny.gov/chemical/23781.html (see appendix D)

[11] https://www.dec.ny.gov/docs/air_pdf/2018airqualreport.pdf (see appendix D)

[12] ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_annmean_gl.txt (see appendix D)

CFD Analysis

Purpose of study

Computational fluid dynamic (CFD) analysis was performed to ascertain the possibility of pollution contamination in and around the outside air intake caused by emissions from 128 Rockaway Motors, DR Auto Repair and Body Shop, and Rockaway Blvd.

Model information

Domain

Figure 1: Map showing PS , DR Auto Body and 128 Rockaway Motors

Vidaris modeled the building and surrounding topography and neighboring structures within a radius of 0.3 miles. The neighboring structures were modeled with a simplified geometry, created by extracting data from Google Earth. The school has 3 air handling units (AHUs) located on the roof. All the units have outside air intake louvers.

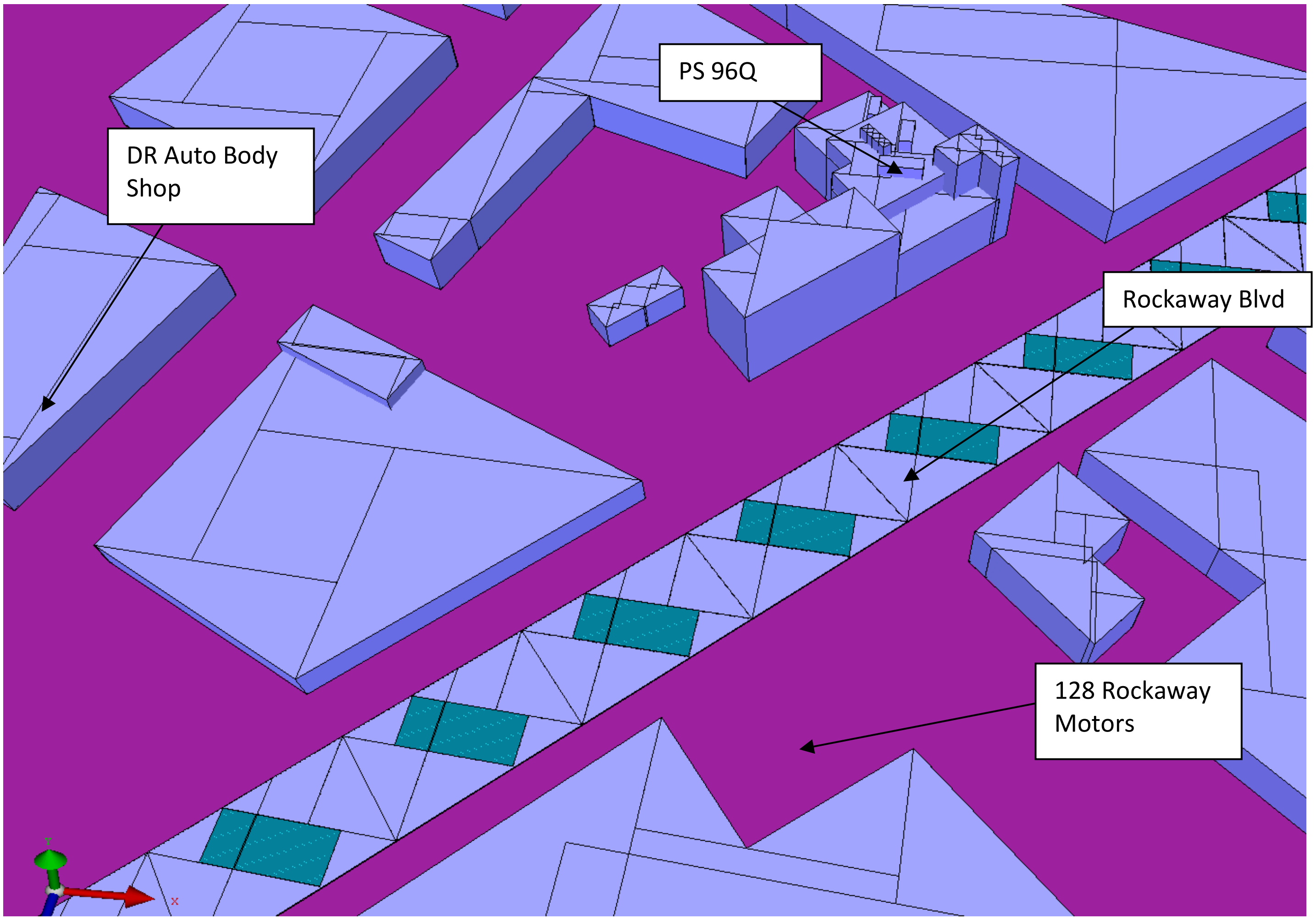

Figure 2: PS96Q and neighboring structures in the CFD model

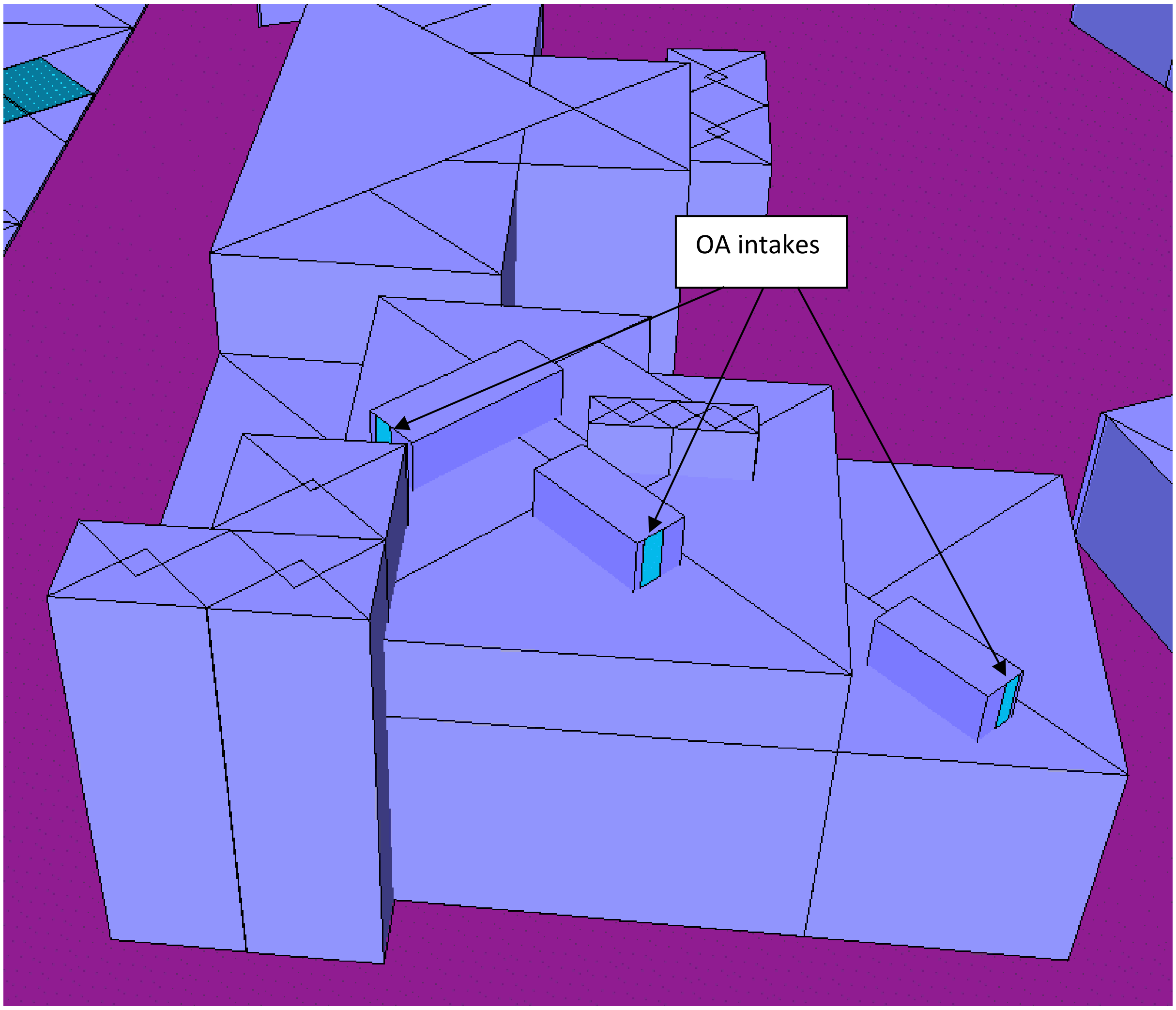

Figure 3: Close-up of the school and outside air intake sites

Boundary Conditions

The following boundary conditions were used:

- Outdoor air temperature: 13F (winter conditions), 89F (summer conditions).
- Wind speeds at standard reference point: 3.0 mph and 7.5 mph.
- Wind orientation: From gas station to school, and from auto body shop to school.
- Emissions at a steady rate as described in Local Pollutant Review.

The model does not account for infiltration /exfiltration through the building envelope. It focuses on pollutant levels at the outdoor air (OA) intakes.

The outdoor air temperature was based on the design heating and cooling temperature for New York City from Table D-1 of ASHRAE Standard 90.1.

The standard reference point for wind speed measurements is of 33 ft (10 m) above the ground. The wind speed profile with respect to distance above ground is shown on following figure.

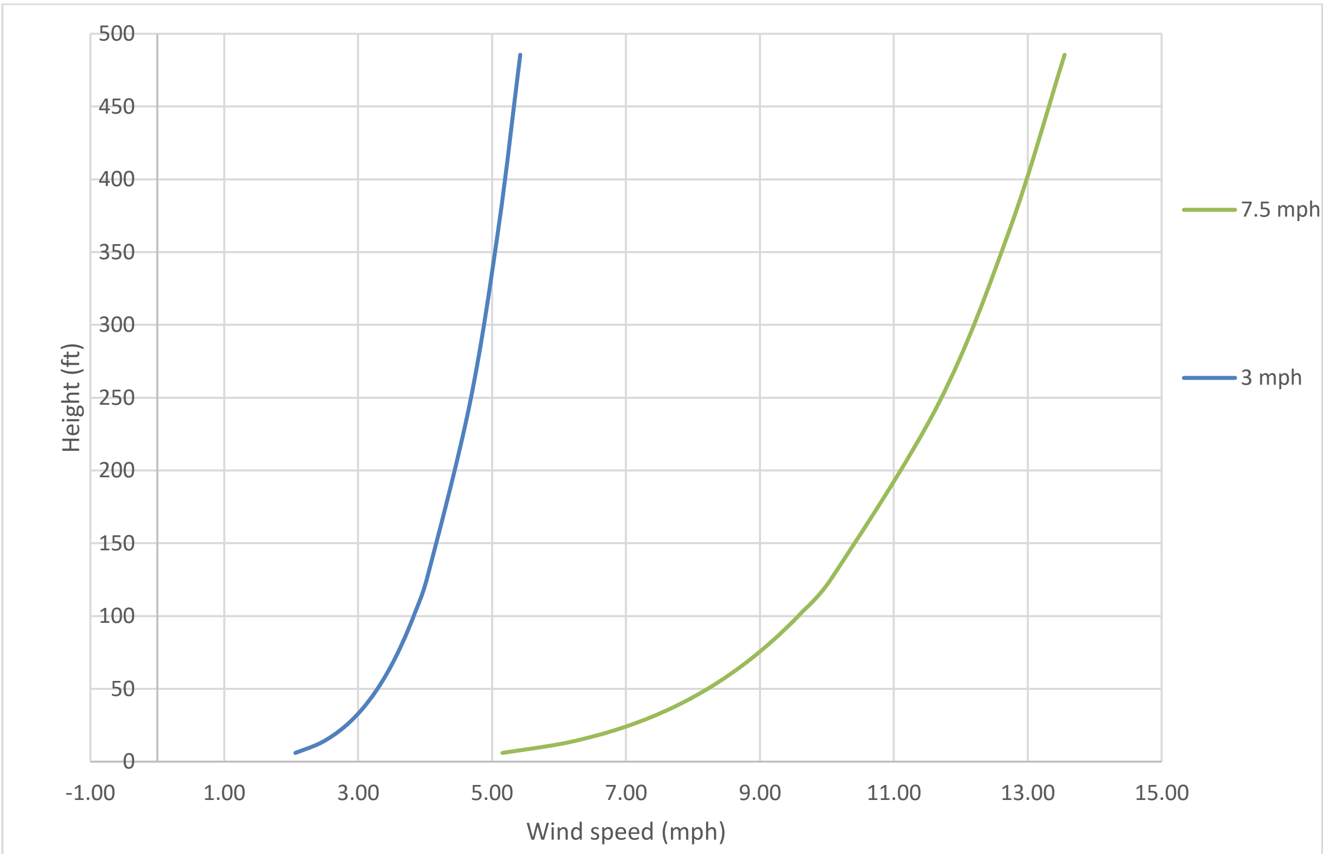

Figure 4: Wind Speed profile for areas exposed to wind flowing over water per chapter 24, ASHRAE Fundamentals 2017. Referenced wind speed is measured 33 feet above the ground: 3mph and 7.5mph

Results

Summary

XXXXXX performed preliminary modeling runs to determine the combination factors which result in the highest risk for contaminants at the outside air intake sites. Based on the parametric runs, the risk of contaminants is highest under the following conditions:

- Outdoor air temperature: 13°F
- Wind speeds at standard reference point: 3 mph
- Wind orientation: From gas station to school, and from auto body shop to school

Additional information on the parametric runs is provided later in this section.

The instantaneous contaminant levels at the inlet to the AHUs for this condition are summarized in Table 4 and Table 5.

Table 4: Concentration of pollutants at AHU inlets for Highest Risk Case, 3.0 mph wind blowing from the gas station to school, Winter

Pollutant	AHU Inlets	LEED maximum	Federal Ambient Air Quality Standard
CO	3.5 ppm	9 ppm	35 ppm
PM10	38 μg/m^3	50 μg/m^3	150 μg/m^3
PM2.5	10.4 μg/m^3	15 μg/m^3	35 μg/m^3
VOC	16.5 μg/m^3	500 μg/m^3	NA
Benzene	0.003 ppm	NA	See Footnote[13]

Table 5: Concentration of pollutants at AHU inlets for Highest Risk Case, 3.0 mph wind blowing from the autobody shop to school, Winter

Pollutant	AHU Inlets	LEED maximum	Federal Ambient Air Quality Standard
CO	3.5 ppm	9 ppm	35 ppm
PM10	38 μg/m^3	50 μg/m^3	150 μg/m^3
PM2.5	10.4 μg/m^3	15 μg/m^3	35 μg/m^3
VOC	381.3 μg/m^3	500 μg/m^3	NA

[13] Occupational Safety and Health Administration (OSHA): 1 ppm.
National Institute for Occupational Safety and Health (NIOSH): 0.1 ppm.
California's Office of Environmental Health Hazard Assessment (OEHHA): 0.008 ppm (or 8 ppb).

The concentrations of individual pollutants were compared against the LEED maximum levels for Indoor Air Quality Assessment. The results show that the concentration of all pollutants is below the LEED threshold.

Vidaris researched design standards for buildings located near source of benzene emissions. Air Resources Board in California has the following advisory in its Air Quality and Land Use Handbook[14]:
"Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities."
The handbook includes school in Sensitive land uses.

Additionally, Hilbert et al found that CARB recommendations should be revised since the amount of benzene from the gas stations appear to be higher than previously thought.

The Sunoco gas station is open 24 hours/day and 8 cars can fill up simultaneously. It is possible that the total output of the gas station is 3.6 million gallons per year or greater.

Due to the above reasons, for a conservative approach in design, Vidaris recommends installing carbon filters for benzene at the OA intakes of all AHUs. This recommendation is based on The California Office of Environmental Health Hazard Assessment's (OEHHA) maximum exposure level of 0.008 ppm for benzene.

[14] https://ww3.arb.ca.gov/ch/handbook.pdf

The figure below shows the graphical plot of benzene from 128 Rockaway Motors and Rockaway Blvd at winter conditions and 3 mph wind speed blowing from the gas station to school.

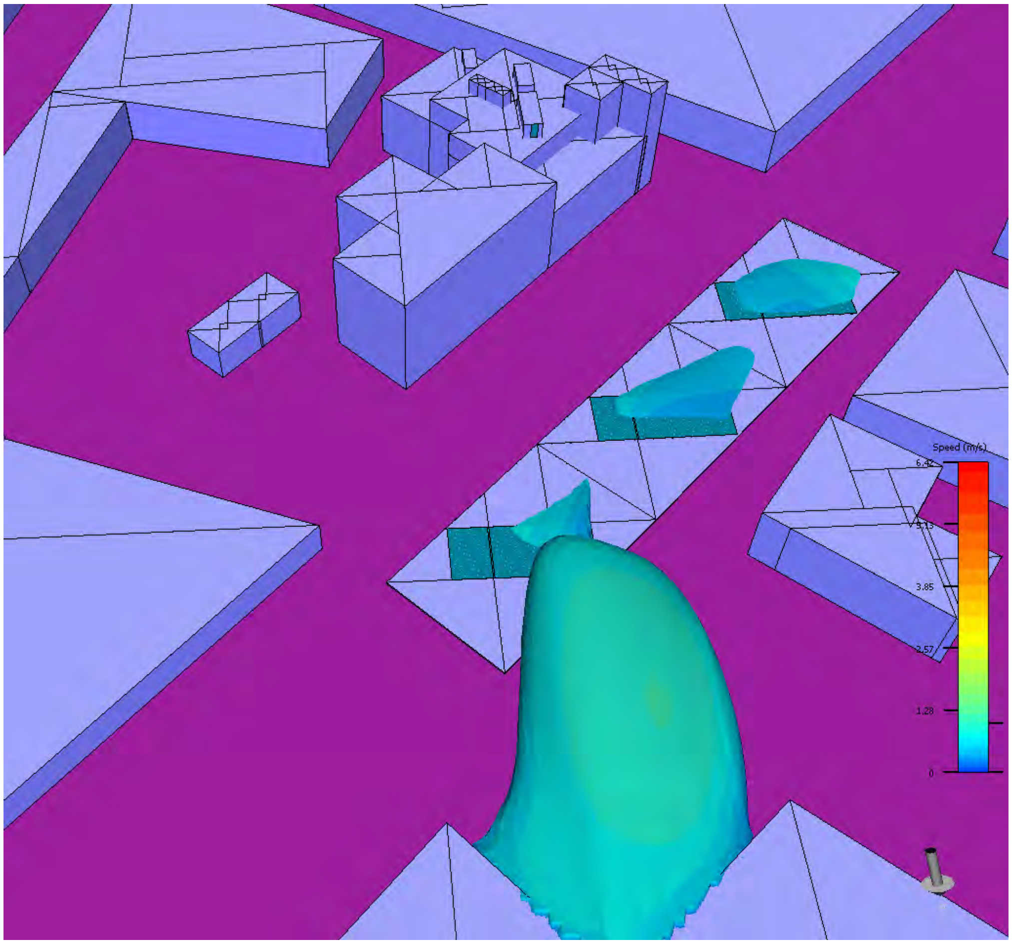

Figure 5: Plot of Benzene at 0.01 ppm concentration colored by speed, Highest Risk case

Figure 6 and Figure 7 show benzene concentration plots around the school and gas station. Note the federal limit is 1 ppm. As seen in the figures, the pollutants from the road do not amount to much. Results from this run show hourly average pollutant levels are under the federal limit.

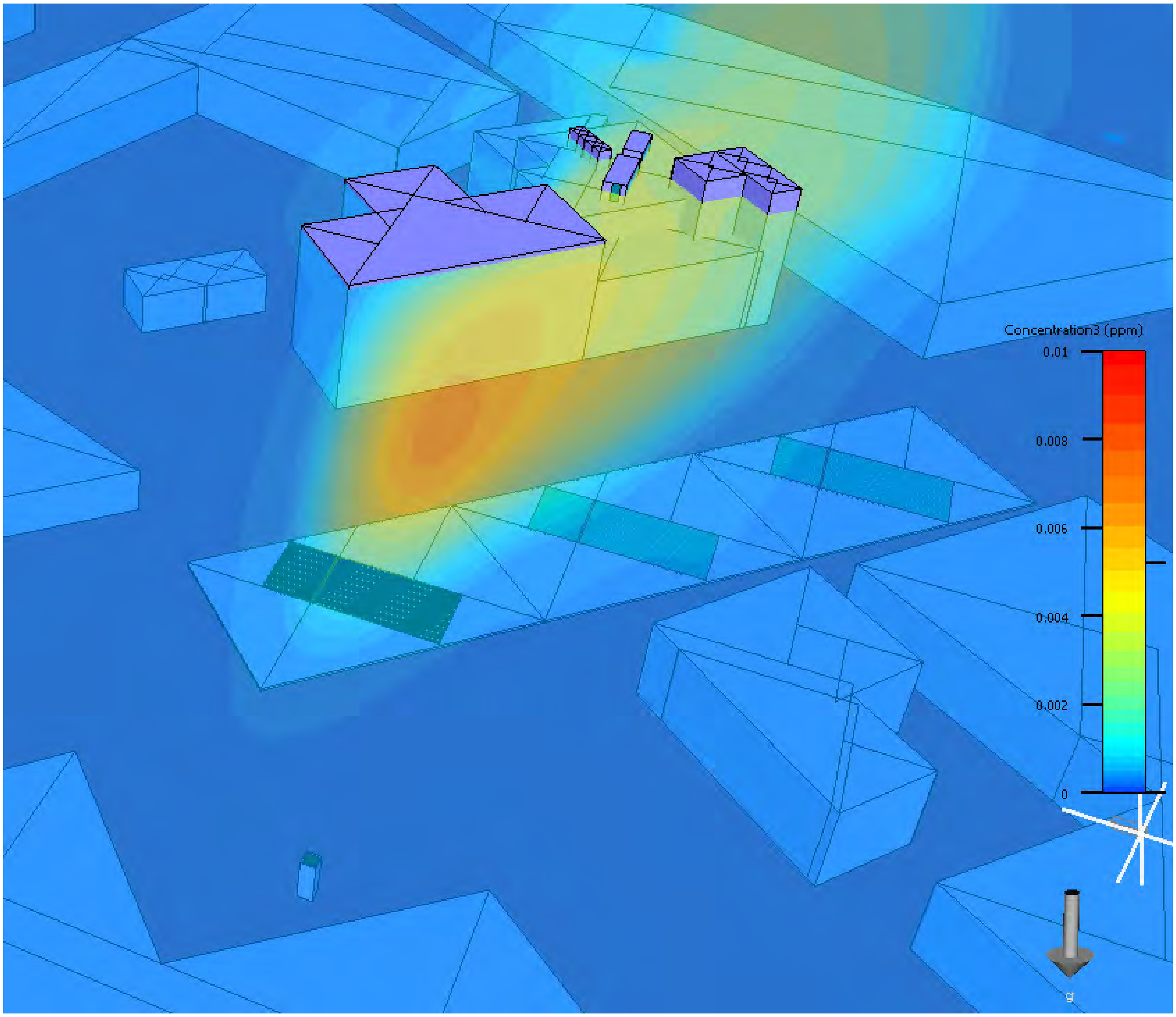

Figure 6: Plot of Benzene Concentration – Horizontal section, Highest Risk case

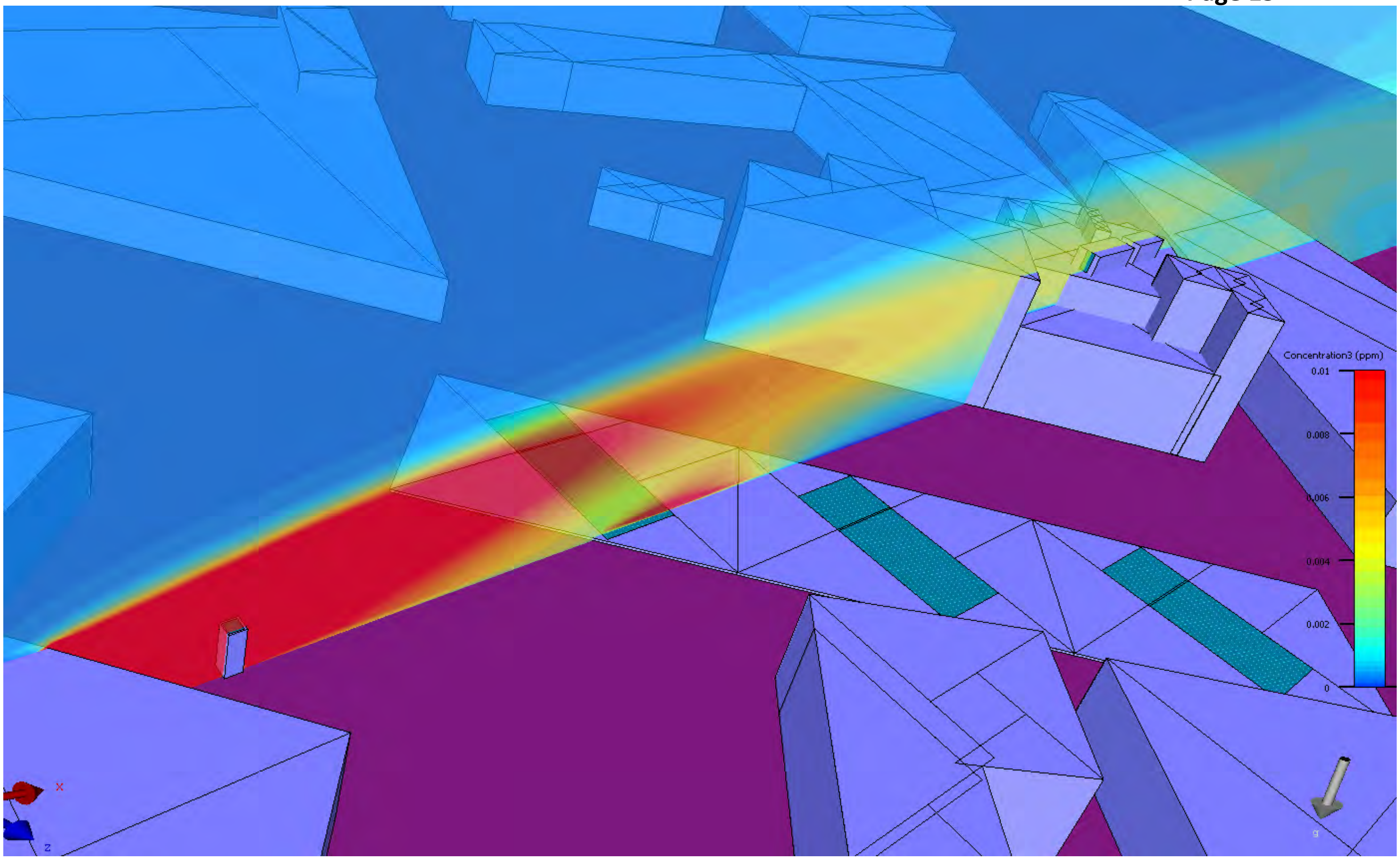

Figure 7: Plot of Benzene Concentration – Vertical section, Highest Risk case

Wind Direction

Initially, all four wind orientations (North, South, West, East) were considered. It became clear that two wind directions, one from gas station to school and the other from auto body shop to school, will carry the maximum amount of pollutants to the school. This can also be seen when the map of the area is visually inspected. Depending on the wind direction, the school will only get pollutants from one source at a time. Pollutants from both sources will not add.

Both wind directions were studied further.

Weather

From Table 6 and Table 7, it is clear that concentration of VOCs and benzene at the AHU inlets are higher in the winter. The emission rate of other pollutants does not vary significantly by temperature. Results for the winter and summer conditions are shown in the table below.

Table 6: Results for different weather conditions, 3.0 mph wind blowing from gas station to school

Weather	Concentration of Benzene (ppm)		
	Inlet of AHU-1	Inlet of AHU-2	Inlet of AHU-3
Winter	0.0028	0.0030	0.0016
Summer	0.0025	0.0025	0.0007

Table 7: Results for different weather conditions, 3.0 mph wind blowing from autobody shop to school

Weather	Concentration of VOC ($\mu g/m^3$)		
	Inlet of AHU-1	Inlet of AHU-2	Inlet of AHU-3
Winter	381.3	372.9	138.2
Summer	349.5	364.7	133.6

Wind Speed

Two wind speeds (3 mph and 7.5 mph) were modeled. The following results were observed:

- Wind speed of 3 mph leads to the highest concentration of pollutants
- Wind speed of 7.5 mph dissipates the pollutants faster than 3 mph wind

Table 8: Results for different wind speed, Wind blowing from gas station to school, Winter

	Concentration of Benzene (ppm)		
Wind Speed	**Inlet of AHU-1**	**Inlet of AHU-2**	**Inlet of AHU-3**
3.0 mph	0.0028	0.0030	0.0016
7.5 mph	0.0013	0.0014	0.0006

Table 9: Results for different wind speed, Wind blowing from autobody shop to school, Winter

	Concentration of VOC ($\mu g/m^3$)		
Wind Speed	**Inlet of AHU-1**	**Inlet of AHU-2**	**Inlet of AHU-3**
3.0 mph	381.3	372.9	138.2
7.5 mph	349.5	364.7	133.6

Qualification of Results

In general, CFD analyses are a simplified representation of reality. There are limitations regarding how close a computer model can predict reality. These limitations stem from the capabilities of the software, the simplifications in the model, and the fact that real-life construction and operation is imperfect.

- "Computational fluid dynamics (CFD) models attempt to resolve airflow around buildings by solving the Navier-Stokes equations at finite grid locations.
- CFD models are currently used to model internal flows but are insufficient to accurately model atmospheric turbulence. (24.10 2009 ASHRAE Handbook—Fundamentals)"
- "Based on the current state of the art, CFD models should be used with extreme caution when modeling exhaust plumes from laboratory pollutant sources. Currently, CFD models can both over- and under predict concentration levels by orders of magnitude, leading to potentially unsafe designs. If a CFD study is conducted for such an application, supporting full-scale or wind tunnel validation studies should be carried out. (45.10 2011 ASHRAE Handbook—HVAC Applications)"
- "Measurements on small-scale models in wind tunnels or water channels can provide information for design before construction. These measurements can also be used as an economical method of performance evaluation for existing facilities. (24.10 2009 ASHRAE Handbook—Fundamentals)"

APPENDIX A: ASHRAE OUTDOOR AIR ASSESSMENT REPORT

AECOM
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February 11, 2020

Ms. Anna Ramirez
Industrial Hygienist
Industrial & Environmental Hygiene Division
New York City School Construction Authority
30-30 Thomson Avenue, Long Island City, NY 11101

Re: ASHRAE Outdoor Air Assessment
Public School (P.S.) 096 (Q096) – Proposed Building Addition
130-01 Rockaway Boulevard, South Ozone Park, New York 11420
Block 11694, Lot 27
NYCSCA LLW No. 116480

Dear Ms. Ramirez:

At the request of the New York City School Construction Authority (NYCSCA), ~~AECOM~~ Technical Services, Inc. ( ) conducted an American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Outdoor Air Assessment in support of the proposed building addition at Public School (P.S.) 96 (Q096), located at 130-01 Rockaway Boulevard, South Ozone Park, New York 11420 (the "Site"). While the exact layout of the proposed building addition has not been finalized, the proposed building addition will occupy the eastern portion of the property.

The assessment was conducted in accordance with the ASHRAE Standard 62.1-2016 (Standard) Section 4.0: Outdoor Air Quality. The assessment was conducted to satisfy the New York City Department of Education/NYCSCA Green Schools Guide Credit Q1.1R: Minimum IAQ Performance/Increased Ventilation. The assessment consisted of a qualitative evaluation of regional and local air quality, and did not include air sampling, modeling, or other detailed analysis.

Regional Air Quality Compliance Status

Criteria Air Pollutants are those substances for which a National Ambient Air Quality Standard (NAAQS) has been established, as provided in the Clean Air Act. The following table contains a summary of criteria pollutant information for Queens County provided by the U.S. Environmental Protection Agency's (USEPA) Green Book Nonattainment Areas for Criteria Pollutants website.

	Regional Outdoor Air Quality Pollutants						
	Particulates (PM2.5)	**Particulates (PM10)**	**Carbon Monoxide – 1 hour/8 hours**	**Ozone 8-hour**	**Nitrogen Dioxide**	**Lead**	**Sulfur Dioxide**
Attainment Status	Attainment	Attainment	Attainment	**Non-attainment**	Attainment	Attainment	Attainment

In August 2019 (effective September 23, 2019), USEPA reclassified New York City as a serious nonattainment area for the 2008 8-hour Ozone Standard.

February 11, 2020
Ms. Anna Ramirez
ASHRAE Outdoor Air Assessment
Proposed Building Addition at Public School 96 (Q096)

Local Survey

Date and Time of Observation
Visual inspection of the Site and adjacent areas was performed on December 22, 2019 at approximately 2:00 PM by Stephen Libert of AECOM.

Site Description
The approximately 55,910 square foot (sf) lot is improved with an approximately 32,000 sf three-story inverted T-shaped brick school building with a basement. The southern portion of the building includes a basement and three stories. The northern part of the building includes a basement and first floor only. At the time of the inspection, weather conditions were cloudy with a temperature of approximately 32º Fahrenheit, and a breeze with winds traveling 5 miles per hour from the north-northeast. No limiting conditions associated with the weather were encountered. The surrounding properties within a 500-foot radius of the perimeter of the Site were surveyed for potential point sources of air emissions.

Description of Nearby Facilities
The Site is bounded to the north by residential properties followed by Foch Boulevard and low-rise residential properties further to the north; to the east by Lincoln Street, followed by low rise residential and retail properties; to the south by Rockaway Boulevard, with a Sunoco Service Station, private school ("Al-Ihsan Academy"), and commercial properties located on the south side of Rockaway Boulevard; and, to the west by 130th Street followed by a lumber yard ("South Ozone Lumber"). Two vehicle repair shops ("DR Auto Body" and "Continental Lift Trucks") were also identified further to the northwest and west during the Site reconnaissance.

Observation of Odors, Irritants, Visible Plumes or Air Contaminants
No odors, irritants, visible plumes or air contaminants were noted during the survey.

Description of Nearby Sources of Vehicle Exhaust
The nearest roadway with heavy traffic flow is Rockaway Boulevard which adjoins the Site building to the south. Lincoln Street adjoins the Site to the east and 130th Street adjoins the Site to the west. Both roadways as well as Foch Boulevard located further to the north are used for local traffic.

Description of Nearby Point Sources
Based on a review of USEPA Envirofacts Air Facility System (AFS) database (https://www.epa.gov/enviro/icis-air-search), the following facilities, located within approximately 1,000 feet of the Site, are potential point sources or air emissions:

Site Name	Address	Distance from Site	Air Program Information[1]	Notes
128 Rockaway Motors (Sunoco Service Station)	128-24 Rockaway Boulevard, South Ozone Park, NY 11420	<200 feet	SIP (Operating)	Gasoline Service Station, Minor Emissions
DR Auto Repair and Body Shop	116-51 128th Street, South Ozone Park, NY 11420	~400 feet	SIP (Operating)	Minor Emissions
Ann's Cleaners (Dry Cleaner)	133-02 Rockaway Boulevard, South Ozone Park, NY 11420	~650 feet	MACT, SIP (Operating)	MACT 63 NESHAPS-Subpart M Dry Cleaners Perchloroethylene
Ozone Auto Body	125-07 Rockaway Boulevard, South Ozone Park, NY 11420	~1000 feet	MACT, SIP (Operating)	MACT 63 NESHAPS-Subpart 6H Paint Strip & Misc. Surface Coating Operations Area Source

1 MACT = Maximum Achievable Control Technology (MACT) Standards (40 CFR Part 63); NESHAP = National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61);
2 SIP = Clean Air Act State Implementation Plan for National Primary and Secondary Ambient Air Quality Standards

Discussion and Conclusions
In order to determine the acceptability of outdoor air, the nearby facilities identified during the assessment were evaluated against the following screening criteria[3]:

- Large parking facilities or parking garage exhaust vents adjacent to the Site;
- An atypical (e.g., not at-grade) source of vehicular pollutants, such as a highway or bridge, within 200 feet of the Site;
- A major or large emission source within 1,000 feet of the Site;
- A medical, chemical, or research lab within 400 feet of the Site;
- Manufacturing or processing facilities within 400 feet of the Site; and
- A facility with a New York State Department of Environmental Conservation (NYSDEC) air facility registration within 200 feet the site.

Based on this evaluation and the findings of the local survey, the following source may affect the acceptability of the outdoor air quality at the Site:

1. 128 Rockaway Motors (Sunoco Service Station), located approximately 200 feet southwest from the Site, across Rockaway Boulevard. This gas station facility is listed as Minor Emission with no specific pollutant description.

Therefore, AECOM recommends conducting further evaluation of emissions from surrounding sources to determine whether additional design measures beyond the standard NYCSCA requirements should be incorporated into the building's heating, ventilation, and air conditioning (HVAC) system.

Please do not hesitate to contact either myself at christine.wagner@aecom.com or on my cell phone at (908) 419-0827 or Steven Albert at steven.albert@aecom.com or via cell phone at (732) 832-6195 at if you have any questions or concerns.

Sincerely,
AECOM Tecgnical Servces, Inc.

Christine Wagner

Christine Wagner
Project Manager

cc: P. Lindell, NYCSCA
Steven Albert, AECOM

[3] Based on guidance for evaluation of air quality in the *City Environmental Quality Review Technical Manual* (New York City Mayor's Office of Environmental Coordination, March 2014).

APPENDIX B: SOURCE OF POLLUTANTS – AUTO BODY SHOP

NEXA autocolor 2K Clear coat mix – 2 parts P190-6490 clearcoat, 1 part P210-8490 hardener			
	VOC	1.39	lb/gal
Clearcoat			
Ingredient	percent by volume	CAS number	
4-chloro-a,a,a-trifluorotoluene	20%	98-56-6	
Acetone	20%	67-64-1	
5-methylhexan-2-one	10%	110-12-3	
2-ethylhexyl acetate	10%	103-09-3	
Pentyl propionate	05%	624-54-4	
Heptan-2-one	01%	110-43-0	
Propionic acid	01%	79-09-4	
Bis(1,2,2,6,6-pentamethyl-4-piperdyl) sebacate	0.1%	41556-26-7	
H20	33%		
Hardener			
Ingredient	percent by volume	CAS number	
Hexamethylene Diisocynaate, oligomers	50%	28182-81-2	
4-chloro-a,a,a-trifluorotoluene	49%	98-56-6	
Hexamethylene-di-isocyanate	1%	822-06-0	

NEXA autocolor 2K Basecoat standard mix – 1 part P422, 1 part P850-16			
	VOC	5.93	lb/gal
Basecoat			
Ingredient	percent by volume	CAS number	
n-butyl acetate	90%	123-86-4	
xylene	50%	1330-20-7	
2-methoxy-1-methylethyl acetate	20%	108-65-6	
5-methylhexan-2-one	10%	110-12-3	
Solvent naphtha	10%	64742-95-6	
Titanium dioxide	10%	13463-67-7	
ethylbenzene	5%	100-41-4	
butan-1-ol	5%	71-36-3	
1,2,40trimethylbenzene	5%	95-63-6	
Aluminium oxide	5%	1344-28-1	
Azacyclotridecan-2-onee, homopolymer	5 %	25038-74-8	
Diiron trioxide	5%	1309-37-1	
Mica-group minerals	1%	12001-26-2	
Magnesium fluoride	1%	7783-40-6	
Ligroine	1%	8032-32-4	
Carbon black, respirable powder	1%	1333-86-4	
Toluene	1%	108-88-3	
Mesitylene	1%	108-67-8	
Naphtha(petroleum)	1%	64741-65-7	
n-butyl propionate	1%	590-01-2	
cumene	1%	98-82-8	
Rosin, oligomers	1%	65997-05-9	
2-methoxypropyl acetate	1%	70657-70-4	
2,3-epoxypropyl neodecanoate	1%	26761-45-5	
Thinner			
Density – 6.84 lbs / gal			
Ingredient	percent by volume	CAS number	
5-methylhexan-2-one	40%	110-12-3	
4-methylpentan-2-one	40%	108-10-1	
xylene	5%	1330-20-7	
2-ethylhexyl acetate	5%	103-09-3	
Solvent naphtha	5%	64742-95-6	
1,2,40trimethylbenzene	3%	95-63-6	
ethylbenzene	1.7%	100-41-4	
cumene	1%	98-82-8	

NEXA autocolor P565-2910 Primer-Surfacer – 6 parts P565, 1 part P210-85 hardener, 2 parts P850-16			
	VOC	4.71	lb/gal
Primer-Surfacer			
Ingredient	percent by volume	CAS number	
b3rium sulfate	30.0%	7727-43-7	
n-butyl acetate	30.0%	123-86-4	
xylene	13.0%	1330-20-7	
titanium dioxide	10.0%	13463-67-7	
Talc , not containing asbestiform fibres	7.0%	14807-96-6	
ethylbenzene	5.0%	100-41-4	
aluminium orthophosphate	5.0%	7784-30-7	
2-methoxy-1-methylethyl acetate	1.5%	108-65-6	
crystalline silica, respirable powder (<10 microns)	1.0%	14808-60-7	
crystalline silica, respirable powder (>10 microns)	1.0%	14808-60-7	
Hardener			
Ingredient	percent by volume	CAS number	
Vexamethylene diisocyanate, oligomers	50.0%	28182-81-2	
2-butoxyethyl acetate	20.0%	112-07-2	
3-lsocyanatomethy1-3,5,5-trimethylcyclohexyl isocyanate, oligo	20.0%	53880-05-0	
Solvent naphtha (petroleum), light aromatic	10.0%	64742-95-6	
heptan-2-one	5.0%	110-43-0	
n-butyl acetate	4.5%	123-86-4	
5-methylhexan-2-one	2.5%	110-12-3	
1,2,4-trimethylbenzene	2.5%	95-63-6	
Solvent naphtha (petroleum), heavy arom.	2.7%	64742-94-5	
xylene	1.6%	1330-20-7	
4-isocyanatosulphonyltoluene	1.0%	4083-64-1	
ethylbenzene	1.0%	100-41-4	
naphthalene	1.0%	91-20-3	
Thinner			
Ingredient	percent by volume	CAS number	
Igmethylhexan-2-one	50.0%	110-12-3	
4-methylpentan-2-one	48.0%	108-10-1	
n-butyl acetate	20.0%	123-86-4	
xylene	13.0%	1330-20-7	
ethylbenzene	2.4%	100-41-4	

APPENDIX C: SOURCE OF POLLUTANTS - TRAFFIC

EMFAC2014 (v1.0.7) Emission Rates													
Region Type: Statewide													
Region: California													
Calendar Year: 2017													
Season: Annual													
Vehicle Classification: EMFAC2011 Categories													
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW													
						mi/day	gram/veh-mile	gram/veh-mile	gram/veh-mile	gram/veh-mile	gram/veh-mile	gram/veh-mile	gram/veh-mile
Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Statewide	2017	LDA	Aggregated	5	GAS	938511.5105	0.151294323	0.214483287	1.987134089	0.175315144	988.3009307	0.01175757	0.010817573
Statewide	2017	LDT1	Aggregated	5	GAS	82697.11122	0.480374648	0.661387953	7.153270782	0.580357296	1161.846787	0.022692751	0.020908989
Statewide	2017	LDT2	Aggregated	5	GAS	354766.0727	0.21432272	0.305434127	2.923718393	0.357613675	1334.68687	0.012036352	0.011075101
Statewide	2017	LHD1	Aggregated	5	GAS	195140.4523	0.450227091	0.64819599	5.328907219	0.790280624	1404.594266	0.010906922	0.010036924
Statewide	2017	LHD2	Aggregated	5	GAS	31447.60501	0.249570681	0.361706671	2.730893965	0.542571114	1492.416129	0.007725231	0.00710547
Statewide	2017	MCY	Aggregated	5	GAS	10298.30336	13.21347885	15.98631029	60.28676158	1.484627033	543.3475889	0.009350837	0.008796928
Statewide	2017	MDV	Aggregated	5	GAS	239543.3436	0.401263099	0.560835886	4.932856388	0.609014299	1760.932895	0.012639272	0.011641149
Statewide	2017	MH	Aggregated	5	GAS	4915.761191	1.342870477	1.789930984	23.90687092	1.399260875	3932.873375	0.01675651	0.015514648
Statewide	2017	OBUS	Aggregated	5	GAS	5050.916969	0.553200011	0.79993857	4.642460368	1.112950075	3891.618334	0.005176993	0.004764552
Statewide	2017	SBUS	Aggregated	5	GAS	2003.889652	0.90494844	1.320498639	6.941540811	1.630983769	1848.851173	0.009681113	0.008901426
Statewide	2017	T6TS	Aggregated	5	GAS	9897.336003	1.163558017	1.662318994	11.56320754	1.946463404	3898.616723	0.009264781	0.00854121
Statewide	2017	T7IS	Aggregated	5	GAS	670.7077748	4.644059008	6.582505951	77.05037312	6.988114251	4273.272306	0.006481312	0.006011949
Statewide	2017	UBUS	Aggregated	5	GAS	9393.869964	2.310287533	3.288070205	17.31417285	2.523543244	3909.452156	0.008504881	0.007862002

Taken from "Assessment of Carbonaceous PM2.5 for New York and the Region", TABLE 3-9								CALCULATIONS				
county	population (2000 Census)	Percent of Total NYS Population	County In NYMA	Gasoline LDV VMT in CY 2002 (1,000,000 mi/yr)	Percent Total NYS Gasoline LDV VMT	Per Capita Gasoline LDV/VMT (1000 mi / person / yr)		**Gasoline LDV VMT per day**	**Gasoline LDV VMT per hour**		**VMT / person / day**	**VMT / person / hour**
Albany	294,565	1.6	No	3,280.1	2.5	11.1		8986575	374440.6		30.41096	1.267123
Bronx	1,332,650	7	Yes	4,327.8	3.3	3.2		11856986	494041.1		8.767123	0.365297
Erie	950,265	5	No	8,132.8	6.3	8.6		22281644	928401.8		23.56164	0.981735
Kings	2,465,326	13	Yes	4,487.6	3.5	1.8		12294795	512283.1		4.931507	0.205479
Monroe	735,343	3.9	No	6,752.8	5.2	9.2		18500822	770867.6		25.20548	1.050228
Nassau	1,334,544	7	Yes	10,610.0	8.2	8		29068493	1211187		21.91781	0.913242
New York	1,537,195	8.1	Yes	3,987.3	3.1	2.6		10924110	455171.2		7.123288	0.296804
Onondaga	458,336	2.4	No	4,307.4	3.3	9.4		11801096	491712.3		25.75342	1.073059
Orange	341,367	1.8	No	4,038.3	3.1	11.8		11063836	460993.2		32.32877	1.347032
Putnam	95,745	0.5	No	2,749.5	2.1	28.7		7532877	313869.9		78.63014	3.276256
Queens	2,229,379	11.7	Yes	7,160.7	5.5	3.2		19618356	817431.5		8.767123	0.365297
Richmond	443,728	2.3	Yes	1,827.7	1.4	4.1		5007397	208641.6		11.23288	0.468037
Rockland	286,753	1.5	Yes	2,405.1	1.9	8.4		6589315	274554.8		23.0137	0.958904
Suffolk	1,419,369	7.5	Yes	17,886.0	13.8	12.6		49002740	2041781		34.52055	1.438356
Westchester	923,459	4.9	Yes	8,012.9	6.2	8.7		21953151	914714.6		23.83562	0.993151
TOTAL		78.2		89,966	69.4							

Taken From "New York State Greenhouse Gas Inventory and Forecst", Table 3-1				VehClass			CALCULATION			
Vehicle Type	**1990**	**2000**	**2007**			**VehClass**		**1990**	**2000**	**2007**
Heavy Duty Diesel Vehicle	4,056	4,538	8,022	LHD1	LHD2	LDA	Passenger Cars	84,398	64,440	60,836
						LDT1	Light-Duty Trucks (GVWR<6000 lbs and ETW <3750)	9067	31579	32789
Heavy Duty Gasoline Vehicle	206	320	1,414	LHD1	LHD2	LDT2	Light-Duty Trucks (GVWR<6000 lbs and ETW 3750-5750)	9067	31579	32789
						LHD1	Light-Heavy-Duty Trucks (GVWR 8501-10000 lbs)	2131	2429	4718
Light Duty Diesel Truck	582	1,890	1,459	LDT1	LDT2	LHD2	Light-Heavy-Duty Trucks (GVWR 10000-14000 lbs)	2,131	2,429	4,718
						MCY	Motorcycles	107	603	887
Light Duty Diesel Vehicle	26	20	19	LDA		MDV	Medium-Duty Trucks (GVWR 6000-8500 lbs)			
						MH	Motor Homes			
Light Duty Gasoline Truck	17,552	61,268	64,119	LDT1	LDT2	OBUS	Motor Coach			
						SBUS	School Bus	206	320	1,414
Light Duty Gasoline Vehicle	84,372	64,420	60,817	LDA		T6TS	Medium-Heavy Duty Gasoline Truck			
						T7IS	Heavy-Heavy Duty Gasoline Truck			
Motorcycle	107	603	887	MCY		UBUS	Urban Buses	206	320	1,414
Total	106,901	133,059	136,737				Total	107,313	133,699	136,737
(1,000,000 mi/yr)							(1,000,000 mi/yr)			

APPENDIX D: AMBIENT AIR QUALITY

NYSDEC Region 2

CARBON MONOXIDE - Continuous Gas Filter Correlation

Comparison Between NYS Ambient Air Quality and Ambient Air Quality Standards for Calendar Year 2018

		One-Hour Average Maximum not to exceed 35 PPM more than once per calendar year *						Running 8-Hour Average (Non-Overlapping) Maximum not to exceed 9 PPM more than once per calendar year *				
		Observations			Highest Values, PPM			Observations		Highest Values, PPM		
Station	**Site No.**	**Total Obs.**	**% Avail**	**>35 PPM**	**1st**	**2nd**	**3rd**	**Total**	**>9 PPM**	**1st**	**2nd**	**Days> 9 PPM**
CCNY	7093-25	8,560	99	0	2.91 [11/04:21]	2.52 [12/02:18]	2.51 [12/02:19]	8,681	0	1.70 [12/02:20]	1.20 [12/20:14]	0
Botanical Gardens (Pfizer Lab)	7094-10	8,646	99	0	2.30 [12/20:09]	2.01 [12/20:08]	1.96 [12/20:10]	8,700	0	1.50 [12/20:11]	1.20 [01/11:09]	0
Queens College 2	7096-15	8,497	97	0	1.95 [12/20:09]	1.72 [10/31:06]	1.69 [10/31:07]	8,409	0	1.30 [12/31:08]	1.20 [10/31:09]	0
Queens College Near Road	7096-16	7,684	88	0	3.50 [12/28:15]	2.41 [12/20:09]	2.20 [10/31:07]	7,453	0	1.70 [12/31:09]	1.50 [10/31:11]	0

NYSDEC Region 2

(Manhattan Sites)

INHALABLE PARTICULATES ($PM_{2.5}$)

Comparison Between NYS Ambient Air Quality and Ambient Air Quality Standards for Calendar Year 2018

(Average of last 3 years' annual means not to exceed 12 µg/m³ *;
and average of 98th percentile for last 3 years not to exceed 35 µg/m³ *)

			Maximum Values, µg/m³			98th Percentile, µg/m³				Quarterly Averages, 2018				Annual Mean, µg/m³			
Station	Site No.	Total Obs.	1st	2nd	3rd	2018	2017	2016	3-yr Avg.	1st	2nd	3rd	4th	2018	2017	2016	3-yr Avg.
JHS 45 (F)	7093-08	121	25.0 4-Jul	23.0 1-Jan	19.7 31-Jan	19.7	16.5	16.2	17.5	8.6	7.7	9.6	6.3	8.1	7.4	7.2	7.6
IS 143 (C)	7093-15	352	24.2 2-Jul	22.8 11-Jan	21.5 28-Aug	19.3	17.1	22.0	19.5	10.3	6.6	7.3	7.13	7.8	8.5	8.4	8.2
PS 19 (F)	7093-21	122	40.4 6-Mar	29.5 5-May	27 2-Mar	27.0	16.5	19.4	21.0	12.7	10.1	10.5	8.3	10.4	9.1	8.9	9.5
PS 19 (C)	7093-21	357	32.2 2-Jul	27.7 16-Aug	23.7 22-Jan	21.1	20.0	18.4	19.8	10.7	7.7	9.2	9.1	8.8	8.8	8.0	8.5
Division St (F)	7093-24	119	22.1 9-Nov	22 6-Aug	21.6 1-Jul	21.6	17.9	18.0	19.2	9.6	9.3	11.0	8.3	9.6	8.8	8.8	9.0
Division St (C)	7093-24	322	27.9 28-Aug	22.6 2-Jul	21.4 16-Aug	18.3	15.8	18.9	17.7	8.2	6.0	7.4	5.6	6.8	7.1	7.8	7.2
CCNY (C)	7093-25	343	28.70 28-Aug	25.43 2-Jul	23.25 3-Jul	18.9	15.3	16.9	17.0	8.7	6.8	8.2	8.1	8.0	7.7	8.1	7.9

(F) = Federal Reference Method
(C) = Continuous, used for AQI calculations. Values based on 24 hour averages of 1-hour values

NYSDEC Region 2

INHALABLE PARTICULATES (PM_{10})

Comparison Between NYS Ambient Air Quality and Ambient Air Quality Standards for Calendar Year 2018

		24-Hour Concentrations - µg/m³							# of Days > 150 µg/m³ - Not to exceed an expected avg of one per year during the last 3 years *						
			Maximum		2nd Max.		3rd Max.		2016		2017		2018		
Station	Site No.	Total Obs.	Value	Date	Value	Date	Value	Date	Mea	Est	Mea	Est	Mea	Est	Exp. Avg.
Division Street	7093-24	61	40	14-Apr	38	6-Aug	33	1-Jul	0	0	0	0	0	0	0
IS 52	7094-07	57	41	14-Apr	28	1-Jul	28	6-Aug	0	0	0	0	0	0	0
Queens College 2	7096-15	55	38	14-Apr	31	6-Aug	28	1-Jul	0	0	0	0	0	0	0

```
# See www.esrl.noaa.gov/gmd/ccgg/trends/ for additional details.
# The uncertainty in the global annual mean is estimated using a monte carlo
# technique that computes 100 global annual averages, each time using a
# slightly different set of measurement records from the NOAA ESRL cooperative
# air sampling network.  The reported uncertainty is the mean of the standard
# deviations for each annual average using this technique. Please see
# Conway et al., 1994, JGR, vol. 99, no. D11. for a complete discussion.
# CO2 expressed as a mole fraction in dry air, micromol/mol, abbreviated as ppm
# NOTE: In general, the data presented for the last year are subject to change,
# depending on recalibration of the reference gas mixtures used, and other quality
# control procedures. Occasionally, earlier years may also be changed for the same
# reasons.  Usually these changes are minor.
# year     mean      unc
  1980   338.80     0.10
  1981   340.00     0.10
  1982   340.76     0.10
  1983   342.44     0.10
  1984   343.99     0.10
  1985   345.46     0.10
  1986   346.87     0.10
  1987   348.62     0.10
  1988   351.15     0.10
  1989   352.80     0.10
  1990   353.98     0.10
  1991   355.29     0.10
  1992   355.99     0.10
  1993   356.71     0.10
  1994   358.21     0.10
  1995   360.04     0.10
  1996   361.79     0.10
  1997   362.90     0.10
  1998   365.54     0.10
  1999   367.64     0.10
  2000   368.84     0.10
  2001   370.41     0.10
  2002   372.42     0.10
  2003   374.96     0.10
  2004   376.79     0.10
  2005   378.81     0.10
  2006   380.94     0.10
  2007   382.68     0.10
  2008   384.79     0.10
  2009   386.29     0.10
  2010   388.57     0.10
  2011   390.45     0.10
  2012   392.46     0.10
  2013   395.19     0.10
  2014   397.12     0.10
  2015   399.41     0.10
  2016   402.86     0.10
  2017   405.00     0.10
  2018   407.38     0.10
```

IS 52 [Site #7094-07, Bronx County] and Morrisania [Site #7094-05, Bronx County] Annual VOC Data (2008-2017)

Annual VOC data for IS 52 and Morrisania, ppb

AQS ID	Parameter	IS 52												IS 52/Morrisania			Morrisania			IS 52/Morisania			IS 52								
		2017			2016			2015			2014			2013			2012			2011			2010			2009			2008		
		#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg	#	Max	Avg
43207	Freon 113	60	0.077	0.067	60	0.084	0.069	56	0.087	0.073	54	0.088	0.073	60	0.098	0.069	60	0.092	0.068	60	0.08	0.064	28	0.085	0.074	27	0.07	0.065	58	0.092	0.08
43208	Freon 114	60	0.025	0.015	60	0.023	0.017	56	0.025	0.016	53	0.032	0.018	60	0.025	0.014	60	0.023	0.015	60	0.028	0.017	28	0.034	0.025	27	0.024	0.02	58	0.03	0.023
43218	*1,3*-Butadiene	60	0.076	0.027	60	0.128	0.034	56	0.134	0.039	54	0.117	0.032	60	0.088	0.034	60	0.14	0.041	60	0.174	0.033	28	0.28	0.046	27	0.208	0.042	58	0.33	0.051
43372	Methyl Tert-Butyl Ether	60	0.006	0.000	60	0.01	0.002	56	0.01	0.003	54	0.028	0.003	60	0.015	0.002	60	0.013	0.002	60	0.008	0.001	28	0.011	0.003	27	0.01	0.004	58	0.022	0.007
43502	Formaldehyde	53	6.300	2.570	56	5.078	2.278	59	6.635	2.498	61	5.22	1.965	54	6.428	2.535	49	6.462	2.349	55	7.243	2.191	26	5.998	2.84	27	5.649	2.111	41	6.25	1.987
43503	Acetaldehyde	53	2.500	0.760	56	1.925	0.78	59	2.105	0.853	61	1.829	0.785	54	1.742	0.973	49	1.841	0.876	55	1.745	0.802	26	1.6	0.901	27	1.69	0.797	41	2.837	0.758
43504	Propionaldehyde	53	0.210	0.067	56	0.235	0.111	59	0.587	0.120	61	0.305	0.106	54	0.365	0.140	49	0.348	0.179	55	0.5	0.146	26	0.26	0.128	27	0.247	0.093	41	0.301	0.091
43505	Acrolein	53	0.286	0.132	60	0.303	0.144	56	0.303	0.148	54	0.447	0.155	59	0.493	0.166	60	0.421	0.146	60	0.45	0.109	28	0.242	0.126	27	0.266	0.145	56	0.424	0.174
43510	Butyraldehyde	53	0.150	0.047	56	0.086	0.037	59	0.114	0.037	61	0.12	0.040	54	0.14	0.058	49	0.148	0.069	55	0.192	0.063	26	0.272	0.088	27	0.095	0.033	41	0.11	0.034
43516	*Trans*-Crotonaldehyde	53	0.060	0.001	56	0.021	0.001	59	0.034	0.001	61	0.04	0.014	54	0.46	0.017	49	0.08	0.029	55	0.325	0.043	26	0.553	0.045	27	0.11	0.019	41	0.056	0.016
43517	Hexanaldehyde	53	0.210	0.073	56	0.169	0.075	59	0.211	0.067	61	0.392	0.035	54	0.089	0.024	49	0.165	0.041	55	0.113	0.054	26	0.078	0.04	27	0.088	0.028	41	0.111	0.034
43518	Valeraldehyde	53	0.200	0.032	56	0.182	0.037	59	0.099	0.031	61	0.067	0.022	54	0.154	0.034	49	0.079	0.036	55	0.062	0.03	26	0.062	0.026	27	0.066	0.017	41	0.059	0.018
43552	Methyl Ethyl Ketone	53	0.310	0.109	56	0.309	0.087	59	0.343	0.129	61	0.337	0.139	53	0.528	0.165	49	0.306	0.121	55	0.325	0.154	26	0.38	0.171	27	0.37	0.139	41	0.51	0.167
43801	Chloromethane	60	0.621	0.495	60	0.604	0.489	56	0.603	0.520	54	0.595	0.520	60	0.65	0.520	60	0.641	0.524	60	0.749	0.476	28	0.539	0.472	27	0.584	0.481	58	0.638	0.508
43802	Dichloromethane	60	0.645	0.152	60	0.532	0.185	56	0.719	0.219	54	1.199	0.236	60	0.819	0.228	60	6.123	0.310	60	1.614	0.207	28	0.456	0.143	27	0.411	0.145	58	0.621	0.188
43803	Chloroform	60	0.072	0.033	60	0.073	0.04	56	0.074	0.036	54	0.073	0.035	60	0.109	0.036	60	0.067	0.034	60	0.086	0.039	28	0.059	0.037	27	0.056	0.03	56	0.137	0.043
43804	Carbon Tetrachloride	60	0.101	0.079	60	0.131	0.082	56	0.097	0.083	54	0.097	0.084	60	0.108	0.085	60	0.099	0.079	60	0.089	0.075	28	0.115	0.094	27	0.099	0.088	58	0.134	0.107
43811	Trichlorofluoromethane	60	0.268	0.222	60	0.283	0.241	56	0.304	0.246	54	0.279	0.245	60	0.398	0.295	60	0.39	0.264	60	0.348	0.28	28	0.318	0.288	27	0.287	0.253	58	0.351	0.276
43812	Chloroethane	60	0.013	0.001	60	0.013	0.002	56	0.016	0.001	54	0.018	0.005	60	0	0	60	0.074	0.003	60	0.045	0.001	28	0	0	27	0	0	58	0	0
43813	*1,1*-Dichloroethane	60	0.006	0.001	60	0.009	0.002	56	0.011	0.003	54	0.012	0.003	60	0.013	0.001	60	0.009	0.002	60	0.011	0.001	28	0.012	0.003	27	0.011	0.006	58	0.021	0.01
43814	Methyl Chloroform	60	0.007	0.003	60	0.012	0.005	56	0.013	0.006	54	0.019	0.007	60	0.019	0.008	60	0.038	0.009	60	0.032	0.012	28	0.04	0.018	27	0.021	0.017	58	0.036	0.022
43815	Ethylene Dichloride	60	0.019	0.014	60	0.026	0.016	56	0.028	0.017	54	0.031	0.018	60	0.033	0.017	60	0.029	0.016	60	0.024	0.015	28	0.022	0.016	27	0.025	0.021	58	0.038	0.024
43817	Tetrachloroethylene	60	0.196	0.051	60	0.22	0.061	56	0.263	0.057	54	0.128	0.036	60	0.207	0.060	60	0.261	0.063	60	0.39	0.093	28	0.349	0.119	27	0.123	0.05	58	0.34	0.088
43818	*1,1,2,2*-Tetrachloroethane	60	0.005	0.000	60	0.01	0.001	56	0.012	0.002	54	0.01	0.002	60	0.016	0.001	60	0.014	0.002	60	0.015	0.001	28	0.013	0.003	27	0.009	0.003	58	0.019	0.008
43819	Bromomethane	60	0.019	0.008	60	0.063	0.01	56	0.068	0.010	54	0.04	0.011	60	0.031	0.010	60	0.024	0.010	60	0.057	0.011	28	0.02	0.012	27	0.024	0.014	58	0.039	0.016
43820	*1,1,2*-Trichloroethane	60	0.004	0.000	60	0.008	0.001	56	0.008	0.001	54	0.008	0.001	60	0.009	0	60	0.006	0.001	60	0.006	0	28	0.009	0.003	27	0.007	0.004	58	0.012	0.005
43823	Dichlorodifluoromethane	60	0.550	0.492	60	0.593	0.515	56	0.579	0.520	54	0.686	0.528	60	0.715	0.559	60	0.669	0.505	60	0.728	0.493	28	0.542	0.511	27	0.561	0.485	57	3.257	0.601
43824	Trichloroethylene	60	0.019	0.004	60	0.018	0.006	56	0.024	0.007	54	0.047	0.008	60	0.025	0.001	60	0.042	0.008	60	0.018	0.006	28	0.023	0.01	27	0.02	0.01	58	0.074	0.016
43826	*1,1*-Dichloroethylene	60	0.004	0.000	60	0.008	0.001	56	0.009	0.002	54	0.01	0.002	60	0.12	0	60	0.008	0.001	60	0.009	0.001	28	0.009	0.003	27	0.008	0.005	58	0.012	0.007
43828	Bromodichloromethane	60	0.006	0.000	60	0.01	0.002	56	0.013	0.003	54	0.012	0.003	60	0.018	0.003	60	0.02	0.004	60	0.019	0.004	28	0.02	0.01	27	0.015	0.009	58	0.031	0.013
43829	*1,2*-Dichloropropane	60	0.009	0.003	60	0.012	0.005	56	0.013	0.005	54	0.016	0.005	60	0.016	0.004	60	0.012	0.004	60	0.011	0.002	28	0.011	0.005	27	0.013	0.008	58	0.018	0.011
43830	*Trans-1,3*-Dichloropropylene	60	0.005	0.000	60	0.009	0.001	56	0.007	0.001	54	0.01	0.001	60	0.009	0	60	0.007	0.001	60	0.008	0.001	28	0.008	0.003	27	0.009	0.005	58	0.013	0.006
43831	*Cis-1,3*-Dichloropropylene	60	0.005	0.000	60	0.009	0.001	56	0.008	0.001	54	0.01	0.002	60	0.01	0.0009	60	0.008	0.001	60	0.008	0.001	28	0.009	0.003	27	0.008	0.005	58	0.011	0.005
43839	*Cis-1,2*-Dichloroethene	60	0.004	0.000	60	0.007	0.001	56	0.009	0.002	54	0.011	0.002	60	0.011	0.0009	60	0.01	0.002	60	0.009	0.001	28	0.01	0.003	27	0.008	0.006	58	0.012	0.006
43843	Ethylene Dibromide	60	0.004	0.000	60	0.007	0.001	56	0.009	0.002	54	0.011	0.002	60	0.011	0.001	60	0.008	0.001	60	0.007	0.001	28	0.009	0.003	27	0.008	0.005	58	0.013	0.007
43844	Hexachlorobutadiene	60	0.000	0.000	60	0.011	0.001	56	0.016	0.004	54	0.01	0.002	60	0.017	0.001	60	0.01	0	60	0.028	0.001	28	0.024	0.001	27	0.011	0.001	58	0.017	0.009
43860	Vinyl Chloride	60	0.011	0.002	60	0.015	0.006	56	0.016	0.005	54	0.014	0.005	60	0.018	0.006	60	0.014	0.005	60	0.011	0.002	28	0.013	0.006	27	0.014	0.009	58	0.023	0.014
45109	*m/p*-Xylene	60	0.513	0.143	60	0.542	0.205	56	0.63	0.221	54	0.436	0.161	60	6.02	0.331	60	0.618	0.189	60	0.632	0.24	28	0.46	0.271	27	0.435	0.212	58	1.612	0.301
45201	Benzene	60	0.378	0.185	60	0.669	0.214	56	0.731	0.235	54	0.54	0.203	60	0.453	0.226	60	0.48	0.233	60	0.624	0.248	28	1.815	0.289	27	0.928	0.25	58	1.268	0.311
45202	Toluene	60	0.965	0.315	60	1.14	0.409	56	1.126	0.395	54	0.972	0.328	60	1.346	0.431	60	1.339	0.466	60	1.47	0.574	28	1.099	0.603	27	1.239	0.501	58	3.614	0.746
45203	Ethylbenzene	60	0.146	0.048	60	0.16	0.063	56	0.15	0.056	54	0.135	0.046	60	1.336	0.084	60	0.184	0.060	60	0.189	0.073	28	0.138	0.077	27	0.138	0.068	58	0.491	0.098
45204	*o*-Xylene	60	0.177	0.053	60	0.195	0.079	56	0.224	0.080	54	0.137	0.057	60	2.067	0.123	60	0.231	0.075	60	0.213	0.096	28	0.194	0.106	27	0.18	0.087	58	0.573	0.106
45207	*1,3,5*-Trimethylbenzene	60	0.053	0.013	60	0.057	0.021	56	0.113	0.023	54	0.047	0.013	60	0.122	0.025	60	0.072	0.018	60	0.07	0.02	28	0.069	0.024	27	0.051	0.026	58	0.188	0.027
45208	*1,2,4*-Trimethylbenzene	60	0.178	0.047	60	0.199	0.07	56	0.409	0.078	54	0.117	0.045	60	0.341	0.080	60	0.255	0.057	60	0.194	0.067	28	0.177	0.067	27	0.162	0.074	58	0.571	0.087
45220	Styrene	60	0.111	0.013	60	0.055	0.017	56	0.04	0.013	54	0.03	0.012	60	0.075	0.017	60	0.042	0.014	60	0.044	0.01	28	0.045	0.011	27	0.024	0.012	58	0.106	0.016
45501	Benzaldehyde	53	0.13	0.045	56	0.073	0.036	59	0.062	0.033	61	0.495	0.098	54	0.33	0.077	49	0.833	0.100	55	0.226	0.052	26	0.2	0.043	27	0.596	0.195	41	0.192	0.063
45504	Tolualdehydes	53	0.20	0.010	56	0.071	0.024	59	0.159	0.034	61	0.024	0.007	54	0.026	0.008	49	0.051	0.012	55	0.025	0.013	26	0.035	0.01	27	0.02	0.008	41	0.038	0.007
45801	Chlorobenzene	60	0.005	0.000	60	0.011	0.003	56	0.031	0.006	54	0.014	0.003	60	0.014	0.002	60	0.013	0.003	60	0.01	0.003	28	0.012	0.005	27	0.01	0.006	58	0.016	0.009
45805	*1,2*-Dichlorobenzene	60	0.007	0.001	60	0.011	0.003	56	0.012	0.003	54	0.008	0.002	60	0.019	0.003	60	0.028	0.002	60	0.022	0.002	28	0.014	0.005	27	0.011	0.006	58	0.015	0.007
45806	*1,3*-Dichlorobenzene	60	0.006	0.001	60	0.01	0.002	56	0.01	0.002	54	0.008	0.002	60	0.018	0.002	60	0.017	0.001	60	0.014	0.001	28	0.012	0.003	27	0.01	0.002	58	0.014	0.007
45807	*1,4*-Dichlorobenzene	60	0.122	0.030	60	0.106	0.039	56	0.089	0.032	54	0.048	0.023	60	0.079	0.035	60	0.171	0.043	60	0.201	0.066	28	0.225	0.088	27	0.202	0.097	58	0.783	0.139
45809	Benzyl Chloride	60	0.014	0.001	60	0.011	0.003	56	0.014	0.003	54	0.023	0.003	60	0.042	0.004	60	0.022	0.001	60	0.023	0.002	20	0.013	0.004	27	0.008	0.003	58	0.015	0.005
45810	*1,2,4*-Trichlorobenzene	60	0.019	0.004	60	0.033	0.008	55	0.019	0.006	54	0.011	0.004	60	0.044	0.005	60	0.069	0.006	60	0.047	0.005	28	0.017	0.007	27	0.013	0.005	58	0.023	0.008

Sampling was suspended due to building renovation at IS 52 in June 2010 and moved to Morrisania. Renovations completed and last sampling at Morrisania was on 8/1/12. Sampling resumed at IS 52 on 8/13/12.

APPENDIX E: MODEL CONVERGENCE

Mesh

The fine grid meshing was used next to the school building with focus on the OA intake inlet, based on the information provided by the design team. The total numbers of grids cells in the CD model is 3,305,006. The shape of the mesh is rectangular cuboid. The maximum aspect ratio in the region around the school is 6.4.

Residuals

The CFD models for 3.0 mph and 7.5 mph wind speed were allowed to run until steady state convergence was achieved. The maximum residual was in the order of e-7 for VOCs; and in the order of e-9 for benzene.

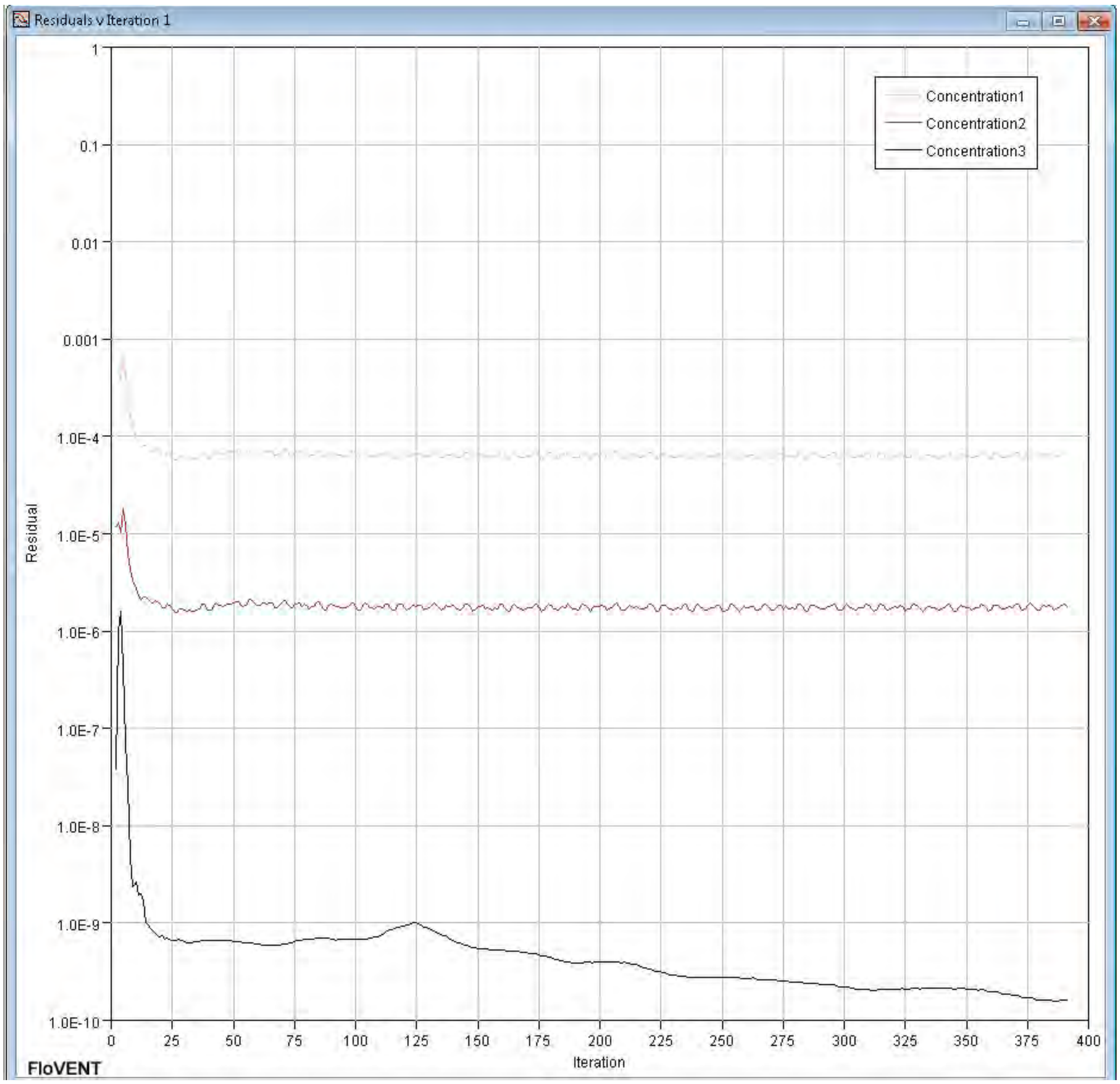

Figure 8: Plot of Residuals of pollutant concentration vs Iteration, High Risk Conditions

Q7.1 - Daylight

30% DD Daylighting Analysis for
SCA GSG Q7.1 Daylight
PS Q School

March 8, 2021

Prepared for:

New York, NY 10119

Prepared by:

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1. <u>EXECUTIVE SUMMARY</u>

XXXXXXX has performed a daylighting analysis, sustainable design assistance, and SCA Green School Guide Indoor Environmental Quality (Q7.1) credit Daylight calculations for the proposed 39,000 ft2 addition at PSQ located Queens, NY. This project includes aspects of the sustainable design process including: the integrated design approach, sustainable product and technology knowledge, energy modeling. and daylighting analysis.

XXXXXX has been tasked to determine the daylight available in the building based on the design as it is currently defined and develop any recommendations, if necessary, that will help the project meet its daylighting performance goals. The current design for PS96Q is in the 30% Design Development phase. Table 1 illustrates the project's GSG IEQ: Daylight performance given current assumptions and defined parameters based on the construction documents dated February 23, 2021.

Table 1: GSG IEQ Credit: Daylight Results

GSG IEQ Credit: Daylight	Credit Requirement	% compliant Area	Point Possible
2 points	55% of all regularly occupied areas with $sDA_{300/50\%}$	69.74%	2
A 3rd point	75% of all regularly occupied areas with $sDA_{300/50\%}$	69.74%	0
	Total GSG Point(s) possible		2

2. INTRODUCTION

Purpose and Scope

The PSQ project is intended to incorporate the principals of sustainable design including the incorporation of an effective daylighting design that will provide natural light in as many areas of the school as practical and as specified in the initial programming. To this end, Kenny & Khan has contracted Lilker Energy Solutions to develop daylighting evaluations for key building areas and to assess the overall daylighting strategy to maximize the use of effective natural lighting techniques that meet the requirements of GSG IEQ credit Daylight.

The design team will attempt to meet the requirements of the School Construction Authority's 2019 NYC Green School Guide (GSG), specifically the Indoor Environmental Quality credit Daylight, that addresses the use of daylight in sustainable building design. As part of the GSG design process, LES will be providing support for the Daylighting credit documentation. To achieve Q7.1 credit: Daylighting, GSG requires that at least 55% of all regularly occupied areas achieve spatial daylight autonomy$_{300/50\%}$ (sDA$_{300/50\%}$). This is accomplished by utilizing a daylight annual simulation to analyze how the spaces receive daylight using a typical meteorologial weather data of nearby weather station. The base 55% achievement will be awarded two points for the credit. One additional point may be earned for when 75% of all regularly occupied areas have sDA$_{300/50\%}$. The overall compliance area also must demonstrate annual sunlight exposure$_{1000,250h}$ (ASE$_{1000/250h}$), of no more than 10%. Spaces with an ASE$_{1000,250h}$ score greater than 10.0% and less than 20.0% are acceptable with a narrative describing how the space is designed to address glare. And spaces with automated glare control devices are exempt from the ASE requirement. The analysis results will present the percentage for these requirements based on the proposed design and assumptions.

Green Building Concerns

Why is daylighting important?

"Daylighting improves the indoor environment of buildings by exposing occupants to natural light. Additionally the use of daylighting has been shown to provide a stimulating and productive environment for building occupants." Studies conducted to measure occupant productivity in daylit buildings show significant improvement as compared to non-daylit buildings. In addition, use of daylighting combined with effective control of building lighting systems can reduce lighting energy use by 50 to 80%. This is of particular interest to schools where lighting can account for as much as 50% of the overall energy use.

Daylighting strategies must also consider and account for the effects of heat gain and loss in the building, glare control, and variations in the availability of daylight due both to hourly and seasonal variation. The GSG program also has the building designer focus on providing as many areas of the building as possible with a direct view of the outside. Studies have shown that people are more productive when they can view the outside environment.

3. Methodology

The daylighting design analysis employed by LES is based upon our knowledge of effective daylighting design techniques combined with the use of Lightstanza application that facilitates incorporation of annual daylighting metrics into building design and also provides the calculation results necessary for GSG Q7.1-Daylight. LES has worked closely with Kenny & Khan to gain an understanding of the requirements for each primary space analyzed. LES has generated detailed daylighting models of all representative spaces.

LES has developed daylighting models to represent all spaces identified as regularly occupied by Kenny & Khan. Sound daylighting design typically incorporates some combination of the following key parameters:

- Building orientation
- Interior and exterior window shading devices
- Interior and exterior light shelves
- Window sizing and spacing (i.e. sill heights, areas, location, etc.)
- Window glass selection (spectrally selective, Visible Light Transmittance, etc.)
- Glare control
- Reflectance of interior finishes and surface properties
- Location of interior walls and partitions

Kenny & Khan provided LES with a full building design and layout that already addressed building orientation, interior wall locations, and window locations and sizes. Our focus in this analysis was to quantify the current performance of the daylighting design.

4. Design Parameters, Findings, & Recommendations

Interior Finishes

Table 2 of this report highlights the interior surface properties that LES utilized to simulate the daylighting performance of the PS96Q school. The general input is tentative at this time as the design continues to be developed.

Table 2: Interior Surface Properties

Surface	Light Reflectance Values As Current Modeled
Interior Walls	65 % - Interior paint
Ceilings	83 % - Acoustic ceiling
Floors (VCT)	38% - VCT floor tiles
Exterior Ground	35% - ground effect near front office and cafeteria**

**provide ground-reflected light surface at a more appropriate elevation since the two areas are partially in-ground.

Glazing Recommendations

There are three main types of glazing and each has specific purposes and characteristics. The first type of window is called vision glazing. Vision glazing is installed in buildings to provide building occupants with a direct connection with, or view of the outdoors. This glazing should have high thermal and infrared insulating properties (U-value, SHGC) to reduce heat gain and loss, to and from the conditioned space respectively. The second type of window is called daylight glazing. The daylight glazing's sole purpose is to bring in as much ambient daylight as possible into interior spaces. The daylight glazing should have similar thermal insulating properties as the vision glazing but with a much higher coefficient of visible light transmittance or VLT. The daylight glazing needs to be as clear as possible to maximize controlled daylight penetration. The third type is a high translucent clerestory-skylight. Translucent elements are an effective top-lighting strategy for even diffuse daylight distribution. The daylighting design strategies of PS96Q utilizes mainly vision glazing as the primary daylight provider based on applicability of locations and spaces.

Table 3: Glazing properties

Glazing type	Product Names/Models	Visible Light Transmittance (VLT)
Perimeter Glazing	Viracon Bird-Friendly Threat Factor 24	Tentatively modeled at 65% Actual product VLT to be verified with vendor**

An opaque pattern of 1/8” dots will be printed on the glass to provide visual aid to birds. The impact of the pattern on the overall glass VLT will likely be due to several factors such as the pattern color, the base glass type, the overall density of the pattern, etc. We plan to connect with the manufacturer to get better information on the glass daylight performance.

Glare Control

Glare control is perhaps the most common failure among daylighting strategies. If not controlled properly, daylight can produce unwanted glare and affect interior lighting quality. The followings are some common strategies to control glare:

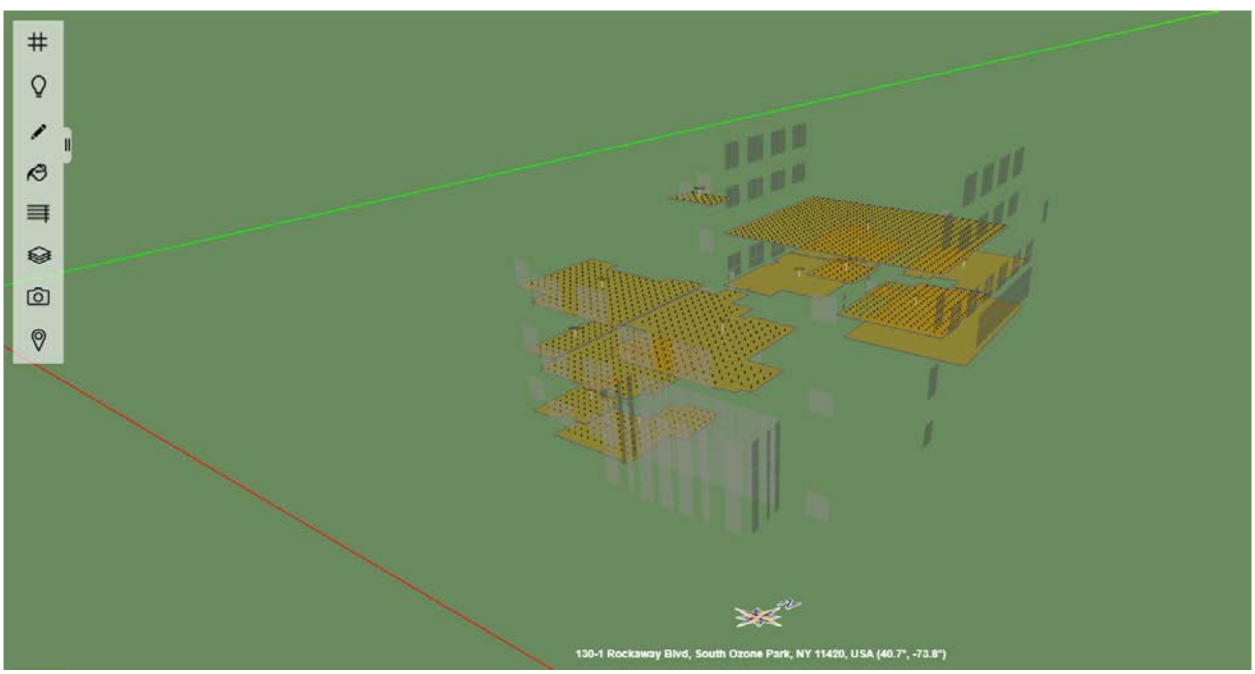
- Fixed exterior shading devices
- Exterior light shelves
- Interior light shelves
- Interior blinds and louvers
- Automated shading devices
- Electronic blackout glazing
- Operable draperies and blinds
- Fritted glazing

PS96Q School incorporates interior adjustable roller shades for their glare control strategies

5. DAYLIGHTING DESIGN RESULTS

Lilker Energy Solutions had evaluated all regularly occupied spaces for the project GSG Q7.1 Credit Daylight eligibility.

A 3-dimensional model of the shool is created and analyzed via annual simulation in Lightstanza analysis application, according to the IES method prescribed by GSG. The daylight simulation is based on the typical weather data at JFK airport, which is the nearest comprehensive weather location for the project.



The summary results for all applicable spaces are listed in Table 4. The design of PS96Q based on the current design and assumptions described above **has achieved the $sDA_{300/50\%}$ compliance of 69.7% and $ASE_{1000,250h}$ of 7.16% for all of its regularly occupied spaces.**

Table 4: Room-by-Room summary simulation results

Space ID	Space Description	Total Regularly Occupied Area (sq ft)	Simulation: Spatial Daylight Autonomy and Annual Sunlight Exposure		
			Analysis Area $sDA_{300/50\%}$ (%)	Analysis Area $ASE_{1000,250}$ (%)	$ASE_{1000,250}$ Criteria Met
cafeteria	Cafeteria	1,990.38	62.73	0.62	Yes
office	office	498.10	69.57	0.00	Yes
dietician	office	90.00	0.00	0.00	n/a
principal	office	277.13	24.53	0.00	Yes
K117	classroom	948.08	61.26	4.95	Yes
K115	classroom	948.75	62.33	5.12	Yes
preK124	classroom	955.28	64.41	19.37	adjustable blind to be provided
preK122	classroom	945.70	39.38	4.42	Yes
science	classroom	801.23	79.31	25.86	adjustable blind to be provided
custodian	office	213.47	45.45	6.82	Yes
music	classroom	900.52	89.90	21.72	adjustable blind to be provided
art	classroom	1,014.68	55.19	21.70	adjustable blind to be provided
gym_offc	office	180.04	0.00	0.00	n/a
gym	gymnasium	3,150.00	97.81	0.00	Yes
offc308	office	106.00	0.00	0.00	n/a

LES recognizes that a few spaces have ASE above 20% maximum threshold prescribed by GSG. We believe that through further refinement of the daylight analysis inputs, as the design continue to develop, the ASE issue can be remedied.

6. GSG - INDOOR ENVIRONMENTAL QUALITY: DAYLIGHT SUMMARY

The daylighting strategies employed in the design of PS96Q School **meets** the Q7.1 credit Daylight requirements set forth by GSG by achieving:

- $sDA_{300/50\%}$ of 69.74% for all regularly-occupied areas
- $ASE_{1000,250h}$ of 7.16% for all regularly-occupied areas

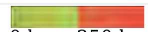
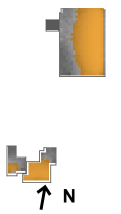
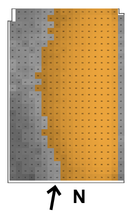
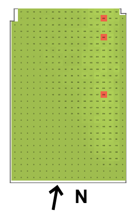
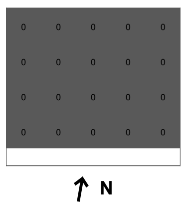
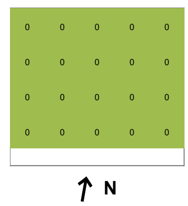
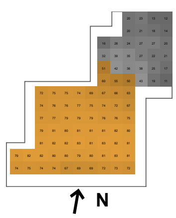
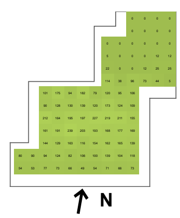
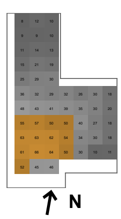
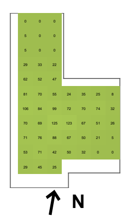
This is anticipated to allow for a total of 2 points towards the project's GSG certification.

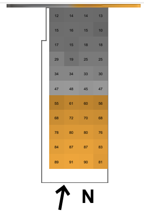
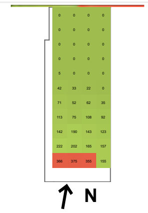
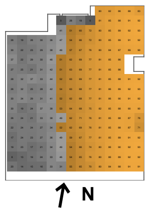
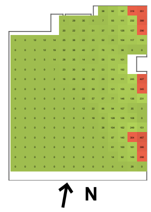
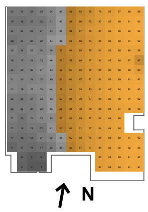
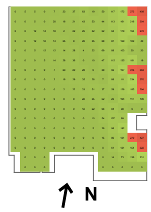
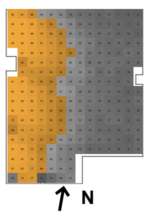
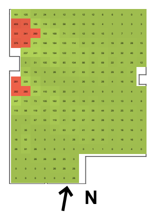
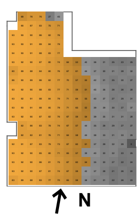
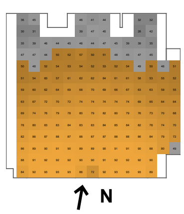
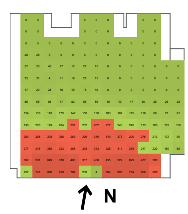
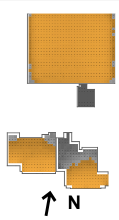
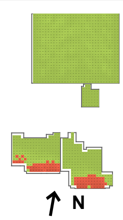
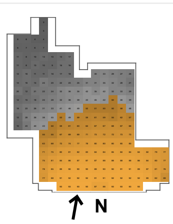
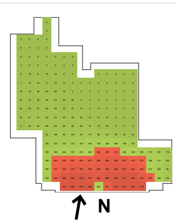
LEED v4.1 Daylight Credit

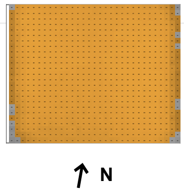
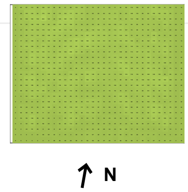
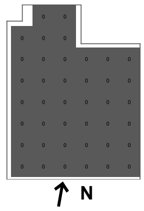
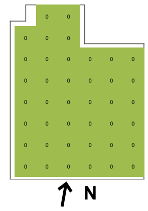
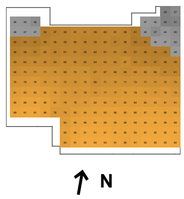
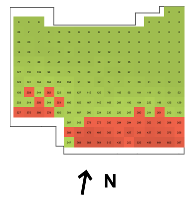
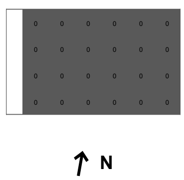
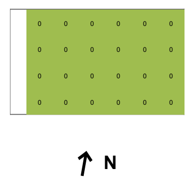
Option 1 Total: *2 points*

LEED v4.1 Option 1 *sDA = 69.74%* *ASE = 7.16%*

ALL FLOOR 1 FLOOR 2 FLOOR 3 FLOOR 4

Name	Area (ft^2)	sDA Results	sDA Score	ASE Results	ASE Score	ASE Met?
		 0% 50%		 0 hr 250 hr		
Floor 1	2,855.6		58.64%		0.46%	
cafeteria	1,990.4		62.73%		0.62%	Yes
dietician	90.0		0.00%		0.00%	Yes
office	498.1		69.57%		0.00%	Yes
principal	277.1		24.53%		0.00%	Yes
Floor 2	4,812.5		59.84%		11.15%	

Name	Area (ft²)	sDA Results	sDA Score	ASE Results	ASE Score	ASE Met?
custodian	213.5		45.45%		6.82%	Yes
K115	948.8		62.33%		5.12%	Yes
K117	948.1		61.26%		4.95%	Yes
preK122	945.7		39.38%		4.42%	Yes
preK124	955.3		64.41%		19.37%	Explanation:
science	801.2		79.31%		25.86%	Explanation:
Floor 3	5,245.2		85.89%		7.26%	
art	1,014.7		55.19%		21.70%	Explanation:

Name	Area (ft^2)	sDA Results	sDA Score	ASE Results	ASE Score	ASE Met?
gym	3,150.0		97.81%		0.00%	Yes
gym_offc	180.0		0.00%		0.00%	Yes
music	900.5		89.90%		21.72%	Explanation:
offc308	106.0		0.00%		0.00%	Yes

Activity: Calculation 2
Design: PS96Q Daylight3(1)
Location: 130-1 Rockaway Blvd, South Ozone Park, NY 11420, USA (40.68°, -73.81°)
North Angle: 10.00°
Sky Type: Climate-based

STUDY PARAMETERS

Daylighting Metrics

Annual Illumination Metrics

Illuminance is the amount of incident light that illuminates a surface measured in lux, which is equal to one lumen per square meter. The amount of illuminance within a space varies by time of day and time of year based on sun position and sky conditions. Therefore, the daylight metrics used are climate-based metrics that provide a way to assess annual daylight performance during occupied hours (between 8 AM and 6 PM) using actual typical hourly sky conditions for a particular location.

The two annual metrics used to measure daylight performance are spatial daylight autonomy (sDA) and annual sunlight exposure (ASE). These metrics are defined in IES standard LM-83-12.

Spatial Daylight Autonomy (sDA)

Daylight autonomy (DA) is the percentage of annual occupied hours (between 8 AM and 6 PM) that a particular sensor node in the space achieves the daylight illumination target. The sDA refers to the percentage of regularly occupied floor area that achieves 50% DA or greater for an illumination target of 300 lux.

As per LM-83-12, the sDA metric is modeled with dynamic interior blinds. If occupants pull down the blinds in response to direct sun, the daylight levels are reduced during those times.

Annual Sunlight Exposure

The ASE is percentage of regularly occupied floor area that experiences direct sunlight of 1000 lux or greater for more than 250 hours a year. Although ASE is not directly a glare metric, it has been demonstrated to be a good proxy to indicate the potential for visual discomfort. Therefore, the goal is to reduce the amount of ASE in the building.
As per LM-83-12, the ASE is modeled without dynamic interior blinds.

GSG 2019 Credit Q7.1

Requirements

Adapted from the LEED v4 NC for Schools rating system, credit Q7.1 Daylight in the 2019 Green Schools Guide recognizes projects achieving at least 55% sDA for the regularly occupied floor area and controlling glare in spaces with ASE between 10-20%.

The newest version v4.1 of LEED lowers the minimum threshold to 40%, rewarding projects that aim to increase daylighting but cannot exceed higher levels because of design or other constraints.

In this analysis, compliance with GSG 2019 and LEED v4.1 criteria are assessed.

Regularly occupied floor area

Q7.2 – Quality Views

NYC Green Schools Rating System

School Construction Authority

QUALITY VIEWS

CREDIT FORM

Credit Q.7.2

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: SD | DD | 60% | 100% | Design | CA

Go to SCA website for active form

Project:	PS 96Q	**Submission Phase:**	DD Report Submission
Address:	130-01 Rockaway Blvd	**Architect:**	Kenny & Khan Architects PC
LLW #	116480	**Preparer:**	Vidaris
Design #	0	**Revision Date:**	3/9/2021

INSTRUCTIONS:

Step 1) Quality Views Calculation Table

Step 1a) Insert Space ID and Space Description for each distinct regularly occupied space, include any permanent interior obstructions in credit calculations. Gymnasiums and auditoriums may be excluded. Views into interior atria may be used to meet up to 30% of the required area. Continue on next page if necessary

Step 1b) Calculate area with direct line of site to outdoors in each regularly occupied space, movable furniture/partitions may be excluded

Step 1c) Refer to Reference Table 1, select two unique view types from each space

Step 1d) If view is obstructed by permanent interior element, submit floor plan and section and remove affected square footage for calculation

Step 1e) Check compliance in page 2

Reference Table 1: View Types

A	Multiple lines of sight to vision glazing in different directions at least 90 degrees apart
B	Views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; (3) objects at least 25 feet from the exterior of the glazing
C	Unobstructed views located within the distance of three times the head height of the vision glazing
D	Views with a view factor of 3 or greater, as defined in “Windows and Offices; A study of Office Worker Performance and the Indoor Environment" For Option D, see Reference Table 2: View Factors

Step 1: Complete Views Calculation Table for all Regularly Occupied Spaces, continued on next page if necessary

Space ID	Space Type	Regularly Occupied Floor Area (SF)	Area with direct line of site to outdoors (SF)	View Type 1 (See Reference Table 1)	View Type 2 (See Reference Table 1)
B14	kitchen	565	0		
B16/B19A	cafeteria/serving	2227	2221	B. Views that include…	D. Views with a view factor of 3…
B06A-D	nurses office	432	0		
B05A	general office	507	0		
B03A	principals office	280	249	B. Views that include…	D. Views with a view factor of 3…
122A	classroom pre-K	946	932	B. Views that include…	D. Views with a view factor of 3…
124A	classroom pre-K	962	954	B. Views that include…	D. Views with a view factor of 3…
117A	classroom K	950	949	B. Views that include…	D. Views with a view factor of 3…
115A	classroom K	949	938	B. Views that include…	D. Views with a view factor of 3…
107	custodian office	214	212	B. Views that include…	D. Views with a view factor of 3…
105	science classroom	800	796	B. Views that include…	D. Views with a view factor of 3…
207	music classroom	900	896	B. Views that include…	D. Views with a view factor of 3…
209A	art classroom	1015	1000	B. Views that include…	D. Views with a view factor of 3…

Reference Table 2: View Factor

View Factor	View Angle	
	Min-Max °	Gray-zone range °
1	1 to 4	
1 or 2		4 to 5
2	5 to 9	
2 or 3		9 to 11
3	11 to 15	
3 or 4		15 to 20
4	20 to 40	
4 or 5		40 to 50
5	50 to 90	

NYC Green Schools Rating System

SCA School Construction Authority

QUALITY VIEWS

CREDIT FORM
Credit Q.7.2

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE: SD | DD | 60% | 100% | Design | CA

Go to SCA website for active form

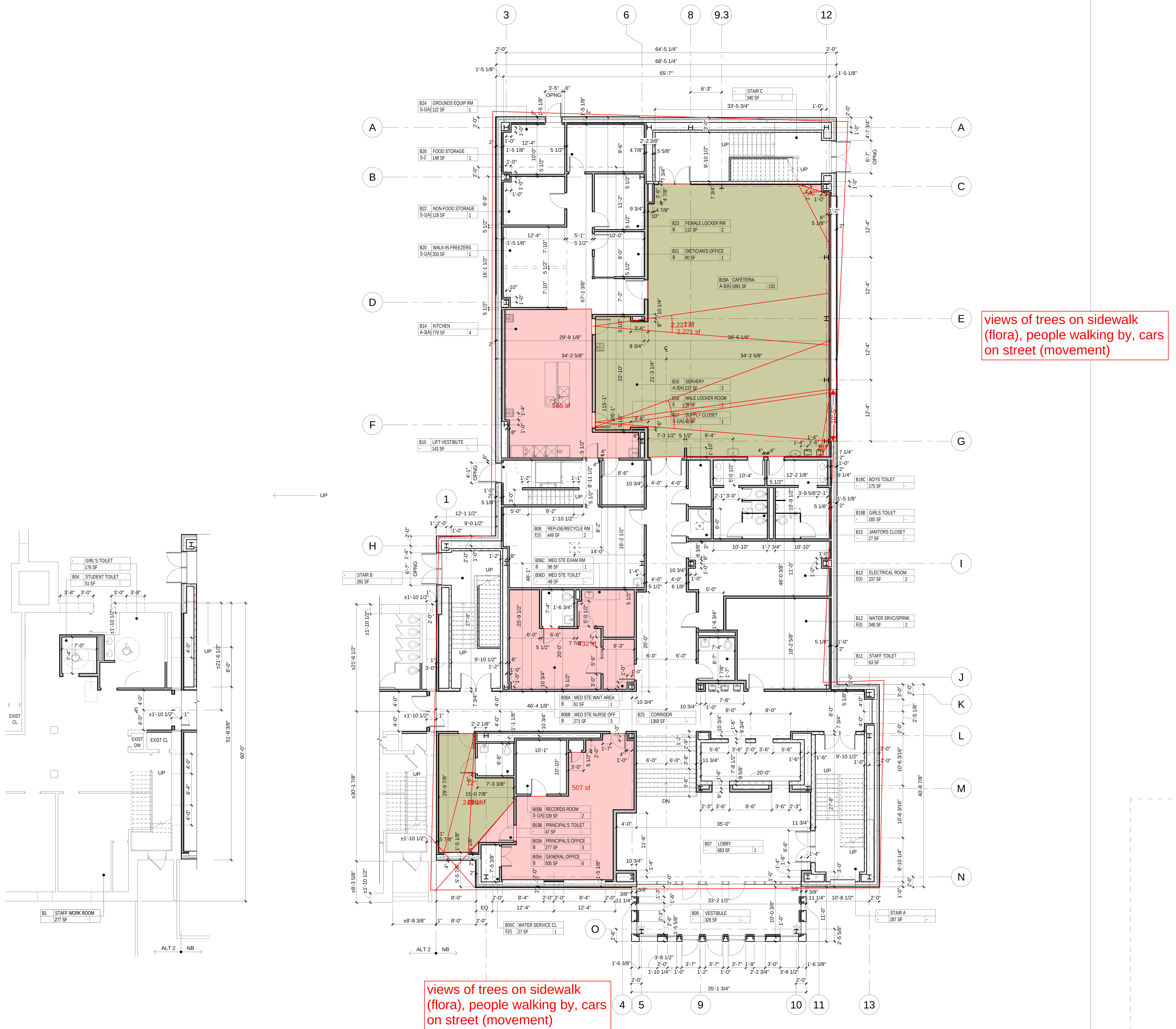
Project:	PS 96Q	**Submission Phase:**	DD Report Submission
Address:	130-01 Rockaway Blvd	**Architect:**	Kenny & Khan Architects PC
LLW #	116480	**Preparer:**	**Vidaris**
Design #	0	**Revision Date:**	**44264**

Step 1: Complete Views Calculation Table for all Regularly Occupied Spaces

Space ID	Space Type	Regularly Occupied Floor Area (SF)	Area with direct line of site to outdoors (SF)	View Type 1 (See Reference Table 1)	View Type 2 (See Reference Table 1)
213	gym office	182	0		
308	supervisor office	108	0		

Total regularly occupied area (SF)	11037
Total regularly occupied area with access to views (SF)	9147
Percentage of regularly occupied area with access to views	**83%**

3/8/2021



FLOOR PLAN - EXISTING BUILDING BASEMENT
1/8" = 1'-0"

FLOOR PLAN - BASEMENT
1/8" = 1'-0"

NYC School Construction Authority

Consultants:

Architect:
kenny & khan architects pc
1123 Broadway, Suite 513, New York, NY 10010 (t) 212-206-0722

Structural Engineer:
WSP USA
One Penn Plaza, 250 W 34th Street, 2nd Floor, New York, NY 10119 (t) 212-465-5000

MEP Engineer:
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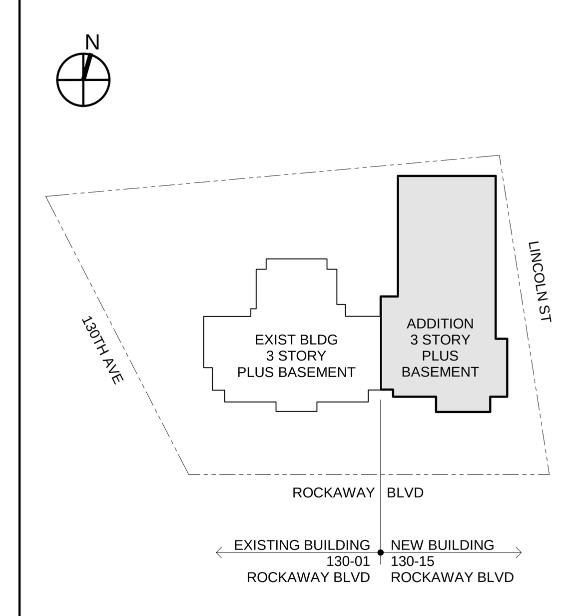
Environmental Consultant to SCA:
AECOM
1255 Broad Street, Suite 201, Clifton, NJ 07013 (t) 973-883-8500

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
	2/23/2021	30% DD SUBMISSION

Key Plan:



Block No. 11694
Lot No. 27

SCA Design Manager:	BERNARD FORTE, DM
Project Architect/Engineer:	ROLANDO KENNY, RA
Discipline Lead:	KHALIDA KHAN, RA
Designer:	ROLANDO KENNY, RA
Drawn by:	DREW TYSON, RA SARAH SAWIRIS
Checked by:	ROLANDO KENNY, RA

LLW No.:	Facility Code:	Date:
116480	Q096	7/22/2021

Project:
P.S. 96 - QUEENS ADDITION

Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - BASEMENT

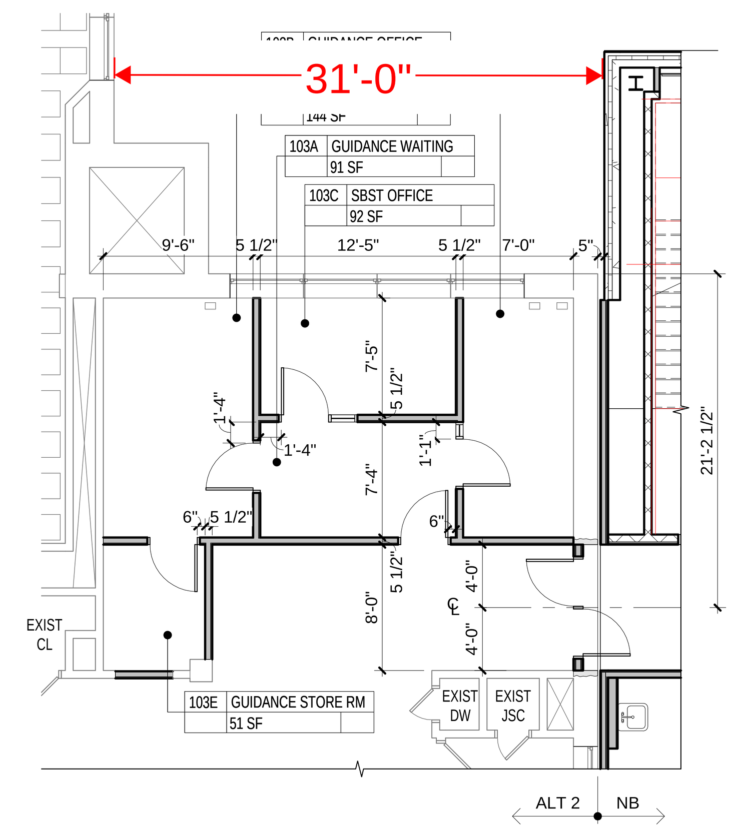
Drawing No.:
A100.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX

views of objects >25 feet away (existing building is >25 feet away), movement (playground, tennis court, track), flora (trees)

views of trees on sidewalk (flora), people walking by, cars on street (movement)



2 FLOOR PLAN - EXISTING BUILDING
FIRST FLOOR
1/8" = 1'-0"

views of trees on sidewalk (flora), people walking by, cars on street (movement)

1 FLOOR PLAN - FIRST FLOOR
1/8" = 1'-0"

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	2/23/2021	30% DD SUBMISSION

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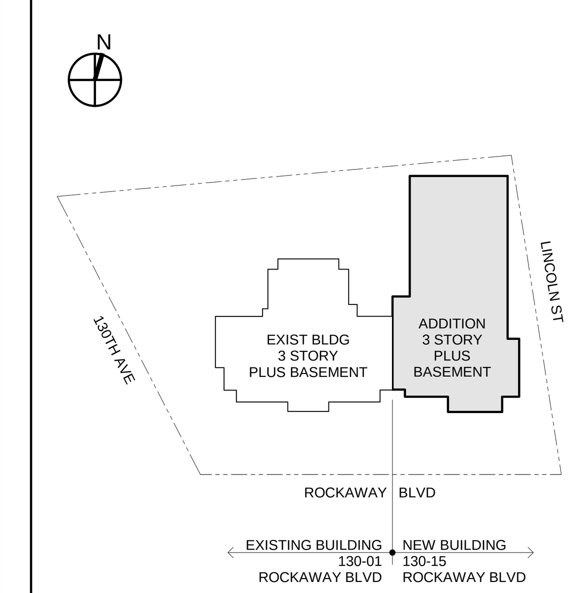

Block No. 11694 Lot No. 27

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Drawn by:	DREW TYSON, RA SARAH SAWIRIS
Checked by:	ROLANDO KENNY, RA

LLW No.:	Facility Code:	Date:
116480	Q096	7/22/2021

Project:
P.S. 96 - QUEENS ADDITION

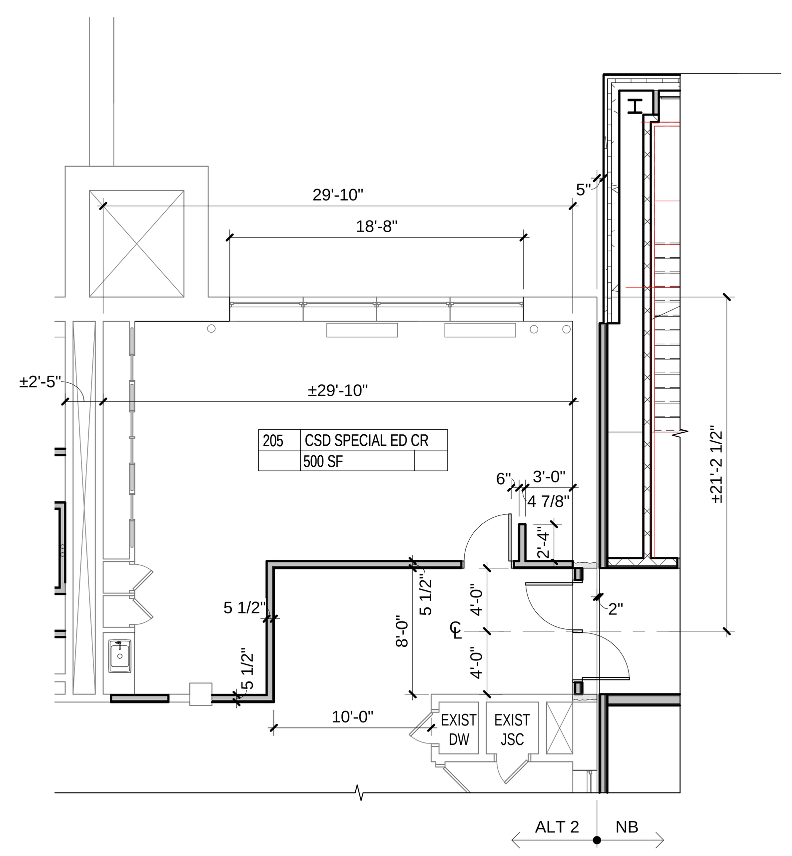
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - FIRST FLOOR

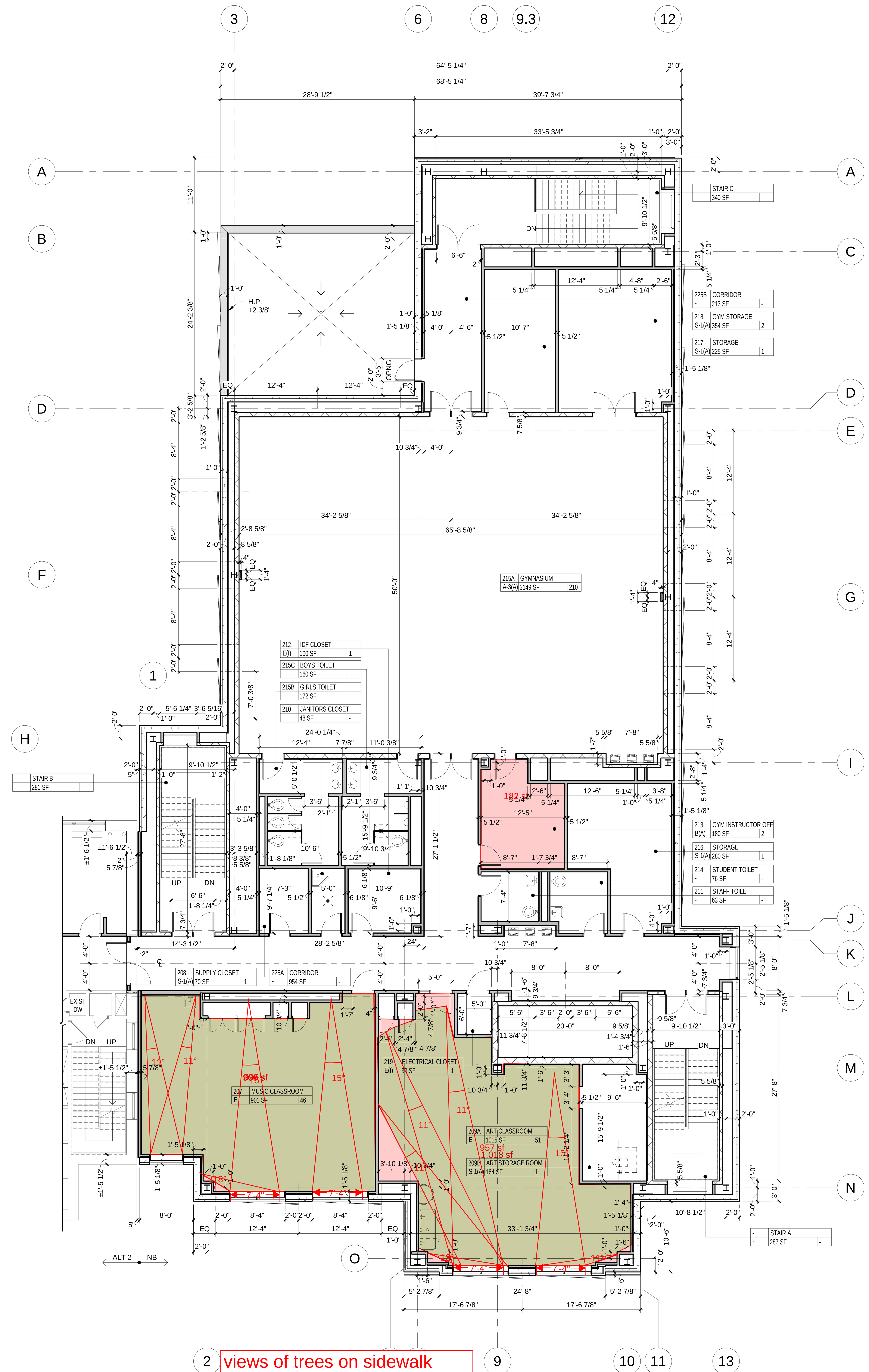
Drawing No.:
A101.00

Sheets in Contract Set: of XXX

Sheets in DOB Set: of XXX



2 FLOOR PLAN - EXISTING BUILDING
SECOND FLOOR
1/8" = 1'-0"



views of trees on sidewalk (flora), people walking by, cars on street (movement), sky, buildings 25 feet away across rockaway blvd.

1 FLOOR PLAN - SECOND FLOOR
1/8" = 1'-0"

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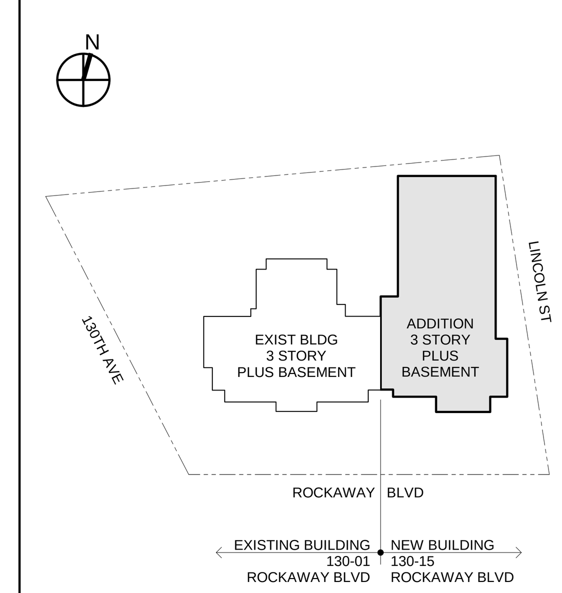

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Checked by:	ROLANDO KENNY, RA

LLW No.:	Facility Code:	Date:
116480	Q096	7/22/2021

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P.S. 96 - QUEENS ADDITION

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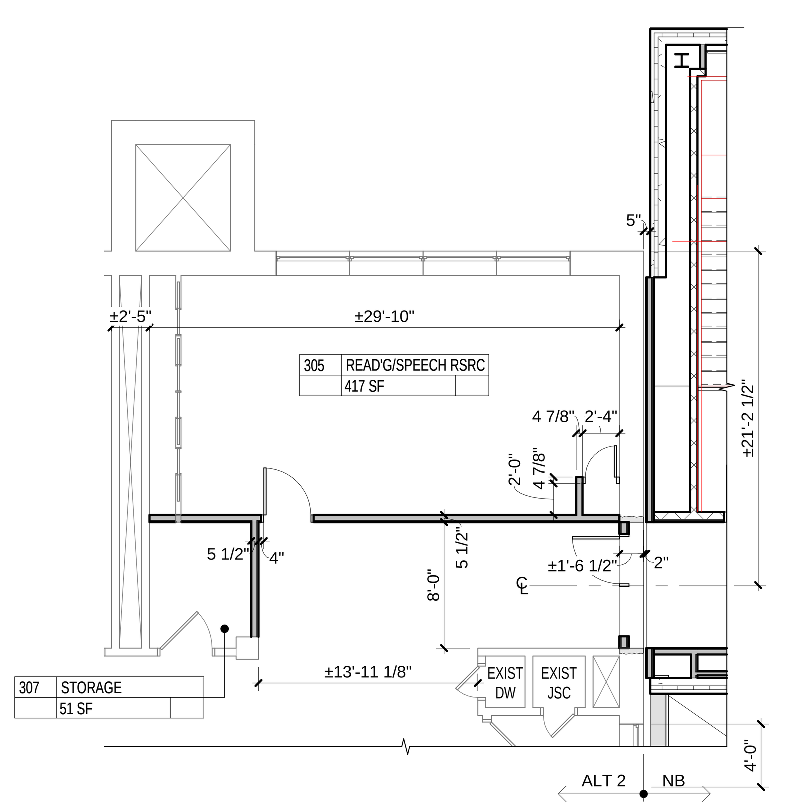
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - SECOND FLOOR

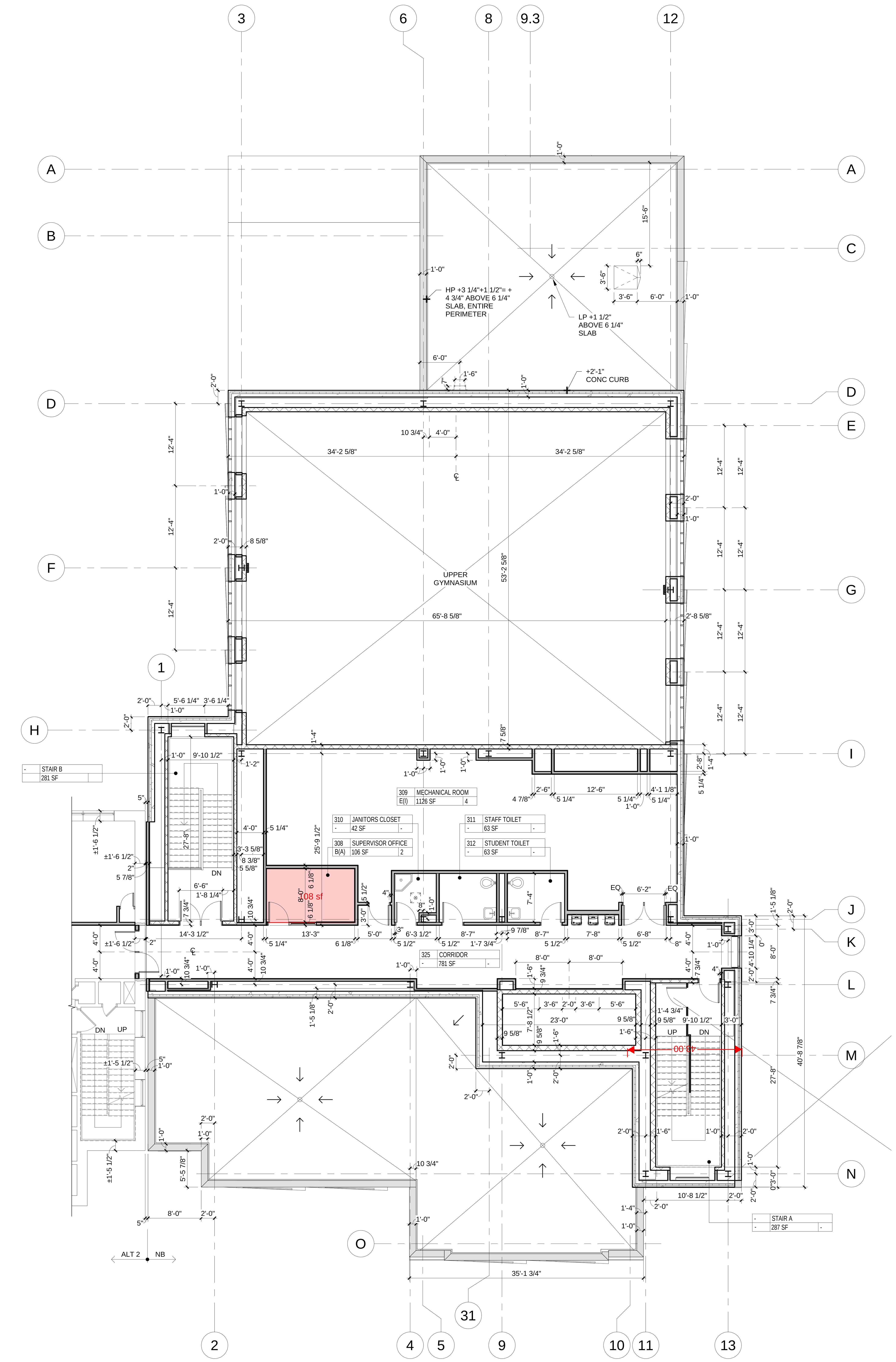
Drawing No.:
A102.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX



2 FLOOR PLAN - EXISTING BUILDING THIRD FLOOR
1/8" = 1'-0"



1 FLOOR PLAN - THIRD FLOOR
1/8" = 1'-0"

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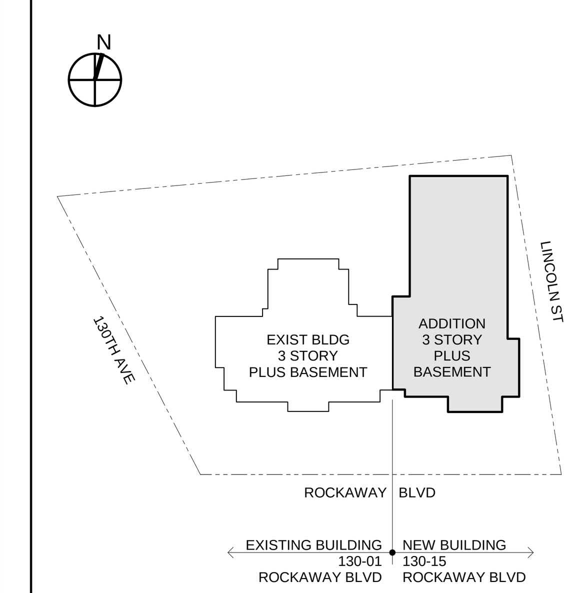

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Lot No. 27

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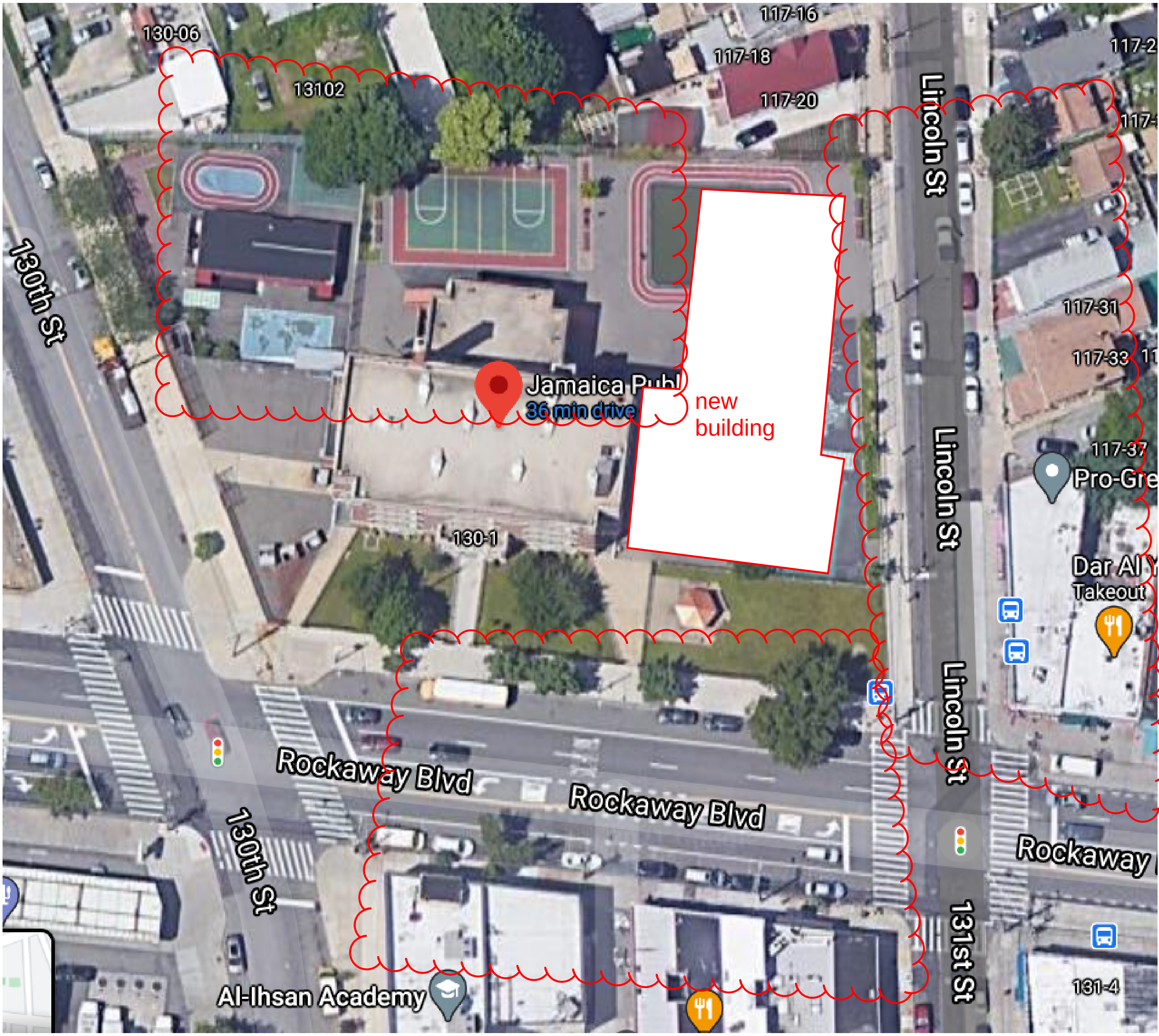
Drawing Title:
FLOOR PLAN -THIRD FLOOR

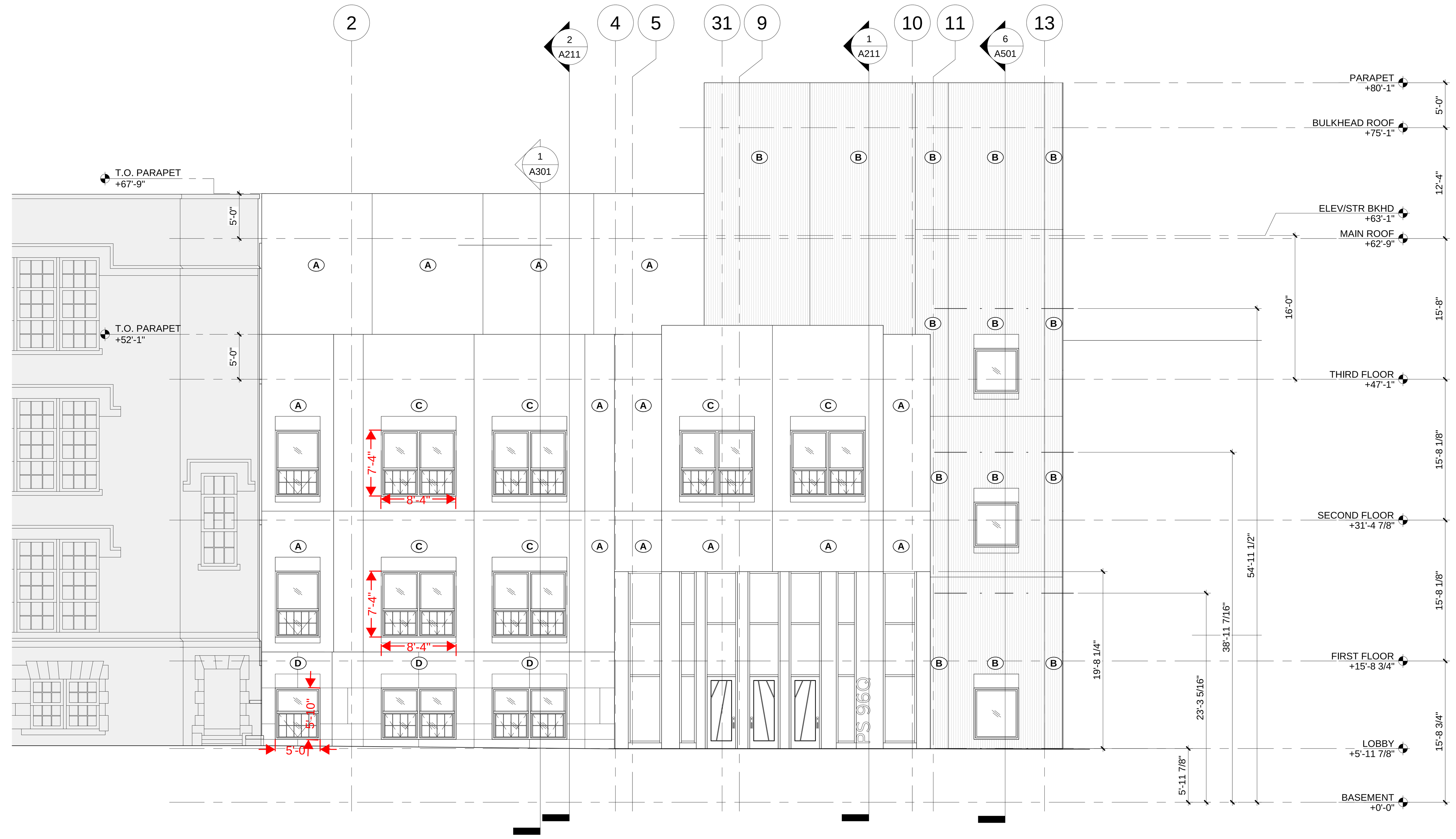
Drawing No.:
A103.00

Sheets in Contract Set:
of XXX

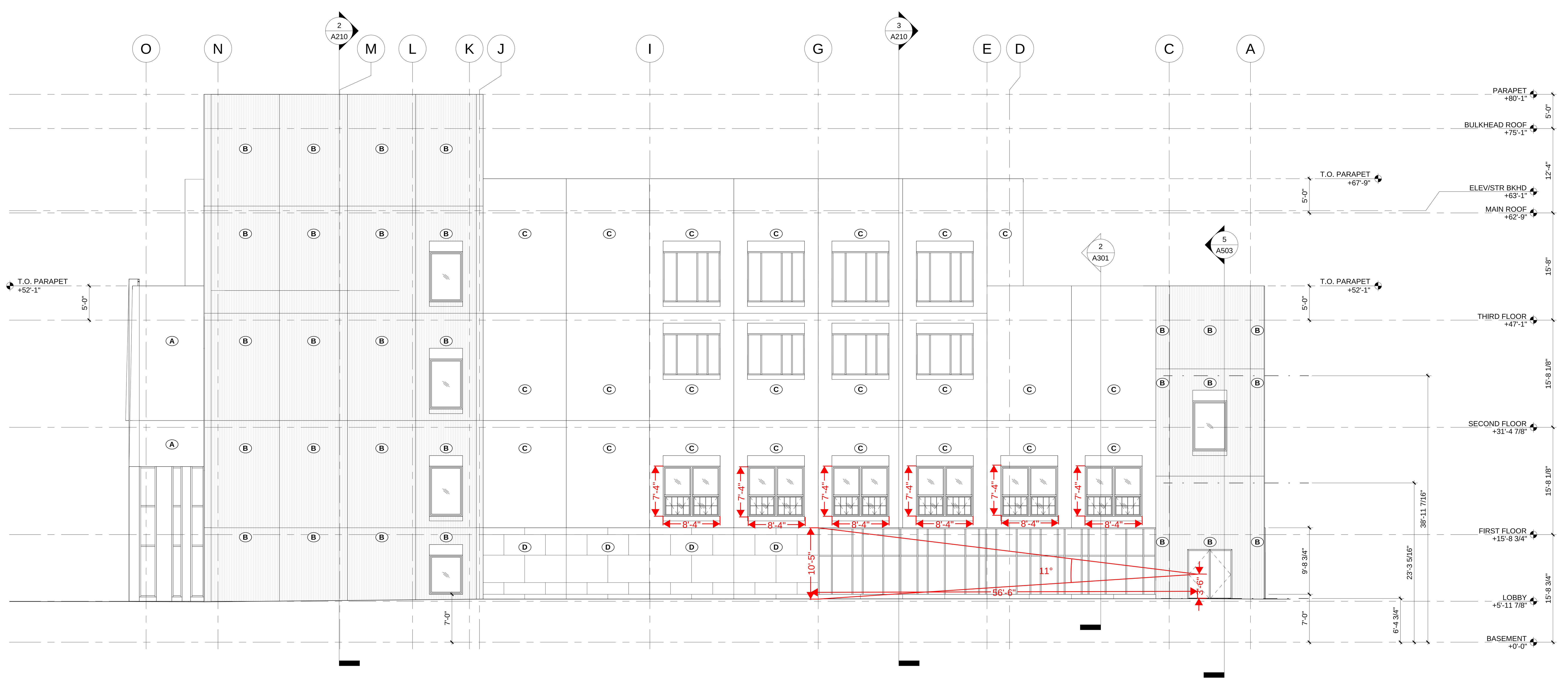
Sheets in DOB Set:
of XXX

Flora, fauna, sky, objects >25 feet away map of existing site





1 ROCKAWAY BOULEVARD ELEVATION
1/8" = 1'-0"



2 LINCOLN STREET ELEVATION
1/8" = 1'-0"

LEGEND

EXTERIOR INSULATED PRECAST CONCRETE WALL PANEL TYPES (REFER TO PC002):

PANEL TYPES A AND C
COLOR - WHITE
FINISH - LIGHT SAND BLAST

PANEL TYPE B
COLOR - WHITE
FINISH - FORMED
FORM LINER - LARGE STRIATED
(BASIS OF DESIGN: SCOTT SYSTEM #124)

PANEL TYPE D
LIMESTONE VENEER FACED
COLOR - FULL COLOR BLEND
JOINT - 3/8" STRUCK JOINT WITH MORTAR

NYC School Construction Authority

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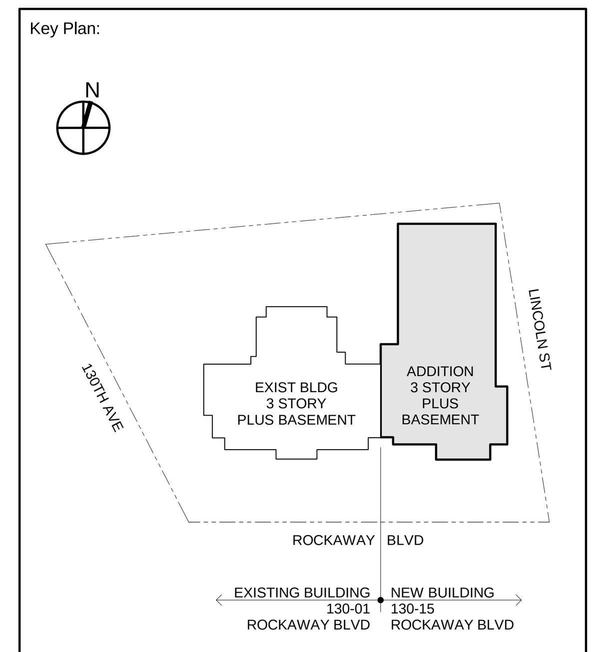
	2/23/2021	30% DD SUBMISSION

Key Plan:



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Checked by:	ROLANDO KENNY, RA

LLW No.:	Facility Code:	Date:
116480	Q096	7/22/2021

Project:
P.S. 96 - QUEENS ADDITION

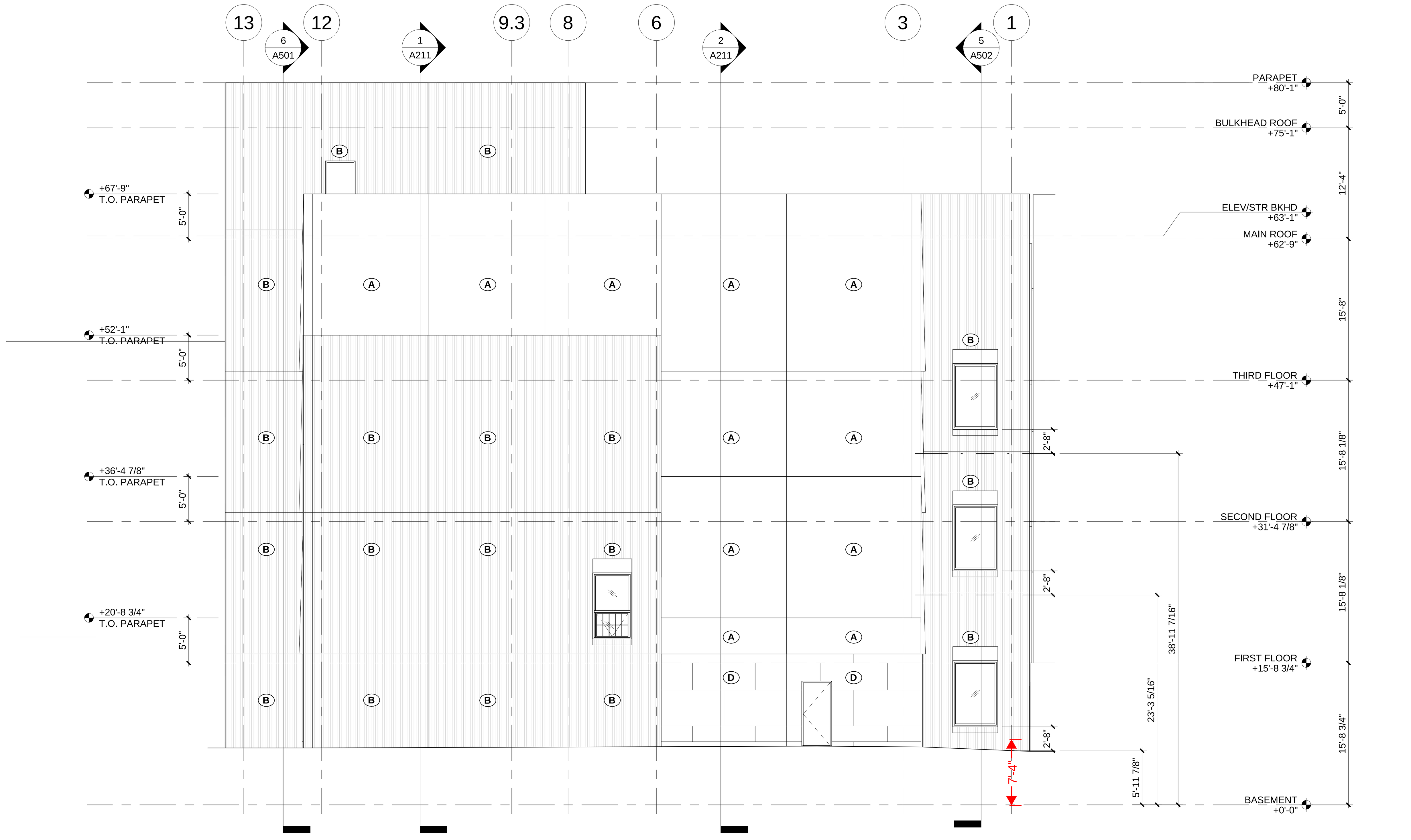
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
EXTERIOR ELEVATIONS - 1

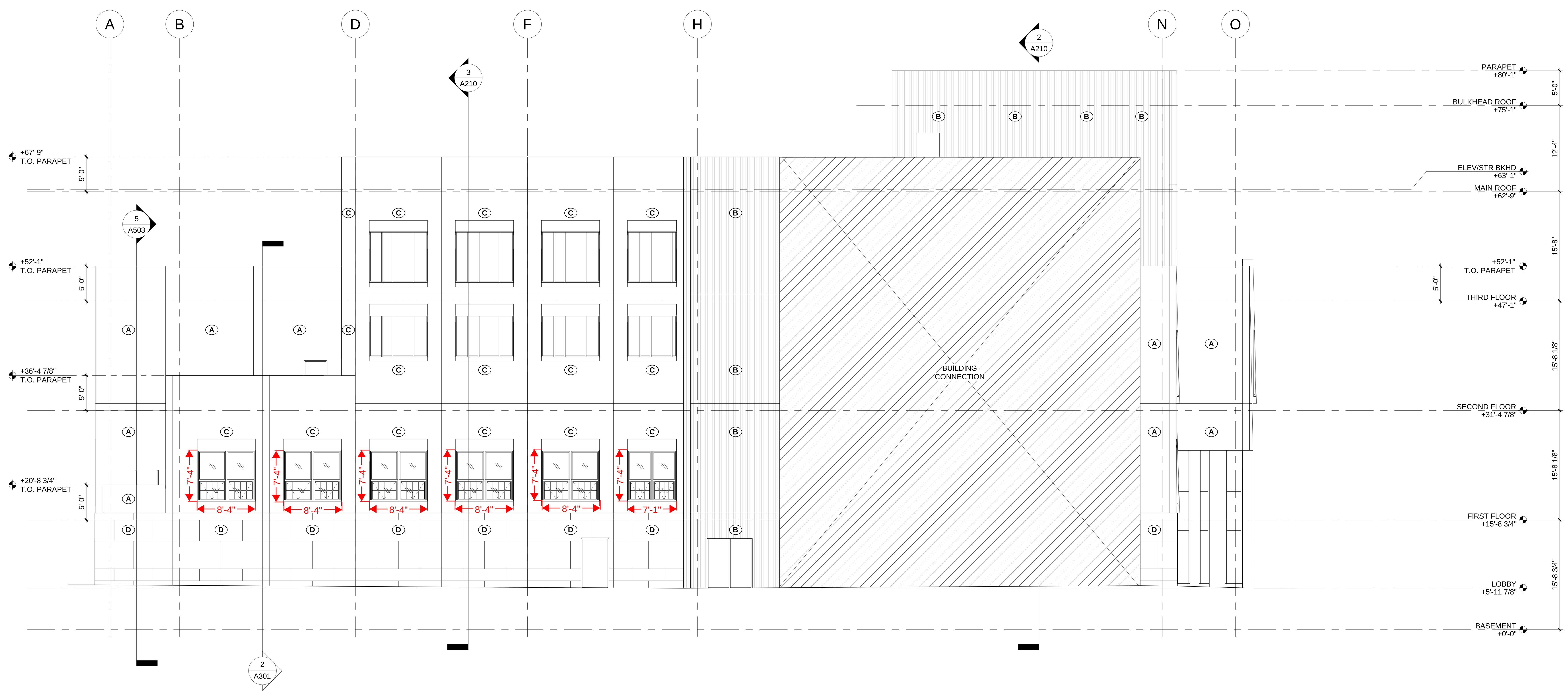
Drawing No.:
A201.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX



1 REAR ELEVATION
1/8" = 1'-0"



2 PLAYGROUND ELEVATION
1/8" = 1'-0"

LEGEND

EXTERIOR INSULATED PRECAST CONCRETE WALL PANEL TYPES (REFER TO PC002):

PANEL TYPES A AND C
COLOR - WHITE
FINISH - LIGHT SAND BLAST

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FORM LINER - LARGE STRIATED
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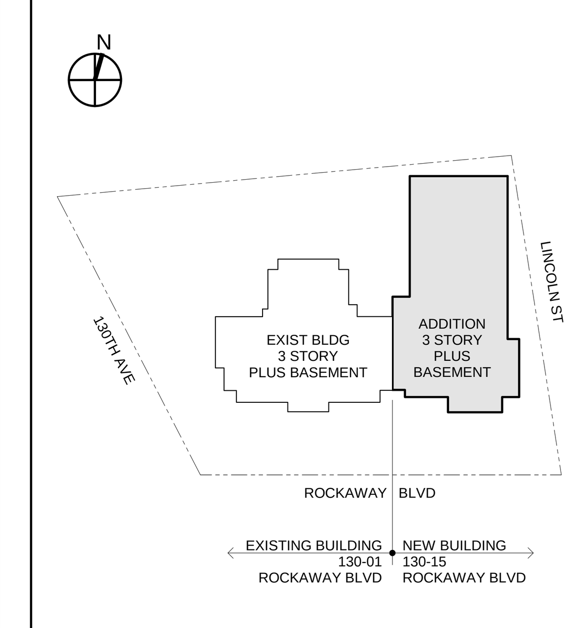

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116480	Q096	7/22/2021

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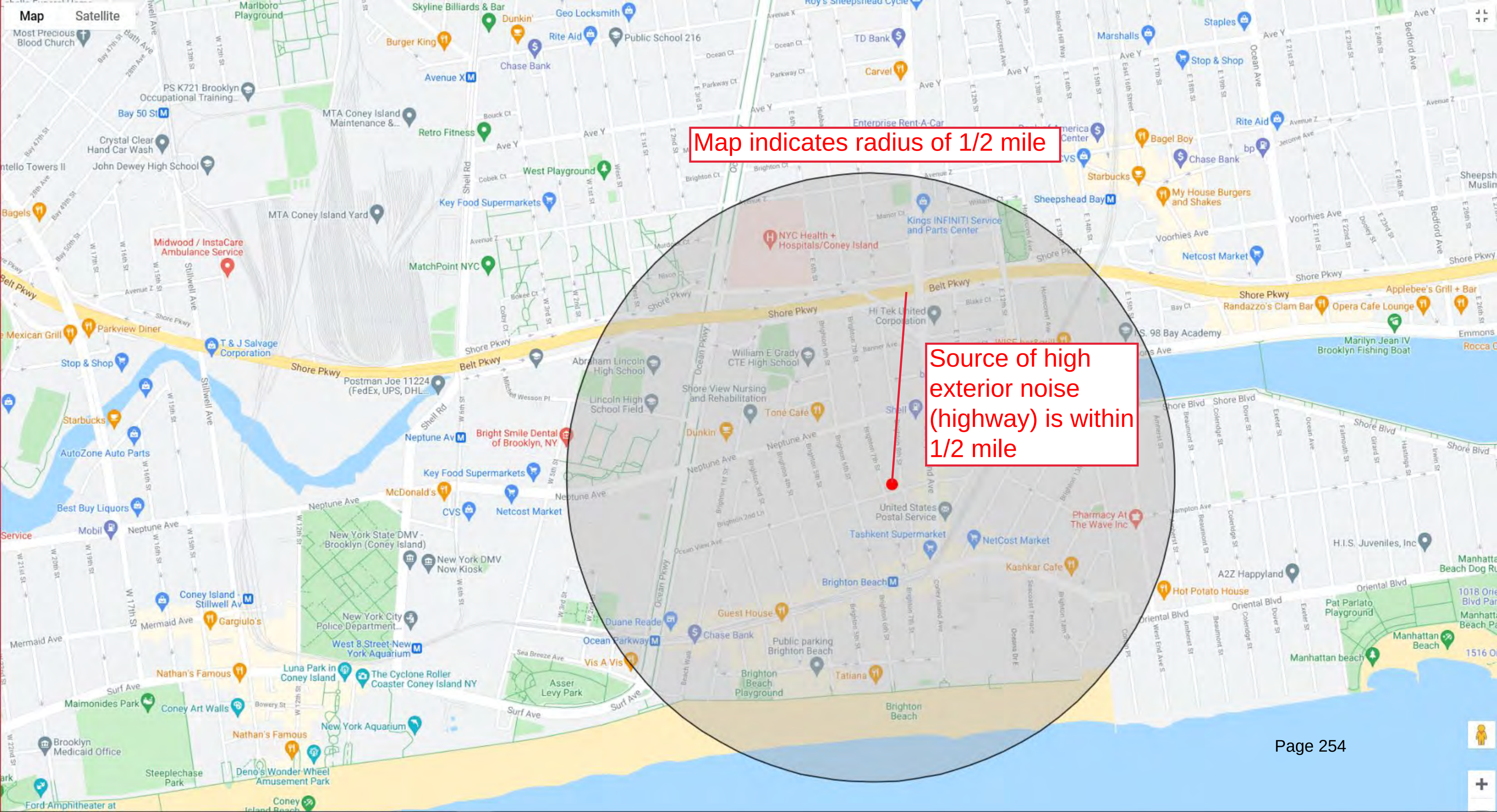
Drawing Title:
EXTERIOR ELEVATIONS - 2

Drawing No.:
A202.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX

Q8.1P – Minimum Acoustic Performance


Map
Satellite
Map indicates radius of 1/2 mile
Source of high exterior noise (highway) is within 1/2 mile

I1.1R – LEED® ACCREDITED PROFESSIONAL

LEED
AP
BD+C

-AP-BD+C

CREDENTIAL ID

12 MAR 2010

ISSUED

10 MAR 2022

VALID THROUGH

GREEN BUSINESS CERTIFICATION INC. CERTIFIES THAT

LEED AP BD+C is required.

HAS ATTAINED THE DESIGNATION OF

LEED AP® Building Design + Construction

by demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED® green building program.

MAHESH RAMANUJAN
PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.

REVISED IDP REPORT COVER PAGE

This Workshop Report is intended to be used as a reference only. Please refer to the requirements outlined in the IDP Facilitator Guide and the Green Schools Guide for a complete list of requirements.

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Site Shading ....Page X

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Order of Magnitude Cost for potential measures ....Page X

Integrative Design Report and Recommendations

Design Phase/	Turnover date	Occupancy Year
Pre schematic	10/25/21	2024

Capacity Project GSG IDP Workshop Meeting Minutes

Date: 12/15/2020
Re: Project Design Kick-off Meeting

List of Attendees				
Initial	Name (SCA/DOE/DSF/Consultant)	Company /Department:	Telephone	Email Address
X				
X				
X				
X				
X				
X				
X				
X				
X				
X				

PS96Q IDP Workshop meeting minutes
Revised 3/18/2020

The PS[redacted] Integrative Design Process workshop was held on 3/16/20 at SCA and remotely via Skype. Attendees are listed on the sign in sheet, provided separately. All documents reviewed during the workshop are included in Integrative Design Process Workshop report dated March 12, 2020, issued by [redacted] Architects and the team.

Summary of Discussion:

Introduction
After introductions, [redacted] provided overview of the IDP process and discoveries conducted by the design team. The IDP discussion is intended to address GSG 2019 standards, relevant local laws, and also ideas beyond the standards and credits. [redacted] reviews the three schemes (A,B,C formerly 7,8a,8b) that have been developed. [redacted] indicates plans for each scheme are to be included in final IDP report.

Discovery #1 Energy
[redacted] presented results of box energy model for the three schemes and reviewed the Box Model Summary form inputs. [redacted] discussed differences in building massing, Window to Wall ratio, and how these differences effect the Box Model results. SCA to provide team with list of EEMs to meet LL31 for reference. Per discussion, a net-zero analysis will not be required as the design is more than 3 stories.

Geothermal tool was reviewed, note that printout in report includes incorrect building and site area. This will be revised for the final report. Geothermal is shown to be a feasible option for this site. A feasibility analysis will need to be conducted by the team for the DD submission, in accordance with the SCA report templates. Geothermal is not typically SCA standard and will not be part of this project unless team is directed by SCA to include.

[redacted] presented the LL94 roof plans, based on FDNY access paths and proposed location of mechanical units for each scheme. The FDNY access is significant due to the number of small roof areas. Location of mechanical units to be considered to maximize clear roof area. The amount of sustainable roofing area varies by scheme in area and also in how fragmented the spaces are, which will affect ability to install a PV array system. Per LL94, all sustainable roofing areas are required to be either PV array or green roof unless they meet one of the exceptions noted in the LL. SCA has advised that green roof will not be pursued on this project. [redacted] Architects notes that some of the spaces may be exempt as they are setback areas less than 25% of the largest floor plate. [redacted] to verify exemption and revise diagrams to include a more limited and feasible area for PV array. Any remaining sustainable roofing zone areas will need to be addressed as project is developed.

Per Building Bulletin 2019-10, II,C, 4 - Building setbacks less than 25% of the area of the largest floor plan in the building shall be exempt from sustainable roof zone requirements. Using Scheme C, the largest floor area of the addition is 11,510 SF. Therefore, any roof area less than 2,877 SF in area is not required to be a sustainable roof zone requiring PV system or green roof system.

Per Building Bulletin 2019-10, II, D, 1 – Sustainable roofing zones shall include a PV system that exceeds a capacity of 4kW, or a green roof system, or a combination of both. Vidaris to provide analysis including shading to confirm that the PV system exceeds 4kW.

The following item was not discussed during the workshop, however is included as follow-up is required. SCA to provide information/details on the ballast PV system per conference call minutes dated 1/30/2020 to go over 2019 GSG requirements for this project.

Discovery #2 Water

[redacted] presented water discoveries including rainwater as a non-potable supply source. Amount of monthly and annual rainfall available was presented for each scheme. Team discussed testing, sanitation requirements for water reuse. Interior water use is the same for all schemes as it is dependent upon the number of building users. Results indicate a reduction of 33% from baseline. Potential exterior water uses include irrigation and maintenance. Rainwater reuse does not appear likely as plantings are expected to be native/adaptive and there is only a limited need for water for exterior maintenance. Amount of rainwater would allow use for fixture flushing but may be cost prohibitive.

Discovery #3 Life-cycle Impacts Assessment

[redacted] presented the LCA analysis generated with the Athena Impact Estimator, and reviewed the six environmental measurement criteria. The comparison reports for two wall assemblies and two roof assemblies were discussed. Assemblies with less concrete (cement) tend to have better results when assessed by these measures. [redacted] Architects noted some errors in the roof assembly; the insulation should be changed to 8" and the thickness of concrete pavers may require revision. SCA to confirm if additional concrete pavers will be required. [redacted] to revise for final report.

Discovery #4 Active Design

[redacted] and [redacted] presented active design measures that can be incorporated into design. There are some differences noted between Scheme A, B, and C. [redacted] noted that some recent changes will also allow Scheme C to achieve measures 4 and 5. [redacted] notes that measure 9 will not be achieved using SCA standards. [redacted] architects to revise checklist.

Discovery #5 Acoustics

[redacted] from [redacted] presented the acoustic analysis. The report indicates that criteria for both prerequisite Q8.1P and credit Q8.2 can be met by design but it can be difficult to meet the criteria Q8.2 HVAC background noise criteria with typical mechanical equipment. The gym location in all schemes is above classroom space. The slab will need to be designed to meet the acoustical separation requirements. The windows may also need to be upgraded from SCA standard to mitigate site noise. A survey will be conducted to determine if traffic or airplane noise will require mitigation. [redacted] notes that if it is airplane noise, it is likely to affect all facades.

Discovery #6 Climate Resiliency

[redacted] from [redacted] presented the summary report, CRDG exposure screening tool and design strategies checklist. Bioswales are not typical but may be an option for the site. SCA noted that there is a new Exposure Screening Tool that should be used. The new tool requires any result of Medium or High to create list of recommendations for mitigation. [redacted] to revise tool and generate list for final report. A green infrastructure assessment will be conducted considering other elements to manage stormwater onsite through infiltration and/or detainment per SCA report template at SD.

[redacted] reviewed GSG 2019 checklist, noting required GSG submissions at SD, DD, 60%, 100%, Design will be required from team.

Conclusions and Next Steps

The IDP report will be revised to incorporate items noted above. The design team is to develop a list of design impacts of topics discussed at the IDP workshop to be included in the DD GSG report. [redacted] and team to deliver final IDP report to SCA by 3/31/20.

PS 96Q IDP Design Impacts Narrative

12/18/20

Energy Discovery

- Among the three evaluated in the IDP energy model, Scheme B showed the highest energy consumptions, along with highest heating and cooling loads. However, this appears to be due to the increased area presented with the scheme. Once the value based on the areas of the project were normalized, Scheme B projected the best performance as far as EUI and loads per square foot. While the performance advantages were marginal, it did show that the design does not sacrifice the building performance for the increased usable areas.

Water Discovery

- Rainwater as a non-potable source has not been incorporated into the design as no cost-effective use for collected water has been found (i.e. irrigation is not required). The landscaping proposed at the site will include low maintenance trees, shrubs, groundcover, etc. that will not require irrigation.

Life Cycle Analysis

- SCA has determined that the exterior envelope of the addition be precast, insulated concrete panels. The precast panels will be utilized to their full potential allowing the envelope to become a self-supported skin that does not bear on the steel frame of the building. Precast panels do not require scaffolding and require less time for installation than masonry.

Active Design Discovery

- Assessment indicates all required strategies and 7 of the main staircase items are achievable with the design.

Acoustics Discovery

- Because the gym is located above classroom space, the design is to include appropriate acoustical separation requirements at the slab.

Climate Resiliency Discovery

- Based on the subsurface investigation performed at the site, the percolation tests concluded that the permeability of the soil meets the NYC DEP and DOB standards for infiltration practices. As part of the design, the stormwater for the entire site will be collected and conveyed to a stormwater retention system located at the north side of the existing building. Heat mitigation measures including permeable paver strips will be installed at the north west limits of the site and landscaping is proposed along the eastern and southern portions of the new building addition.

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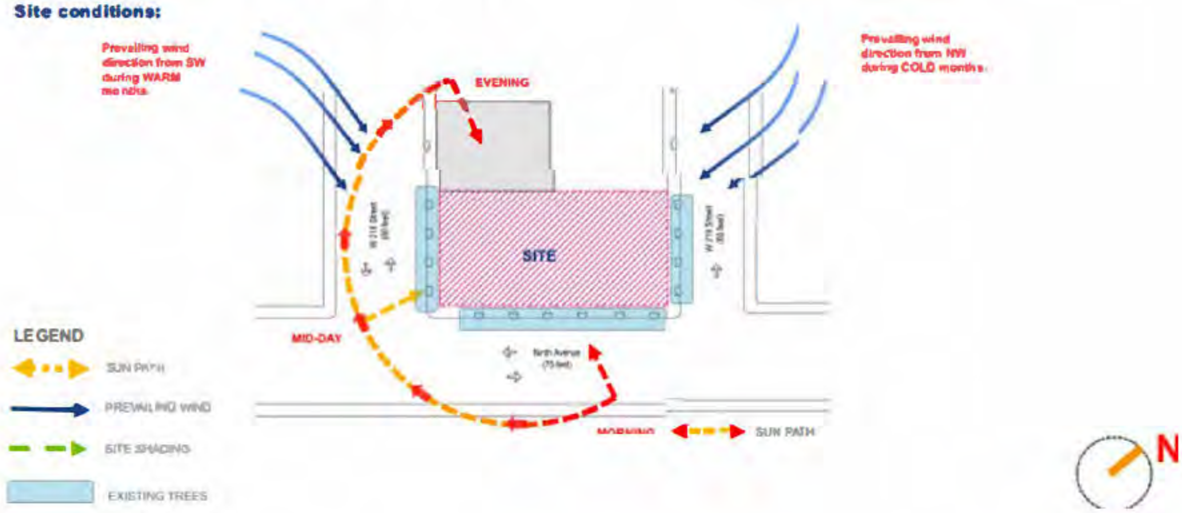
2.0 Discovery # 1 Energy and Daylight Related Systems\

2.1 Energy and Daylight Systems

Site conditions:



Site conditions: Exterior lighting at exit and entrance

SCHEME A SCHEME B SCHEME C

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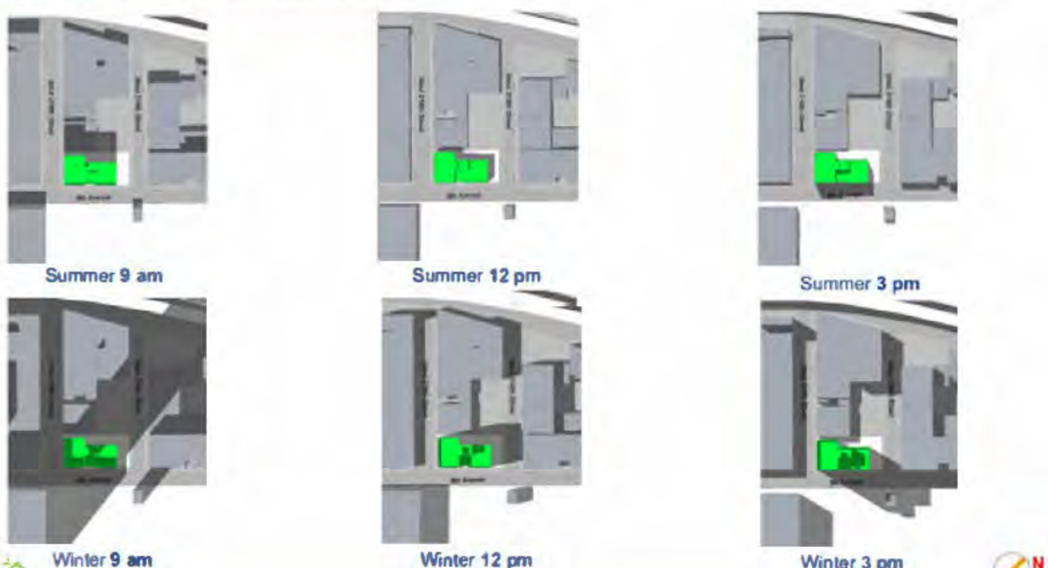
Discovery #1 Scheme A
Energy and Daylight Related System
Site conditions: Summer & winter solstice shadows

Discovery #1 Scheme B
Energy and Daylight Related System
Site conditions: Summer & winter solstice shadows



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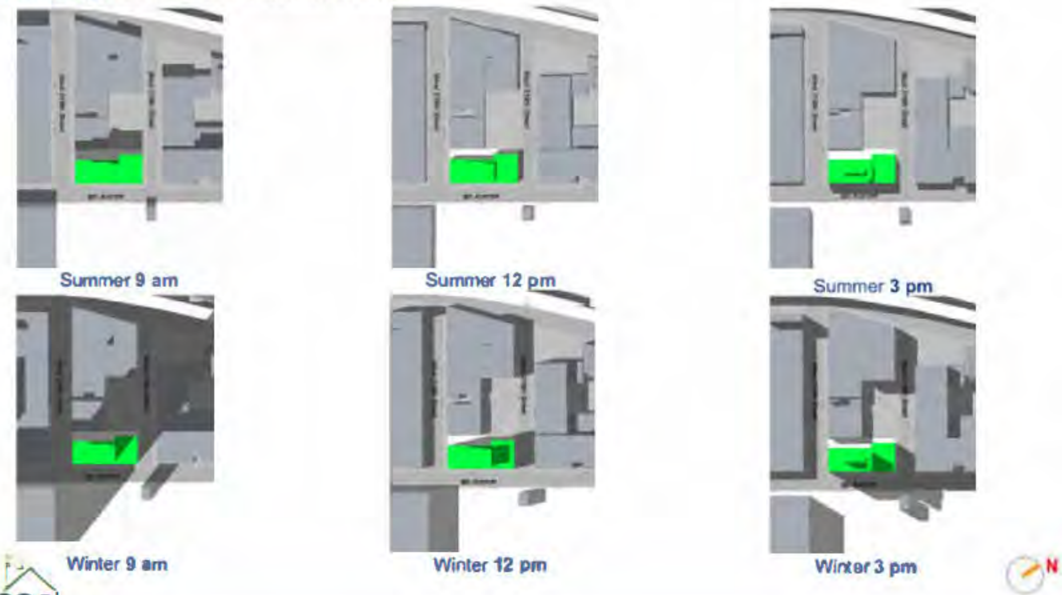
Discovery #1 Scheme C
Energy and Daylight Related System
Site conditions: Summer & winter solstice shadows



Discovery #1 Scheme A, B, & C
Energy and Daylight Related System
Gymatorium Daylight

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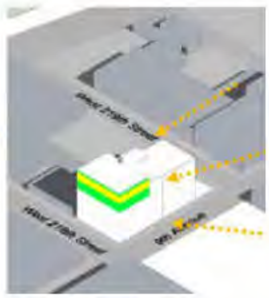
Discovery #1 Scheme A, B, & C
Energy and Daylight Related System
Gymatorium Daylight

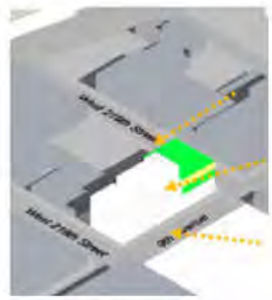
SCHEME A

- Minimum exposure to daylight
- Gymatorium is facing West
- Minimal building obstruction



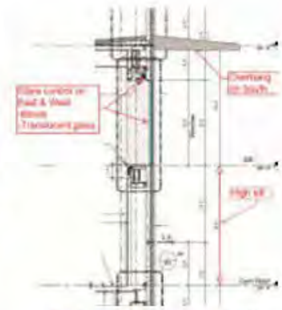
SCHEME B

- High exposure to daylight, volume is more exposed
- Part of Gymatorium is facing South and East
- Minimal building obstruction



SCHEME C

- Medium exposure to daylight
- Gymatorium is facing North
- No building obstructions



Window Example detail

2.2 Scheme 1 Energy box model

IDP Box Model Summary

School Name	

How many schemes were explored?	3
If less than 3 schemes, explain	

Warnings	No Warnings

Basic Attributes

Description	Scheme 1	Scheme 2	Scheme 3
Building Area (ft2)	63,909	63,991	63,548
Wall Area (ft2)	30,335	34,086	30,747
Window Area	7,555	8,537	7,711
% Window Area	20%	20%	20%
Roof Area (ft2)	13,593	12,543	14,990

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Comparison to Scheme 1 (% increase/decrease)

Description	Scheme 1	Scheme 2	Scheme 3
Source EUI (2.55 elec)	0%	0%	-1%
Carbon Emissions (tons)	0%	1%	-1%
PV installation (kW)	0%	-8%	10%
PV Energy Production (kWh/yr)	0%	-8%	10%
Peak kW	0%	1%	-3%
Max Heating Demand (kBtu/hr)	0%	-4%	-5%
Max Cooling Demand (kBtu/hr)	0%	4%	-3%
Annual Daylighting Reduction	0%	3%	-3%

Effects of Window Area- Scheme 1

All Results are compared to Scheme 1 with 20% glazing on all facades

Description	**Whole Building**		
Window-Wall Ratio (%)	15%	20%	25%
Source EUI (2.55 elec)	0%	0%	1%
Carbon Emissions (tons)	0%	0%	1%
Peak kW	-1%	0%	1%
Max Heating Demand (kBtu/hr)	1%	0%	-1%
Max Cooling Demand (kBtu/hr)	-1%	0%	0%
Annual Daylighting Reduction	-5%	0%	3%

Effects of Window Area- Scheme 2

All Results are compared to Scheme 2 with 20% glazing on all facades

Description	**Whole Building**		
Other Façade Window %	15%	20%	25%
Source EUI (2.55 elec)	0%	0%	1%
Carbon Emissions (tons)	0%	0%	1%
Peak kW	-1%	0%	1%
Max Heating Demand (kBtu/hr)	-1%	0%	1%
Max Cooling Demand (kBtu/hr)	-8%	0%	-2%
Annual Daylighting Reduction	-3%	0%	3%

Effects of Window Area- Scheme 3

All Results are compared to Scheme 3 with 20% glazing on all facades

Description	**Whole Building**

Integrative Design Report and Recommendations

Other Façade Window %	15%	20%	25%
Source EUI (2.55 elec)	0%	0%	0%
Carbon Emissions (tons)	0%	0%	0%
Peak kW	0%	0%	1%
Max Heating Demand (kBtu/hr)	1%	0%	-7%
Max Cooling Demand (kBtu/hr)	0%	0%	0%
Annual Daylighting Reduction	-3%	0%	3%

Scheme A

Information from LS-I

Case	Annual Reduction by Daylight %
Building Orientation_0	37%
Building Orientation_90	37%
Building Orientation_180	37%
Building Orientation_270	37%

Information from SS-D

Case	Maximum Heating Load (kBtu/hr)	Maximum Cooling Load (kBtu/hr)
Building Orientation_0	1,258	1,726
Building Orientation_90	1,252	1,728
Building Orientation_180	1,231	1,728
Building Orientation_270	1,247	1,728

Information from PS-E

Case	Electric Use (kWh)	Fuel Use (MBTU)	Peak Demand (kW)
Building Orientation_0	348,617	876	222
Building Orientation_90	348,894	895	222
Building Orientation_180	347,793	890	222
Building Orientation_270	347,634	886	222

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2.3 IDP *Energy Summary*

Site Conditions

Site Shading

Review the IDP Shading Study. **Rank the favorability of each scheme.**

Shading Table

Scheme A	Very Unfavorable	Somewhat Unfavorable	Neutral	Somewhat Favorable	Very Favorable	Not Feasible
Scheme B	Very Unfavorable	Somewhat Unfavorable	Neutral	Somewhat Favorable	Very Favorable	Not Feasible
Scheme C	Very Unfavorable	Somewhat Unfavorable	Neutral	Somewhat Favorable	Very Favorable	Not Feasible

Site conditions does not provide a very favorable shading. Scheme C could improve favorability if the playground could be relocated.

Exterior Lighting

Describe any features that may have special lighting requirements. Describe opportunities to have single fixtures meet multiple lighting needs.

Wall pack lighting will be provided no special requirement.

Landscaping

Describe opportunities for deciduous shade plants/trees on the south side of the building, and evergreen trees on the north/west sides.

Trees may be implemented on the design where it doesn't obstruct any entrances or exits. There will be more trees in the sidewalk to comply with the park department requirement. The goal is to maintain the existing nine trees on the sidewalk.

Adjacent Site Conditions

Describe any existing built environment conditions and vegetation that can provide shelter from extreme weather or to deflect unwanted noise, if any.

There is no protection from existing structures. The lot is located in a manufacture zone, the existing landscape responds to that use.

Landscaping

Existing Site Plan

Possible Landscaping with Deciduous Shade Trees

NYC School Construction Authority

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Massing, Envelope and Façade Elements

Review the Shading Study and Box Model Information Summary. When determining the most favorable scheme, reduction in boiler capacity is preferable to reduction in chiller capacity. The box model only includes daylighting controls in a specific run, and higher chiller capacity indicates greater daylighting potential.

1.0 **List the preferred Scheme based on box model. More than one may be considered if results are similar. Options that are not feasible due to site constraints may be eliminated. Briefly describe the decision making process:**

Based on the results of the box model, the programmatic needs should be used to select the preferred scheme, not the energy use.

The box model shows that the overall energy use between the three options are similar:

Scheme	Energy (MBTU)
A	4,445.9
B	4,415.9
C	4,373.0

The overall energy use is similar in all three schemes, with Scheme C having lowest energy consumption and scheme B best daylighting opportunity. The main difference in the massing options is the locations of the kitchen/cafeteria and the gymatorium. The box model was developed and analyzed using eQuest

2.0 **Scheme for Design:**

To be determined as design is developed.

3.0 **If the Scheme selected for the design is not among the preferred options from the box model**

a) Explain why the preferred box model scheme is not suitable

NA- the site is constrained and both massing options are equally preferable

b) Describe how the findings from the box model will influence the design.

We learn a few energy saving items and less carbon emission from box model. We will consider to improve those items during the design development, such as install as many PV panel as possible, reduce wall openings, and reduce overall building envelop.

4.0 **Describe the strategies for limiting the vision glazing while maximizing daylighting. Provide proposed window wall ratio.**

- External shades should be considered on south facing windows.
- Framing should be minimized to the extent possible (fewer large windows preferred over more smaller windows)
- 20% WWR was modeled in the box model analysis
- The window head height should be as high as possible to maximize daylighting while maintaining views.
- The window-to-wall (WWR) ratio favored the north facing walls to maximize the daylight savings possible. The WWR of each orientation is as follows:

	Scheme A	Scheme B	Scheme C
NE	17.8%	21.5%	16.5%
SE	29.0%	25.1%	27.3%
SW	14.7%	13.6%	12.7%
NW	38.5%	39.8%	43.5%

5.0 **Describe the consideration of thermal breaks in the envelope assembly and the integration of details in the design process.**

Envelope Recommendations below are based on studies that were performed on prototypical buildings. The studies can be applied to all SCA buildings.

- The insulation values of the walls and roof should be maximized to the extent practical.
- Recommended Roof insulation is R-40 or greater
- Recommended effective wall U-value is R-15 or greater

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MEP Layout Optimization

6.0 **Do special circumstances advocate for consideration of HVAC alternates to the standard design?**

a) If yes, describe the HVAC system(s) under consideration
No alternate to standard design. HVAC design will follow agency standard SCA Design Requirements Section 6.2.

7.0 **Describe how the following will be addressed in the design. Both architectural and HVAC disciplines should be considered:**

1. Reducing cooling loads

- For building envelope load reduction, HVAC Engineer will account for load reductions as a result of any additional insulation and better building envelope components (windows etc.) the Architect will provide.
- For infiltration load reduction, HVAC Engineer will slightly pressurize interior spaces to reduce infiltration. In addition, the Architect will design air barriers and/or vapor barriers for the building envelope.
- For outside air load reduction, HVAC Engineer will provide Enthalpy Heat Recovery wheels on Rooftop Units serving classrooms and the gymnasium. CO2 based demand control ventilation to reduce outside air in response to space vacancies will also be provided for Rooftop Units serving classrooms and the gymnasium.
- For internal load reduction, HVAC Engineer will take into consideration the energy efficient lighting as designed.
- For air leakage load reduction, HVAC Engineer will provide air curtains at the main building entrances and provide Energy Code required Class 1 low leakage dampers integral to the building envelope.

2. Reducing heating loads
The same methodology which reduces cooling loads described above will also be utilized for heating load reductions.

3. Limiting air duct pressure drop
Air ducts will be designed according to acoustical guidelines which limits air duct velocities. Limiting air duct velocities automatically limits air duct pressure drop. In addition, a variable air volume (VAV) system will be designed. The VAV system reduces airflow during non-peak heating and cooling space load conditions. The reduction of airflow reduces air duct velocities in mild weathers, therefore also reduces air duct pressure drop in mild weathers.

4. Limiting envelope penetrations
Envelope penetrations by HVAC equipment (ductwork and piping through roof, louvers through walls) will be limited to necessary ones according to required equipment for the project, as well as code required shaft smoke vents as per 2014 NYCBC 708.12.1. Envelope penetrations by HVAC equipment and shaft smoke vents will be caulked and sealed per SCA specifications.

5. Limiting piping pressure drop
Engineer will limit piping pressure drop according to 2020 NYC ECC Appendix CA (aka, ASHRAE 90.1-2016 with NYC amendments) Section 6.5.4.6 Pipe Sizing Requirements with Table 6.5.4.6.

6. Other
N/A.

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Architecture & Engineering - A&E In-House Design Studio

2.4 NYC Geothermal Screening Tool selection

NYC Geothermal Webtool selection

This document contains the geothermal feasibility estimation, retrieved at:
Wed May 20 2020 15:07:47 GMT-0400 (Eastern Daylight Time)

Selection			
Address	400 WEST 219 STREET		
Borough	Manhattan		
Block	2214		
Lot(s)	24		
BBL(s)	1022140024		
Building			***Overrides**
Lot Area (SqFt)	20,000		20000
Building Area (SqFt)	63,909		63909
Building Footprint (SqFt)	13,593		13593
Building Type	Other: W3		
Calculation			
Depth To Bedrock (Ft +-25 Ft)	0		
Depth To Water (Ft +-25 Ft)	Data Not Available		
Lloyd Aquifer (Present/Not Present)	Not Present		
Geothermal System	**Standing Column Well**	**Closed Loop**	**Open Loop****
Geological and Technical Suitability (Yes/No)	Yes	Yes	No
Potential Capacity (Tons)	105	49	
Full System Feasible (Yes/No)	Yes	Yes	Yes
Hybrid System Feasible (Yes/No)	No	No	No
Carbon Footprint Reduction (Tons CO2e)			
Annual Cost of Carbon ($)	0	0	0
Annual Potential Savings with Geothermal System ($)	0	0	0
Projected Incremental Payback with Carbon Credit (Years)			
Projected Incremental Payback without Carbon Credit (Years)			

NOTE: The City's critical infrastructure, such as water tunnels, shafts, or appurtenant facilities are regulated by the New York City Department of Environmental Protection ("DEP"). DEP is in the process of promulgating rules to require that any boring, drilling or excavation to a depth of 50 feet in the borough of the Bronx or north of 135th Street in the borough of Manhattan or to a depth of 100 feet in any other location / borough in New York City first be reported to DEP. Please send written notification of intention to drill or excavate to: Chief of Site Connection and Plan Review, Bureau of Water and Sewer Operations, 9605 Horace Harding Expy, 3rd Floor, Flushing, NY 11368-4100

The geothermal feasibility tool indicates that geothermal systems are feasible for full systems.

The Geothermal Feasibility Tool indicates that closed loop, open loop and standing column well are feasible for a Full system.

The SCA Geothermal Feasibility Report is required to be completed if either a standing column, closed loop or open loop system indicates "Yes" for full system feasibility.

Therefore,
the SCA Geothermal Feasibility Report will need to be completed for a later phase.

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Furthermore, sites that have contaminated land, are archeologically significant, and/or are located in protected marshland should not move forward with a full feasibility study due to an increased cost.

*. The override calculation assumes new construction with optimal building location to maximize geothermal capacity. In cases of renovation or re-purposing of an existing building, the calculation may over-estimate capacity.

**: For Open Loop systems in the Bronx and Manhattan, the information available from USGS is insufficient.

SCA
NYC School Construction Authority

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2.6 Renewable Energy

Summary

Each scheme was evaluated for photovoltaic (PV) capacity and generation. Scheme A has the most potential for PV capacity and energy generation. Scheme C has comparable capacity and generation if the area dedicated for the playground can be used for PV instead. Scheme B does not have a favorable building orientation to the southern sun exposure. The schemes have system capacities ranging from 26 kW to 53 kW, and energy generations ranging from 33,000 to 68,000 kWh annually depending on which scheme is chosen. Certain schemes have recommendations in the analysis below, based on shading and rooftop equipment design flexibility. The analysis is based on ballasted PV racking. This allows for the PV modules (weighed down by ballast, usually CMUs), to avoid roof penetrations and allow for flexible system layouts.

Building Scheme	Scheme A	Scheme B	Scheme C
PV System Capacity	52.9 kW	41.7 kW	25.9 kW
Annual Energy Generation	68,319 kWh	46,343 kWh	33,437 kWh

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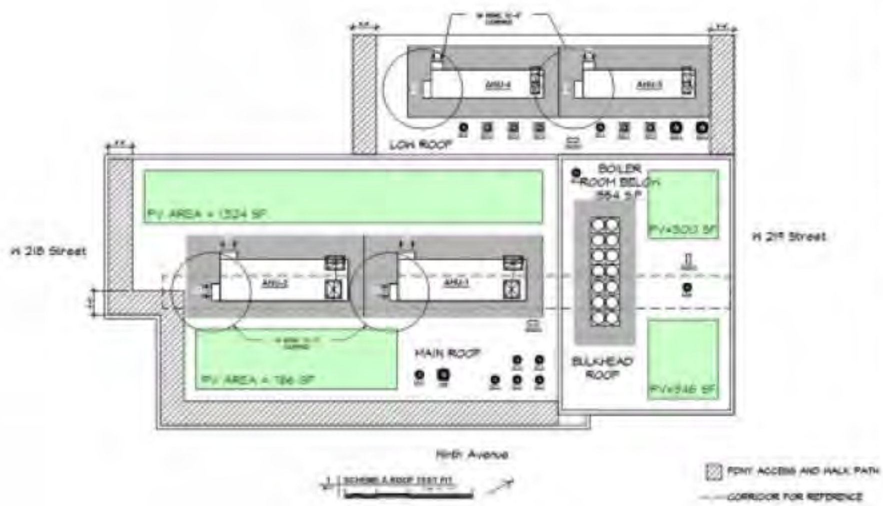
Scheme A

TOTAL SOLAR AREA= 1,324+766+346+300 = 2,736 SQFT
TOTAL DC SYSTEM SIZE KW= 2736/80= 34.20 KW
TOTAL GENERATED AMPs= 34,200/(1.73*208*0.8)=118.80A
TOTAL NUMBER OF PANEL= 34,200/372 = 91 PANELS



AIR HANDLING UNITS	
UNIT NO.	SERVICE
AHU-1	CLASSROOMS
AHU-2	CLASSROOMS
AHU-3	CAFETERIA / KITCHEN
AHU-4	GYMNASIUM

SPLIT A/C UNIT SCHEDULE	
UNIT NO.	SERVICE
ACCU-1	ELEVATOR MACHINE ROOM
ACCU-2	MDF/IDF ROOM
ACCU-3	FOOD STORAGE ROOM

FAN SCHEDULE	
UNIT NO.	SERVICE
EF-1	REFUSE ROOM
EF-2	WATER METER, ELECT SWITCH GEAR & ATS ROOM
EF-3	GROUND EQUIPMENT ROOM
EF-4	KITCHEN STAFF LOCKERS / MEP ROOM
EF-5	CUSTO. LOCKER ROOMS
EF-6	ART KILN HOOD
EF-7	BOILER ROOM
EF-8	ELEVATOR MACHINE ROOM
EF-9	CAN WASH ROOM
KEF-1	KITCHEN HOOD
KEF-2	KITCHEN GENERAL EXHAUST
SPF-1	GYM SMOKE PURGE
SPF-2	GYM SMOKE PURGE
SPF-3	CELLAR SMOKE PURGE
SPF-4	KITCHEN SMOKE PURGE
SPF-5	CAFE. SMOKE PURGE
TEF-1	TOILETS
FHE	LAB HOOD EXHAUST

Solar PV systems generation potential is to be evaluated for each scheme, the below tool is a sample reference.

PVWatts Calculator

RESULTS

226,976 kWh/Year*

System output may range from 217,874 to 234,580 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.76	15,916	1,448
February	4.51	17,055	1,552
March	4.80	19,642	1,787
April	5.46	20,822	1,895
May	5.32	20,509	1,866
June	5.77	21,030	1,914
July	5.87	21,706	1,975
August	5.80	21,489	1,955
September	5.58	20,668	1,881
October	4.43	17,704	1,611
November	3.95	15,782	1,436
December	3.42	14,653	1,333
Annual	**4.89**	**226,976**	**$ 20,653**

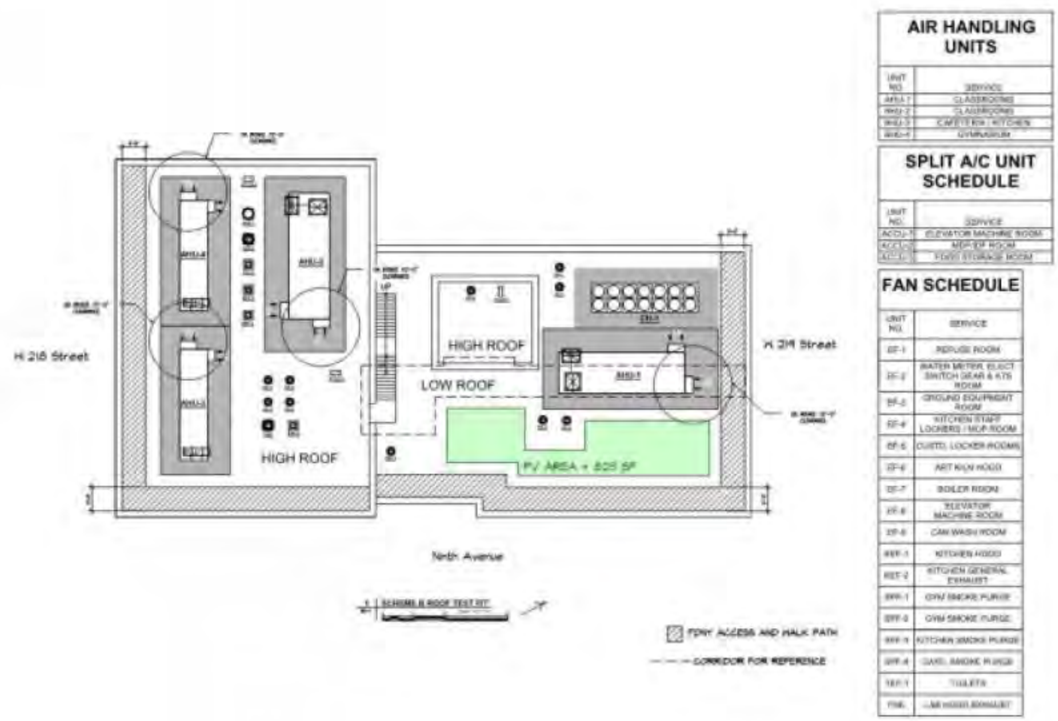
We evaluated the pre-schematic design schemes for solar PV potential. The following drawings consider HVAC equipment clearances (shown as dashed lines) and FDNY for rooftop access requirements for buildings less than 100 feet in height with roof slopes less than 20 degrees from horizontal. Mechanical equipment and solar PV panels are treated as obstructions per the Fire Code. All four exposures of each scheme are assumed to be accessible to fire apparatus. Requirements include:

- For each 12 linear feet of accessible perimeter, a minimum 6 foot by 6 foot landing clearance area. Such areas may be combined into areas up to 12 feet long, separated by no less than 12 feet.
- For each 100 linear feet of rooftop width and each 100 linear feet of length, a minimum 6 foot wide clear path from side to side or from front to back, providing reasonable access to all bulkhead doors.
- For each rooftop stairway or bulkhead access door, a minimum 6 foot clear area in all directions.

Integrative Design Report and Recommendations

Scheme B

TOTAL SOLAR AREA = 823 SF
TOTAL DC SYSTEM SIZE KW=823/80=10.28 KW
TOTAL GENERATED AMPs= 10,280/(1.73*208*0.8)=35.71A
TOTAL NUMBER OF PANEL= 10,280/372 = 27 PANELS



RESULTS

105,642 kWh/Year*

System output may range from 101,406 to 109,181 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.76	7,408	674
February	4.51	7,938	722
March	4.80	9,142	832
April	5.46	9,691	882
May	5.32	9,546	869
June	5.77	9,788	891
July	5.87	10,103	919
August	5.80	10,002	910
September	5.58	9,620	875
October	4.43	8,240	750
November	3.95	7,345	668
December	3.42	6,820	621
Annual	**4.89**	**105,643**	**$ 9,613**

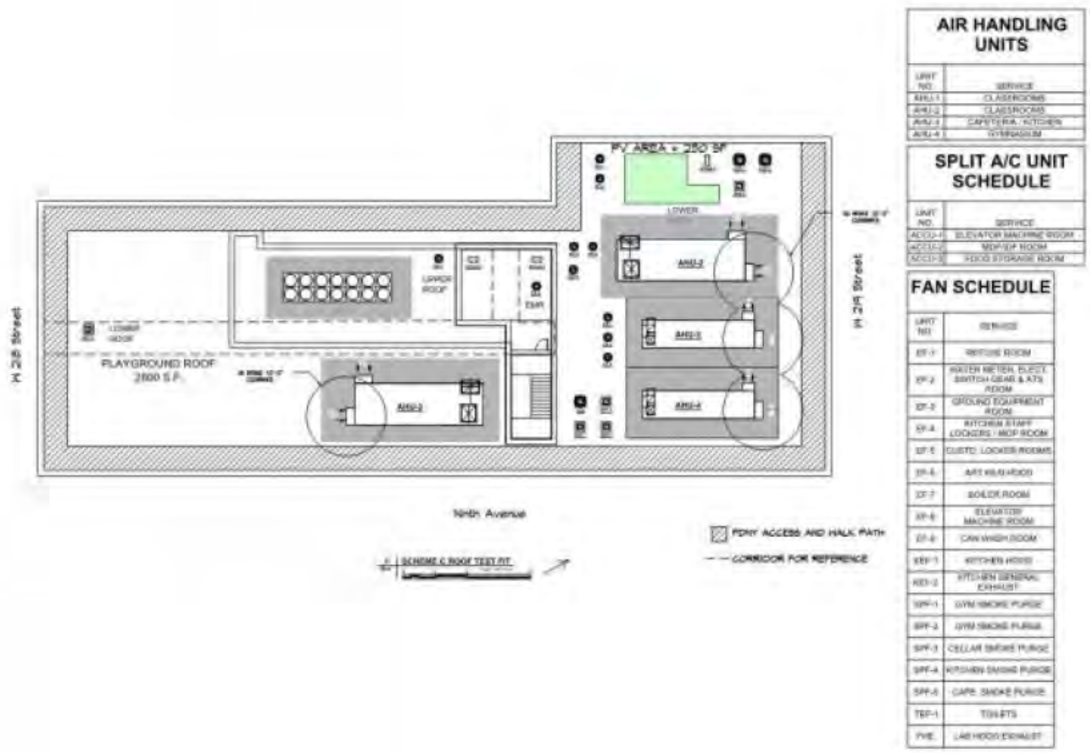
Schematic Green Design Report

The New York City School Construction Authority

Integrative Design Report and Recommendations

Scheme C

TOTAL SOLAR AREA= 230 SF
TOTAL DC SYSTEM SIZE KW=230/80 = 7.6 KW
TOTAL GENERATED AMPs=7,666/(1.73*208*0.8)= 26.6A
TOTAL NUMBER OF PANEL= 7,666/372 = 20 PANEL



RESULTS

132,963 kWh/Year*

System output may range from 127,631 to 137,417 kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.76	9,324	2,164
February	4.51	9,991	2,319
March	4.80	11,507	2,671
April	5.46	12,198	2,831
May	5.32	12,014	2,788
June	5.77	12,320	2,859
July	5.87	12,715	2,951
August	5.80	12,588	2,922
September	5.58	12,107	2,810
October	4.43	10,371	2,407
November	3.95	9,245	2,146
December	3.42	8,584	1,992
Annual	4.89	132,964	$ 30,860

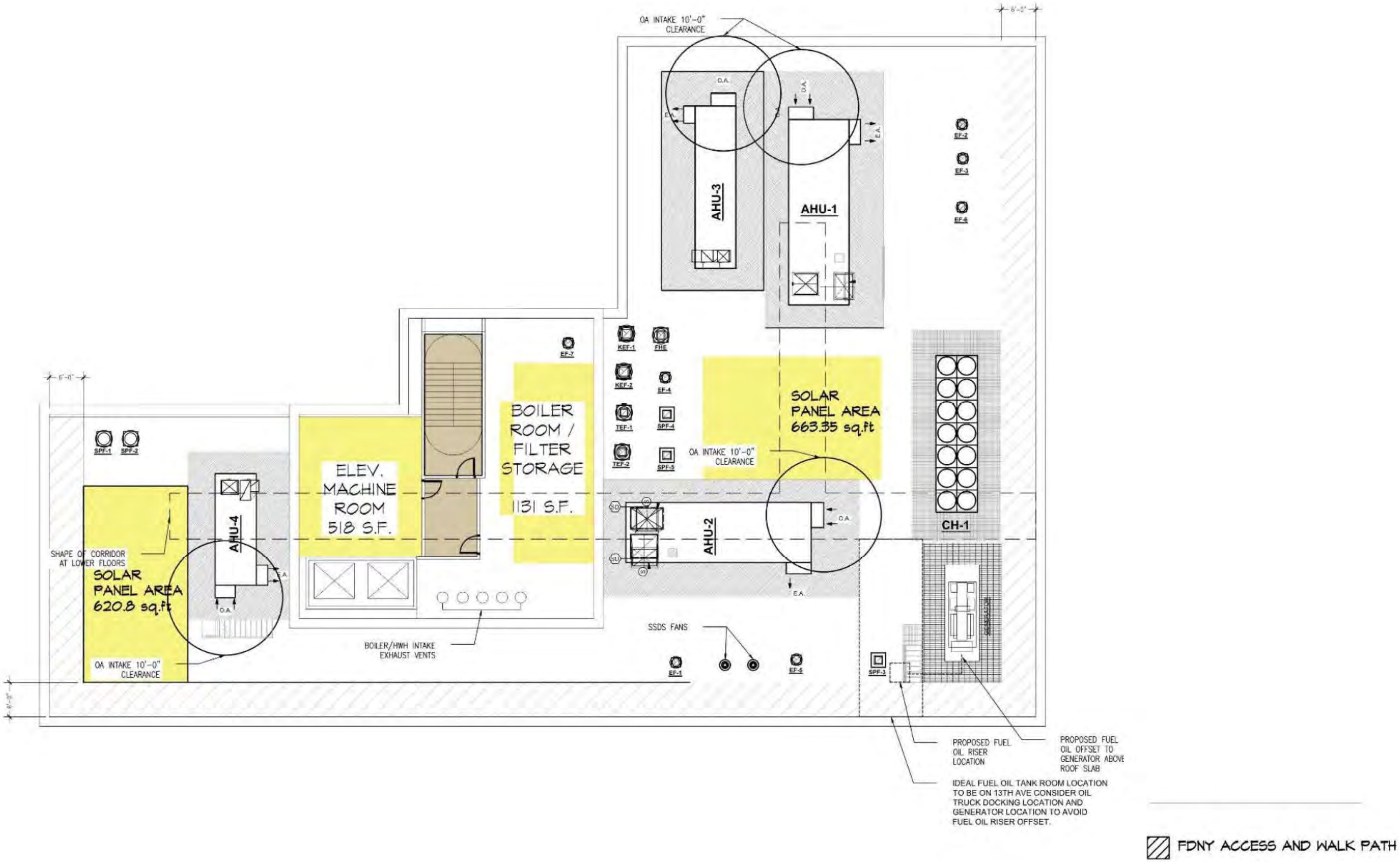
Local Law 94 of 2019 – Sustainable Roofing Zone

Refer to Sustainable Roofing Zone Diagrams below

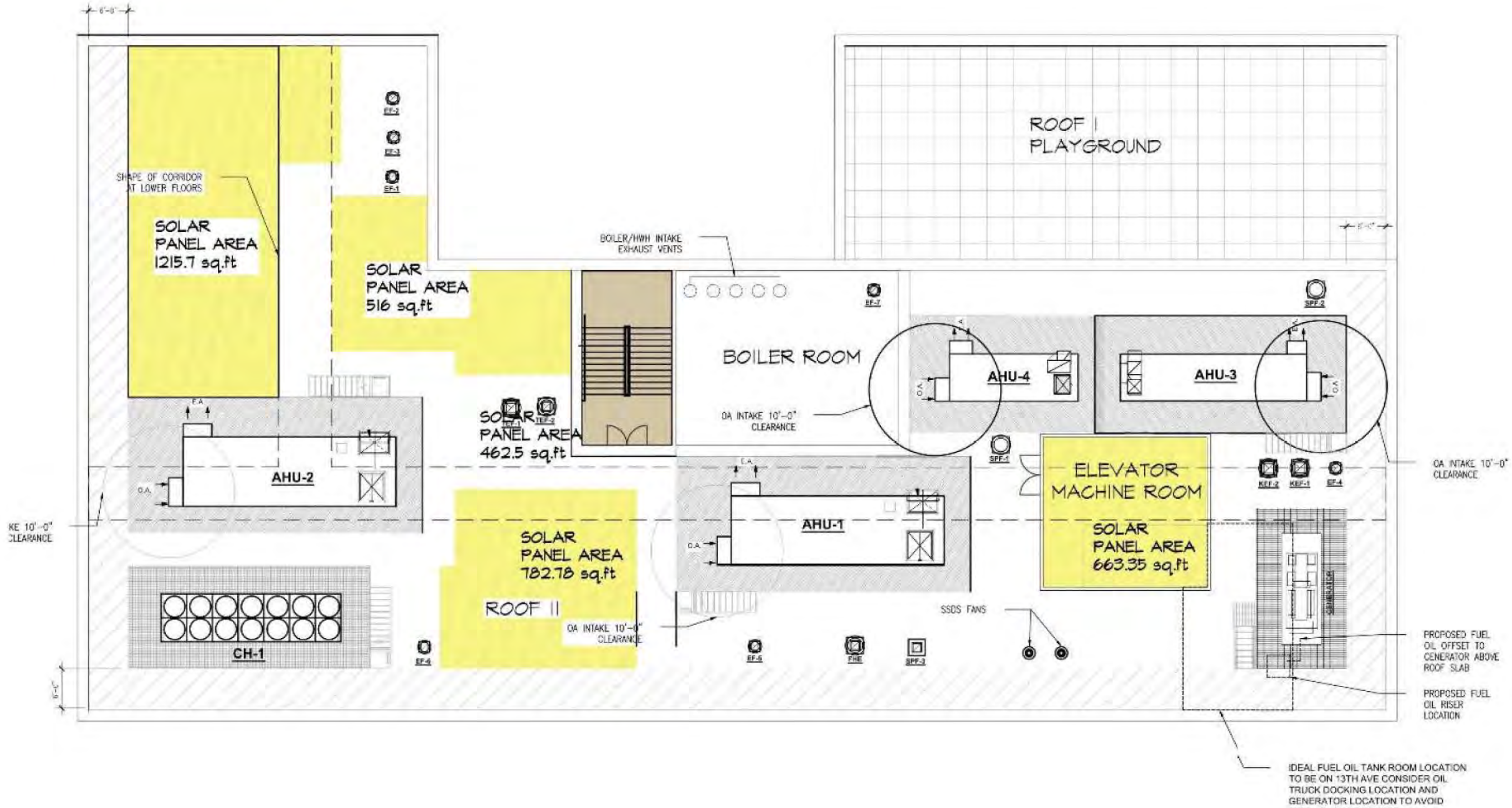
Discovery #1 Scheme A

Energy and Daylight Related Systems

Renewable Energy Analysis

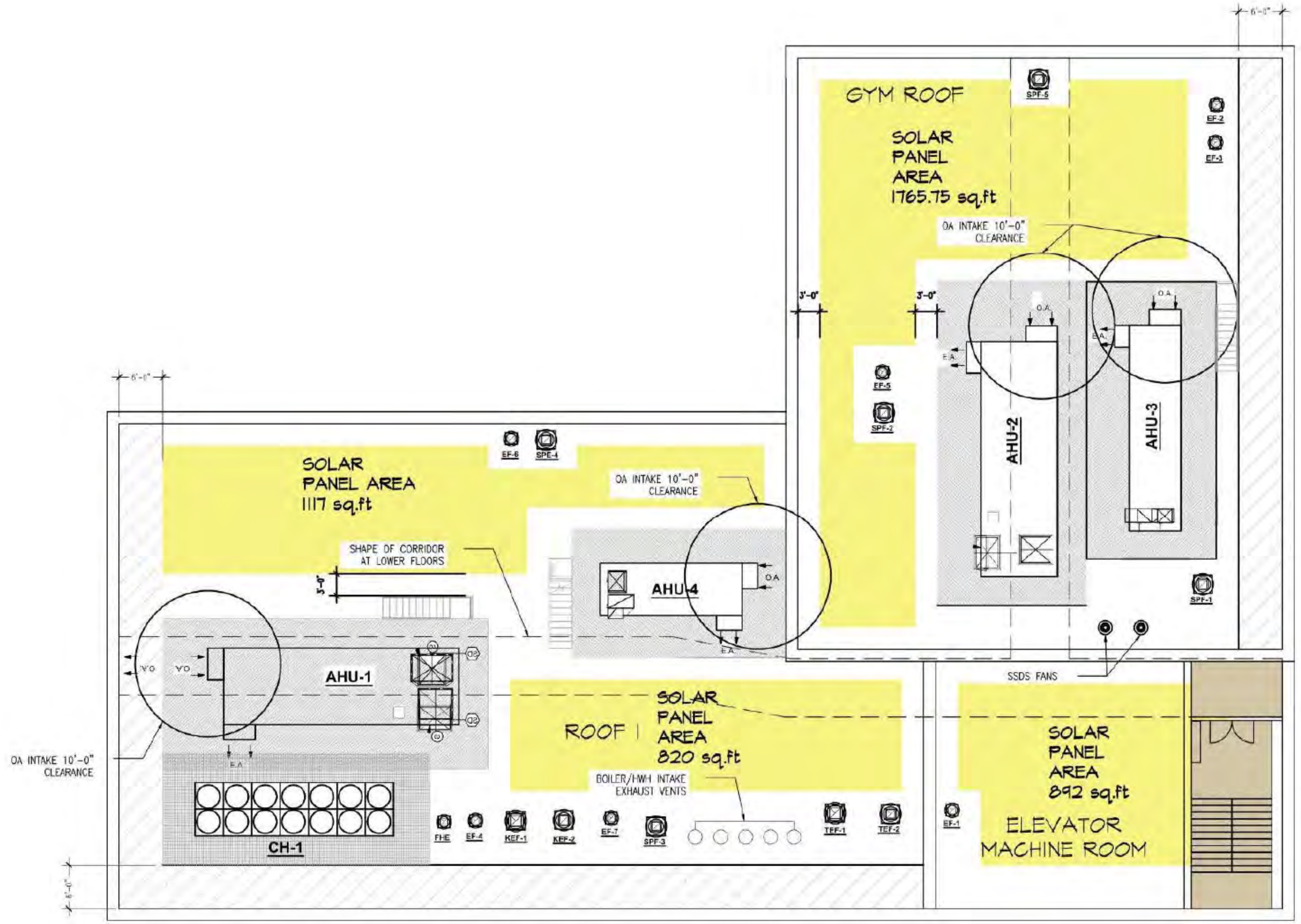


Discovery #1 Scheme B
Energy and Daylight Related Systems
Renewable Energy Analysis



Energy and Daylight Related Systems

Renewable Energy Analysis



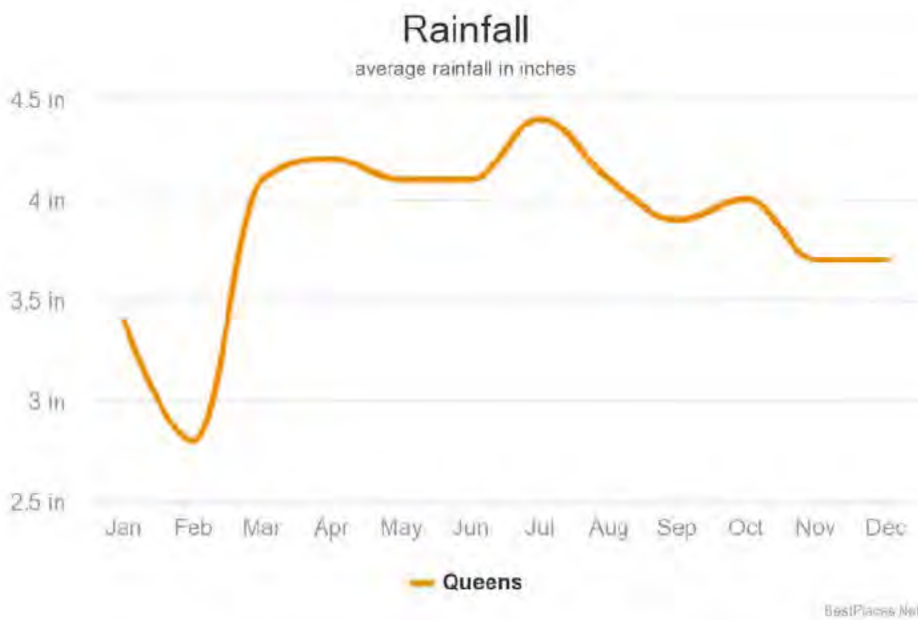
Discovery #2 - Water-Related Systems

Supply Sources

Test-Fit / Sketch Study report indicates groundwater was encountered at 30 feet based on 1944 borings. Groundwater cannot be used as a source of potable water.

Existing 8" lined cast iron pipe water supply lines are below Ellwell Crescent and Dieterle Crescent.

	Queens, New York	United States
<u>Annual Rainfall</u>	46.4 in.	38.1 in.



Rainwater Collection Calculator in Gallons

Rainwater can be collected from the roofs using the rain water harvesting method. The collectable rainwater from the roof can be calculated in gallons using this calculator based on the rainfall and area.

Calculate Rainwater Collection in Gallons

Rain Fall

46.4 inches

Area

20000 square feet

Rain Water

464000 gallons

Calculate Reset

Formula:

$$r = 0.5 * f * a$$

Where,

r = Rainwater Collection in Gallons
f = Rain Fall
a = Area

The 20,000sf area considered for rainwater collection includes the entire area carved out of Lot 1 for the new addition, not just the roof of the new building itself.

Average annual rainfall collected from this area can supply roughly 100% of the plumbing fixture use.

Cost Impact

Rainwater collection: extensive filtering required by NYC DEP for use for irrigation and/or flushing toilets. Queens groundwater is not used as a source of potable water.

Graywater re-use: large increase in piping needed and extensive filtering required by NYC DEP for use for irrigation and/or flushing toilets.

HVAC equipment condensate (e.g. boilers, split heat pumps, kitchen equipment) re-use: extensive filtering required by NYC DEP.

Cooling tower condensate re-use: Standard SCA cooling system does not include cooling towers so condensate re-use in cooling towers is not available.

Annual Water Demand Analysis

NYC Green Schools Rating System
INDOOR WATER USE REDUCTION
CREDIT FORM
Credit W2.1P, W2.2R

SCA School Construction Authority
RESPONSIBLE PARTY:
INITIAL SUBMISSION PHASE:

Project:		Submission Phase:	IDP
Address:	65-10 Dieterle Crescent	Architect:	
LLW #:		Preparer:	
Design #:	0	Form Revision Date:	11-Dec-20

INSTRUCTIONS:
Step 1) Insert Occupancy Info:
Insert number of students in summer, number of staff in summer, number of D75 students with toilets in regular school year and number of D75 students with toilets in summer.
Step 2) Check compliance at bottom of form.
W2.2R is feasible if reduction from baseline is equal to or greater than 30%.
W2.3 is feasible if reduction from baseline is equal to or greater than 35%.
W2.3 is feasible if reduction from baseline is equal to or greater than 40%.

Step 1: Insert Occupancy Info

	Regular	Summer
Total number students	460	138
Total number of staff	73	22
Number of D75 students in classrooms with toilets	0	0
Total students PK to K	152	46
Conventional Water Closet (male 1-12)	154	46
Conventional Urinal (male 1-12)	154	46
Conventional Water Closet (female 1-12)	154	46

Reference Table 1: Instructional Days

Annual Instruction Days School is in Full Operation	180
Annual Instructional Days School is in Summer Operation	30

Reference Table 2: Daily Sewage Volumes (gallons)

		Base Case					Design Case				
		Daily Uses	Flowrate (gpm or gpc)	Duration (Flush)	Regular Sewage Generated	Summer Sewage Generated	Daily Uses	Flowrate (gpm or gpc)	Duration (Flush)	Regular Sewage Generated	Summer Sewage Generated
Flow Fixtures	Conventional Lavatory (Student) (cycle)	3.0	0.25	1	345	104	3.0	0.125	1	173	52
	Conventional Lavatory (Adult) (cycle)	3.0	0.25	1	55	17	3.0	0.125	1	27	8
	Shower (gpm, seconds)	0.1	2.50	1	18	18	0.1	1.80	1	13	13
	Hand Sink (cycle)	4.0	0.25	1	533	160	4.0	0.125	1	267	80
Flush Fixtures	Conventional Water Closet (male 1-12)	1.0	1.60	1	246	74	1.0	1.28	1	197	59
	Conventional Urinal (male 1-12)	2.0	1.00	1	308	92	2.0	0.125	1	39	12
	Conventional Water Closet (female 1-12)	3.0	1.60	1	739	221	3.0	1.28	1	591	177
	Conventional Water Closet (PK, K classrm w/ toilet)	3.0	1.60	1	730	221	3.0	1.28	1	584	177
	Conventional Water Closet (D75 classrm w/ toilet)	3.0	1.60	1	-	-	3.0	1.28	1	-	-
	Conventional Water Closet (adult)	3.0	1.60	1	350	106	3.0	1.28	1	280	84
				BASE CASE TOTALS	3,325	1,011			DESIGN CASE TOTALS	2,170	661

Regular Operation + Summer Operation Summary

	Base Case	Design Case
Total "Regular Operation" + Summer Operation" Annual Volume	628,760	410,528
Total: Water Use Reduction for "Regular Operation" + "Summar Operation"		35%

Notes

1. Figures in shaded boxes are based on EPA 1992 as amended in 2005 with revisions as per LEED 2009 (base case), SCA standards (design case) or are calculated by this spreadsheet. No design team revision required.
2. Spreadsheet will calculate occupant users for water closets and urinals for design and base cases based on figures entered by Design Team for "Occupant Users" for "Conventional Lavatory" for students and adults, along with "% of Student Population by Grade". Distribution of male and female "Occupant Users" are based on assumption of 50-50 ratio of male and
3. Methodology to determine student population. Use unadjusted capacity from POR
Methodology to determine adult population. Follow DR 2.3.3-Bicycle Racks
4. Figure entered by Design Team for occupant users for showers should include all physical education staff, potential adult bike users (GSG credit S 2.2) and for high schools with showers in the student locker rooms, all students.
5. Figure entered by Design Team to determine occupant users for "Food Sevice Hand Sinks" is based on 1 staff for each 100 students. Student population based on unadjusted capacity from POR is to be entered. (Minimum of 2 kitchen staff is required)
6. For "Summer Operation", occupant users is anticipated to be 30% of "Full Operation Population". If program is known to be different, actual summer population should be entered.
7. For "Annual Days of Summer Operation", revise anticipated number of days for regular summer operation, excluding weekends and days when school is closed, if program is known to be different than the default value of 30.
8. Modernization projects should include the actual fixture flow rate of fixtures to remain in the design case calculations and indicate assumptions about percentage of occupant users who will use those existing fixtures to remain.
9. Percentage of Student Population by Grade should be based on number of students in classrooms with toilets located within the classrooms. Dedicated classroom toilets would be applicable to PK and K and to first and second grade classrooms as indicated in the POR. Single user toilets are typically provided for staff use. If first and second grade don't have
10. For typical IS and HS, percentage of occupant users in the PK-K row should be equal to zero.
11. For typical PS and PS/IS, percentage of occupant users in the PK-K row should be based on occupants users in PK-K grade classrooms that have dedicated toilets.

Green Infrastructure

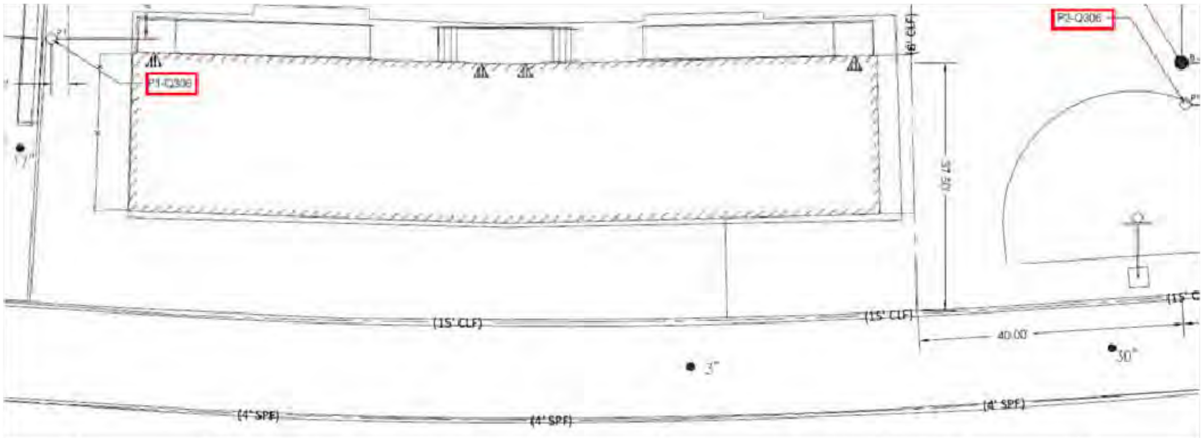
Test Fit / Sketch Study:

- Site slopes down from Northeast to Southwest, approximate 1.6% slope.
- Bedrock is approximately 434 feet below grade.
- Ground water level is below 30 feet below grade from borings of 1944.
- Not within a flood zone.
- Most of proposed site currently covered in asphalt.

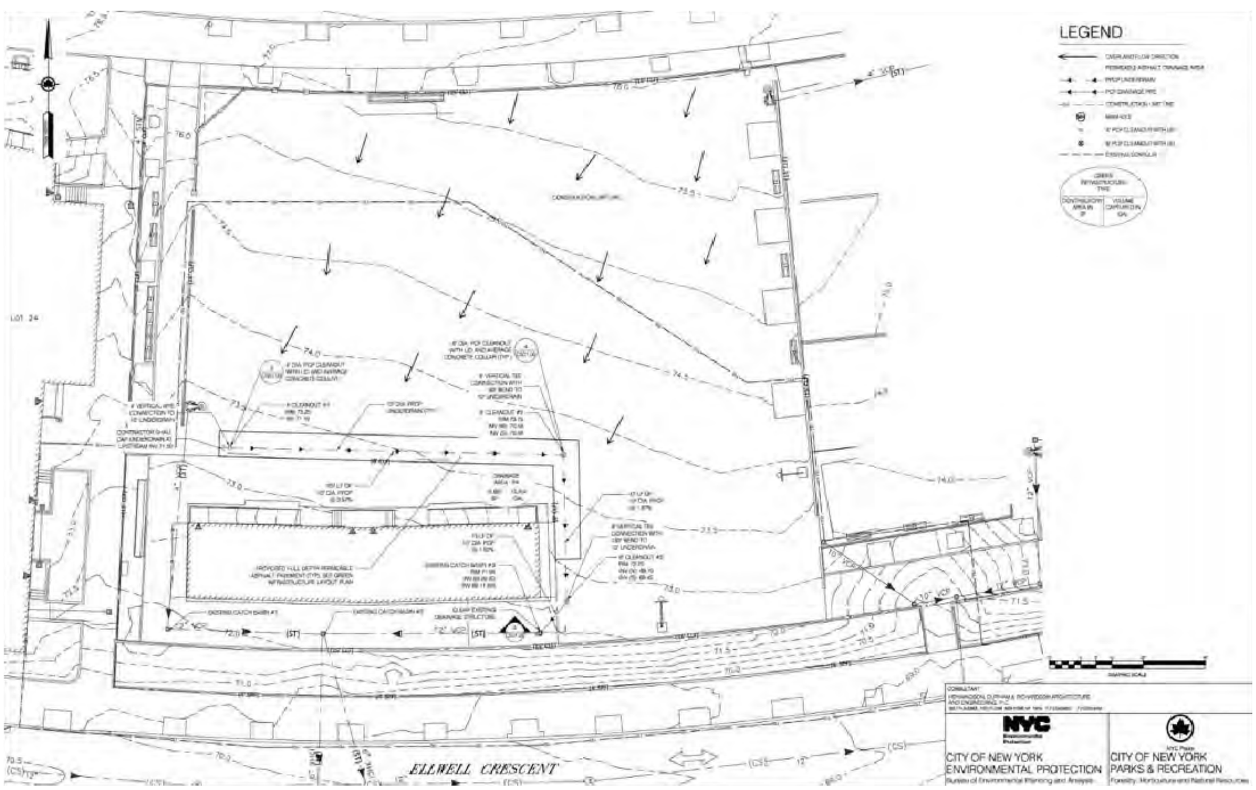
Documentation from DEP Green Infrastructure project Q306-2, previously planned for Painters Playground, is shown below.

- Borings found dry loose light brown f sand, trace silt, and trace f gravel (SP) to 15 feet below grade
- Borings found maximum soil permeability of 19.51 in/hr = 0.0138 cm/sec
- Per the SCA Green Infrastructure Assessment flow chart, soil type and soil permeability are not suitable for green infrastructure

Following the DEP documentation is a preliminary analysis of stormwater management options for the PS174Q addition by the project's civil engineer.



No.	Nearest Boring ID No.	Laboratory Testing Data / Historical Boring Soil Description			Permeability Analysis			Groundwater Table Depth(ft)
		Depth (ft)	USCS Symbol	% Passing No 200 Sieve	Nearest Permeability Test ID No.	Permeability Test Depth (ft)	Average Permeability Coef. (in/hr)	
6-1	B1-Q306	3 - 5	SM	22.1%	P1-Q306	3	1.59	
.C)		5 - 7	SM	13.2%		6	0.40	
		7 - 9	SM	12.4%		10	0.52	N/A
		9 - 11	SW-SM	10.7%				
		11 - 13	SM	16.7%				
6-2	B2-Q306	3 - 5	SM	12.7%	P2-Q306	3	19.51	
.C)		5 - 7	SW-SM	10.8%		6	0.13	
		7 - 9	SP-SM	5.4%		10	2.70	N/A



From:
Sent: Tuesday, November 10, 2020 11:17 AM
To:
Cc:
Subject: Stormwater summary

Please see our outline for your schematic considerations.
The two concepts you are advancing (2 story v. 3 story) have little bearing on the rough sizing, so please consider this information universal.
SCA support with DEP and Parks to obtain information not available through record retrieval channels would be advantageous to stay on schedule.
For comparative purposes, we sized the stormwater mitigation as a pipe in a stone envelope.
You will see the inclusion of the JOP in the project introduces a multiplier of ~5 on the stormwater requirement.
Building design, survey, and geotechnical will be required to remove variables and allow us to refine the design.
Please let us know what level of additional information/documentation you would like us to prepare at this early juncture.

1. Point of discharge
    a. Ellwell Crescent
    b. Combined sewer
    c. Sewer ~11' below grade
    d. Survey to confirm elevations
2. Location of system
    a. Grade falls from Dieterle to Ellwell
    b. Subsurface system would lie generally below footprint of TCB to be removed
    c. Infiltration and borings required to confirm separation from rock/groundwater and infiltration rate
    d. Record drawings required from Parks. SCA should provide contact or request/circulate plans.
    e. DEP has a green infrastructure project (Q306-2) under design(OGI-DESIGN-2-OS14) in the Painter's Playground (permeable pavement)
        i. The location of the project is unknown and requires coordination design drawings required from DEP. SCA should request and circulate.
3. Approach to filing
    a. 2 theoretical possibilities:
        i. JOP = Site
            1. typical approach that requires stormwater mitigation be installed for the entire lot (SCA and Parks improvements)
            2. Existence of DEP green infrastructure project (Q306-2) may complicate the application
        ii. 20,000 SF "lease" = Site
            1. Deputy Chief, Site Connection & Application Review was hesitant, but did not rule out. Pre-application conference would be required to discuss any potential.
            2. Existence of DEP green infrastructure project (Q306-2) may complicate the discussion design drawings should be obtained before a meeting

3. Direction required to proceed to Pre-application conference.

4. Schematic solutions
   a. Working assumptions:
      i. 15,000 SF building (max)
      ii. 5,000 SF exterior hardscape (walks, courtyards, plazas, ramps, and similar)
      iii. Painter's Playground improvements are unchanged under this project
      iv. <10,000 SF available for blue roof
      v. Structural verification of load-carrying capacity for blue roof will be provided
      vi. SCP application cannot be made without final design of roof
      vii. SWPPP will be provided on the detailed erosion and sediment control plans.
      viii. Green infrastructure feasibility will require subsurface investigation results.
   b. 20,000 SF "lease" = Site
      i. 1 perforated pipe in stone pack
      ii. 4' diameter
      iii. infiltration rate conservatively assumed
      iv. 121' of pipe required
      v. Rectangular footprint (ft) = 5x121, plus inlet & outlet structures
   c. JOP = Site
      i. 5 perforated pipes in stone pack
      ii. 4' diameter
      iii. infiltration rate conservatively assumed
      iv. 137' of pipe required in each row – 685' total
      v. Rectangular footprint (ft) = 25x137, plus inlet & outlet structures
      vi. The tributary area to the DEP green infrastructure project (Q306-2) can potentially offset a portion of this system size.
      vii. feasibility of capture of the eastern portion of the park is unknown until survey is completed, Parks record plans are reviewed, and DEP GI project Q306-2 is reviewed.
   d. Blue roof
      i. cannot mitigate stormwater alone
      ii. can be implemented in series before subsurface system
      iii. will provide a small but limited volume mitigation benefit – can be disregarded for schematic planning purposes
      iv. benefit is constrained by DEP limitations on depth, flow rate, roof slope, and percentage contribution to regulatory release rate

Integrative Design Report and Recommendations

3.3 Detention Facility Design

CRITERIA FOR DETENTION FACILITY DESIGN
SD-1/SD-2 CALCULATION - MANHATTAN

SCHEME A

PREPARED BY: NYAN WIN AUNG, P.E. DATE: 5/21/2020

PROJECT NAME:			
PROJECT ADDRESS:			
BOROUGH:	MANHATTAN		
BLOCK:	2214		
LOT:	24		
ZONE	M1-1	MAP:	3a

STORM FLOW CALCULATION

	AREA	RUNOFF COEFFICIENT	
	SQ.FT	C	AREA X C
LOT SIZE	20,000.00		20,000.00
ROOF	13,610.00	0.95	12,929.50
SYNTHETIC TURF		0.70	0.00
PAVED	6,390.00	0.85	5,431.50
GRASS	0.00	0.20	0.00

As = THE SITE AREA IN ft^2	
ASxCw	18,361.0

Cwt = THE WEIGHTED RUNOFF COEFFICIENT FOR THE SITE AREA	
Cwt	0.918

Qall = THE ALLOWABLE FLOW RATE IN cfs A Site in the Brooklyn			
Qall	Site Area		Factor
1.64	20,000.00		12,200.00

Qdev = THE DEVELOPED FLOW RATE IN cfs			
Qdev	AS	Factor	
2.51	18,361.00	7,320.00	

Qdrr= THE DETENTION FACILITY MAXIMUM RELEASE RATE IN cfs	
Qdrr	0.25

Qall	<	Qdev	Detention tank is required

NYC School Construction Authority
SCA

Integrative Design Report and Recommendations

OUTFLOW WILL BE CONTROLLED BY AN ORIFICE TUBE AND WILL VARY WITH THE DEPTH OF STORAGE.

tv = 0.27(Cwt At/Qdrr)^0.5-15

Tv = THE DURATION OF THE STORM IN min WITH A 10YR. RETURN FREQUENCY REQUIRING THE MAXIMUM DETENTION VOLUME WITH A VARIABLE OUTFLOW

Cwt = THE WEIGHTED RNOFF COEFFICIENT FOR THE AREA TRIBUTARY TO THE DETENTION FACILITY

At= THE ARE TRIBUTARY TO THE DETENTION FACIUTY IN ft2

Tv (min)	Factor	Cwt	At	Qdrr
58.17	0.27	0.92	20,000.00	0.25

Vv = THE MAXIMUM REQUIRED DETENTION VOLUME IN ft^3 WITH A VARIABLE OUTFLOW

Vv = [0.19CwtAt/(tv+15)-40Qdrr]tv

Vv (cu.ft.)	Factor	Cwt	At	Qdrr
2,191.72	0.19	0.92	20,000.00	0.25

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH FLUSH ORIFICE TUBE OUTLET.

Sdf = THE MAXIMUM STORAGE DEPTH IN FT. FOR FLUSH ORIFIC TUBE OUTLET

Sdf = 1400 (Qdrr)^2/(do)^4 + do/24

Sdf (ft)	Factor	Qdrr	do	
5.55	1400	0.25	2	

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH RE-ENTRANT ORIFICE TUBE OUTLET

Sdr = THE MAXIMUM STORAGE DEPTH IN FT. FOR RE-ENTRANT ORIFICE TUBE OUTLET

Sdr = 1930 (Qdrr)^2/(do)^4 + do/24

Sdr (ft)	Factor	Qdrr	do	
7.62	1930	0.25	2	

USE FLUSH ORIFICE	ONE MODULE CAPACITY			
NO. OF MODULES REQUIREMENT	DEPTH (ft.)	WIDTH (ft.)	LENGTH (ft.)	VOLUME (cu.ft.) PER MODULE
4	5.55	15.0	7.0	583.0

TOTAL STORAGE VOLUME (cu.ft.)		REQUIRED VOLUME (cu.ft.)	
2,331.88	>	2,191.72	SATISFY

SANITARY FLOW CALCULATION (Zone: M1-1)

10,000 (gal./acre/day) x total site area (sq.ft/43,560) Acre x factor x peak flow factor

Sanitary Flow (cfs)	Population Density per Acre	Site Area (sq ft.)	Gallons Per Person Per Day	Peak
0.0142	10,000	20,000.00	1	2

CRITERIA FOR DETENTION FACILITY DESIGN

SD-1/SD-2 CALCULATION - MANHATTAN

SCHEME B

PREPARED BY: NYAN WIN AUNG, P.E. DATE: 5/21/2020

PROJECT NAME:			
PROJECT ADDRESS:			
BOROUGH:	MANHATTAN		
BLOCK:	2214		
LOT:	24		
ZONE	M1-1	MAP:	3a

STORM FLOW CALCULATION

	AREA	RUNOFF COEFFICIENT	
	SQ.FT	C	AREA X C
LOT SIZE	20,000.00		20,000.00
ROOF	12,872.00	0.95	12,228.40
SYNTHETIC TURF		0.70	0.00
PAVED	7,128.00	0.85	6,058.80
GRASS	0.00	0.20	0.00

As = THE SITE AREA IN ft^2	
ASxCw	18,287.2

Cwt = THE WEIGHTED RUNOFF COEFFICIENT FOR THE SITE AREA	
Cwt	0.914

Qall = THE ALLOWABLE FLOW RATE IN cfs			
A Site in the Brooklyn			
Qall	Site Area		Factor
1.64	20,000.00		12,200.00

Qdev = THE DEVELOPED FLOW RATE IN cfs			
Qdev	AS	Factor	
2.50	18,287.20	7,320.00	

Qdrr= THE DETENTION FACILITY MAXIMUM RELEASE RATE IN cfs	
Qdrr	0.25

Qall	<	Qdev	Detention tank is required

SCA NYC School Construction Authority

Integrative Design Report and Recommendations

OUTFLOW WILL BE CONTROLLED BY AN ORIFICE TUBE AND WILL VARY WITH THE DEPTH OF STORAGE.

tv = 0.27(Cwt At/Qdrr)^0.5-15

Tv = THE DURATION OF THE STORM IN min WITH A 10YR. RETURN FREQUENCY REQUIRING THE MAXIMUM DETENTION VOLUME WITH A VARIABLE OUTFLOW

Cwt= THE WEIGHTED RNOFF COEFFICIENT FOR THE AREA TRIBUTARY TO THE DETENTION FACILITY

At= THE ARE TRIBUTARY TO THE DETENTION FACILITY IN ft2

Tv (min)	Factor	Cwt	At	Qdrr
58.02	0.27	0.91	20,000.00	0.25

Vv = THE MAXIMUM REQUIRED DETENTION VOLUME IN ft^3 WITH A VARIABLE OUTFLOW

Vv = [0.19CwtAt/(tv+15)-40Qdrr]tv

Vv (cu.ft.)	Factor	Cwt	At	Qdrr
2,180.61	0.19	0.91	20,000.00	0.25

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH FLUSH ORIFICE TUBE OUTLET.

Sdf = THE MAXIMUM STORAGE DEPTH IN FT. FOR FLUSH ORIFIC TUBE OUTLET

Sdf = 1400 (Qdrr)^2/(do)^4 + do/24

Sdf (ft)	Factor	Qdrr	do	
5.55	1400	0.25	2	

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH RE-ENTRANT ORIFICE TUBE OUTLET

Sdr = THE MAXIMUM STORAGE DEPTH IN FT. FOR RE-ENTRANT ORIFICE TUBE OUTLET

Sdr = 1930 (Qdrr)^2/(do)^4 + do/24

Sdr (ft)	Factor	Qdrr	do	
7.62	1930	0.25	2	

USE FLUSH ORIFICE	ONE MODULE CAPACITY			
NO. OF MODULES REQUIREMENT	DEPTH (ft.)	WIDTH (ft.)	LENGTH (ft.)	VOLUME (cu.ft.) PER MODULE
4	5.55	15.0	7.0	583.0

TOTAL STORAGE VOLUME (cu.ft.)		REQUIRED VOLUME (cu.ft.)	SATISFY
2,331.88	>	2,180.61	

SANITARY FLOW CALCULATION (Zone: M1-1)

10,000 (gal./acre/day) x total site area (sq.ft/43,560) Acre x factor x peak flow factor

Sanitary Flow (cfs)	Population Density per Acre	Site Area (sq.ft.)	Gallons Per Person Per Day	Peak
0.0142	10,000	20,000.00	1	2

Integrative Design Report and Recommendations

CRITERIA FOR DETENTION FACILITY DESIGN

SD-1/SD-2 CALCULATION - MANHATTAN

SCHEME C

PREPARED BY: NYAN WIN AUNG, P.E. DATE: 5/21/2020

PROJECT NAME:	I		
PROJECT ADDRESS:	',		
BOROUGH:	MANHATTAN		
BLOCK:	2214		
LOT:	24		
ZONE	M1-1	MAP:	3a

STORM FLOW CALCULATION

	AREA	RUNOFF COEFFICIENT	
	SQ.FT	C	AREA X C
LOT SIZE	20,000.00		20,000.00
ROOF	15,027.00	0.95	14,275.65
SYNTHETIC TURF		0.70	0.00
PAVED	4,973.00	0.85	4,227.05
GRASS	0.00	0.20	0.00

As = THE SITE AREA IN ft^2	
ASxCw	18,502.7

Cwt = THE WEIGHTED RUNOFF COEFFICIENT FOR THE SITE AREA	
Cwt	0.925

Qall = THE ALLOWABLE FLOW RATE IN cfs A Site in the Brooklyn			
Qall	Site Area		Factor
1.64	20,000.00		12,200.00

Qdev = THE DEVELOPED FLOW RATE IN cfs			
Qdev	AS	Factor	
2.53	18,502.70	7,320.00	

Qdrr= THE DETENTION FACILITY MAXIMUM RELEASE RATE IN cfs	
Qdrr	0.25

Qall	<	Qdev	Detention tank is required

SCA NYC School Construction Authority

Integrative Design Report and Recommendations

OUTFLOW WILL BE CONTROLLED BY AN ORIFICE TUBE AND WILL VARY WITH THE DEPTH OF STORAGE.

tv = 0.27(Cwt At/Qdrr)^0.5-15

Tv = THE DURATION OF THE STORM IN min WITH A 10YR. RETURN FREQUENCY REQUIRING THE MAXIMUM DETENTION VOLUME WITH A VARIABLE OUTFLOW

Cwt= THE WEIGHTED RNOFF COEFFICIENT FOR THE AREA TRIBUTARY TO THE DETENTION FACILITY
At= THE ARE TRIBUTARY TO THE DETENTION FACILITY IN ft2

Tv (min)	Factor	Cwt	At	Qdrr
58.45	0.27	0.93	20,000.00	0.25

Vv = THE MAXIMUM REQUIRED DETENTION VOLUME IN ft^3 WITH A VARIABLE OUTFLOW
Vv = [0.19CwtAt/(tv+15)-40Qdrr]tv

Vv (cu. ft.)	Factor	Cwt	At	Qdrr
2,213.07	0.19	0.93	20,000.00	0.25

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH FLUSH ORIFICE TUBE OUTLET.
Sdf = THE MAXIMUM STORAGE DEPTH IN FT. FOR FLUSH ORIFIC TUBE OUTLET
Sdf = 1400 (Qdrr)^2/(do)^4 + do/24

Sdf (ft)	Factor	Qdrr	do	
5.55	1400	0.25	2	

TO MAXIMUMIZE THE STORAGE DEPTH, USE A 2.0 in Dia. WITH RE-ENTRANT ORIFICE TUBE OUTLET
Sdr = THE MAXIMUM STORAGE DEPTH IN FT. FOR RE ENTRANT ORIFICE TUBE OUTLET
Sdr = 1930 (Qdrr)^2/(do)^4 + do/24

Sdr (ft)	Factor	Qdrr	do	
7.62	1930	0.25	2	

USE FLUSH ORIFICE	ONE MODULE CAPACITY			
NO. OF MODULES REQUIREMENT	DEPTH (ft.)	WIDTH (ft.)	LENGTH (ft.)	VOLUME (cu.ft.) PER MODULE
4	5.55	15.0	7.0	583.0

TOTAL STORAGE VOLUME (cu.ft.)		REQUIRED VOLUME (cu.ft.)	
2,331.88	>	**2,213.07**	**SATISFY**

SANITARY FLOW CALCULATION (Zone: M1 1)
10,000 (gal./acre/day) x total site area (sq.ft/43,560) Acre x factor x peak flow factor

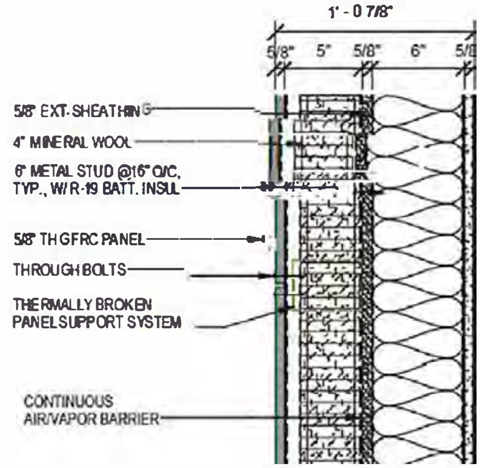
Sanitary Flow (cfs)	Population Density per Acre	Site Area (sq.ft.)	Gallons Per Person Per Day	Peak
0.0142	10,000	20,000.00	1	2

DISCOVERY #3 PRELIMINARY LIFE-CYCLE IMPACTS

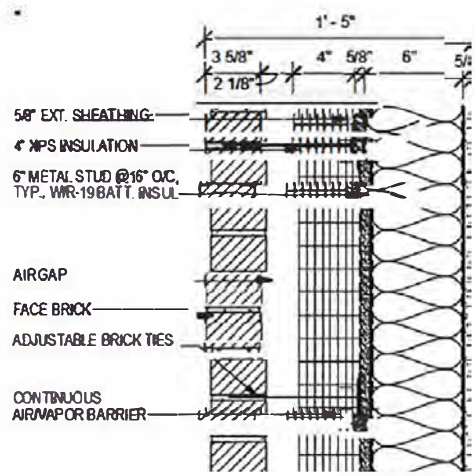
Comparative life-cycle assessment of potential wall systems was investigated in the Athena software.

The LCA comparison is between:

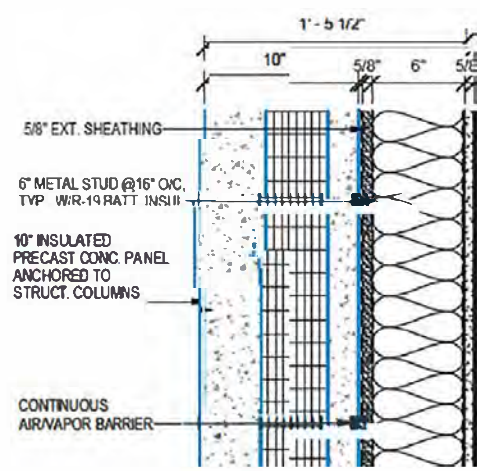
BASE: Brick/CMU Cavity wall
OPTION #1: Fiber Cement Panel On Metal Stud
OPTION #2: Modular Brick On Metal Stud
OPTION #3: Precast Concrete Panels On Metal Stud



OPTION 1
Fiber Cement Panel On Mtl Stud

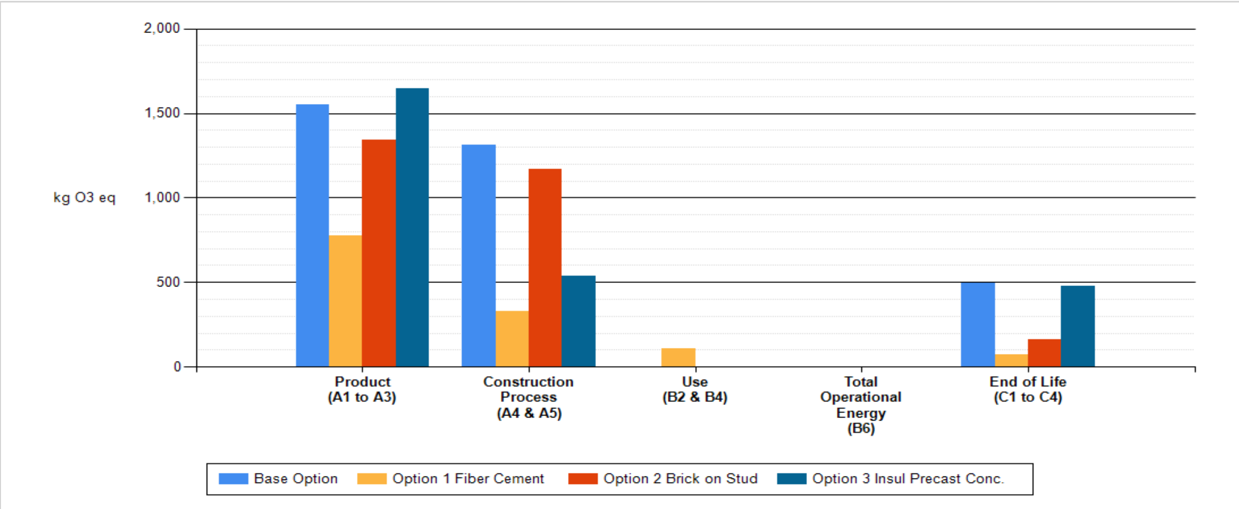


OPTION 2
Modular Brick On Mtl Stud



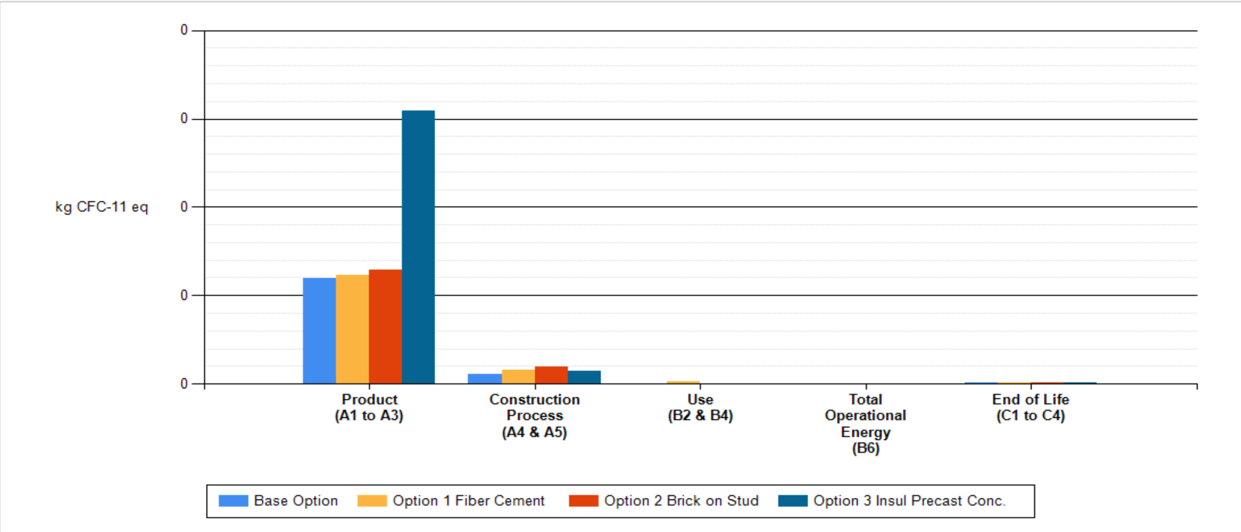
OPTION 3
Precast Concrete Panels On Mtl Stud

Comparison of Smog Potential By Life Cycle Stage



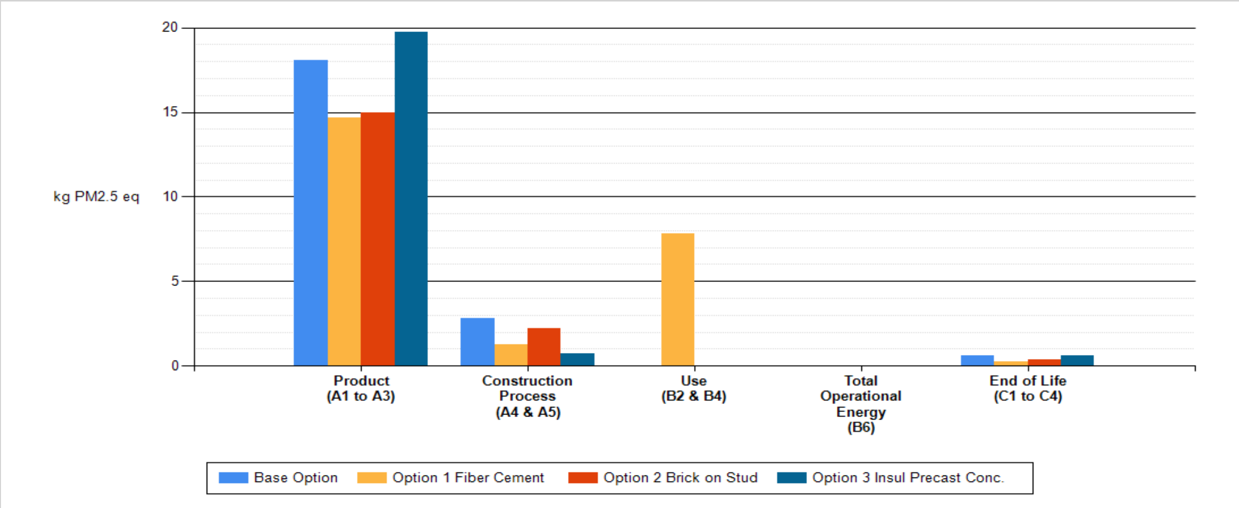
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg O3 eq	1.55E+03	1.31E+03	0.00E+00	0.00E+00	4.94E+02	**3.35E+03**
Option 1 Fiber Cement	kg O3 eq	7.75E+02	3.30E+02	1.05E+02	0.00E+00	7.44E+01	**1.28E+03**
Option 2 Brick on Stud	kg O3 eq	1.34E+03	1.17E+03	0.00E+00	0.00E+00	1.60E+02	**2.67E+03**
Option 3 Insul Precast Conc.	kg O3 eq	1.65E+03	5.37E+02	0.00E+00	0.00E+00	4.75E+02	**2.66E+03**
Total	**kg O3 eq**	**5.31E+03**	**3.35E+03**	**1.05E+02**	**0.00E+00**	**1.20E+03**	**9.97E+03**

Comparison of Ozone Depletion Potential By Life Cycle Stage



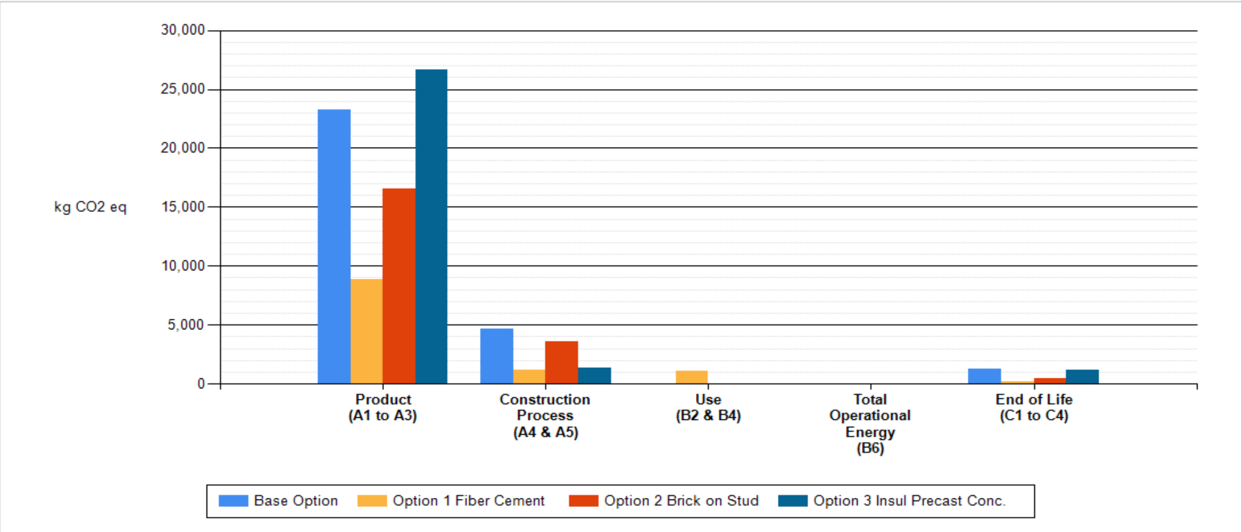
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CFC-11 eq	2.40E-04	2.28E-05	0.00E+00	0.00E+00	4.94E-08	**2.63E-04**
Option 1 Fiber Cement	kg CFC-11 eq	2.45E-04	3.20E-05	4.50E-06	0.00E+00	8.28E-09	**2.82E-04**
Option 2 Brick on Stud	kg CFC-11 eq	2.58E-04	3.78E-05	0.00E+00	0.00E+00	1.76E-08	**2.96E-04**
Option 3 Insul Precast Conc.	kg CFC-11 eq	6.18E-04	2.88E-05	0.00E+00	0.00E+00	4.68E-08	**6.47E-04**
Total	**kg CFC-11 eq**	**1.36E-03**	**1.21E-04**	**4.50E-06**	**0.00E+00**	**1.22E-07**	**1.49E-03**

Comparison of HH Particulate By Life Cycle Stage



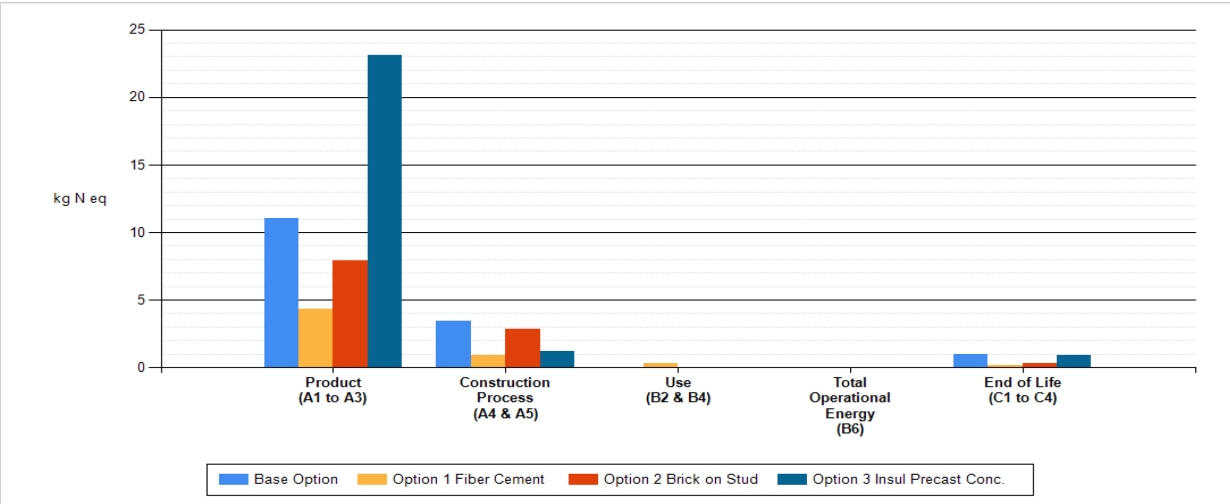
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg PM2.5 eq	1.81E+01	2.82E+00	0.00E+00	0.00E+00	5.78E-01	**2.15E+01**
Option 1 Fiber Cement	kg PM2.5 eq	1.47E+01	1.28E+00	7.84E+00	0.00E+00	2.48E-01	**2.40E+01**
Option 2 Brick on Stud	kg PM2.5 eq	1.50E+01	2.20E+00	0.00E+00	0.00E+00	3.77E-01	**1.75E+01**
Option 3 Insul Precast Conc.	kg PM2.5 eq	1.97E+01	7.04E-01	0.00E+00	0.00E+00	6.17E-01	**2.10E+01**
Total	**kg PM2.5 eq**	**6.74E+01**	**7.01E+00**	**7.84E+00**	**0.00E+00**	**1.82E+00**	**8.41E+01**

Comparison of Global Warming Potential By Life Cycle Stage



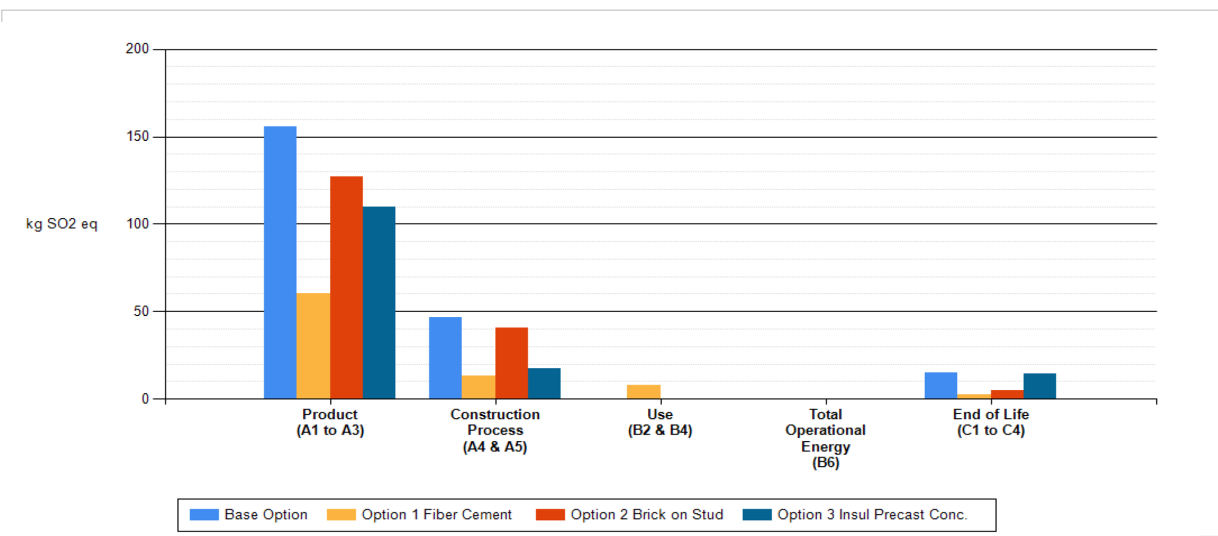
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CO2 eq	2.32E+04	4.67E+03	0.00E+00	0.00E+00	1.24E+03	**2.91E+04**
Option 1 Fiber Cement	kg CO2 eq	8.88E+03	1.22E+03	1.04E+03	0.00E+00	2.08E+02	**1.13E+04**
Option 2 Brick on Stud	kg CO2 eq	1.65E+04	3.57E+03	0.00E+00	0.00E+00	4.60E+02	**2.06E+04**
Option 3 Insul Precast Conc.	kg CO2 eq	2.66E+04	1.39E+03	0.00E+00	0.00E+00	1.14E+03	**2.92E+04**
Total	**kg CO2 eq**	**7.53E+04**	**1.08E+04**	**1.04E+03**	**0.00E+00**	**3.04E+03**	**9.02E+04**

Comparison of Eutrophication Potential By Life Cycle Stage



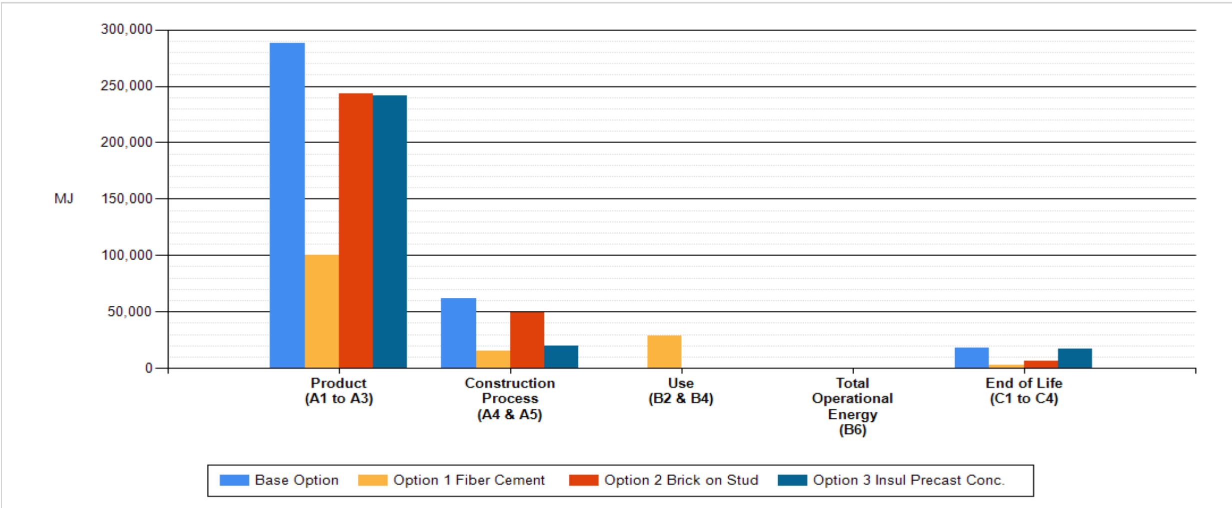
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg N eq	1.10E+01	3.41E+00	0.00E+00	0.00E+00	9.44E-01	**1.54E+01**
Option 1 Fiber Cement	kg N eq	4.36E+00	8.73E-01	3.00E-01	0.00E+00	1.43E-01	**5.68E+00**
Option 2 Brick on Stud	kg N eq	7.92E+00	2.86E+00	0.00E+00	0.00E+00	3.10E-01	**1.11E+01**
Option 3 Insul Precast Conc.	kg N eq	2.31E+01	1.21E+00	0.00E+00	0.00E+00	9.02E-01	**2.52E+01**
Total	**kg N eq**	**4.64E+01**	**8.35E+00**	**3.00E-01**	**0.00E+00**	**2.30E+00**	**5.73E+01**

Comparison of Acidification Potential By Life Cycle Stage



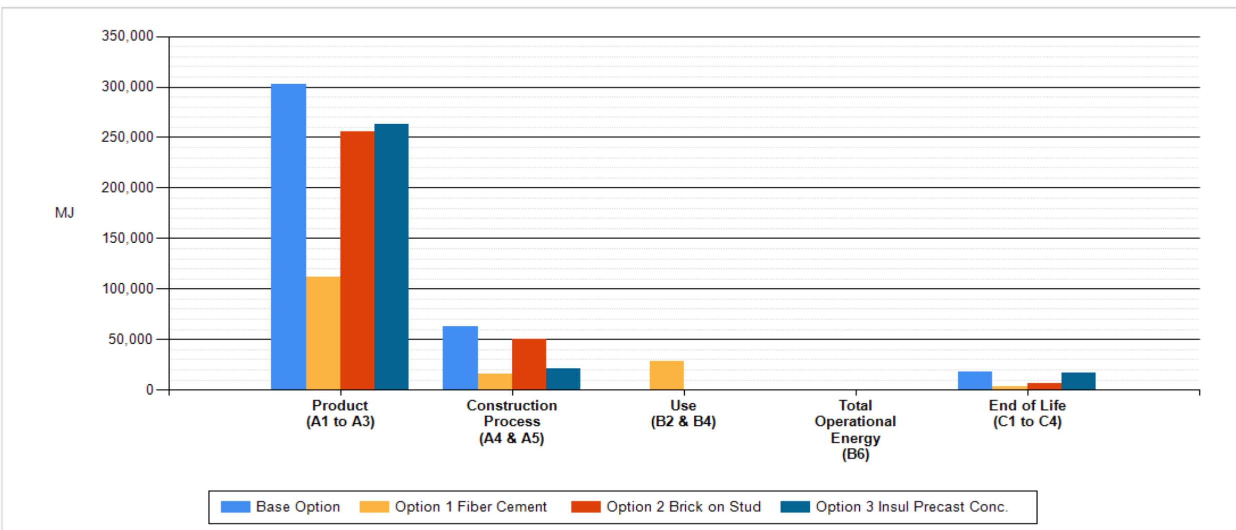
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg SO2 eq	1.56E+02	4.64E+01	0.00E+00	0.00E+00	1.51E+01	**2.17E+02**
Option 1 Fiber Cement	kg SO2 eq	6.01E+01	1.29E+01	7.89E+00	0.00E+00	2.30E+00	**8.32E+01**
Option 2 Brick on Stud	kg SO2 eq	1.27E+02	4.09E+01	0.00E+00	0.00E+00	4.98E+00	**1.73E+02**
Option 3 Insul Precast Conc.	kg SO2 eq	1.10E+02	1.75E+01	0.00E+00	0.00E+00	1.45E+01	**1.42E+02**
Total	**kg SO2 eq**	**4.53E+02**	**1.18E+02**	**7.89E+00**	**0.00E+00**	**3.69E+01**	**6.15E+02**

Comparison of Fossil Fuel Consumption By Life Cycle Stage



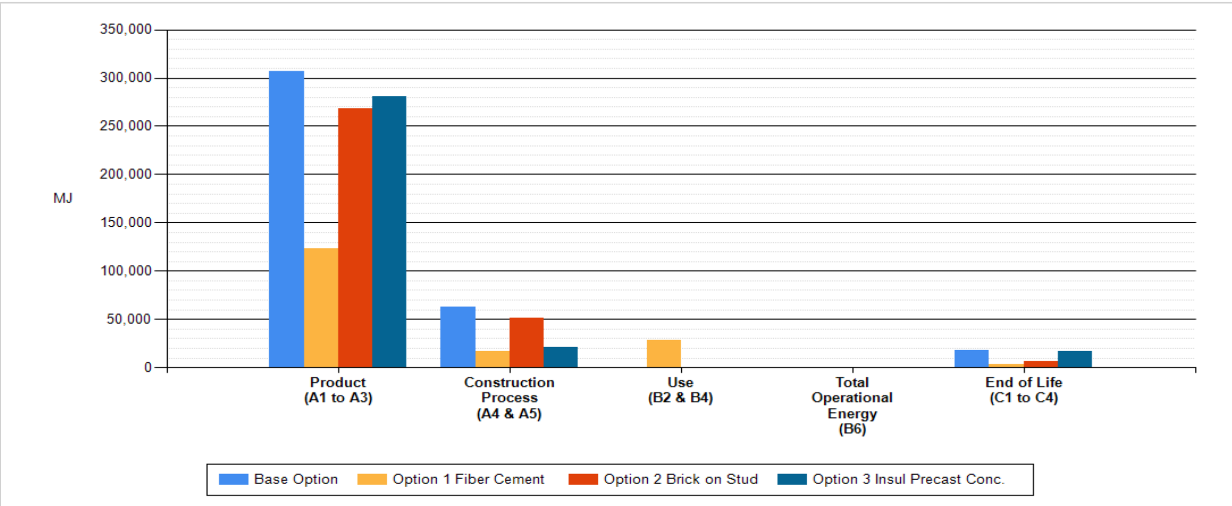
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	2.88E+05	6.17E+04	0.00E+00	0.00E+00	1.82E+04	**3.68E+05**
Option 1 Fiber Cement	MJ	9.99E+04	1.52E+04	2.83E+04	0.00E+00	3.04E+03	**1.46E+05**
Option 2 Brick on Stud	MJ	2.43E+05	4.95E+04	0.00E+00	0.00E+00	6.73E+03	**2.99E+05**
Option 3 Insul Precast Conc.	MJ	2.42E+05	1.98E+04	0.00E+00	0.00E+00	1.68E+04	**2.78E+05**
Total	**MJ**	**8.73E+05**	**1.46E+05**	**2.83E+04**	**0.00E+00**	**4.48E+04**	**1.09E+06**

Comparison of Non-Renewable Energy By Life Cycle Stage



Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	3.02E+05	6.25E+04	0.00E+00	0.00E+00	1.82E+04	**3.83E+05**
Option 1 Fiber Cement	MJ	1.12E+05	1.61E+04	2.83E+04	0.00E+00	3.05E+03	**1.59E+05**
Option 2 Brick on Stud	MJ	2.56E+05	5.07E+04	0.00E+00	0.00E+00	6.74E+03	**3.14E+05**
Option 3 Insul Precast Conc.	MJ	2.63E+05	2.08E+04	0.00E+00	0.00E+00	1.68E+04	**3.01E+05**
Total	**MJ**	**9.34E+05**	**1.50E+05**	**2.83E+04**	**0.00E+00**	**4.48E+04**	**1.16E+06**

Comparison of Total Primary Energy By Life Cycle Stage



Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	3.07E+05	6.30E+04	0.00E+00	0.00E+00	1.82E+04	**3.88E+05**
Option 1 Fiber Cement	MJ	1.23E+05	1.69E+04	2.83E+04	0.00E+00	3.05E+03	**1.71E+05**
Option 2 Brick on Stud	MJ	2.68E+05	5.16E+04	0.00E+00	0.00E+00	6.74E+03	**3.27E+05**
Option 3 Insul Precast Conc.	MJ	2.80E+05	2.15E+04	0.00E+00	0.00E+00	1.68E+04	**3.19E+05**
Total	**MJ**	**9.79E+05**	**1.53E+05**	**2.83E+04**	**0.00E+00**	**4.49E+04**	**1.20E+06**

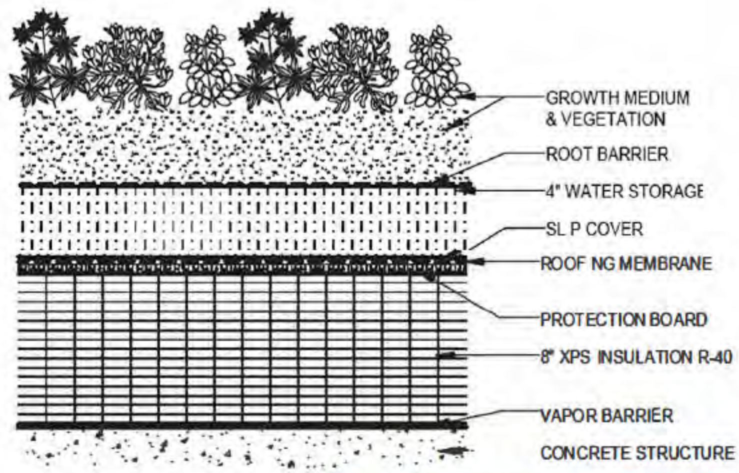
Project teams are to refer to the SCA LCA Impact Assessment Guidelines for instructions on correctly documenting the LCA considerations impacts for all wall and roof envelope assemblies.

DISCOVERY #3 PRELIMINARY LIFE-CYCLE IMPACTS

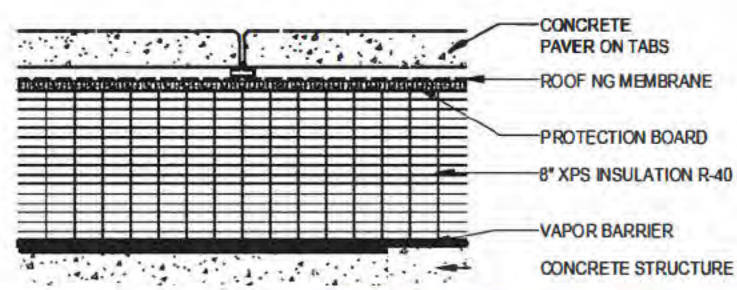
Comparative life-cycle assessment of potential roof systems was investigated in the Athena software.

The LCA comparison is between:

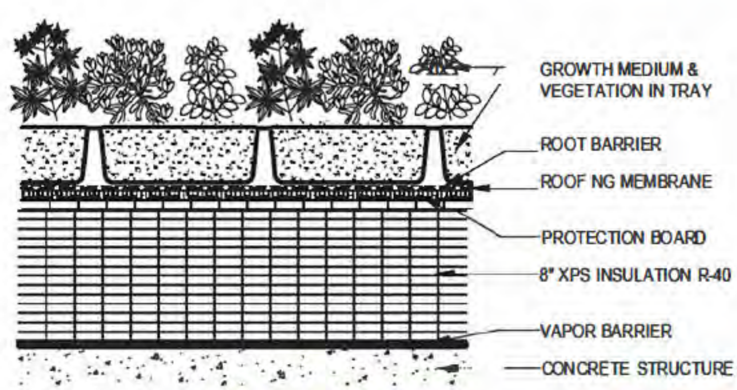
BASE Roof Option
OPTION #1: Blue Roof Seedums
OPTION #2: Green Roof Paver Area
OPTION #3: Green Roof Seedums



Blue Roof Seedums **OPTION 1**

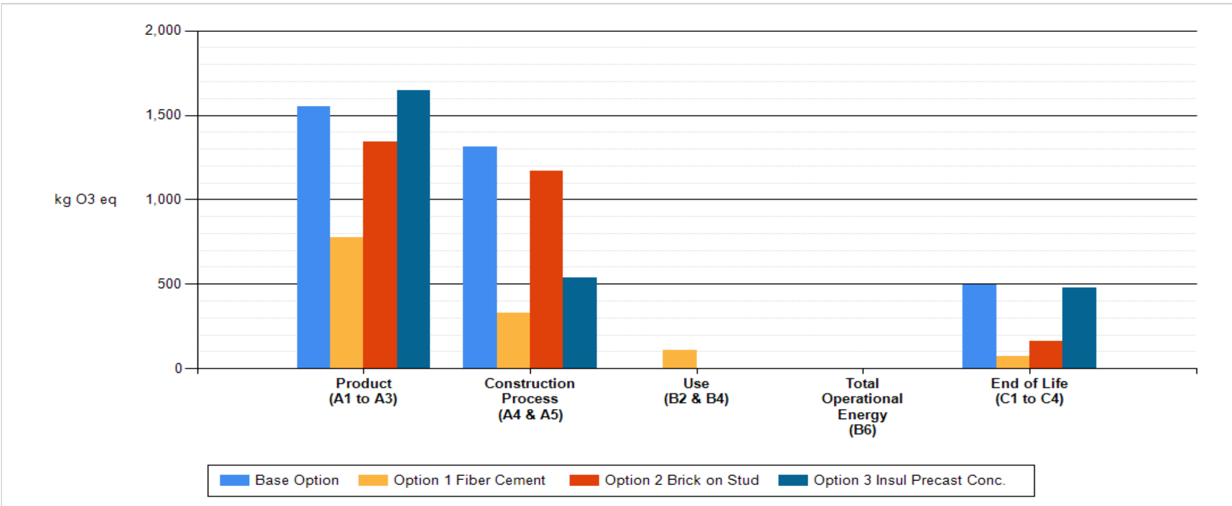


SCA Standard Roof **OPTION 2**



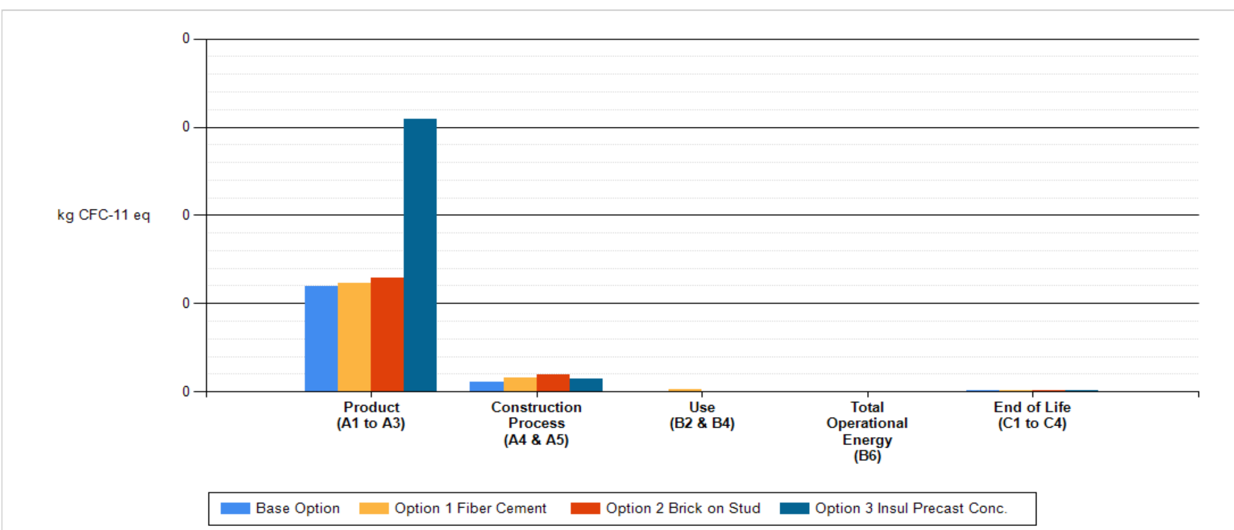
Green Roof Seedums **OPTION 3**

Comparison of Smog Potential By Life Cycle Stage



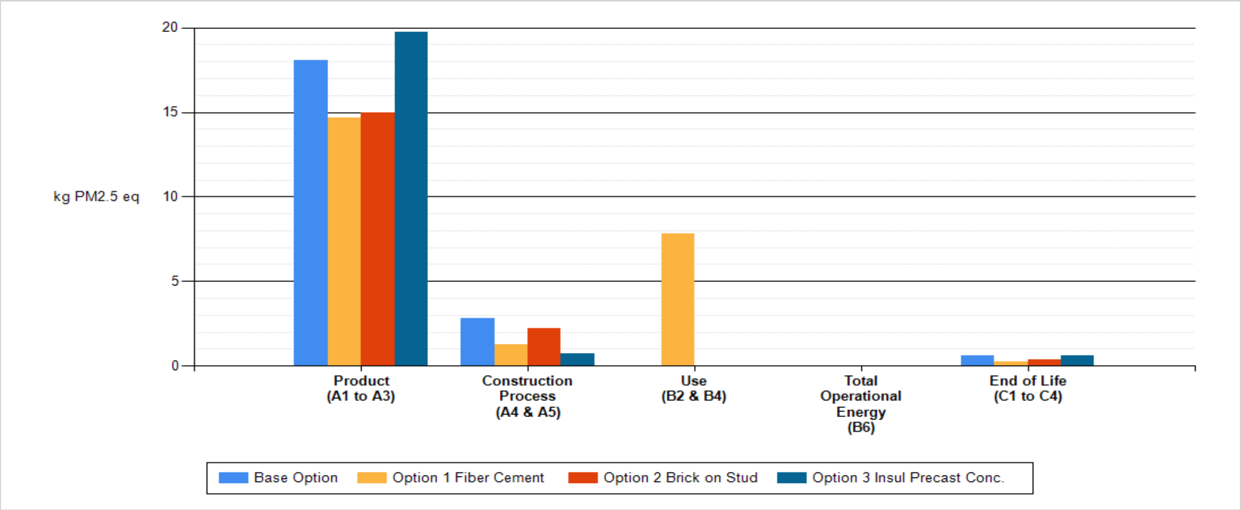
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg O3 eq	1.55E+03	1.31E+03	0.00E+00	0.00E+00	4.94E+02	**3.35E+03**
Option 1 Fiber Cement	kg O3 eq	7.75E+02	3.30E+02	1.05E+02	0.00E+00	7.44E+01	**1.28E+03**
Option 2 Brick on Stud	kg O3 eq	1.34E+03	1.17E+03	0.00E+00	0.00E+00	1.60E+02	**2.67E+03**
Option 3 Insul Precast Conc.	kg O3 eq	1.65E+03	5.37E+02	0.00E+00	0.00E+00	4.75E+02	**2.66E+03**
Total	**kg O3 eq**	**5.31E+03**	**3.35E+03**	**1.05E+02**	**0.00E+00**	**1.20E+03**	**9.97E+03**

Comparison of Ozone Depletion Potential By Life Cycle Stage



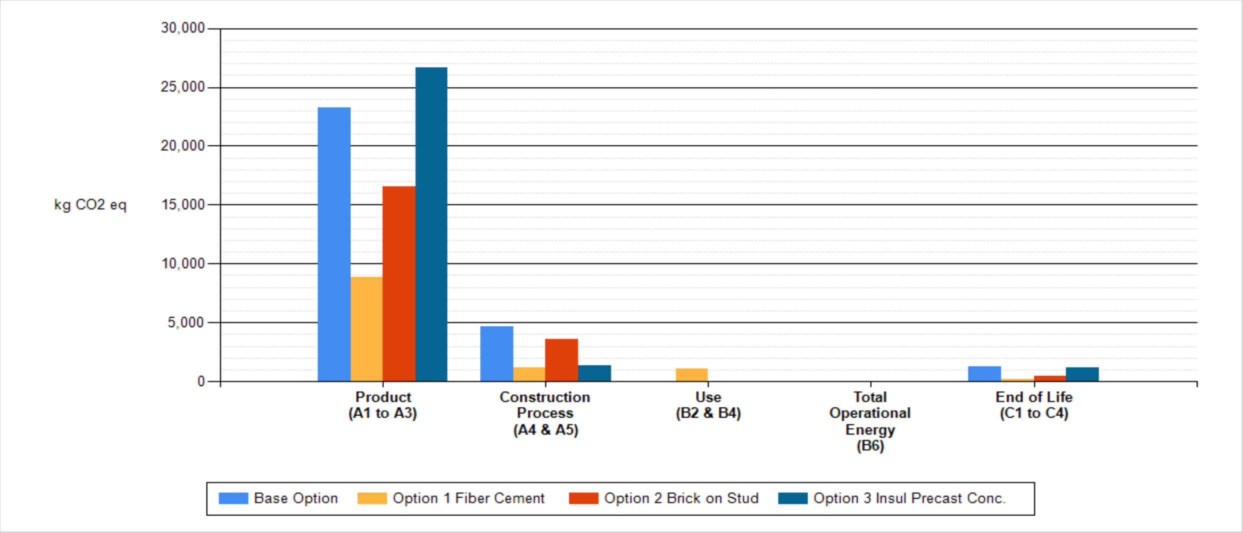
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CFC-11 eq	2.40E-04	2.28E-05	0.00E+00	0.00E+00	4.94E-08	**2.63E-04**
Option 1 Fiber Cement	kg CFC-11 eq	2.45E-04	3.20E-05	4.50E-06	0.00E+00	8.28E-09	**2.82E-04**
Option 2 Brick on Stud	kg CFC-11 eq	2.58E-04	3.78E-05	0.00E+00	0.00E+00	1.76E-08	**2.96E-04**
Option 3 Insul Precast Conc.	kg CFC-11 eq	6.18E-04	2.88E-05	0.00E+00	0.00E+00	4.68E-08	**6.47E-04**
Total	**kg CFC-11 eq**	**1.36E-03**	**1.21E-04**	**4.50E-06**	**0.00E+00**	**1.22E-07**	**1.49E-03**

Comparison of HH Particulate By Life Cycle Stage



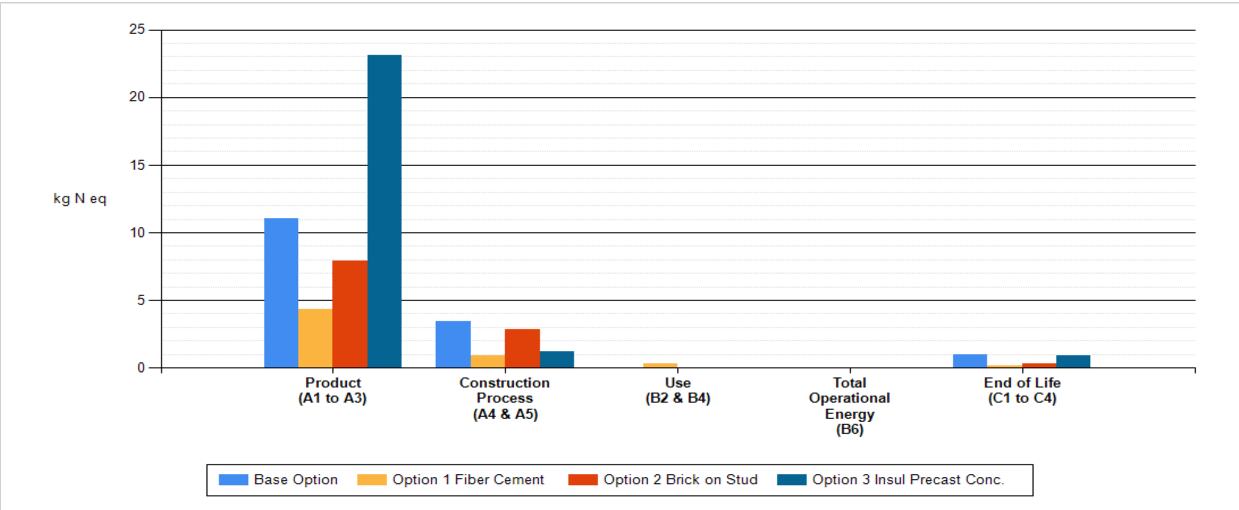
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg PM2.5 eq	1.81E+01	2.82E+00	0.00E+00	0.00E+00	5.78E-01	**2.15E+01**
Option 1 Fiber Cement	kg PM2.5 eq	1.47E+01	1.28E+00	7.84E+00	0.00E+00	2.48E-01	**2.40E+01**
Option 2 Brick on Stud	kg PM2.5 eq	1.50E+01	2.20E+00	0.00E+00	0.00E+00	3.77E-01	**1.75E+01**
Option 3 Insul Precast Conc.	kg PM2.5 eq	1.97E+01	7.04E-01	0.00E+00	0.00E+00	6.17E-01	**2.10E+01**
Total	**kg PM2.5 eq**	**6.74E+01**	**7.01E+00**	**7.84E+00**	**0.00E+00**	**1.82E+00**	**8.41E+01**

Comparison of Global Warming Potential By Life Cycle Stage



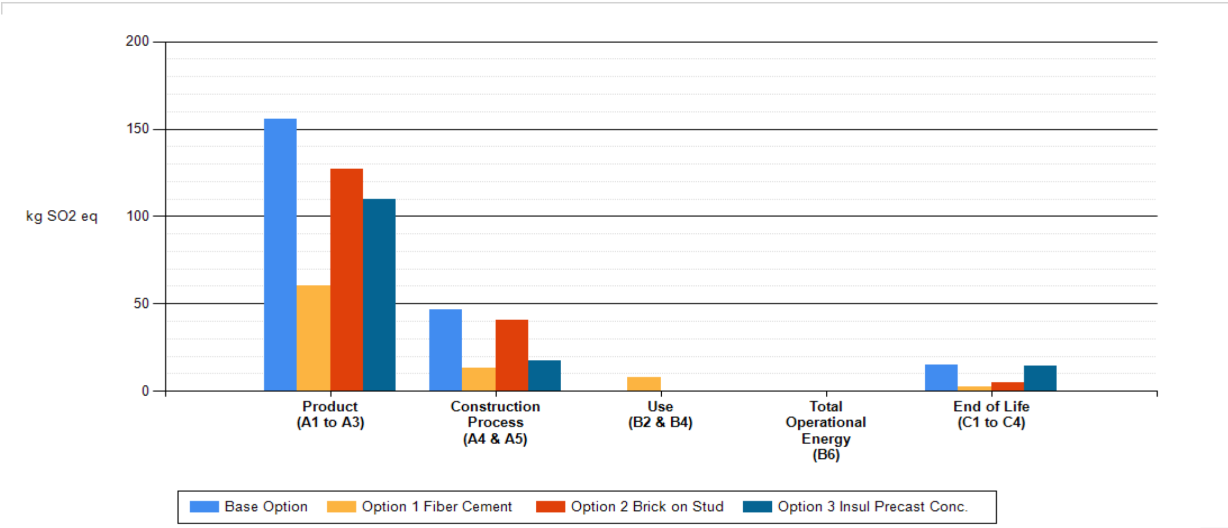
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CO2 eq	2.32E+04	4.67E+03	0.00E+00	0.00E+00	1.24E+03	**2.91E+04**
Option 1 Fiber Cement	kg CO2 eq	8.88E+03	1.22E+03	1.04E+03	0.00E+00	2.08E+02	**1.13E+04**
Option 2 Brick on Stud	kg CO2 eq	1.65E+04	3.57E+03	0.00E+00	0.00E+00	4.60E+02	**2.06E+04**
Option 3 Insul Precast Conc.	kg CO2 eq	2.66E+04	1.39E+03	0.00E+00	0.00E+00	1.14E+03	**2.92E+04**
Total	**kg CO2 eq**	**7.53E+04**	**1.08E+04**	**1.04E+03**	**0.00E+00**	**3.04E+03**	**9.02E+04**

Comparison of Eutrophication Potential By Life Cycle Stage



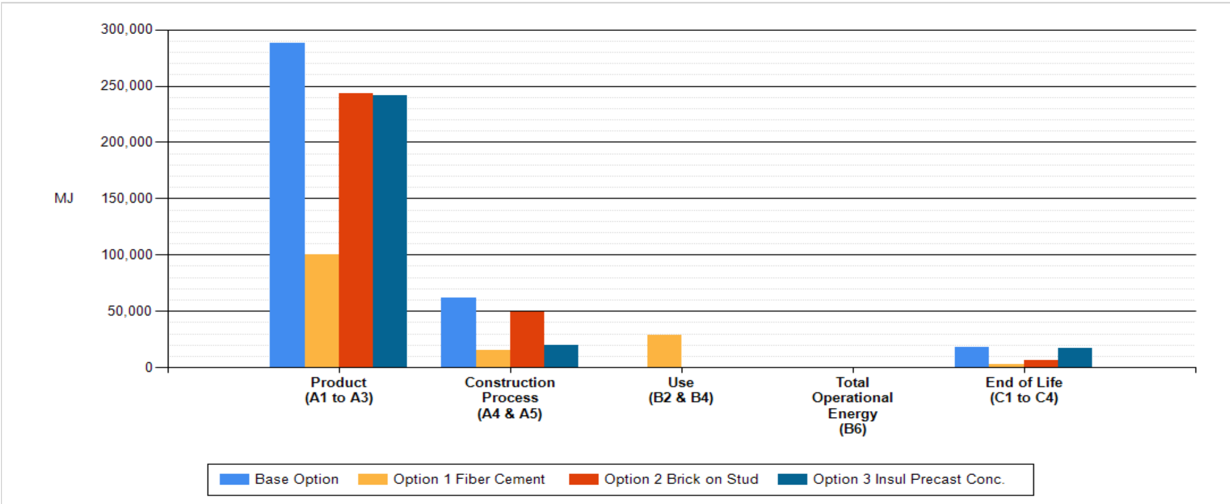
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg N eq	1.10E+01	3.41E+00	0.00E+00	0.00E+00	9.44E-01	**1.54E+01**
Option 1 Fiber Cement	kg N eq	4.36E+00	8.73E-01	3.00E-01	0.00E+00	1.43E-01	**5.68E+00**
Option 2 Brick on Stud	kg N eq	7.92E+00	2.86E+00	0.00E+00	0.00E+00	3.10E-01	**1.11E+01**
Option 3 Insul Precast Conc.	kg N eq	2.31E+01	1.21E+00	0.00E+00	0.00E+00	9.02E-01	**2.52E+01**
Total	**kg N eq**	**4.64E+01**	**8.35E+00**	**3.00E-01**	**0.00E+00**	**2.30E+00**	**5.73E+01**

Comparison of Acidification Potential By Life Cycle Stage



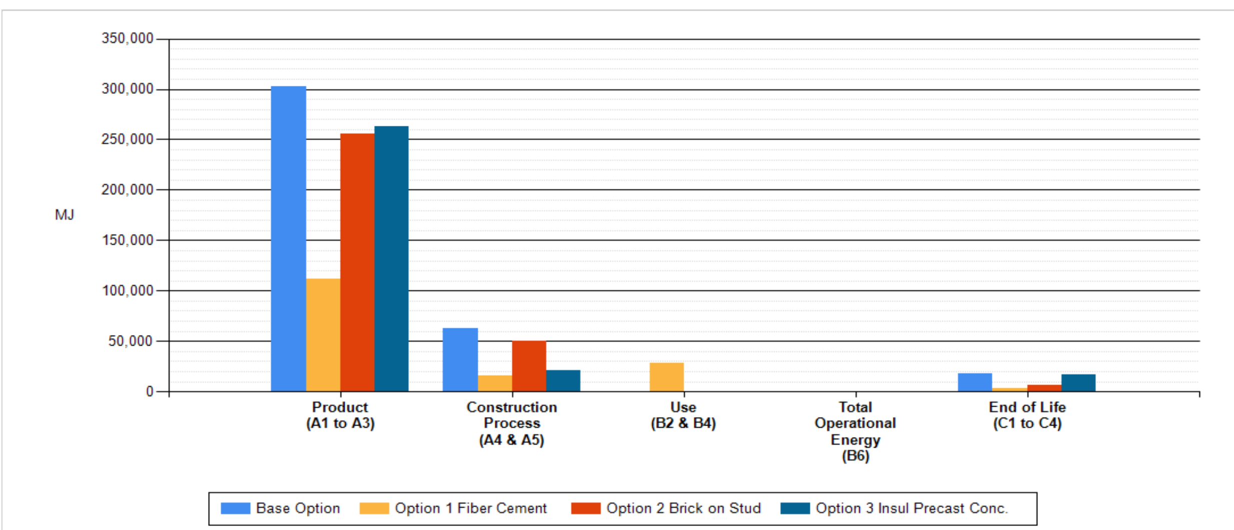
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg SO2 eq	1.56E+02	4.64E+01	0.00E+00	0.00E+00	1.51E+01	**2.17E+02**
Option 1 Fiber Cement	kg SO2 eq	6.01E+01	1.29E+01	7.89E+00	0.00E+00	2.30E+00	**8.32E+01**
Option 2 Brick on Stud	kg SO2 eq	1.27E+02	4.09E+01	0.00E+00	0.00E+00	4.98E+00	**1.73E+02**
Option 3 Insul Precast Conc.	kg SO2 eq	1.10E+02	1.75E+01	0.00E+00	0.00E+00	1.45E+01	**1.42E+02**
Total	**kg SO2 eq**	**4.53E+02**	**1.18E+02**	**7.89E+00**	**0.00E+00**	**3.69E+01**	**6.15E+02**

Comparison of Fossil Fuel Consumption By Life Cycle Stage



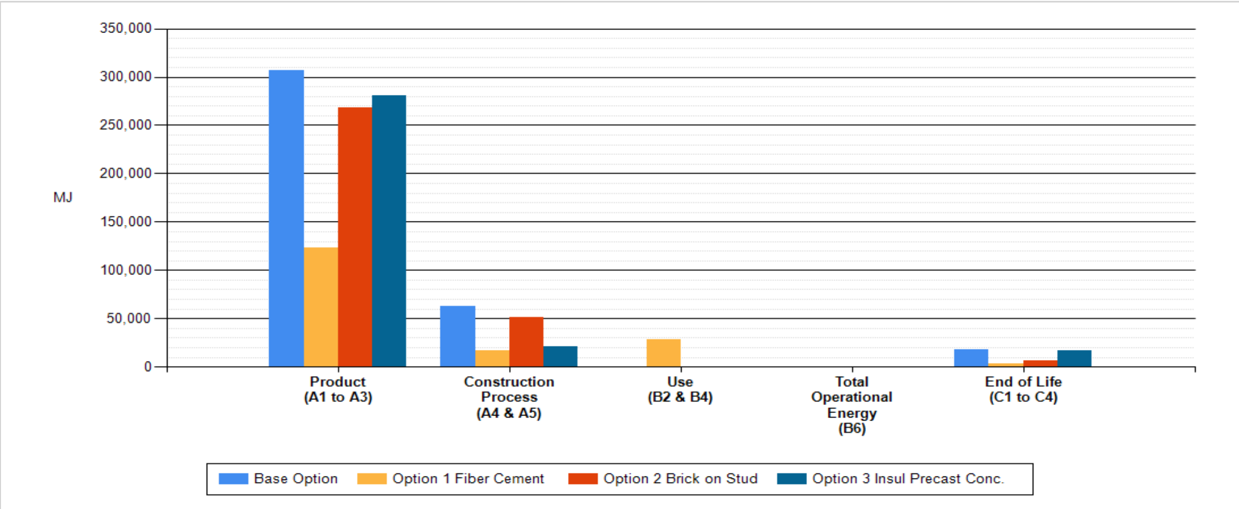
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	2.88E+05	6.17E+04	0.00E+00	0.00E+00	1.82E+04	**3.68E+05**
Option 1 Fiber Cement	MJ	9.99E+04	1.52E+04	2.83E+04	0.00E+00	3.04E+03	**1.46E+05**
Option 2 Brick on Stud	MJ	2.43E+05	4.95E+04	0.00E+00	0.00E+00	6.73E+03	**2.99E+05**
Option 3 Insul Precast Conc.	MJ	2.42E+05	1.98E+04	0.00E+00	0.00E+00	1.68E+04	**2.78E+05**
Total	**MJ**	**8.73E+05**	**1.46E+05**	**2.83E+04**	**0.00E+00**	**4.48E+04**	**1.09E+06**

Comparison of Non-Renewable Energy By Life Cycle Stage



Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	3.02E+05	6.25E+04	0.00E+00	0.00E+00	1.82E+04	**3.83E+05**
Option 1 Fiber Cement	MJ	1.12E+05	1.61E+04	2.83E+04	0.00E+00	3.05E+03	**1.59E+05**
Option 2 Brick on Stud	MJ	2.56E+05	5.07E+04	0.00E+00	0.00E+00	6.74E+03	**3.14E+05**
Option 3 Insul Precast Conc.	MJ	2.63E+05	2.08E+04	0.00E+00	0.00E+00	1.68E+04	**3.01E+05**
Total	**MJ**	**9.34E+05**	**1.50E+05**	**2.83E+04**	**0.00E+00**	**4.48E+04**	**1.16E+06**

Comparison of Total Primary Energy By Life Cycle Stage

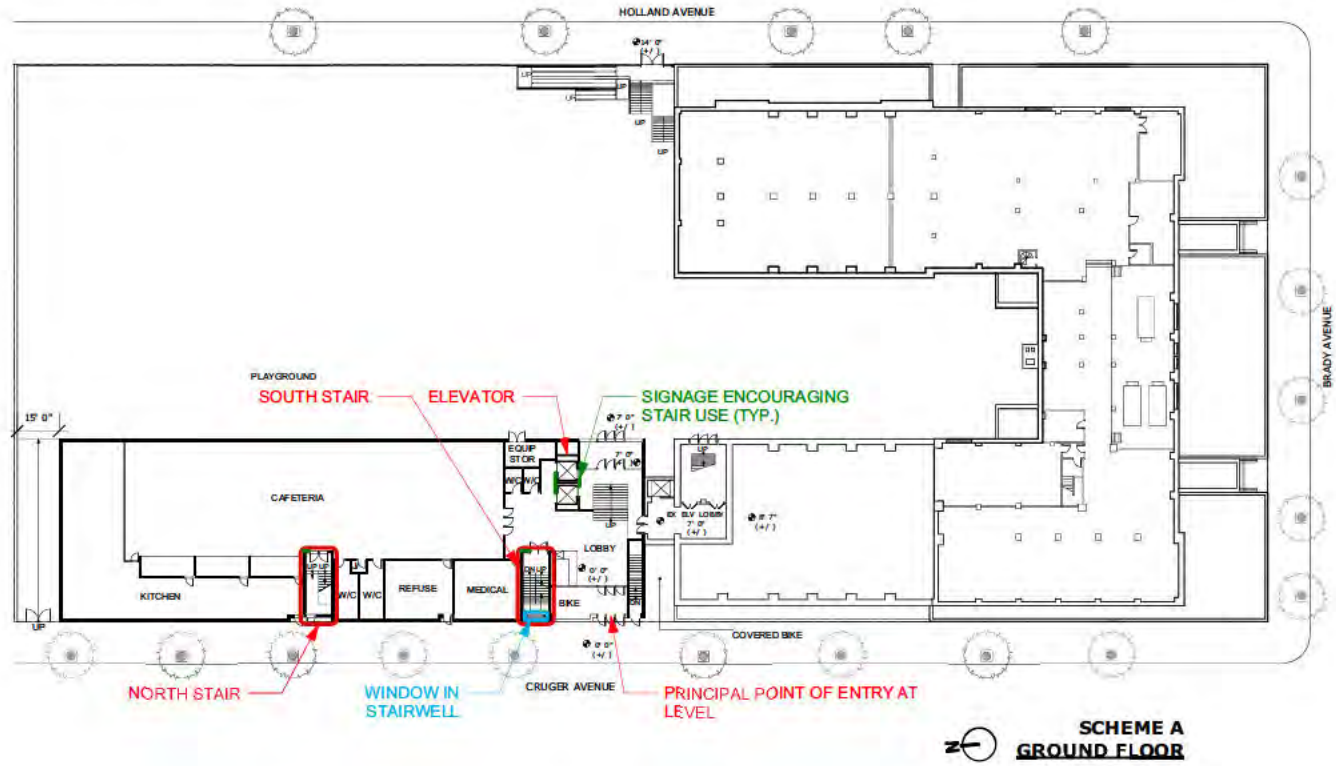


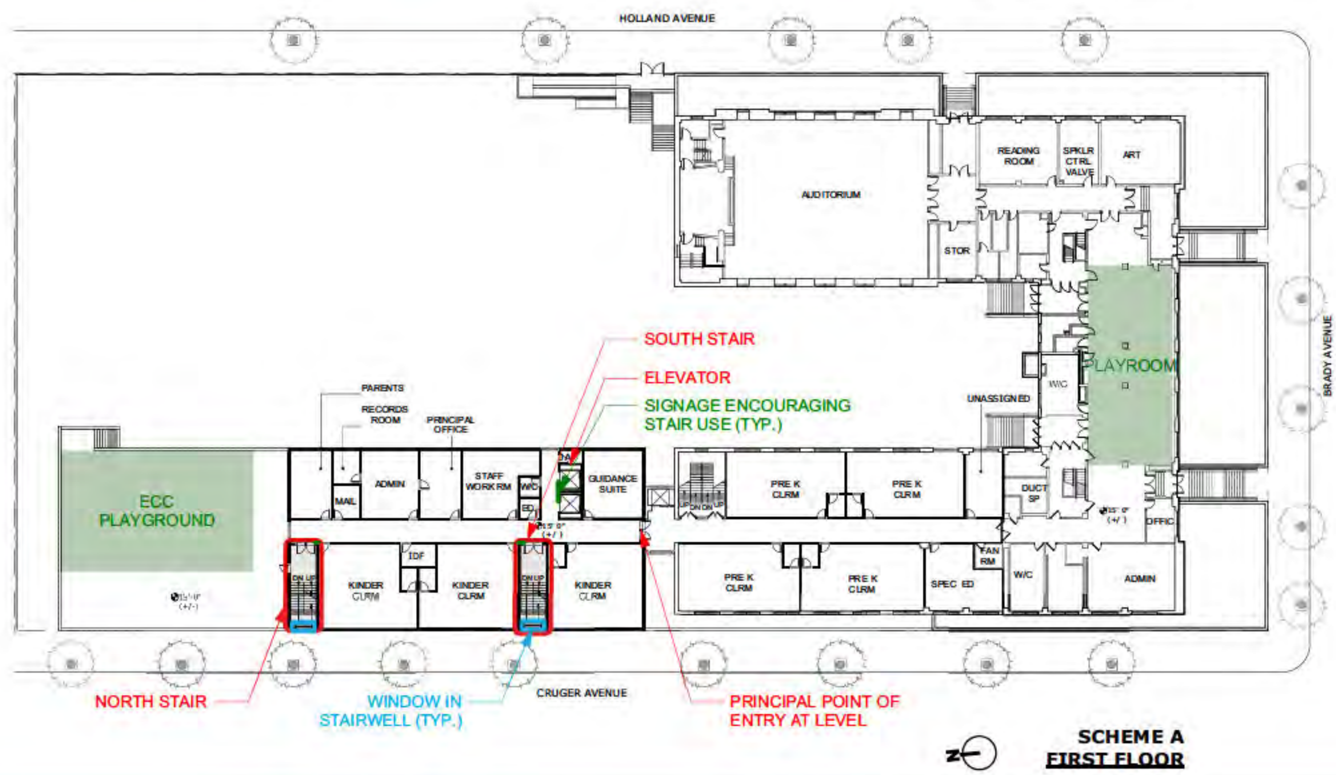
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	3.07E+05	6.30E+04	0.00E+00	0.00E+00	1.82E+04	**3.88E+05**
Option 1 Fiber Cement	MJ	1.23E+05	1.69E+04	2.83E+04	0.00E+00	3.05E+03	**1.71E+05**
Option 2 Brick on Stud	MJ	2.68E+05	5.16E+04	0.00E+00	0.00E+00	6.74E+03	**3.27E+05**
Option 3 Insul Precast Conc.	MJ	2.80E+05	2.15E+04	0.00E+00	0.00E+00	1.68E+04	**3.19E+05**
Total	**MJ**	**9.79E+05**	**1.53E+05**	**2.83E+04**	**0.00E+00**	**4.49E+04**	**1.20E+06**

DISCOVERY #4

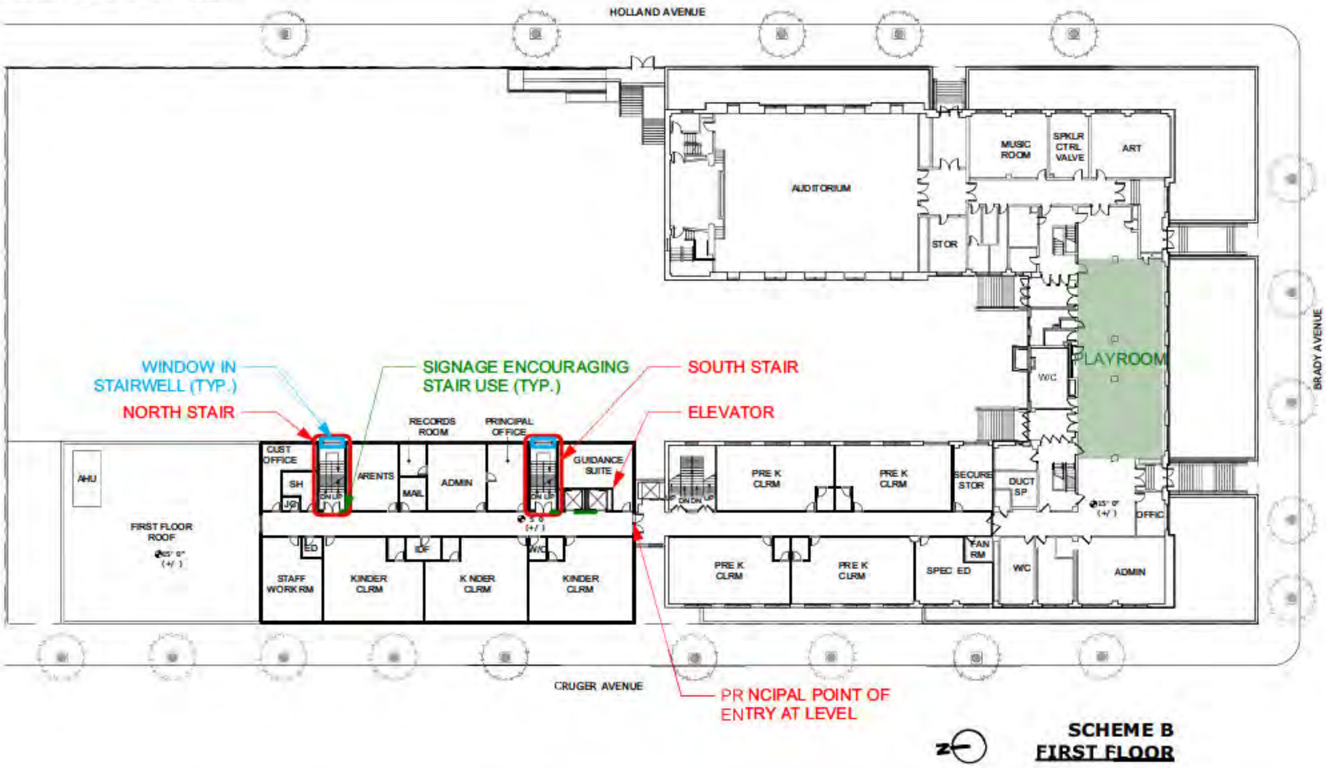
ACTIVE DESIGN

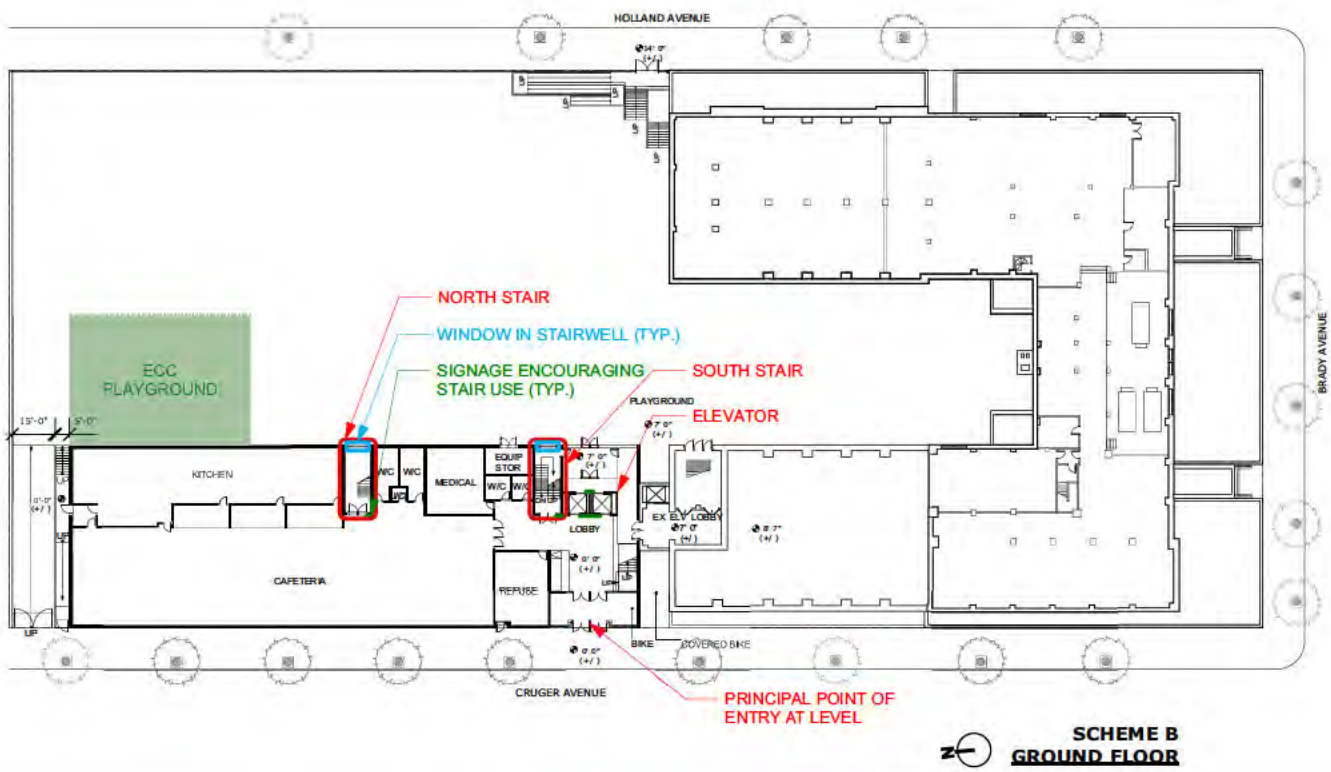
SCHEME A DIAGRAMS



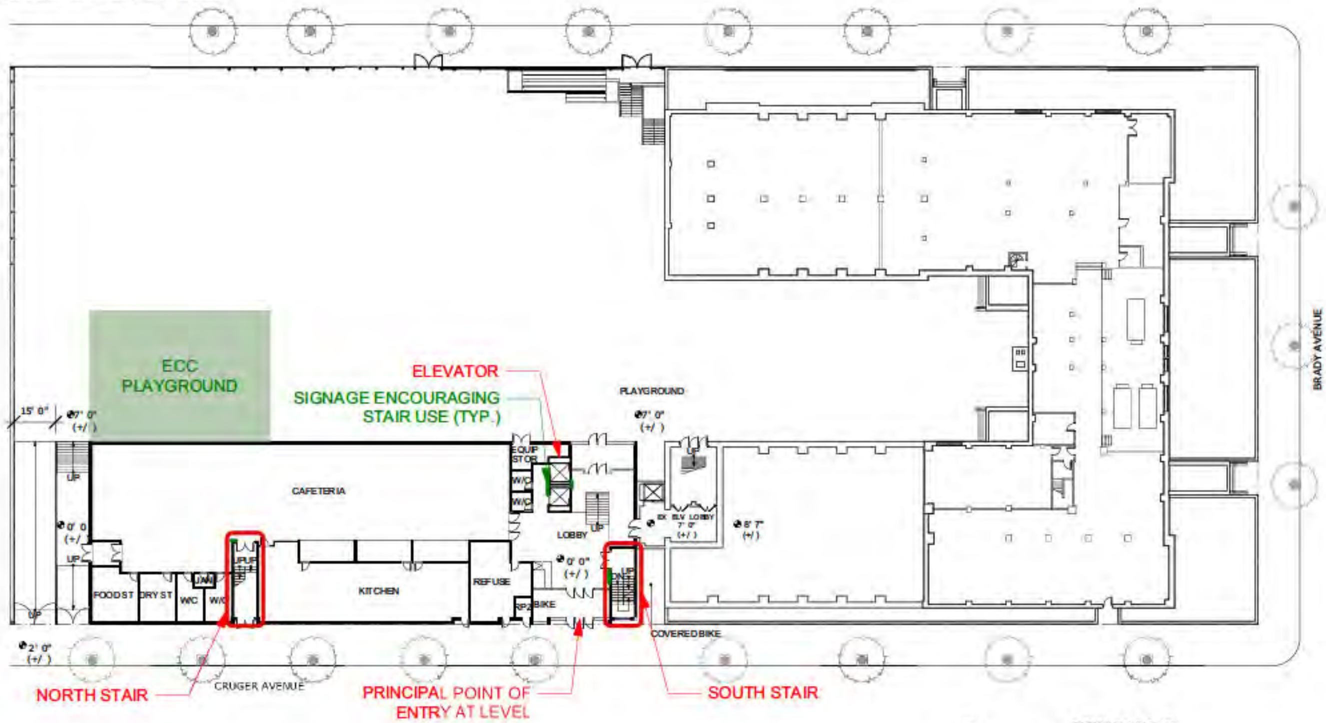


SCHEME B DIAGRAMS

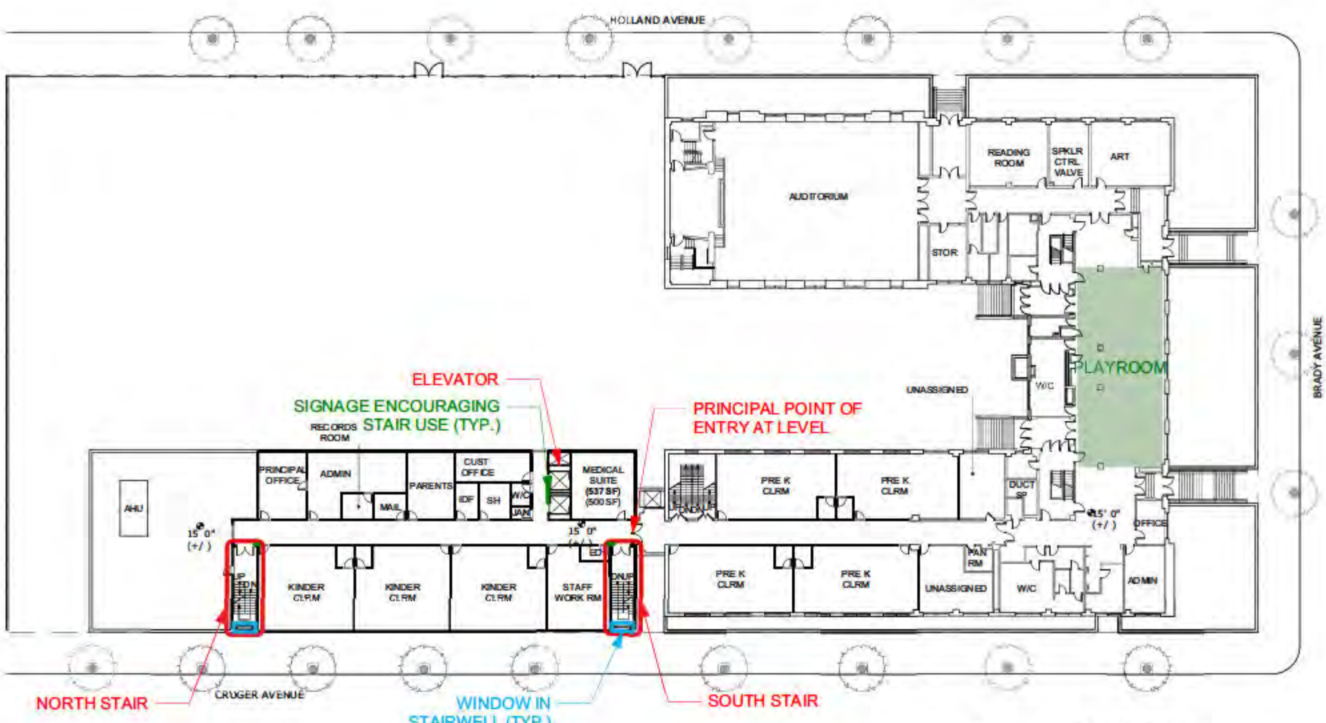




SCHEME C DIAGRAMS



SCHEME C
GROUND FLOOR



SCHEME C
FIRST FLOOR

DISCOVERY SUMMARY

Active Design in a School Environment (S3.2) is a Green Schools Guide credit requirement. Assessment uses SCA's "Active Design in a School Environment Credit Form" to review scheme compliance. Each scheme must comply with Step 1 strategies and meet a minimum of 7 credits in Step 2. Scheme A and C comply, Scheme B does not meet the minimum 7 strategy requirement.

ACTIVE DESIGN PLAN

<u>FINDINGS</u>

Step 1: Comply with both of the following strategies					
#	Design Case	Base Case Code Minimum	Scheme A Complies?	Scheme B Complies?	Scheme C Complies?
R1	Building occupants shall have access via at least one main active mode of vertical circulation to and from all common use floors, and occupant's own floor(s)	In schools, doors may be locked on the stair side except at intervals of 4 stories or less.	Yes	Yes	Yes
R2	Provide an onsite recreation space that is open and accessible to all users. For schools that have more than 10 classrooms, the space must be at least 400 square feet. Include adult exercise and children's play equipment for a minimum of 5% of the building occupants. Gardening activity space and equipment may also count as adult active recreation space and equipment.	Not applicable	Yes	Yes	Yes

Step 2: Comply with seven of the following strategies					
DESIGN FOR INCREASED ACTIVE MODES OF VERTICAL CIRCULATION					
A	FOR THE MAIN STAIRCASE				
1	Classify all regularly occupied floors for re-entry, allowing all building users to have access to and from these floors. Service floors do not need access for all users.	In schools, doors may be locked on the stair side except at intervals of 4 stories or less.	Yes	Yes	Yes
2	Provide transparent glazing of at least 10 square feet at all stair doors or at a side light. OR Provide magnetic door holds on all doors leading to the stairs. OR Provide unenclosed stairs.	Not applicable	No	No	No

3	Provide accessibility to at least one open or interconnecting staircase to at least 50% of the tenant/occupant floors for convenient pedestrian vertical circulation.	Exact location not mandated	Yes	Yes	Yes
4	Locate a main staircase to be visible from main building lobby and within 25 foot walking distance from any edge of the lobby. Ensure that no turns or obstacles prevent visibility of or accessibility to the qualifying staircase from the lobby.	Exact location not mandated, follow SCA Design Requirements	Yes	Yes	Yes
5	Locate a main staircase to be visible before an occupant visually encounters any motorized vertical circulation (elevator/escalator). The staircase must be visible from the principal point of entry at each building floor.	Exact location not mandated, follow SCA Design Requirements	Yes	No	Yes
6	Install architectural light fixtures that provide a level of lighting in the staircase(s) consistent with or better than what is provided in the building corridor.	200 lux recommended by IES.	Yes	Yes	Yes
7	Provide daylighting at each floor/roof level of the stair(s) using either windows and/or skylights of at least eight square feet in size.	Follow SCA Design Requirements	Yes	Yes	Yes
8	Place signage encouraging stair use for health and other benefits at all elevator call areas, next to escalators and outside stairwells on each floor.	Not applicable	Yes	Yes	Yes
9	Use inviting sensory stimulation such as artwork and/or music in stairwells.	Not applicable	No	No	No
B	ELSEWHERE WITHIN THE PROJECT				
10	Provide exercise equipment or exercise opportunities for at least 5% of staff occupants that can be used at employee workstations to allow workers opportunities for physical activity while working at their desks.	Not applicable	No	No	No
11	Provide a dedicated or multi-use space to act as an on-site exercise room, which includes a variety of exercise equipment, for use by at least 5% of staff occupants.	Not applicable	No	No	No

Note: In facilities where stairs are not the main active mode of vertical circulation, other active modes of vertical circulation that promote physical activity, such as ramps and ladders can be used in place of stairs

Strategies Achieved	7	6	7
Project Complies	**Yes**	**No**	**Yes**

Acoustics • Audio/Video

Integrative Design Process Discovery #5 Analysis - Acoustics

Public School
Jamaica, New York

Prepared for:

March 10, 2020

INTRODUCTION

This report reviews the NYC Green Schools Guide 2019 requirements for Minimum (Q8.1P) and Enhanced (Q8.2) Acoustic Performance, in connection with three schemes proposed for the PS [redacted] Addition project, and identifies risks to achieving each credit. The three schemes are referred to as 7, 8a, and 8b as prepared by [redacted]

Q8.1P - MINIMUM ACOUSTIC PERFORMANCE

Requirements

1. **HVAC Background Noise:** Achieve a maximum background noise level of 40 dBA from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces.
2. **Exterior Noise:** For high-noise sites (peak-hour Leq above 60 dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior sources and control sound transmission between classrooms and other core learning spaces. Projects at least one-half mile from any significant noise sources are exempt.
3. **Reverberation Time:** Adhere to the following reverberation time requirements:
    a. For Classrooms and Core Learning Spaces < 20,000 cubic feet: Design classrooms and other core learning spaces to include sufficient sound-absorptive finishes for compliance with the reverberation time requirements specified in ANSI Standard S12.60-2010, Part 1: Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools.
    b. For Classrooms and Core Learning Spaces > 20,000 cubic feet: Meet the recommended reverberation times for classrooms and core learning spaces described in the NRC-CNRC Construction Technology Update No. 51: Acoustical Design of Rooms for Speech (2002).

Analysis

1. **HVAC Background Noise**: It is expected that achieving a maximum background noise level of 40 dBA in classrooms and other core learning spaces will be feasible without the need to implement extraordinary noise control measures, based on use of multi-zone variable air volume (MZVAV) systems with roof mounted equipment. Special consideration will need to be given to potential unit noise break-out of supply and return ductwork if it will penetrate the roof directly above classrooms or other core learning spaces. In such cases it is often necessary to enclose initial ductwork runs in sound control lagging in order to sufficiently mitigate duct noise break-out.

    There are no significant differences among design schemes 7, 8a, and 8b with respect to achieving the HVAC background noise requirement.
2. **Exterior Noise:** The site is approximately 0.5 miles from the Belt Parkway and the boundary of the DNL 65 noise contour associated with Kennedy International Airport, and 0.25 miles away from the Van Wyck Expressway. These factors suggest that the new building addition may be

subject to higher-than-average exterior noise levels, and potentially higher than 60 dBA as referenced in the requirements.

An instrumented survey will be conducted in order to determine the peak-hour noise level at the site during school hours. Results will be utilized to determine measures that may be required to minimize noise intrusion to classrooms and other core learning spaces.

The Green Schools Guide does not specify to what level the exterior noise is to be reduced. However, SCA Design Requirements recommend that interior-transmitted noise levels be limited to NC (Noise Criterion) 45 for the L_{10} condition (noise level exceeded 10% of the time).

Exterior noise transmitted to classrooms and other core learning spaces will be controlled by the glazing configuration of exterior windows. Given the possibility of elevated exterior noise levels at the site, as described above, there is some potential that non-standard glazing configurations will need to be employed in exterior windows of classrooms and other core learning spaces.

Except where the size of exterior windows may vary significantly among design schemes 7, 8a, and 8b, there are no differences among the design schemes with respect to exterior noise impact on classrooms and other core learning spaces.

3. **Reverberation Time** – Employing standard ceilings per SCA Design Requirements will achieve reverberation time requirements as specified. There are no differences among design schemes 7, 8a, and 8b with respect to achieving reverberation time requirements.

Q8.2 – ENHANCED ACOUSTIC PERFORMANCE

Requirements

1. **HVAC Background Noise:** Achieve a maximum background noise level of 35 dBA from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces.

2. **Sound Transmission:** Design classrooms and other core learning spaces to meet the sound transmission class (STC) requirements of ANSI Standard S12.60-2010, Part 1. Exterior windows must have an STC rating of at least 35, unless outdoor and indoor noise levels can be verified to justify a lower rating.

Analysis

3. **HVAC Background Noise:** It is feasible to achieve a background noise level of 35 dBA from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces, although the requirement is considered to be stringent. Careful consideration will need to be given to equipment selection (particularly VAV terminal units), duct sizing, and selection of grilles, registers, and diffusers. Depending on the zoning and sizing of VAV terminal units, it may be necessary to locate the units outside the boundaries of classrooms and other core learning spaces.

4. **Sound Transmission:** The requirements specify minimum STC ratings of partitions separating classrooms and other core learning spaces from other adjacent spaces. Also specified are the STC and IIC (floor Impact Insulation Class) ratings of floor / ceiling assemblies separating classrooms and other core learning spaces from other vertically adjacent spaces.

   Employing standard partition types and floor / ceiling assemblies per SCA Design Requirements will satisfy specified STC and IIC ratings. There are no differences among design schemes 7, 8a, and 8b with respect to achieving these sound transmission requirements.

   There is one condition common to each of the schemes that will require non-standard construction in order to achieve specified STC and IIC ratings, and that is the Second Floor location of the Gymnasium directly above First Floor classrooms. SCA Design Guidelines prescribe that the Gymnasium shall have a 4 in. concrete slab supported 2 in. above the structural slab with resilient isolators.

CONCLUSIONS

Except as noted below, requirements for Q8.1P (Minimum Acoustic Performance) and Q8.2 (Enhanced Acoustic Performance) can be satisfied by following SCA Design Requirements and utilizing SCA standard details. There are no significant differences among design schemes 7, 8a, and 8b with respect to achieving the specified requirements.

1. Given the proximity of the site to transportation noise sources, it may be necessary to utilize non-standard glazing configurations in exterior windows to achieve required interior-transmitted noise levels in classrooms and other core learning spaces. There are no differences among design schemes 7, 8a, and 8b in these respects except if the windows among the schemes are significantly different in size.

2. In all schemes, the Gymnasium locates directly above classrooms, which will require a secondary concrete slab that is isolated from the structural floor slab.

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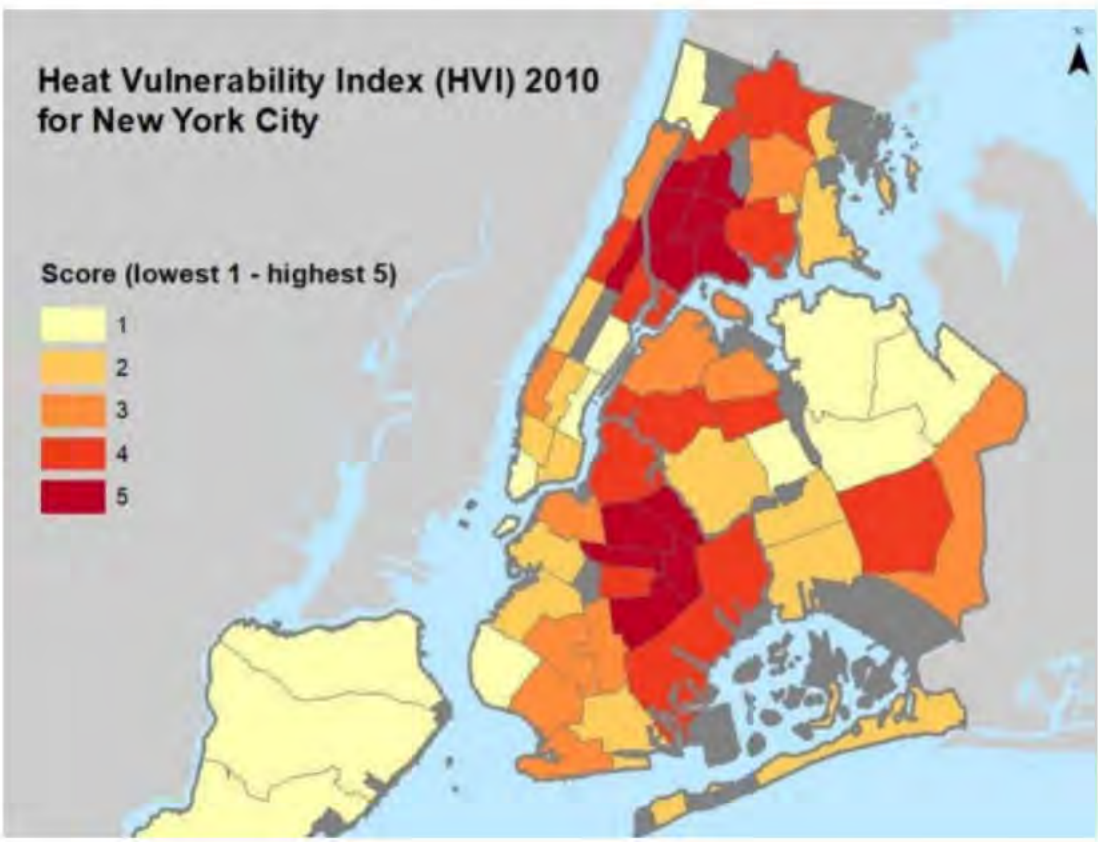
Integrative Design Report and Recommendations

7.0 Discovery #6 Climate Resiliency

7.1 Narrative Summary

The purpose of the climate resiliency is to analyze the site risk in relation to heat, precipitation and sea level rise. This influence the design strategies as in program, material & equipment location. Our proposed Project site is located in a medium heat vulnerability index with a score of three. Based on the heat vulnerability index map and the heat risk screening questions we have a score of seven, given a result of medium exposure rating. The next section is precipitation risk and after the question answered from the screening tool the score came to a two given a medium exposure rating. Lastly we are not at any sea level risk since we are not near the coast and are at elevation above sea level

. 7.2 Exposure Screening Tool

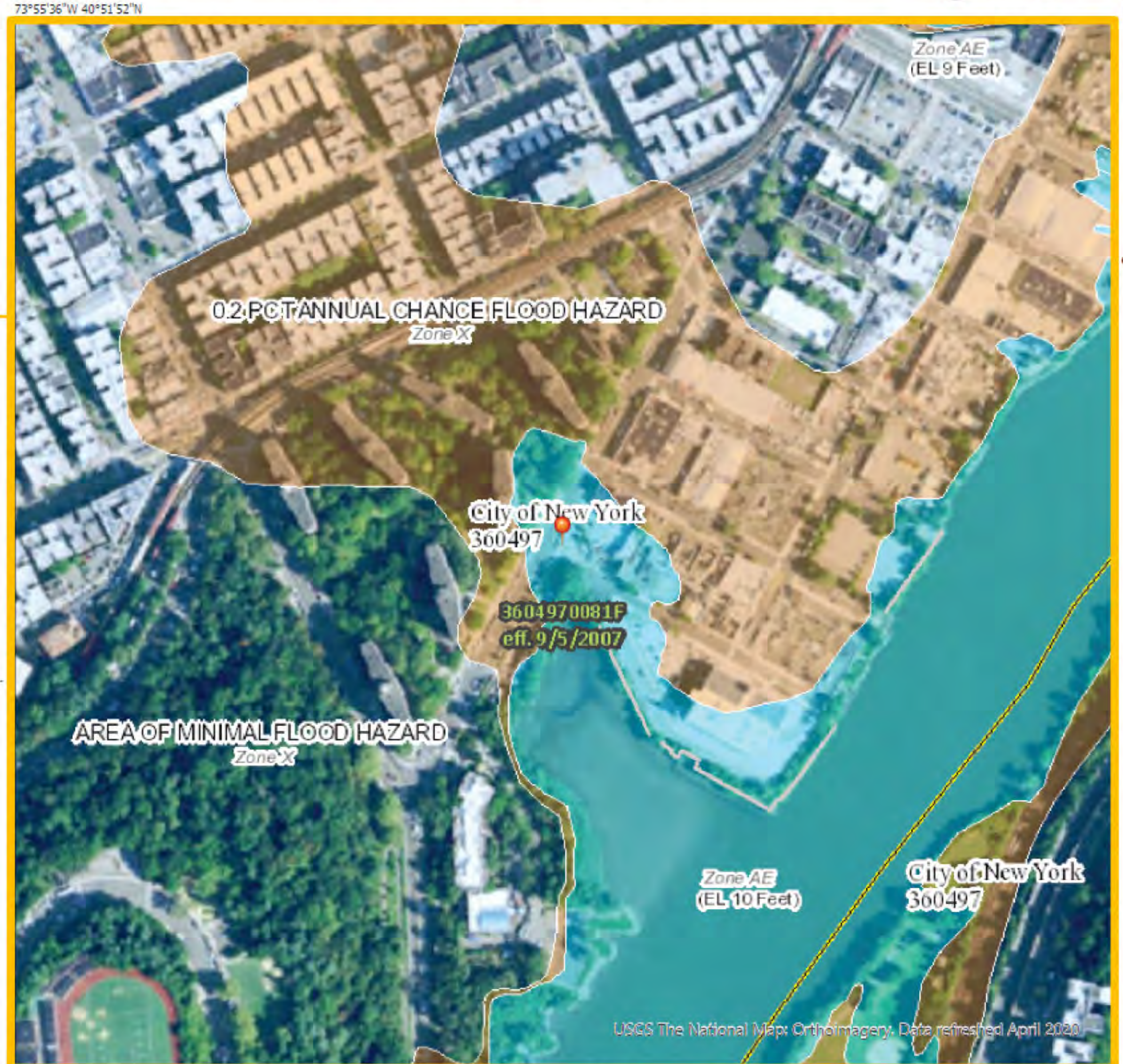


Pre-FIRM and FEMA Maps:

National Flood Hazard Layer FIRMette

FEMA

73°55'36"W 40°51'52"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

73°54'59"W 40°51'25"N

N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

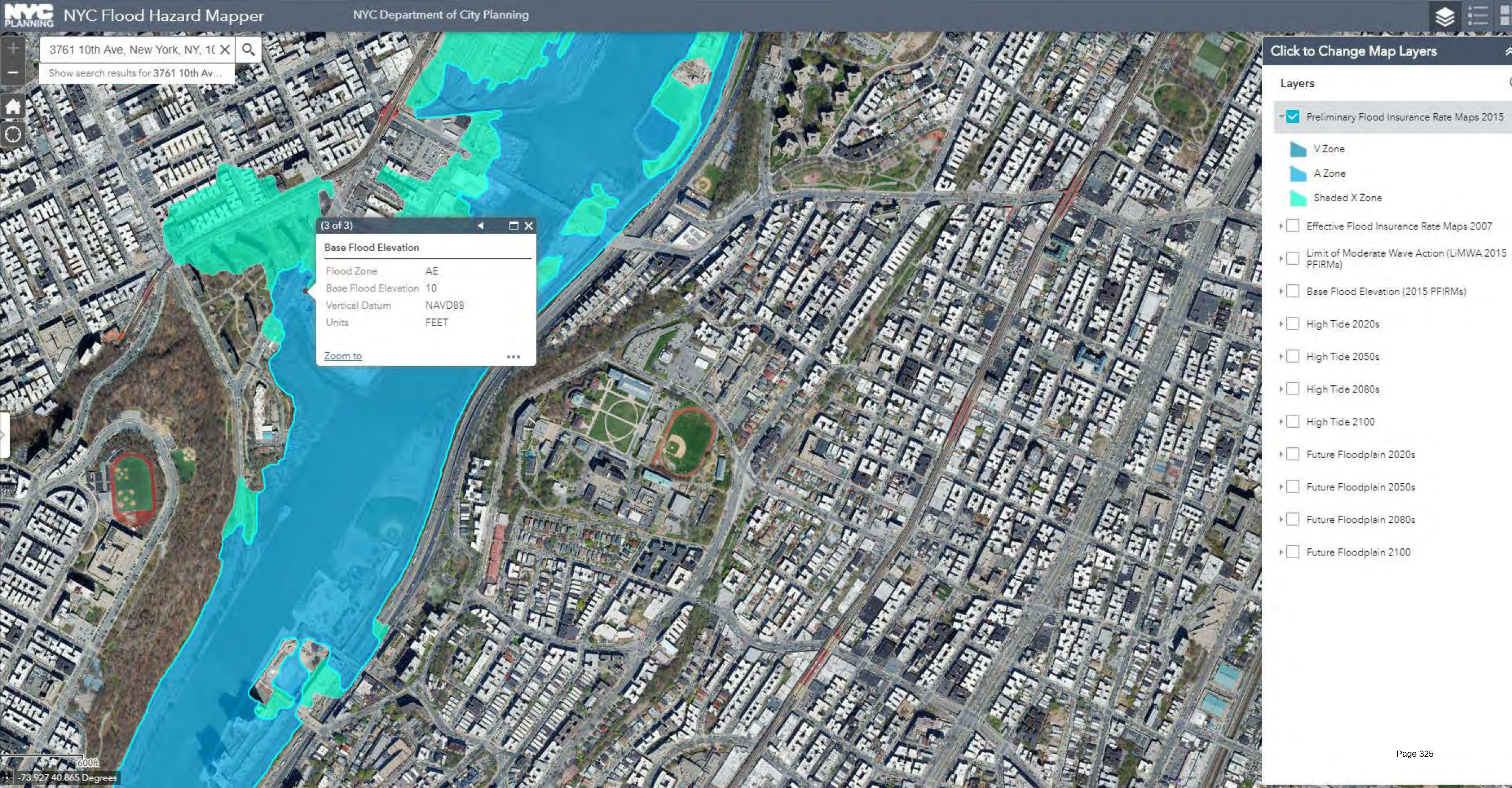
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/29/2020 at 8:34 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

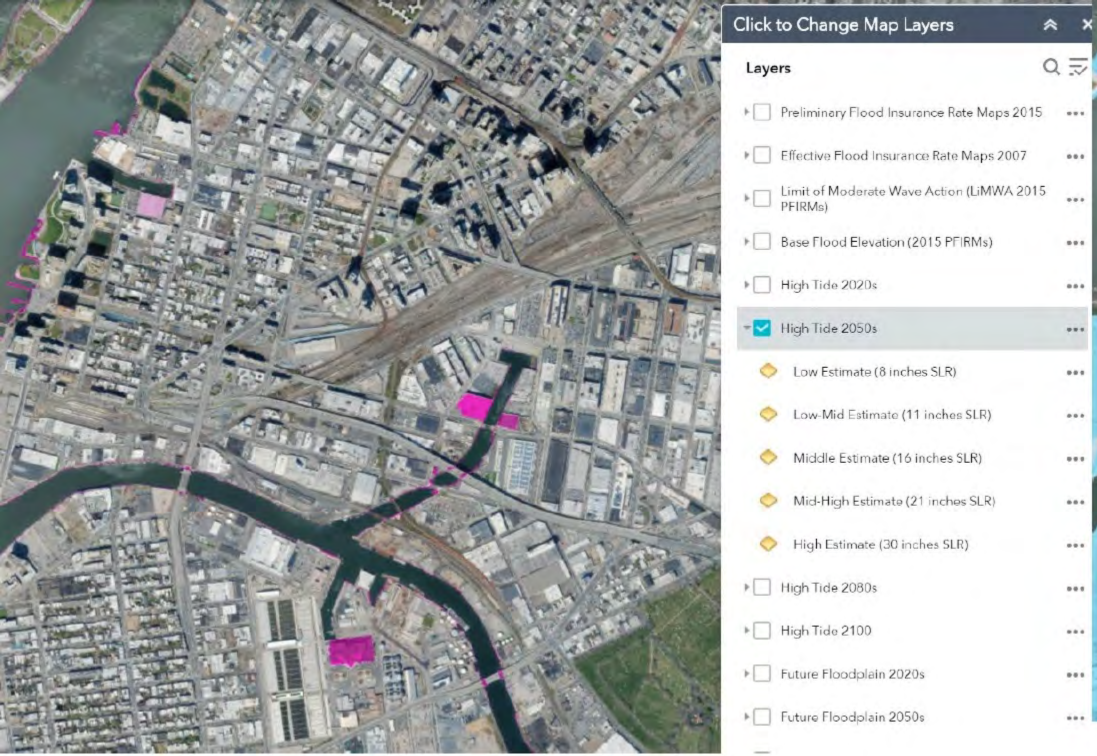
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

SCA School Construction Authority


NYC PLANNING
NYC Flood Hazard Mapper
NYC Department of City Planning
3761 10th Ave, New York, NY, 10
Show search results for 3761 10th Av...
(3 of 3)
Base Flood Elevation
Flood Zone AE
Base Flood Elevation 10
Vertical Datum NAVD88
Units FEET
Zoom to
Click to Change Map Layers
Layers
Preliminary Flood Insurance Rate Maps 2015
V Zone
A Zone
Shaded X Zone
Effective Flood Insurance Rate Maps 2007
Limit of Moderate Wave Action (LiMWA 2015 PFIRMs)
Base Flood Elevation (2015 PFIRMs)
High Tide 2020s
High Tide 2050s
High Tide 2080s
High Tide 2100
Future Floodplain 2020s
Future Floodplain 2050s
Future Floodplain 2080s
Future Floodplain 2100
600ft
-73.927 40.865 Degrees

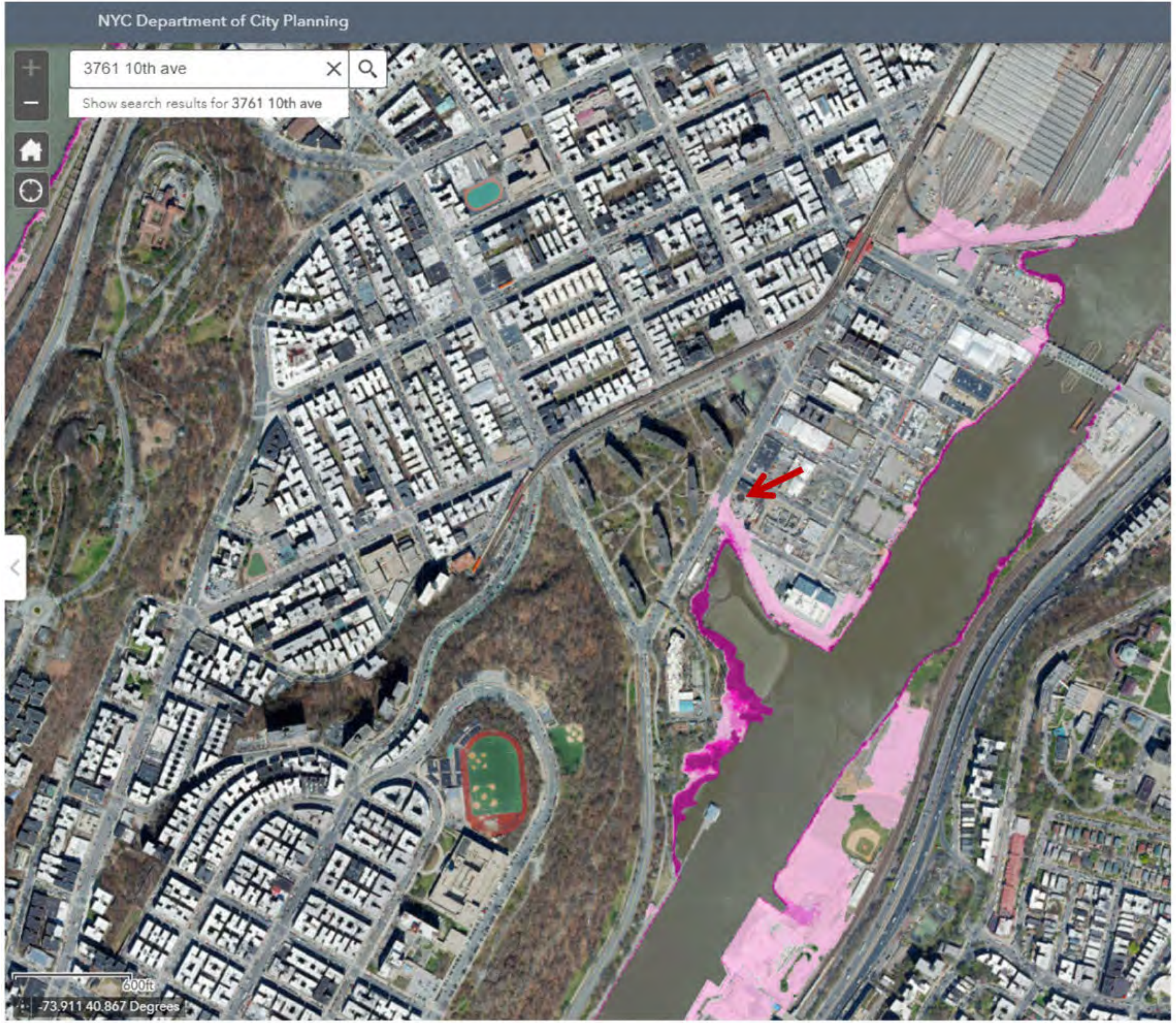
High Tide – 2020s

Future Flood Plain 2020s



High Tide-2050s

Future FloodPlain 2050s



High Tide – 2080s

Future Flood Plain 2080s

High Tide – 2100s

Future Flood Plain 2100s

Integrative Design Report and Recommendations

B. Exposure Screening Tool

Use the Exposure Screening Tool to identify and assess climate change-related hazards and risks. A capital project's exposure can be determined based on preliminary project information available at the earliest stages of project planning and/or design. Results from the screening tool can inform if to include the Guidelines in the project scope.

Exposure Screening Tool				
	Risk Screening Question	Directions	Answers and Score	Total Score and Next Steps
Heat	Does the facility include new construction of, or substantial improvements to, the landscape, hardscape, roof, HVAC, building envelope, ventilation system, or façade?	All parts of NYC are exposed to extreme heat. New construction projects or substantial improvements that include changes to the landscape, hardscape, roof, HVAC, building envelope, ventilation system, or façade could affect the material performance of a project, thermal comfort of occupants, and/or increase ambient temperatures. If the project includes any of those components, answer 'yes.'	Yes=1	Total Score: 2-5 — Exposure Rating: Low Total Score: 6-8 — Exposure Rating: Medium Total Score: 9-10 — Exposure Rating: High If project budget is more than $50 million: ...and scores "Medium" or "High" provide a list of recommendations for modifications to the current design to address the triggered climate risk. Include an order of magnitude cost for each recommended measure. **Score 7 Medium**
Heat	Is the facility in community district with high heat vulnerability?	Identify the community district your facility is located in. Locate that community district on the Heat Vulnerability Index map located in Section II.A of the Guidelines and note the area's vulnerability. Select the corresponding answer.	Heat Vulnerability Score Moderate=3	
Heat	How many annual heat waves are projected to occur during the facility's useful life?	See Section II.A of the Guidelines and note the annual heat wave projection according to the useful life of the facility. Select the corresponding answer.	# of heat waves 7 days = 3	
Precipitation	Does the facility require a new DEP site connection proposal, or a modification to the existing site connection plan?	The intensity and frequency of precipitation events are projected to increase across all parts of NYC, creating new challenges for stormwater management and impacts to the built environment. New construction projects provide opportunities to accommodate increased precipitation flow volumes, and typically require submitting a new site drainage connection proposal to DEP for review and approval. If a project is a substantial improvement, the scope of work of the substantial improvement would dictate if the previously approved DEP site connection plan will require modifications. If a new site connection proposal or modifications are required, answer 'yes.'	Yes=1	Total Score: 1 — Exposure Rating: Low Total Score: 2 — Exposure Rating: Medium Total Score: 3 — Exposure Rating: High If project budget is more than $50 million: ...and scores "Medium" or "High" provide a list of recommendations for modifications to the current design to address the triggered climate risk. Include an order of magnitude cost for each recommended measure. **Score 2 Medium**
Precipitation	Does the site have a history of flooding during precipitation events?	Consult institutional knowledge (for example, if this site flooded during Hurricane Irene) and 311 service requests for flooding at or near this site (see hyperlink below) and select "yes" if there is a history of flooding at the site. https://data.cityofnewyork.us/Social-Services/Street-Flooding/wymi-u6i8	No=0	
Precipitation	Will there be a net increase in impervious area on the site as a result of the project?	Refer to preliminary site plans (if they are part of the project scope) or consult with Capital Project Initiation team. Choose 'yes' if a net increase in impervious area is anticipated.	Yes=1	

Integrative Design Report and Recommendations

NYC Mayor's Office of Recovery and Resiliency

Climate Resiliency Design Guidelines - Version 3.0

Exposure Screening Tool

	Risk Screening Question	Directions	Answers and Score
Sea level rise	Current Flood Risk Is the facility in the current 1% annual chance floodplain (100-year)?	Visit NYC Flood Hazard Mapper.* Click on the Map Legend and select the 'Preliminary Flood Insurance Rate Maps 2015'. Search for or navigate to the site to see if it is located within the current effective floodplain. If the site is shown to be all or partly in the current floodplain, answer 'yes.' http://www.nyc.gov/floodhazardmapper	No=0
	Future Flood Risk Is the facility in the future 1% annual chance floodplain (100-year) at any point during its useful life?	Visit NYC Flood Hazard Mapper.* Click on the Map Legend and select the 'Future Floodplain' that corresponds to the project useful life. Search for or navigate to the property to see if it is located within the future floodplain. If the site is shown to be all or partly in the future floodplain, answer 'yes.' http://www.nyc.gov/floodhazardmapper	No=0
	Current Tidal Inundation Does this site have a history of flooding from high tide events?	Potential sources to answer this question include institutional knowledge (for example, if this site floods during regular high tides) or history of 311 service requests (see hyperlink below). If the site is shown to have a history of tidal flooding, answer 'yes.' https://data.cityofnewyork.us/Social-Services/Street-Flooding/wymi-u6i8	No=0
	Future Tidal Inundation Are there any critical access roads to the site that will be inundated by future high tides?	Visit the NYC Flood Hazard Mapper.* Click on the Map Legend and select the "High Tide" scenario that corresponds to the project useful life. Identify if any primary access roads are inundated from high tide plus sea level rise. If the site is shown to have roads at risk of tidal inundation, answer 'yes.' http://www.nyc.gov/floodhazardmapper	No=0

Total Score and Next Steps

Total Score	Exposure Rating
0	Not Exposed
1	Low
2	Medium
>3	High

If project budget is more than $50 million:
...and scores "Medium" or "High" provide a list of recommendations for modifications to the current design to address the triggered climate risk. Include an order of magnitude cost for each recommended measure.

Score **0 Not Exposed**

*For more information on how to use the Flood Hazard Mapper, see Section II.C

NYC School Construction Authority

Integrative Design Report and Recommendations

7.3 GSG checklist

Exposure screening tool results

Heat: Project site is located at a medium heat Vulnerability Index area.

Precipitation: The site is at a medium range, site drainage will be provided

Sea Level Risk: Project site has no sea level risk based on the screening and flood maps

NYC Mayor's Office of Recovery and Resiliency

Climate Resiliency Design Guidelines - Version 3.0

Design Strategies Checklist

This appendix provides a template for identifying possible design strategies to address climate change hazards, as described throughout the Guidelines.

Project Title: K676

Design Strategies Checklist (not exhaustive)

	Extreme Heat	Comments		Extreme Precipitation	Comments		Sea Level Rise & Storm Surge	Comments
☐	Select Site in Low Heat Vulnerability Index area	Site was given,no choice	✓	Select High Elevation Site		✓	Select High Elevation Site	
✓	Building Cooling System		☐	Green Roof	High structural and maintenance cost	☐	Raise Building Floor Elevation	Site limitation to have ramp or stairs
☐	Minimize East-West Building Orientation	Property size & orientation to fit program	✓	Protect Below Grade Areas from Flooding		✓	Waterproof Building Envelope	
☐	Passive Solar Cooling and Ventilation Systems	Maintenance & available system limitation	☐	On-site Stormwater Management (gray)	Site limitation	✓	Elevate Critical Building Functions	
✓	Cool Roof (SRI appropriate)		✓	Reduce Impervious Areas		✓	Elevate Critical Equipment	
☐	Green Roof (extensive)	tural cost and maintena	☐	Permeable Pavement	Play ground safety concerns	☐	Perimeter Floodwall** / Levee (passive or active)	Avoid building below water level, not appicable
☐	Vegetative Structures	Higher structural cost and maintenance	☐	Increase Green Spaces and Planted Areas	Site limitation	☐	Dry/Wet Floodproofing	
✓	Enhanced HVAC System, including space layout optimization and system scalability		☐	Blue Roof	Not SCA standard roof type	☐	Utility Redundancy Design***	Additional construction cost
✓	More Efficient Building Envelope		☐	Bioswale	Site limitation	✓	Resilient Materials & Landscape Treatments	
☐	Parking Lot Shading	No parking space required	☐	Other:		✓	Design for Storm Surge Outflow	
✓	Light Colored Pavements (appropriate SRI)					✓	Install Backwater Flow Prevention	
☐	Increase Planted Areas	Property size limitation				☐	Design for Scour	Existing street storm line elevation fixed
☐	Permeable Surfaces and Open-grid Pavement	Not appropriate for playground				☐	Raise Road Elevation	Not practical/ DOT control road design
☐	Other:					☐	Other:	

** Permanent perimeter flood walls are not permitted to meet floodproofing requirements in buildings with substantial improvements and/or damages.
*** Utility redundancy design should be pursued for critical systems, not all building systems.

Design Strategies Checklist

SCA NYC School Construction Authority

Integrative Design Report and Recommendations

7.4 Cost for Heat and Precipitation for each potential measure

1) A SRI appropriate roof is a minimal method to reduce the heat island effect. There is no additional cost.
2) One of the most effective methods to reduce heat island effect. Initial cost for an extensive green roof is estimated at an extra $.[redacted] for a roof of appropriately 145,000 s.f. like this new school.
3) This can generally be translated to a thicker layer of insulation. Additional cost is estimated at $[redacted]/s.f. or $;[redacted] for this new school.
4) Light colored asphalt (SRI appropriate) is a minimal method to reduce the heat island effect. There is no additional cost.
5) Cost for planting is estimated at $[redacted] per s.f. only slightly higher than the estimates $[redacted] per s.f. for concrete pavement. Planting in a school setting is not ideal.
6) Permeable pavers are an estimation cost increase of $ [redacted] per s.f. compared to concrete or asphalt pavement.
7) One of the most effective methods to reduce heat island effect. Initial cost for a (integrative) green roof is estimated at an extra $ [redacted] for a roof of appropriately 14,500 s.f. like this new school.
8) Installing an on-site gray water systems for a building of this size is estimated at $ [redacted]
9) Reducing impervious areas is a good method to manage runoff if percolation rate at the site is suited. There is only minimal additional cost of an estimated $[redacted] per s.f.
10) There is an additional cost of $[redacted] per s.f. for pervious concrete installation.
11) Cost for green areas and planting is estimated at $ [redacted] per s.f. only slightly higher than the estimated $[redacted] per s.f. for concrete pavement. Planting in a school setting is not ideal.
12) Blueroof is a very effective way to manage storm water. Cost is estimated at appropriately @[redacted] per s.f. or $ [redacted] for a roof of approx.. 14,500 s.f.
13) A bioswale can be another effective method to storm water. Cost of bioswale is estimated at $ [redacted] per s.f. or $ [redacted] for a bioswale of 1,000 s.f.