COVER PAGE

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(Refer to SD & DD sample submissions for recommended TOC structure)

Project Credit Checklist[1]

SCA School Construction Authority

NYC Green Schools Rating System 2019

SD	DD	60%	100%	Design	Const
		X			

Project:	PS 123A
Address, Zip Code:	345 Example St
LLW #:	123456
Design #:	123456
Architect:	Architect

Date last updated:

Select if interior fit-out[13]

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
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

Revision I - September 2019
Revision II - February 26, 2021

Project Credit Checklist[1]

SCA School Construction Authority

NYC Green Schools Rating System 2019

		SD	DD	60%	100%	Design	Const
Project:	PS 123A		X				
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]	Design Phase	Const. Phase
										Credit submissions required for Design and Construction[7]	
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		Q1.3	Enhanced IAQ Ventilation & Monitoring[11]				1		1	
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	7	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	42	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
14	automatically. Long Term Commitment is new credit in the checklist only and applicable to Interior Fit-out projects only.

Revision I - September 2019
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 or 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:

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		Separate Sanitary and Storm Sewage System
	Fuel Oil	X	Rainwater		
	Biofuels		Graywater		
	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

DESIGN MANAGER		DESIGN PROJECT MANAGER	
Name:	Example Design Manager	Name:	Example PDM
Telephone:	123-456-7890	Telephone:	123-456-7890
Email:	example@example.com	Email:	example@example.com

COMMISSIONING	
Name:	Example CxA
Telephone:	123-456-7890
Email:	example@example.com

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 (UPDATED for GSG-60% and GSG-100%)
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. The preliminary

Commissioning Plan has been submitted to SCA. CxA 60% design review comments and commissioning requirements have been incorporated into the construction documents.

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 (UPDATED for GSG-60% submission)
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. RTU's will be sized slightly above ventilation requirements to account for ductwork leakage

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 UPDATED for GSG-60% submission)
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.

It is also noted that preliminary ventilation calculations as part of the 30% DD set for each of the four (4) AHUs in the project HVAC scope show that 30% increase in outdoor air delivered to the project over flow rate required by ASHRAE 62.1-2010 is achievable for multi-zone AHUs 1 and 2.
For AHU 1, the design OA intake flow is 9,000 cfm, a 30% increase over the ASHRAE 62.1 minimum (6,803 cfm). For AHU 2, the design OA intake flow is 8,250 cfm, over 2x the ASHRAE 62.1 minimum (4,086 cfm).
The single-zone AHUs 3 and 4 deliver 2,250 cfm and 2,750 cfm, respectively. Increased ventilation rates, however, is not an option under Q1.3A.

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

SCA School Construction Authority

INTEGRATIVE DESIGN PROCESS
CREDIT FORM
Credit P1.1R

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

	Y	N
IDP Workshop Report included in this submittal package	X	

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).

	Y	N
Geothermal System Feasibility Report required	X	

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

	Y	N	Topics addressed
Water related system assessment performed	X		**Indoor Fixture Use, Irrigation, Stormwater Collection**

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

	Y	N
LCA Assessment performed	X	

Discovery #4 Active Design

	Y	N
Active Design Plan provided	X	

Discovery #5 Acoustics

	Y	N
Q8.1P and Q8.2 Risk Assessment performed	X	

Discovery #6 Climate Resiliency

	Y	N
Climate Resiliency discovery analysis provided	X	

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

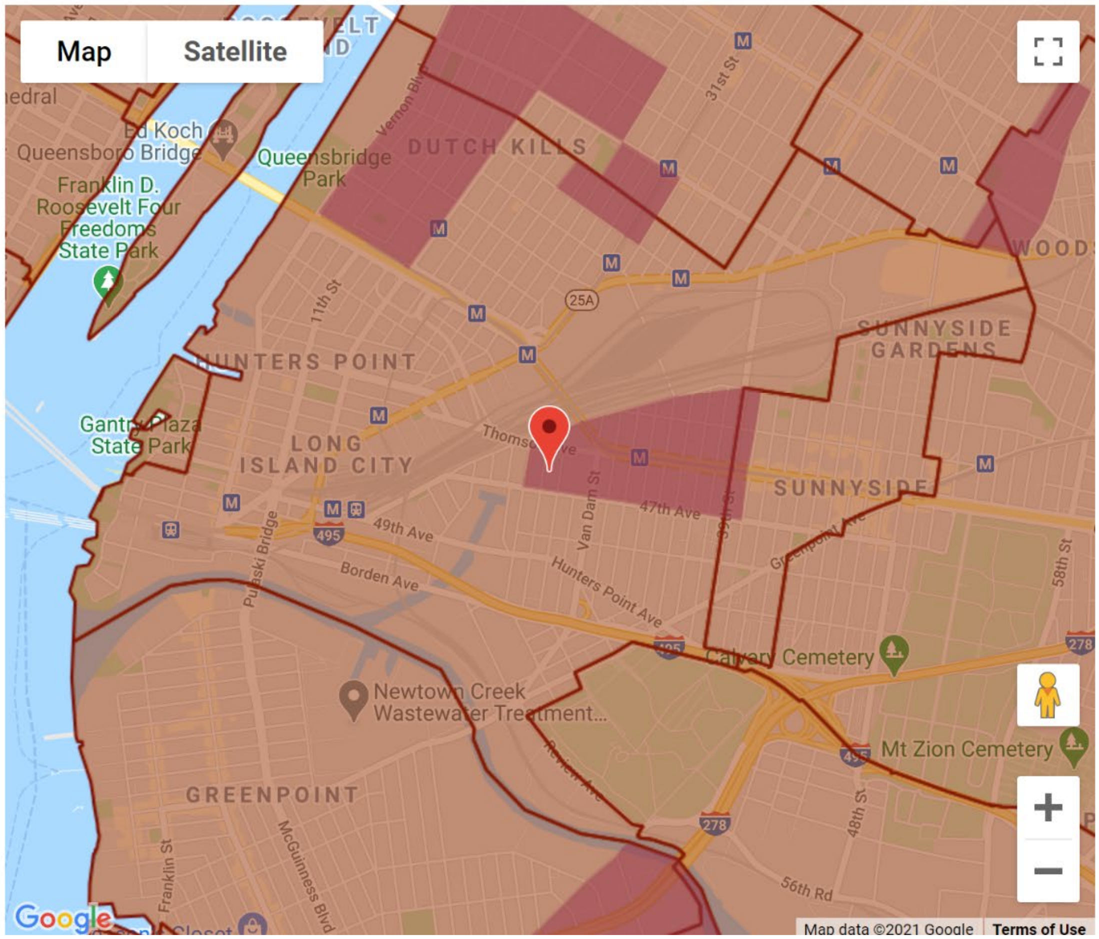
14 Current Zoom Level

- [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

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

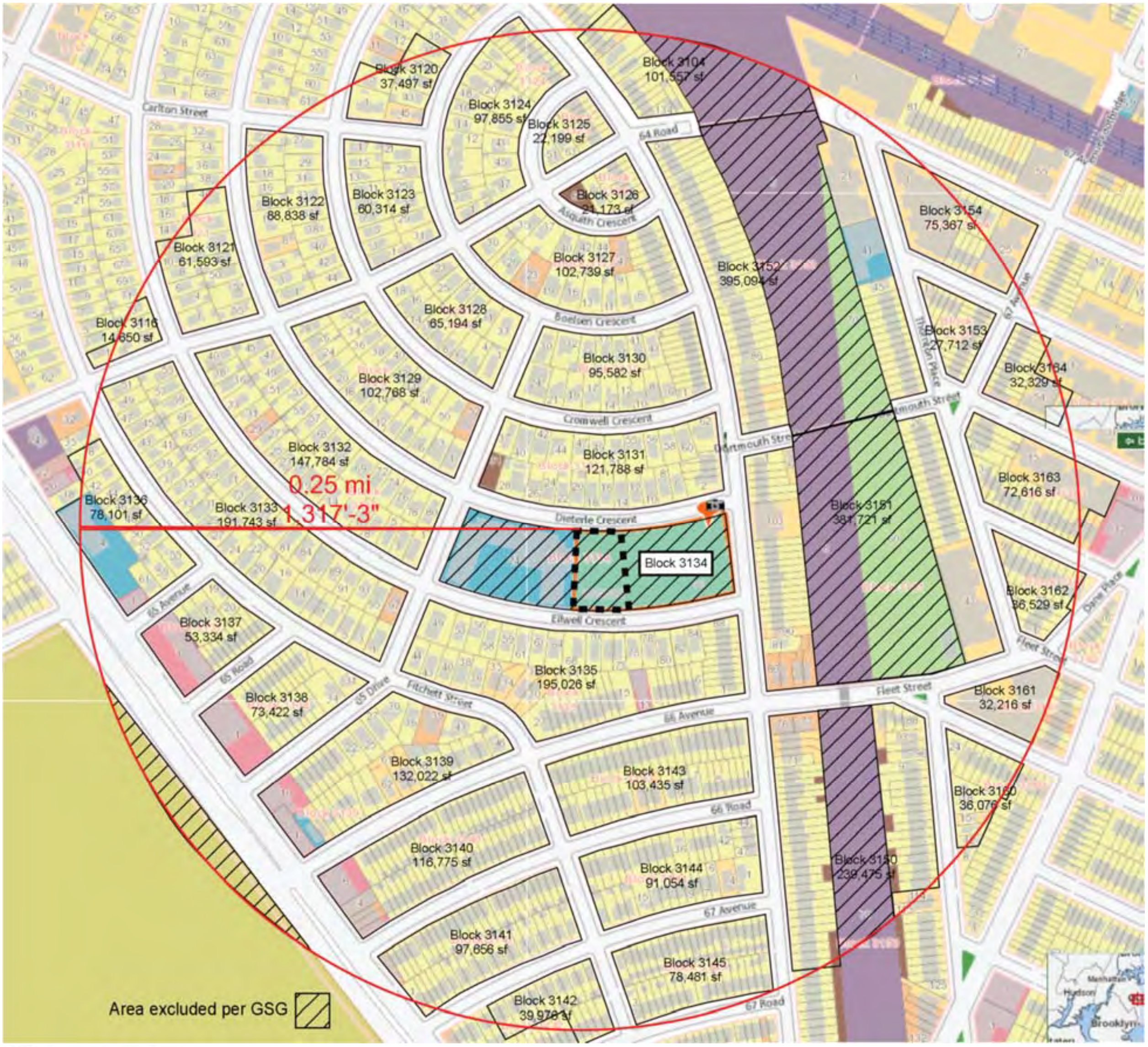
Mixed-use building area (SF)	Residential SF	3,735
	Nonresidential SF	3,735
Total mixed-use building area (SF)		7,470
Percentage of mixed-use building area (%)	Residential %	50
	Nonresidential %	50
Total mixed-use building land area (acres)		10,844.00
Weighted mixed-use land area (acres)	Residential acres	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 3124
97,855 sf
Block 3125
22,199 sf
Block 3104
101,557 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 3116
14,650 sf
Block 3128
65,194 sf
Boelsen Crescent
Block 3153
27,712 sf
Block 3130
95,582 sf
Block 3164
32,329 sf
Block 3129
102,768 sf
Cromwell Crescent
Dartmouth Street
Block 3132
147,784 sf
Block 3131
121,788 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 3163
72,616 sf
Block 3134
Block 3162
36,529 sf
65 Avenue
Block 3137
53,334 sf
Eliwell Crescent
65 Road
Block 3135
195,026 sf
Fleet Street
Block 3161
32,216 sf
Block 3138
73,422 sf
65 Drive
Fitchett Street
66 Avenue
Block 3139
132,022 sf
Block 3143
103,435 sf
Block 3160
38,076 sf
66 Road
Block 3140
116,775 sf
Block 3150
239,475 sf
Block 3144
91,054 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		
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		
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 SCA 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.

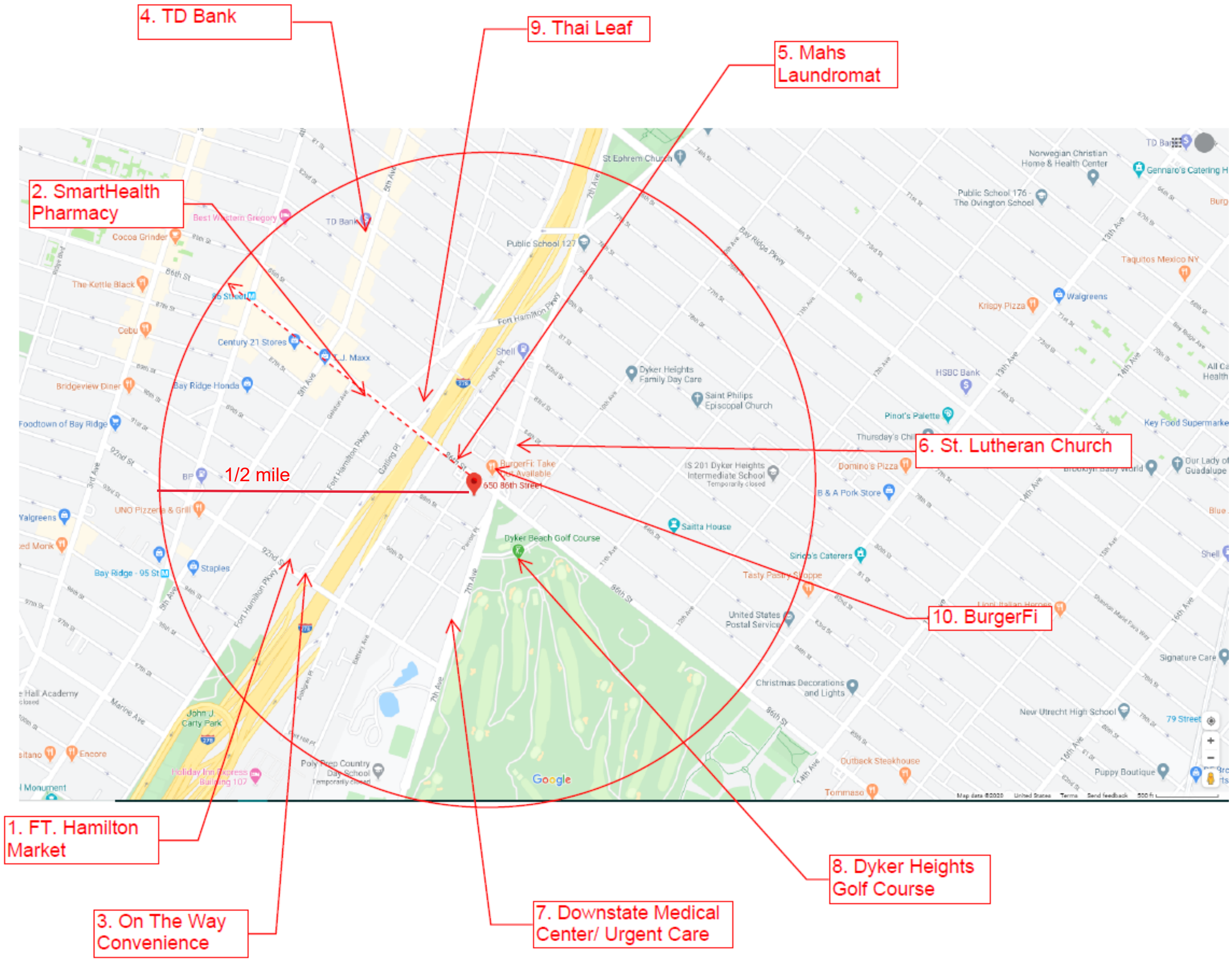
Step 1: Input business name and type

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

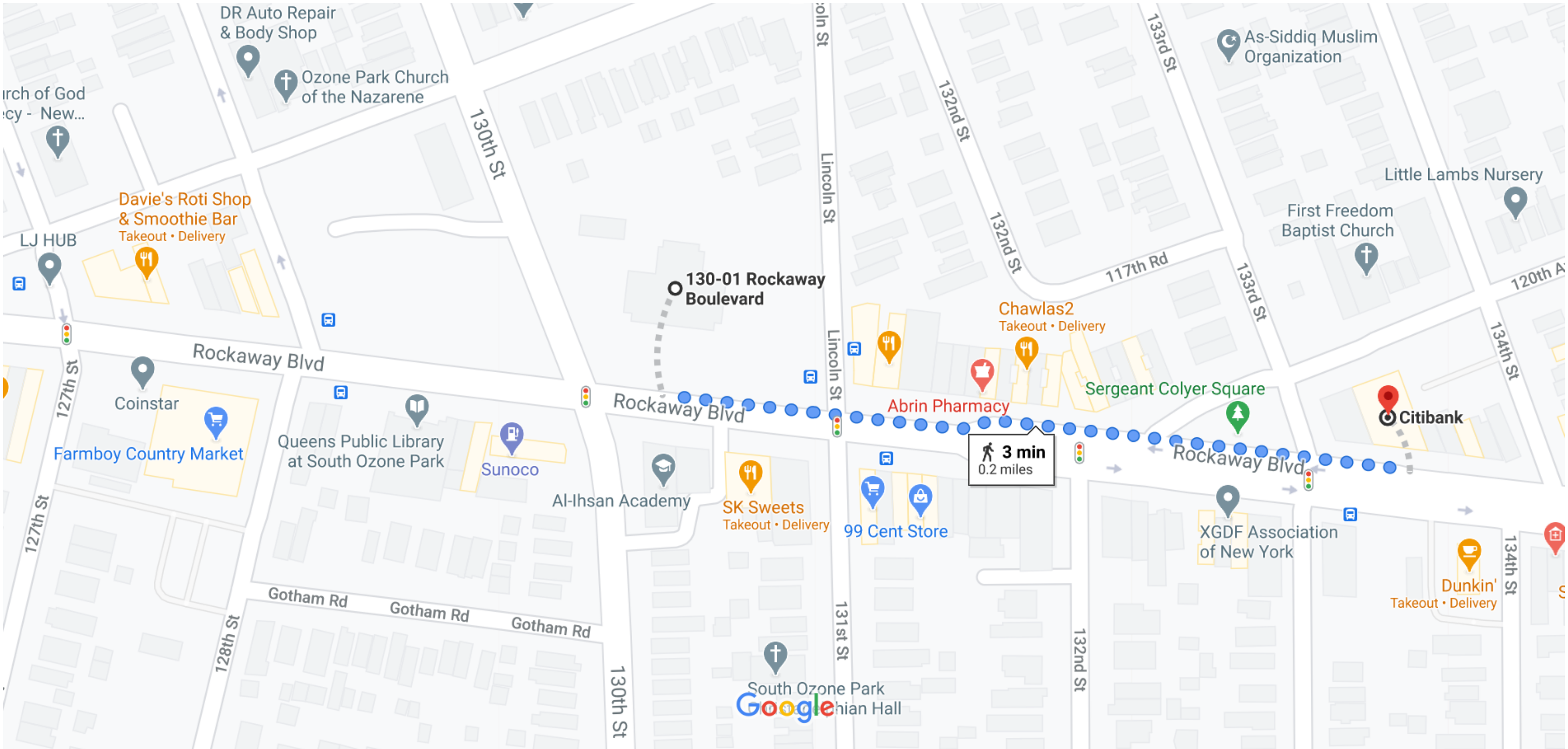
Category	Food Retail	Community Service Retail	Services	Civic & Community Facilities	Community Anchor
Use Type	Supermarket	Convenience store	Bank	Senior care facility	Commercial office
	Grocery with produce	Hardware store	Theater	Day care	
		Pharmacy	Fitness center	Community center	
			Hair care	Place 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
650 86th Street
6. St. Lutheran Church
10. BurgerFi
1. FT. Hamilton Market
8. Dyker Heights Golf Course
7. Downstate Medical Center/ Urgent Care
3. On The Way Convenience

Google Maps

Rockaway Boulevard, Queens, NY to Citibank

Walk 0.2 mile, 3 min



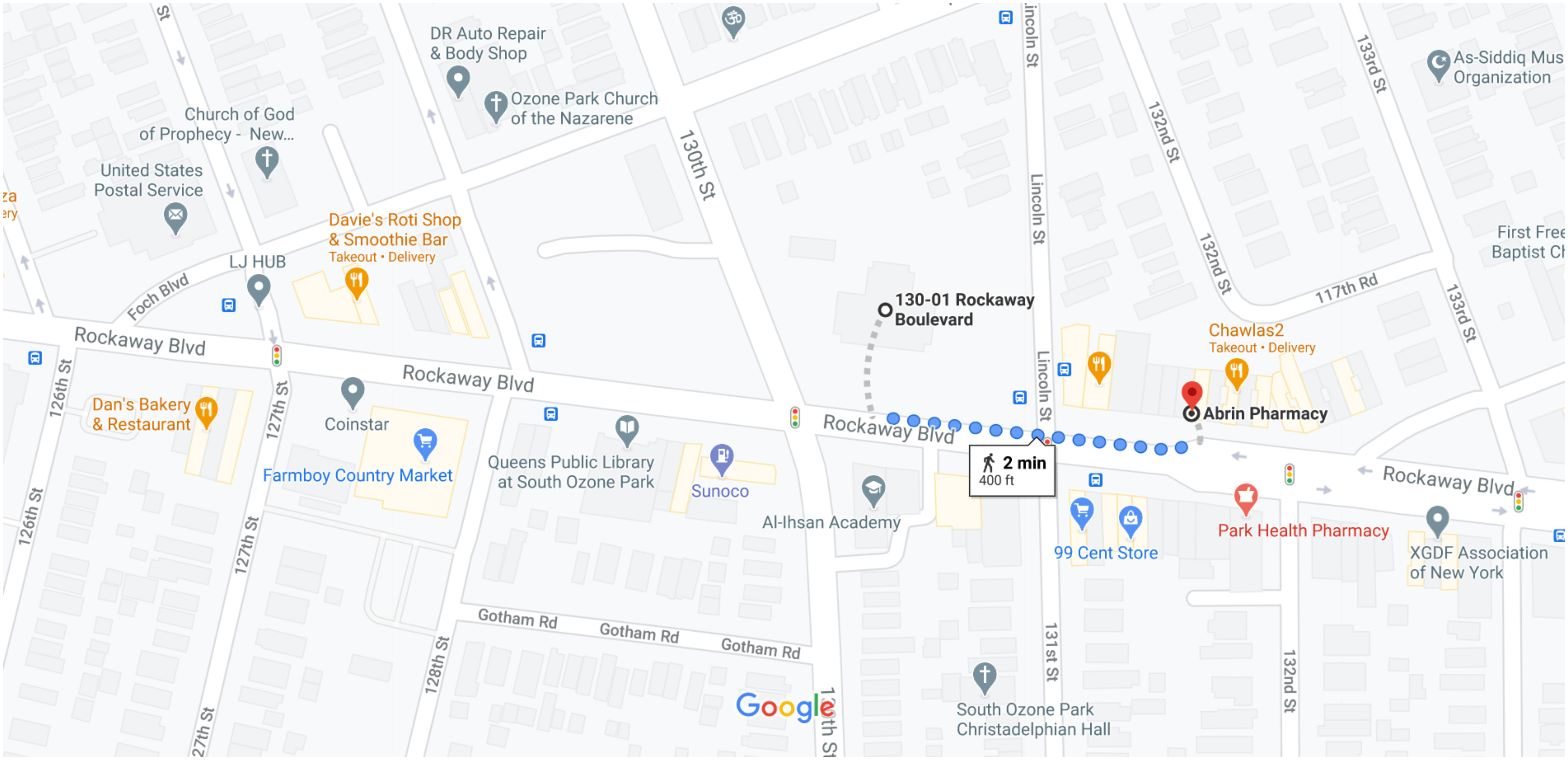
Map data ©2020 Google 100 ft

via Rockaway Blvd 3 min

0.2 mile

Mostly flat

Google Maps Rockaway Boulevard, Queens, NY to Abrin Pharmacy Walk 404 ft, 2 min



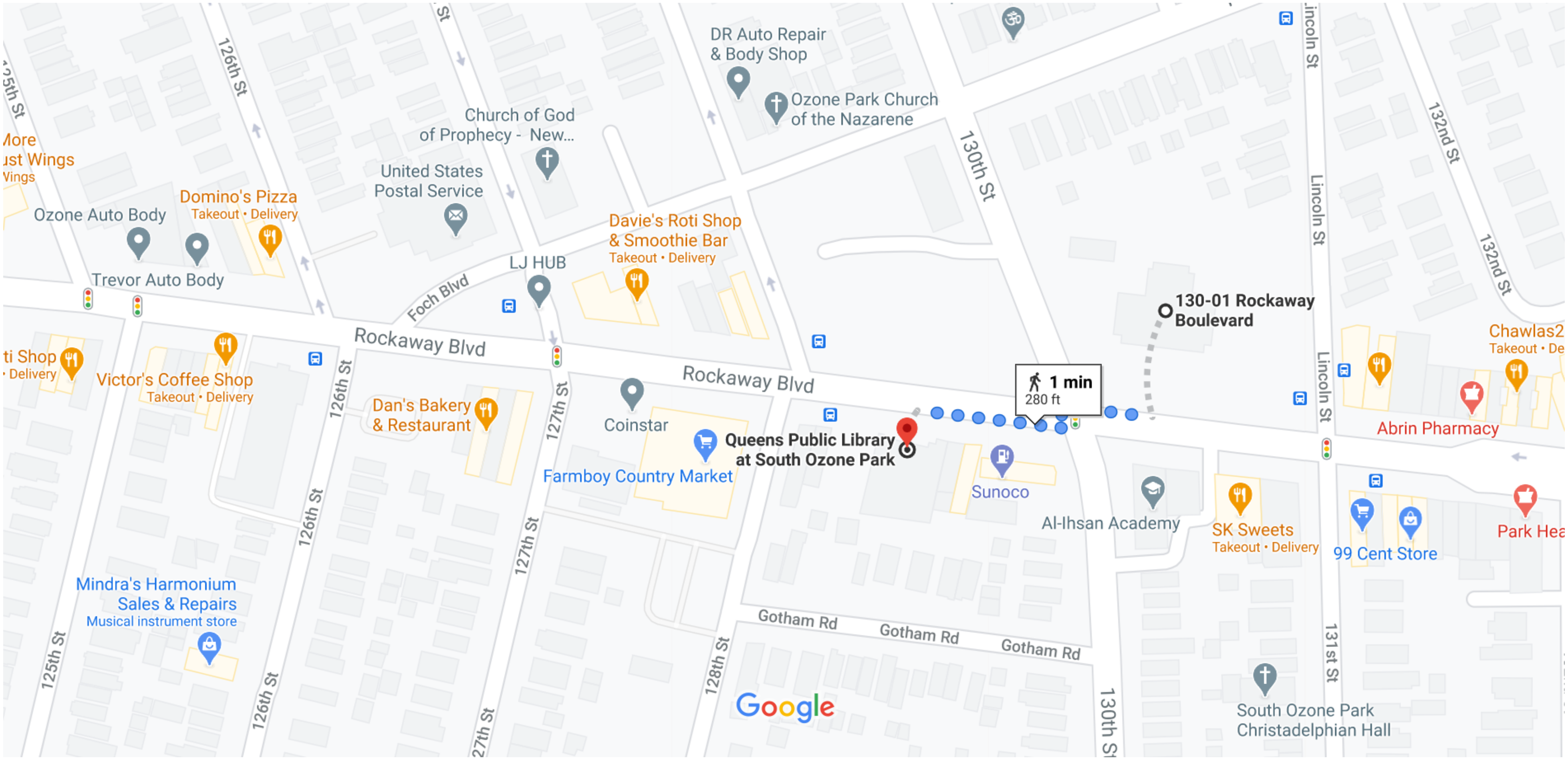
Map data ©2020 Google 100 ft

via Rockaway Blvd 2 min

404 ft

Mostly flat

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

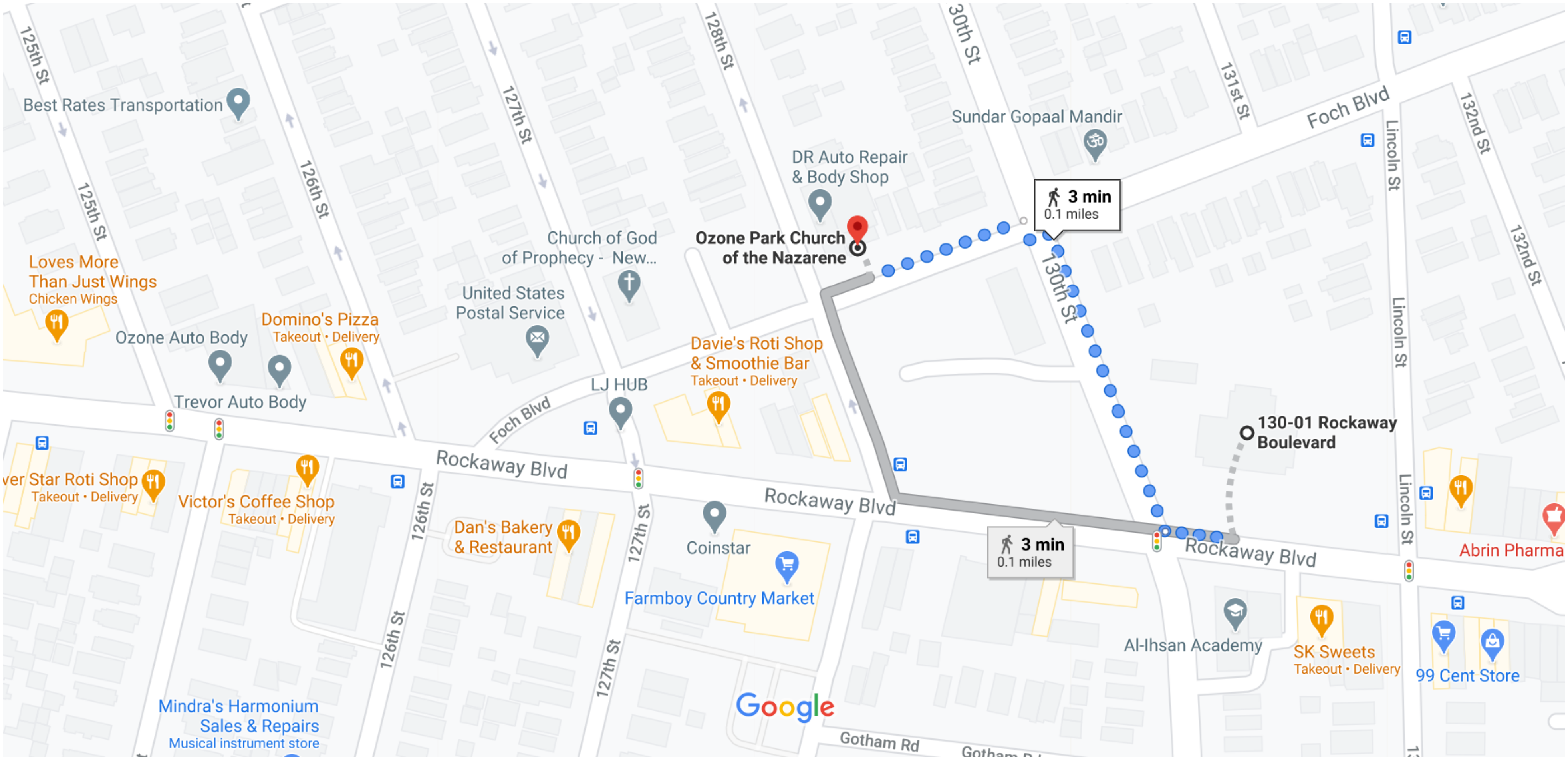
282 ft

Mostly flat

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

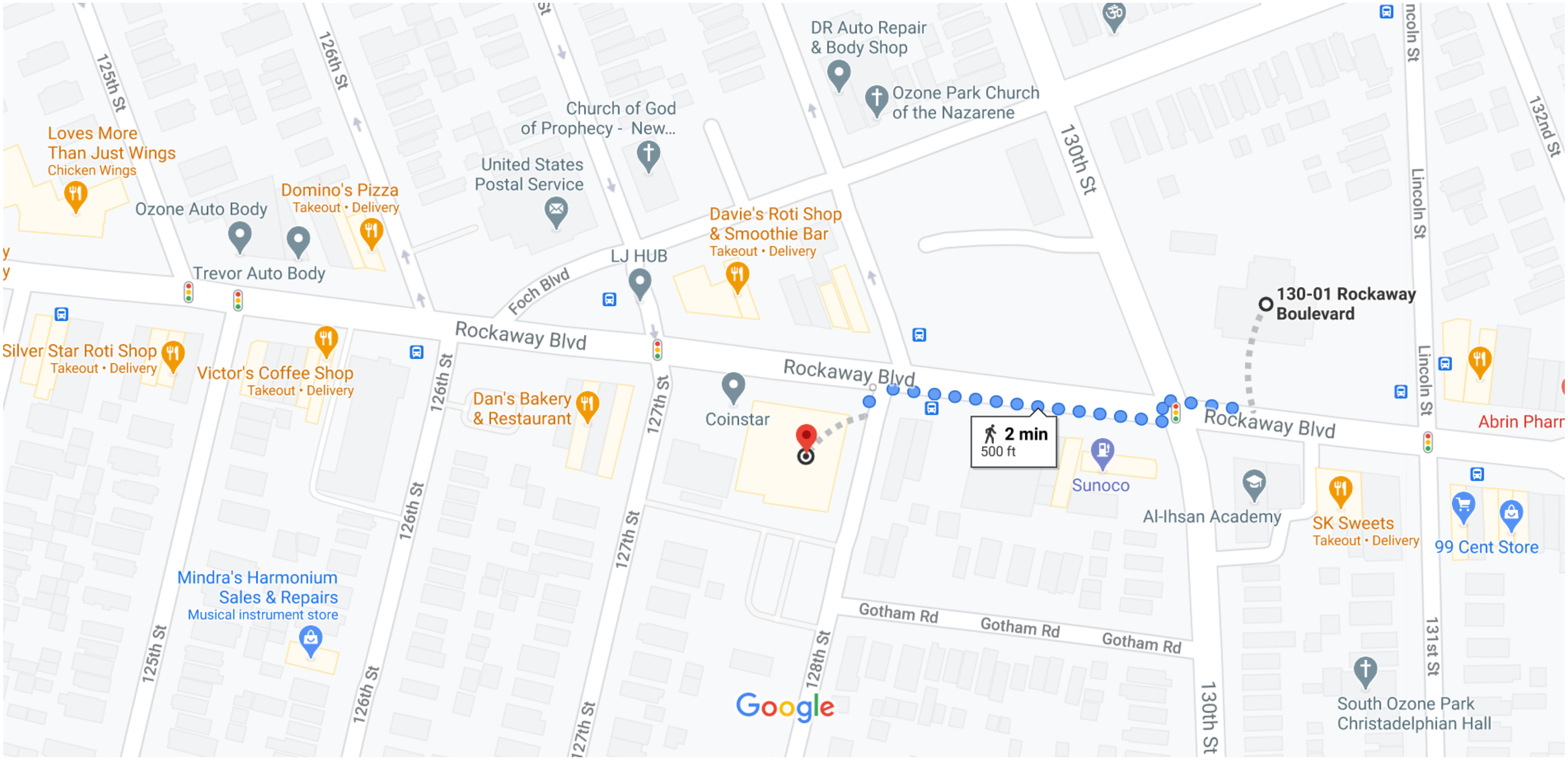
via Rockaway Blvd and 128th St 3 min

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

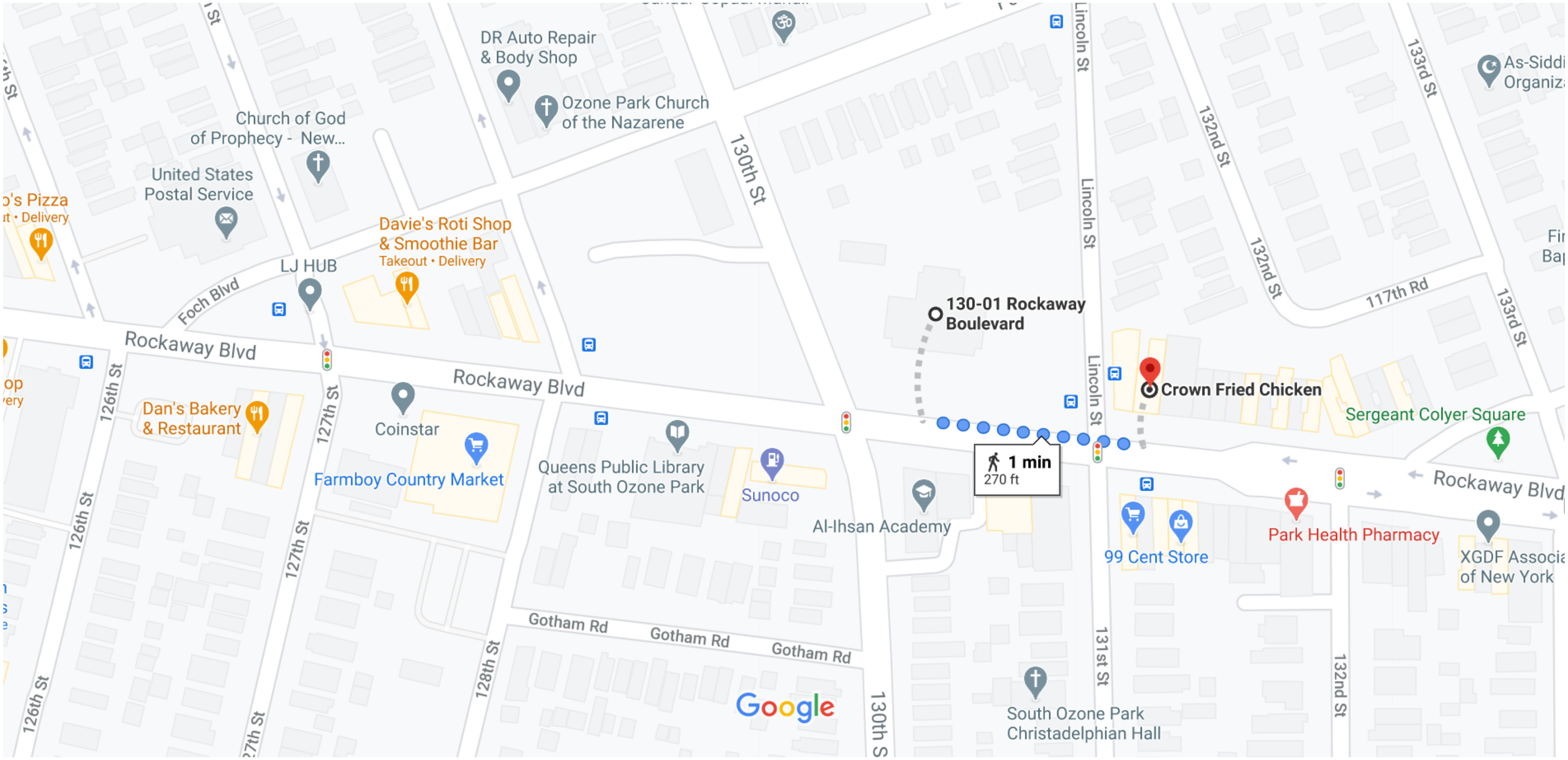
495 ft

Mostly flat

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

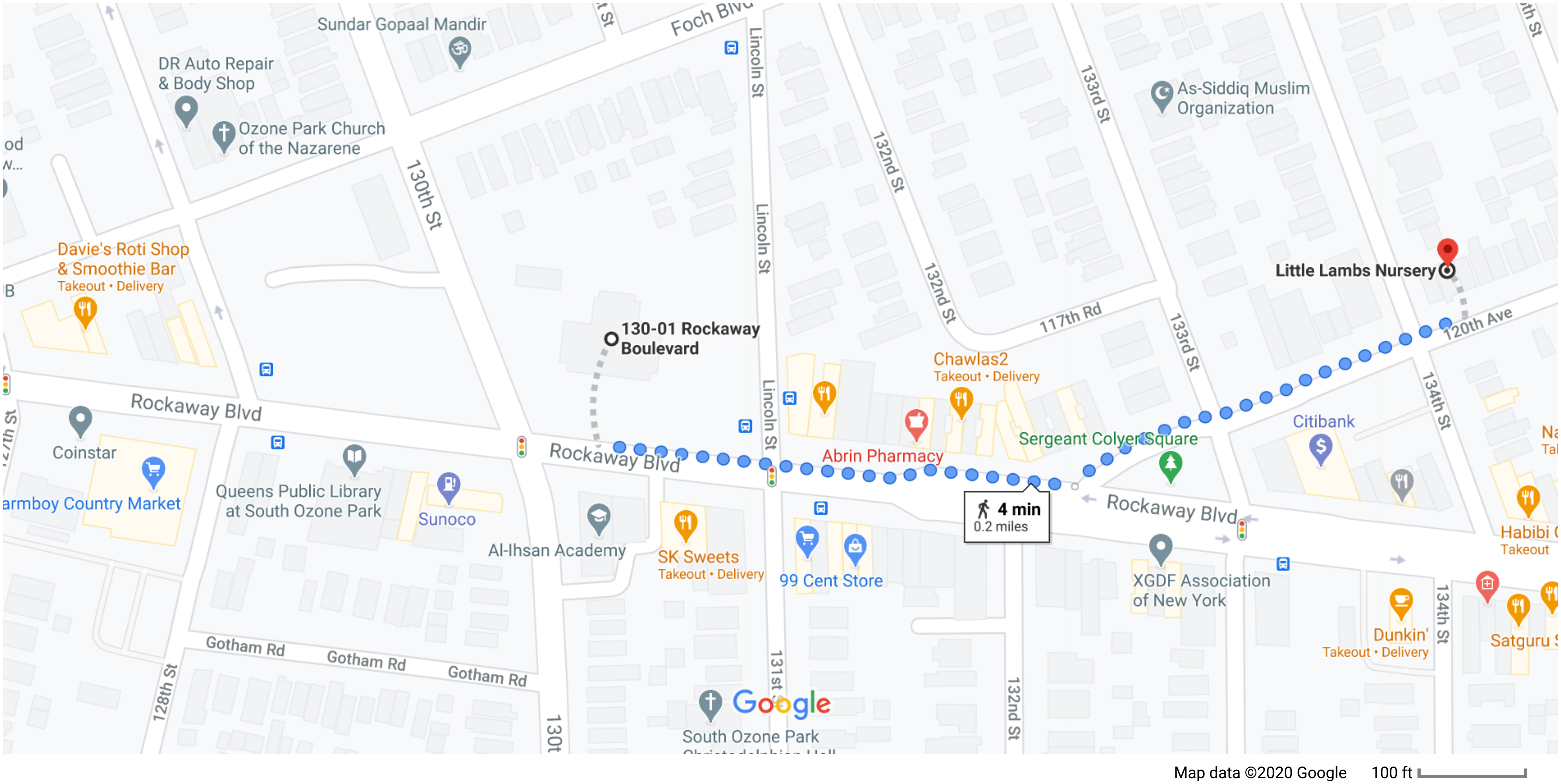
266 ft

Mostly flat

Google Maps

Rockaway Boulevard, Queens, NY to Little Lambs Nursery

Walk 0.2 mile, 4 min

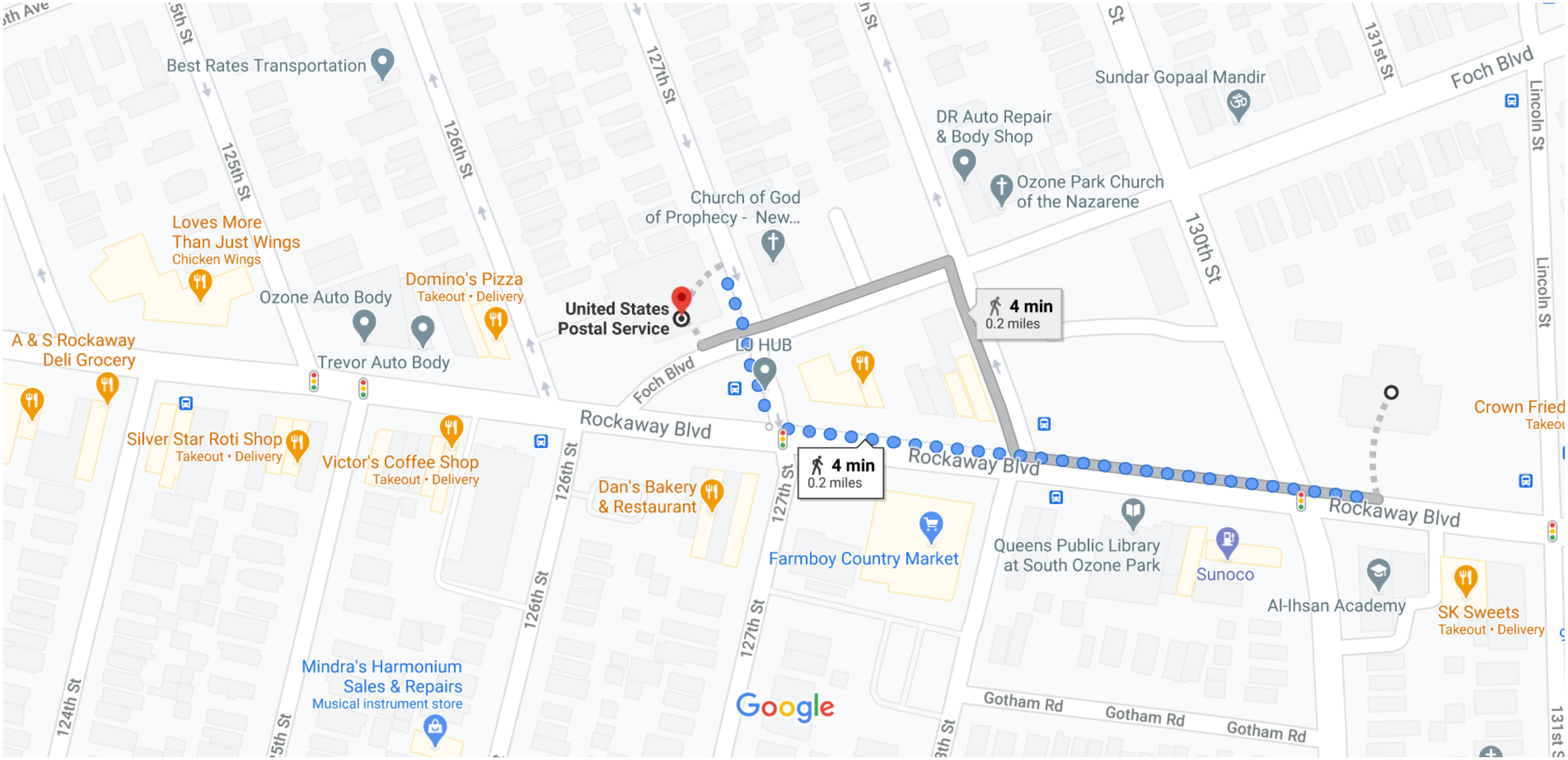


via Rockaway Blvd and 120th Ave — 4 min

0.2 mile

Mostly flat

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



Map data ©2020 Google 100 ft

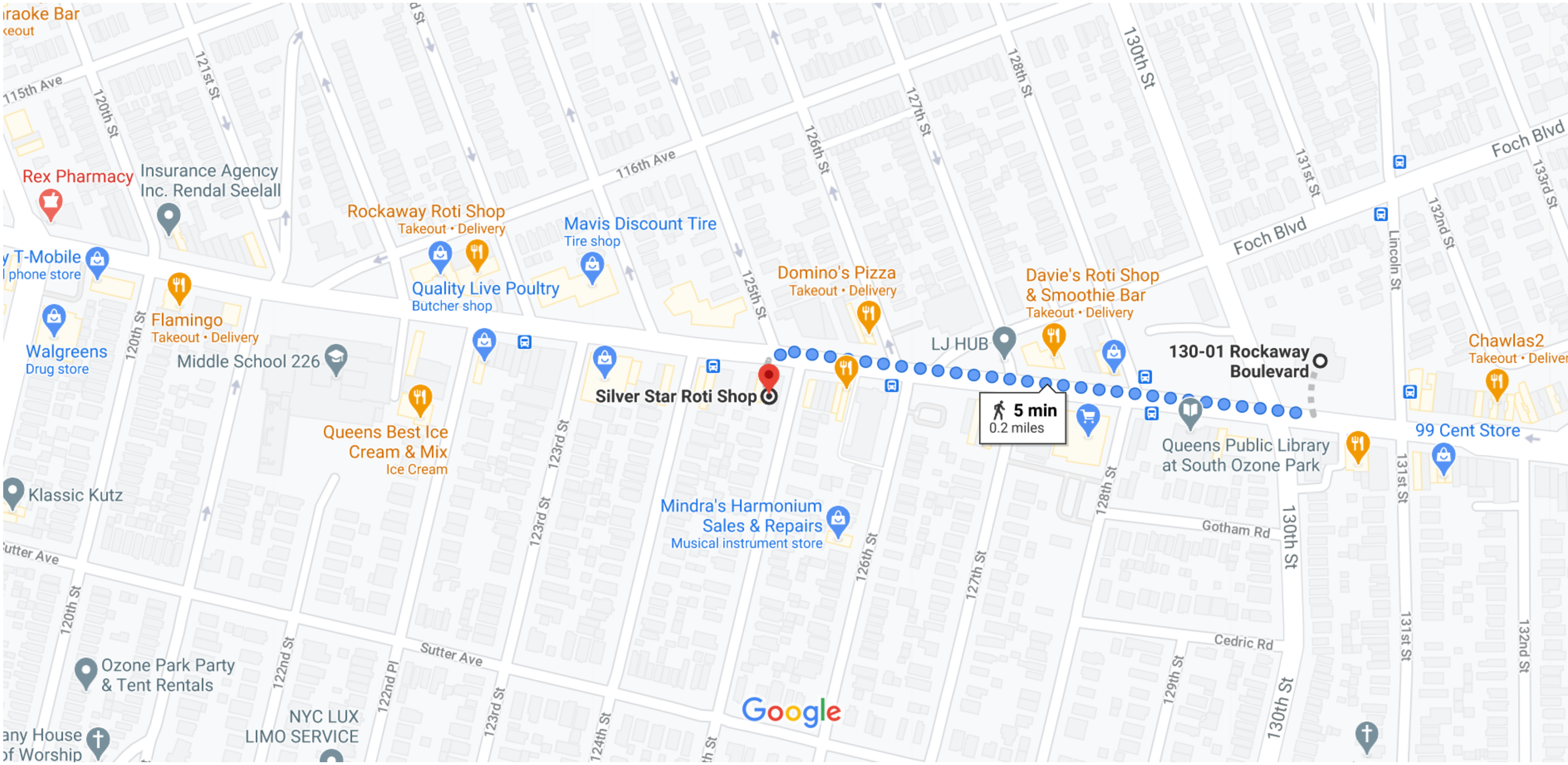
via Rockaway Blvd 4 min
0.2 mile

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



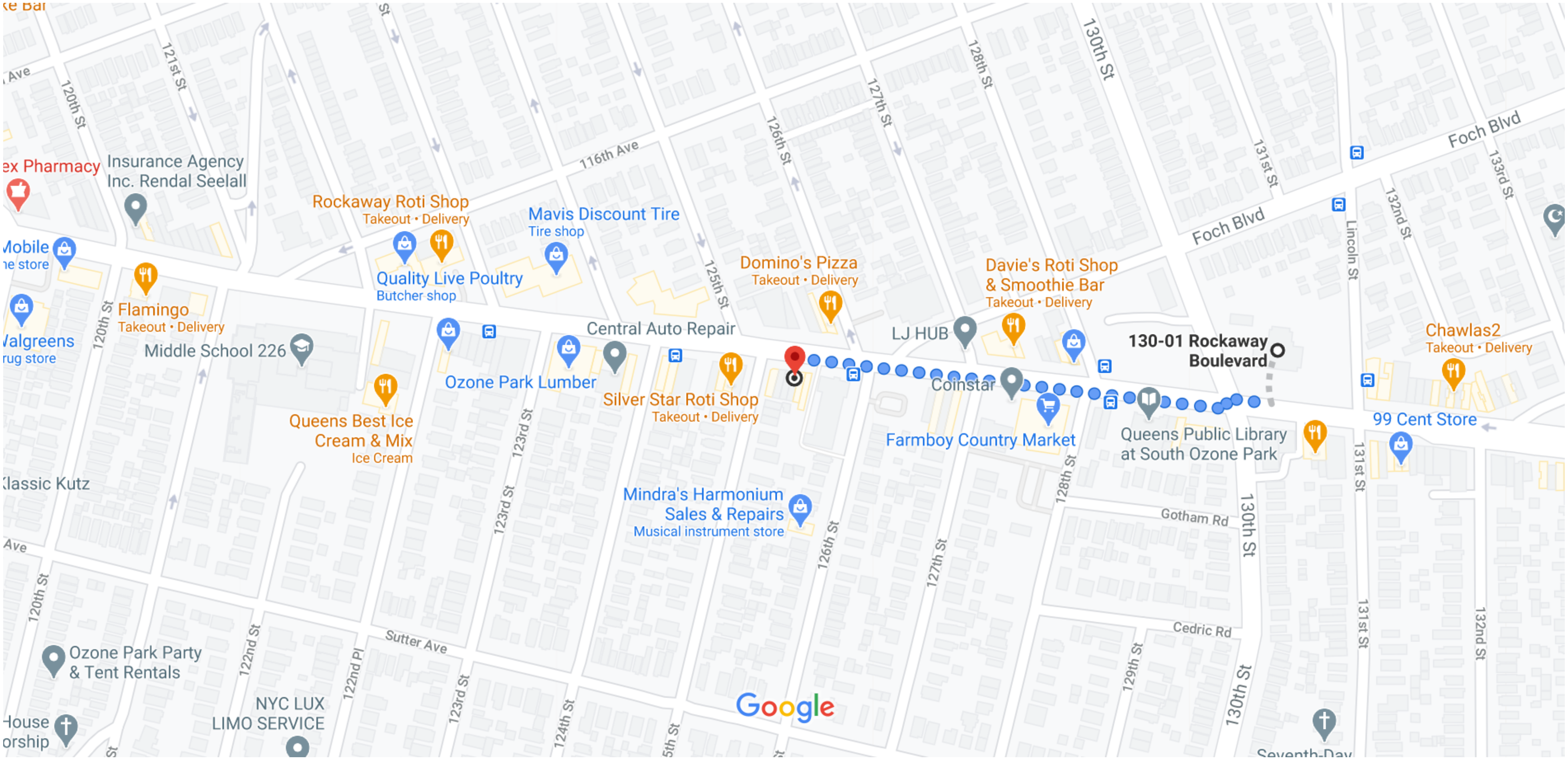
Map data ©2020 Google 200 ft

via Rockaway Blvd 5 min

0.2 mile

Mostly flat

Google Maps Rockaway Boulevard, Queens, NY to J & D Laundromat Walk 0.2 mile, 5 min



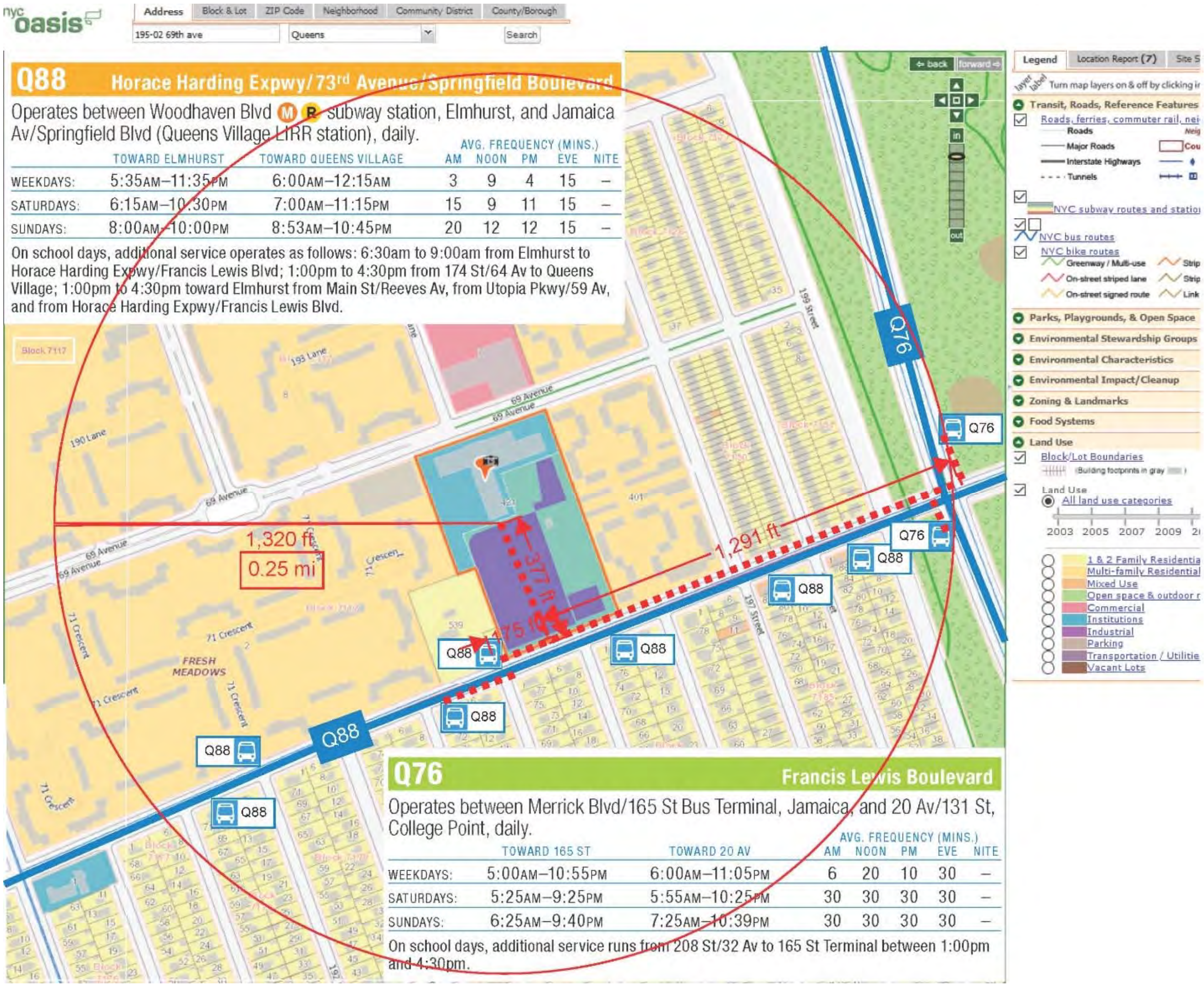
Map data ©2020 Google 200 ft

via Rockaway Blvd 5 min

0.2 mile

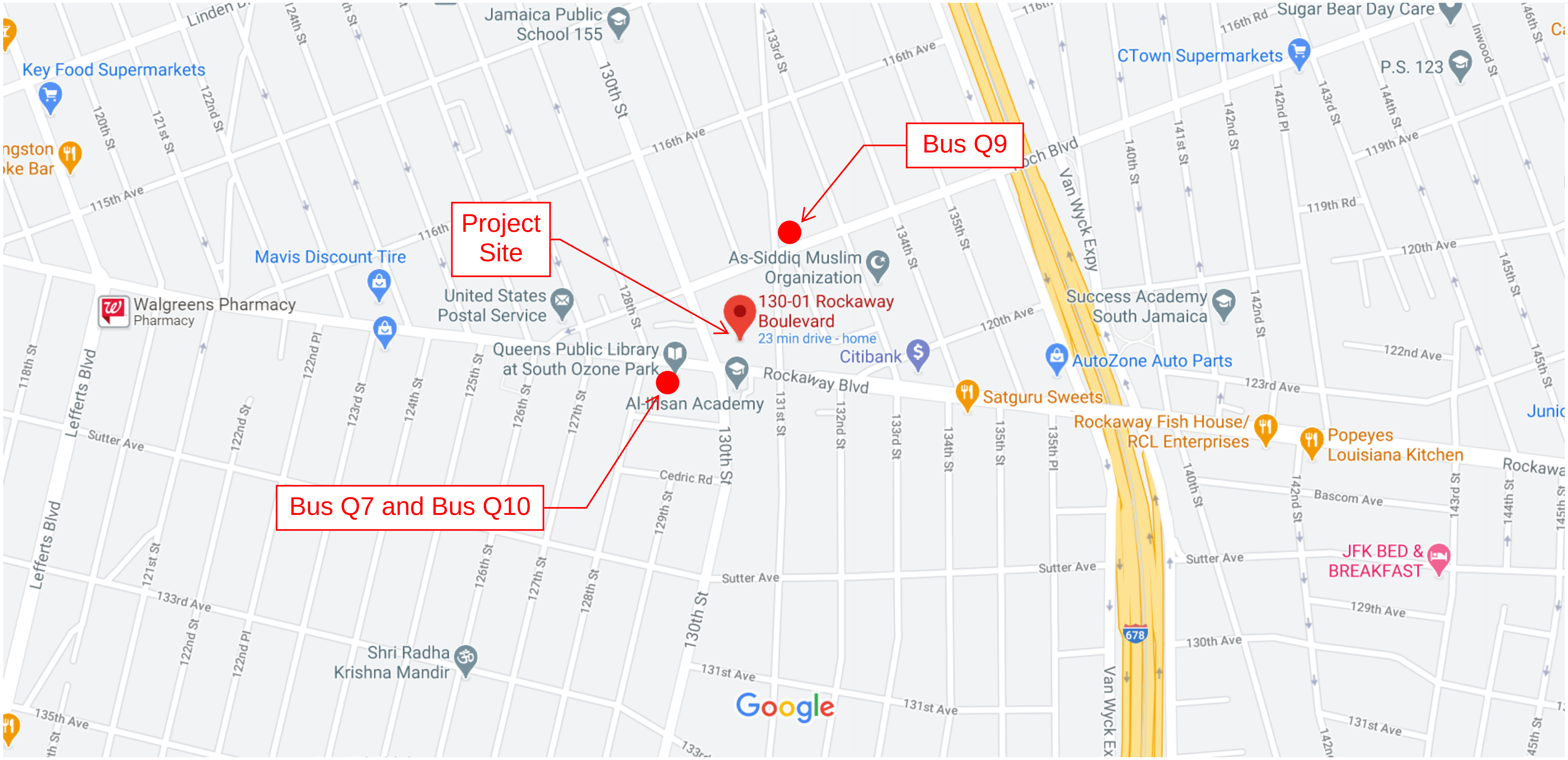
Mostly flat

L2.1R – ACCESS TO QUALITY TRANSIT


nyc oasis
Address
Block & Lot
ZIP Code
Neighborhood
Community District
County/Borough
195-02 69th ave
Queens
Search
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.
AVG. FREQUENCY (MINS.)
	TOWARD ELMHURST	TOWARD QUEENS VILLAGE	AM	NOON	PM	EVE	NITE
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.
1,320 ft
0.25 mi
377 ft
175 ft
1,291 ft
Q76
Q88
69 Avenue
199 Street
197 Street
71 Crescent
FRESH MEADOWS
Q76 Francis Lewis Boulevard
Operates between Merrick Blvd/165 St Bus Terminal, Jamaica, and 20 Av/131 St, College Point, daily.
AVG. FREQUENCY (MINS.)
	TOWARD 165 ST	TOWARD 20 AV	AM	NOON	PM	EVE	NITE
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.
Legend
Location Report (7)
Transit, Roads, Reference Features
NYC subway routes and stations
NYC bus routes
NYC bike routes
Parks, Playgrounds, & Open Space
Environmental Stewardship Groups
Environmental Characteristics
Environmental Impact/Cleanup
Zoning & Landmarks
Food Systems
Land Use
Block/Lot Boundaries
All land use categories
2003 2005 2007 2009
Mixed Use
Commercial
Institutions
Industrial
Parking
Vacant Lots

Access to Quality Transit

Google Maps   Rockaway Blvd



Map data ©2020   500 ft

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

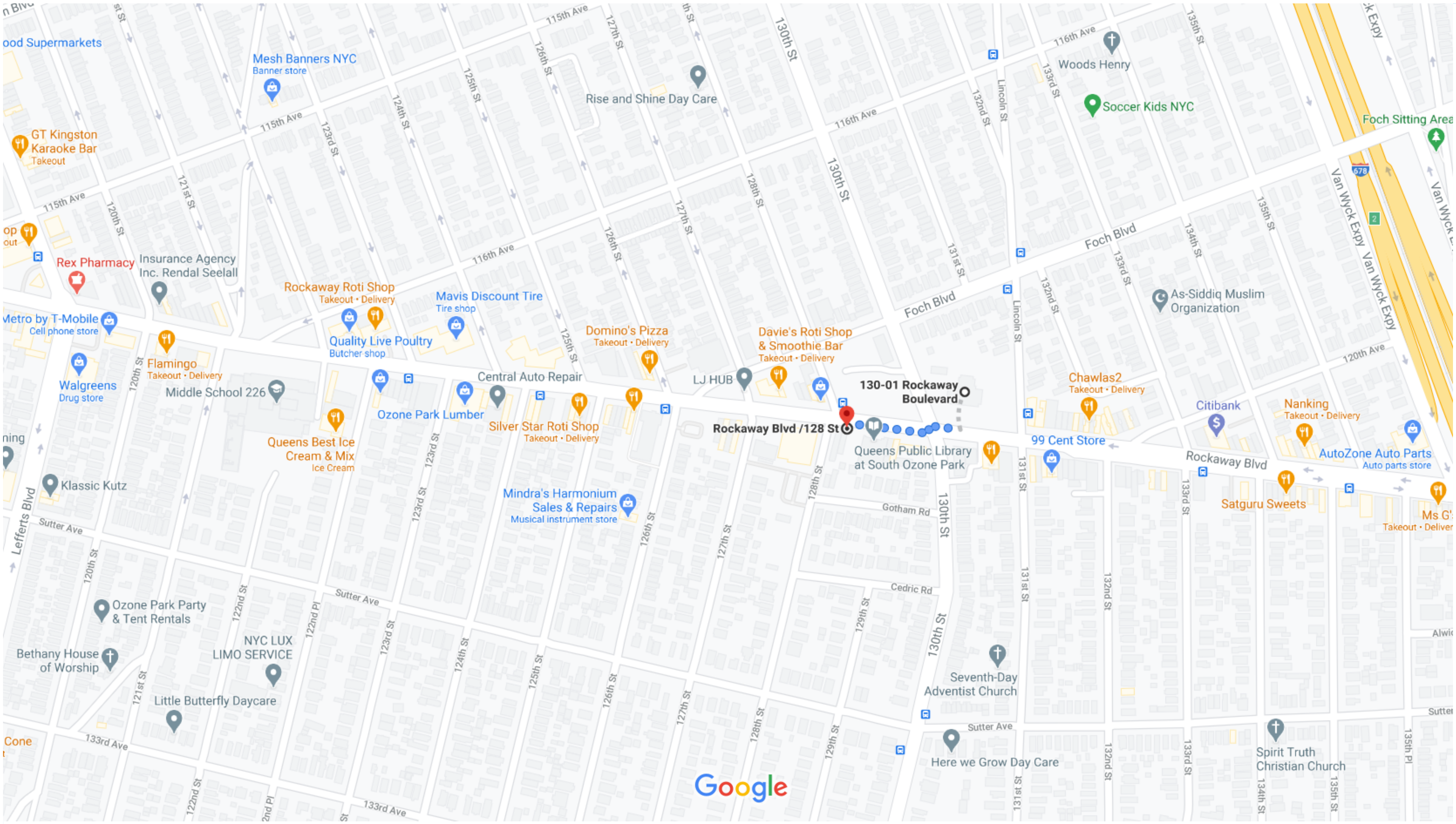
TOTAL TRIPS
Weekday = 361

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



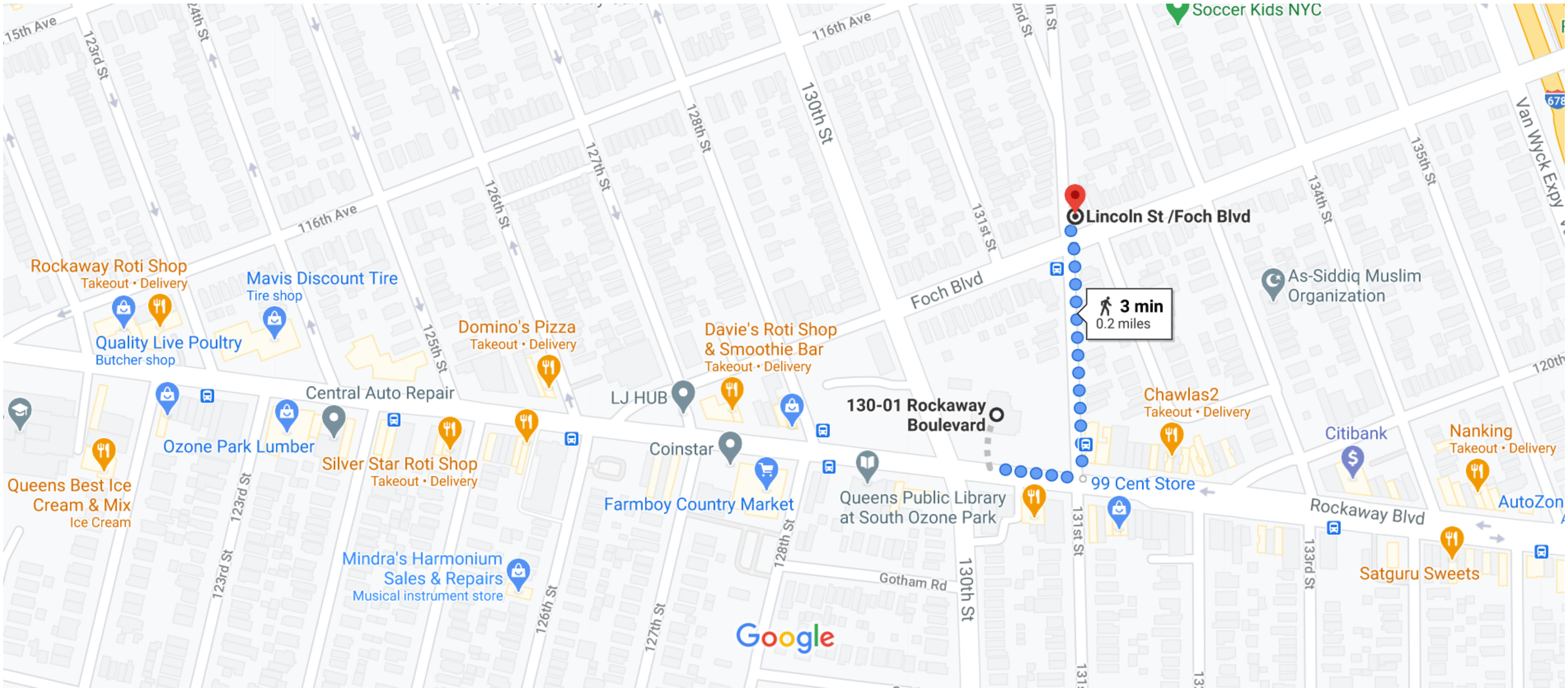
via Rockaway Blvd 2 min

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 flat

L2.2 – BICYCLE FACILITIES

NYC Green Schools Rating System SCA School Construction Authority

BICYCLE FACILITIES

RESPONSIBLE PARTY:

CREDIT FORM

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

Credit L2.2

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)	227
Indicate if project is an addition (filed as an addition)	No
Gross Area of existing building (if current project is addition).	
Is addtion SF> 50% of existing building SF	N/A
If SF of addition is >=50% of existing SF, enter staff and students for existing building (4th grade & abov	
Area of building (gross area)	44,028

Interior Bike Storage (to meet Zoning Resolution)

Number of interior spaces **required** per zoning	5
Number of interior spaces **provided** (Must be equal or greater than required per zoning)	7

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)	12
Required Spaces within 100 ft of any main entrance for existing building **(based on existing building staff and students 4th grade and above)**	0
Required spaces within 100 ft of any main entrance excluding interior spaces **(based on new building staff and students 4th grade and above)**	5
Provided covered spaces within 100 ft of any main entrance excluding interior spaces (based on new building **capacity**)	7
Provided **Exterior** spaces for **Existing Building**	
Compliance Achieved	***Yes***

Step 2: Showers

Staff (excluding all students)	31
Number of showers with changing facilities required	1
Number of showers with changing facilities provided	1

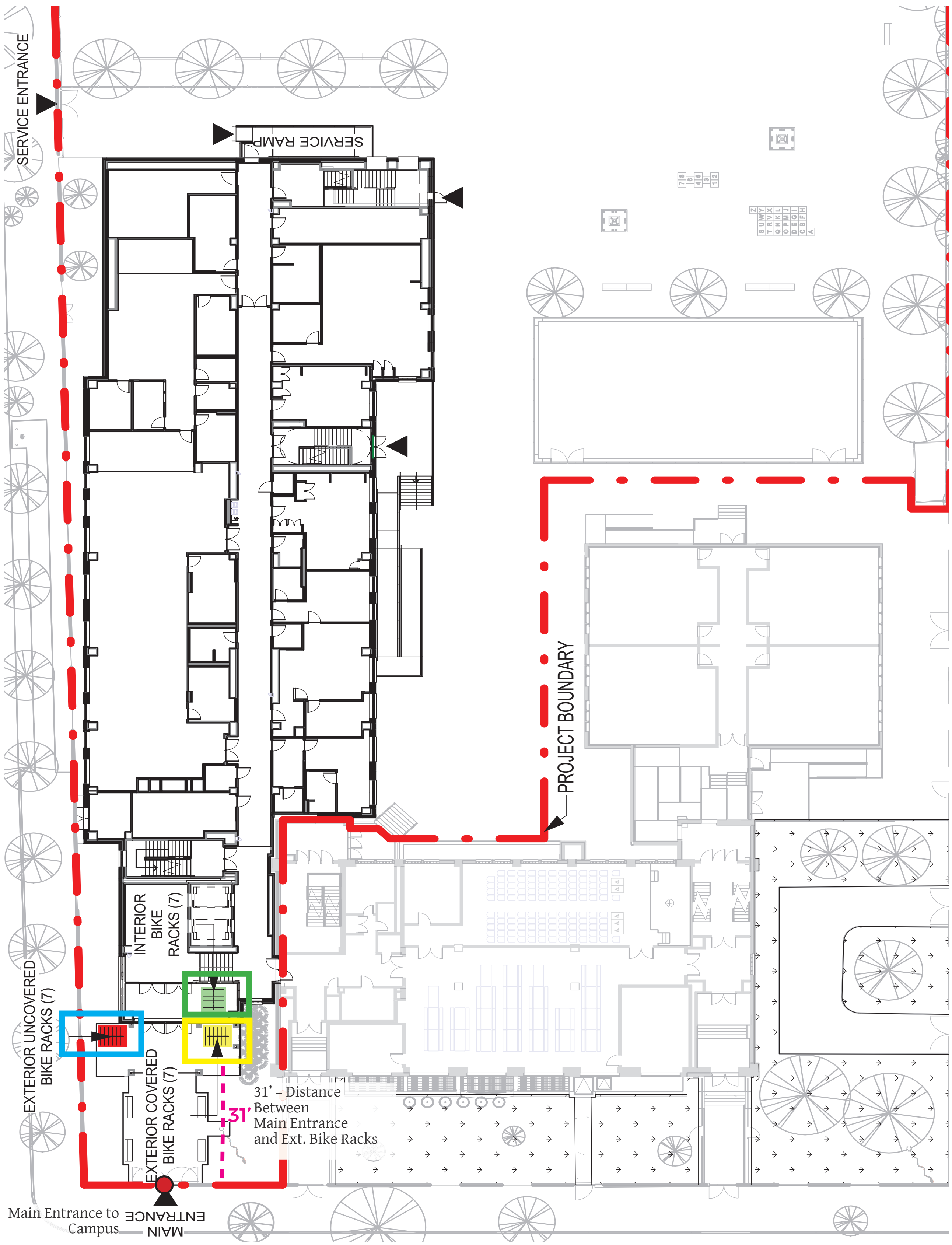
Step 3: Required Documentation

	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	

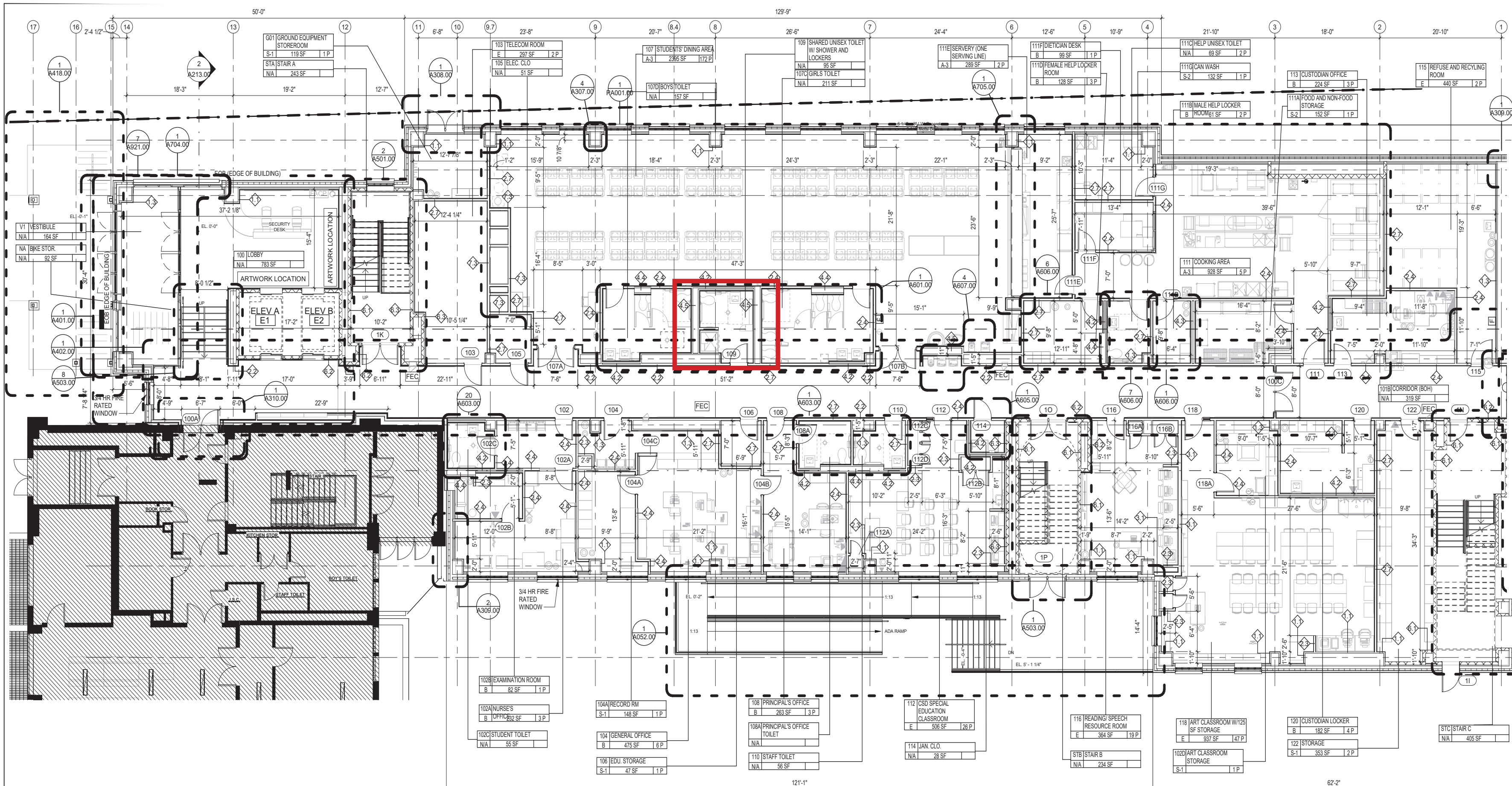
Exterior Bike Storage, Covered (7 racks), 92 SF

Exterior Bike Storage, Uncovered (7 racks)

Interior Bike Storage (7 Racks)



Shower/Changing Facility (1)



1 FIRST FLOOR PLAN
1/8" = 1'-0"

GROSS AREA:

GROSS FIRST FLOOR AREA: 14,987 SQFT

GENERAL NOTES:

1. ARTWORK LOCATION: NO M/E/P FIXTURES DEVICES OR OUTLETS MAY BE INSTALLED WITHOUT THE APPROVAL OF PUBLIC ART FOR PUBLIC SCHOOLS (PAPS) AND ARCHITECT
2. FINISH FLOOR ELEVATION AS INDICATED IN THE TITLE FOR EACH PLAN DRAWING.
3. SPOT ELEVATION INDICATE TOP OF FINISH ELEVATION.
4. WALL TYPES ARE SHOWN ON INTERIOR PARTITION DRAWING A701.00
5. RATED WALLS ARE SHOWN ON THE FIRE PROTECTION DRAWINGS IN THIS SET.
6. ALL WALLS SHALL EXTEND FROM THE FLOOR TO THE SRUCTURAL SLAB ABOVE.
7. WALL FINISHES (TILE WORK, PAINT, ETC.) SHALL EXTEND A MINIMUM OF 6 (SIX) INCHES ABOVE SUSPENDED CEILING.
8. RECEPTACLES, ENCLOSURES, ETC. IN WALLS BETWEEN CLASSROOMS SHALL BE OFFSET FROM EACH OTHER.
9. ALL WALL, WALL TO CEILING AND WALL TO FLOOR INTERSECTIONS SHALL BE CAULKED WITH USG ACOUSTIC SEALANT (OR APPROVED EQUAL).
10. RATED WALLS SHALL BE CAULKED WITH HILTI FIRE CAULK (OR APPROVED EQUAL).
11. WHERE CEILING TRACKS RUN PERPENDICULAR TO THE METAL DECK FLUTES, FLUTES SHALL BE PACKED WITH MINERAL WOOL INSULATION FOR THE FULL DEPTH OF THE WALL.
12. MULTIPLE LAYERS OF GYPSUM BOARD SHALL BE INSTALLED WITH JOINTS STAGGERED BOTH VERTICALLY AND HORIZONTALLY.
13. DIMENSION STRINGS IN THE EAST/WEST DIRECTION PICK THE FACE OF GYPSUM.
14. DIMENSION STRINGS IN THE NORTH/SOUTH DIRECTION PICK THE FACE OF GYPSUM.
15. ALL WOOD USED FOR GROUNDS, BLOCKING AND BACKUP SHALL FIRE RATED LABEL SHALL BE VISIBLE ON WOOD MATERIALS. SUPPLY MANUFACTURERS MSDS SHEETS WITH SUBMITTALS.
16. MINIMUM CLEAR WIDTH OF CIRCULATION CORRIDOR SHALL BE 8' - 0".
17. ALL DOORS TO COMPLY WITH ADA APPROACH REQUIREMENTS. SEE ADA LAYOUT ON THE TITLE DRAWING
18. STRUCTURAL SLAB RATED 2HRS PER UL ASSEMBLY UL D916. STEEL THAT IS PART OF A 2HR FIRE RATED ASSEMBLY (ROOF, WALLS, FLOORS, SHAFTS) AT SPACES REQUIRING RATED ENCLOSURES, ARE TO BE FIREPROOFED ACCORDINGLY.
19. SWING DOORS SHALL COMPLY WITH ANSI A117.1 SECTION 404.2.3 FOR PULL SIDE CLEARANCE 18" AND PUSH SIDE CLEARANCE 12" AND FLOOR AREA CLEARANCE.
20. THE OPENING FORCE FOR DOORS MAY NOT EXCEED MAXIMUMS AS PER BC 1008.1.3 AND ANSI A117.1-2009 404.2.8.
21. SEE DRAWING A702.00 FOR FIRESTOPPING DETAILS.

Do Not Use
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Plan Examiner's
Stamps

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DOB BScan

Architecture & Engineering

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

Consultants:
Architect
Structural
MEP & FP
Civil & Geotech
Vertical Transportation
Food Service
Acoustical
Sustainability
Landscape Architect
Expeditor

NOTE: Drawing may be printed at reduced scale

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
1	3/30/21	60% CD SUBMISSION

Key Plan:

Block # 6566 Lot # 1

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
LLW No.:
Facility Code:
Date: 03/30/2021

RESERVED FOR DOB NOW JOB#

Project: PS NEW ADDITION

Drawing Title: FIRST FLOOR PLAN

Drawing No.: A102.00

Sheets in Contract Set: OF

Sheets in DOB Set: OF

3/30/2021 11:41:47 PM

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.

Revision I - September 2019
Revision II - February 1, 2021

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

U.S. National Grid
100,000 - m Square ID
WK
Grid Zone Designation
18T

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

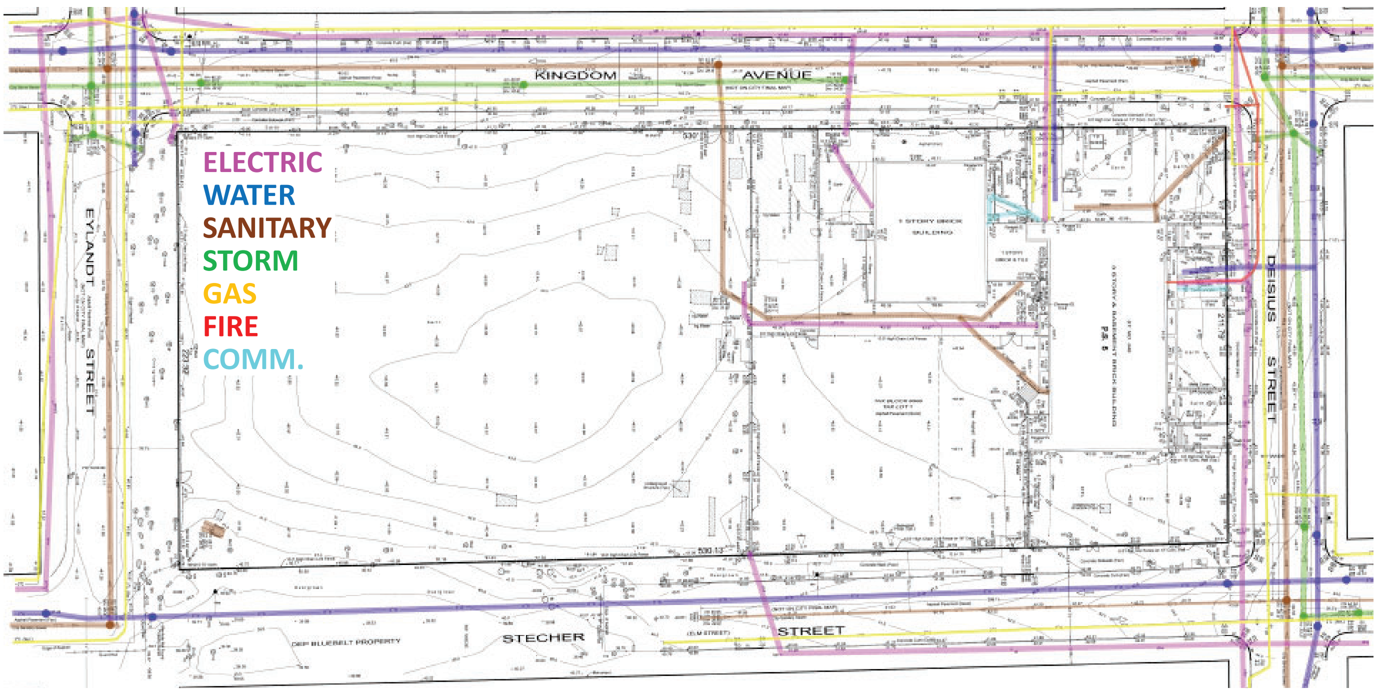
QUADRANGLE LOCATION

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

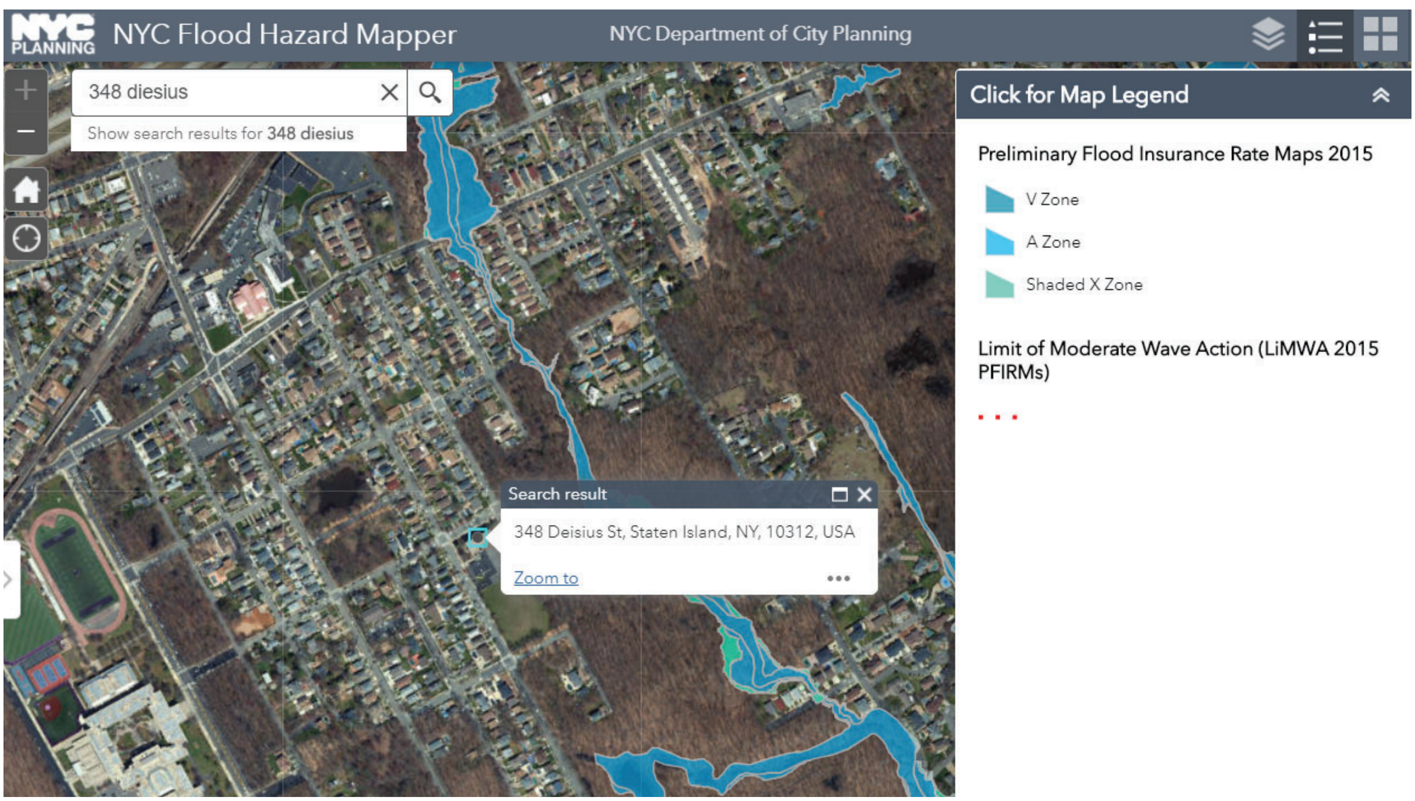
ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

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 I 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,

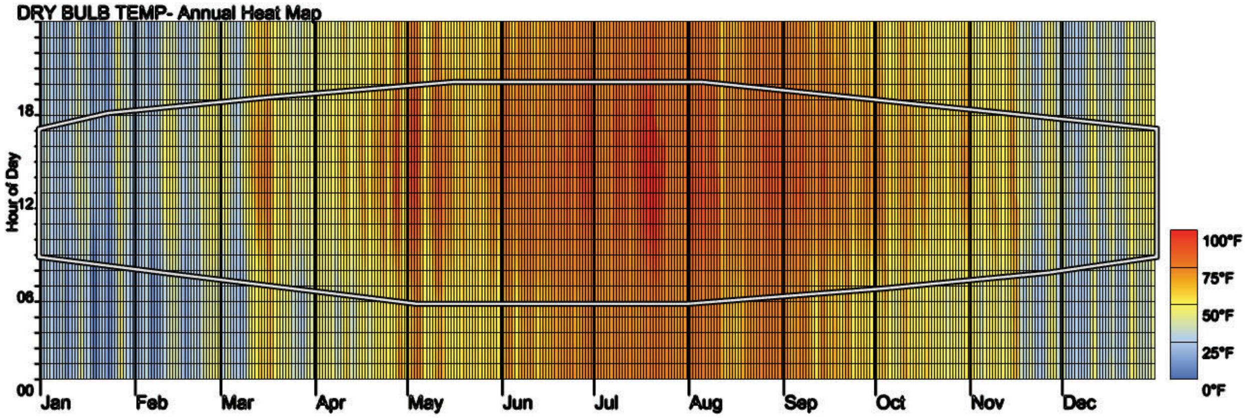
Regional Permit Administrator

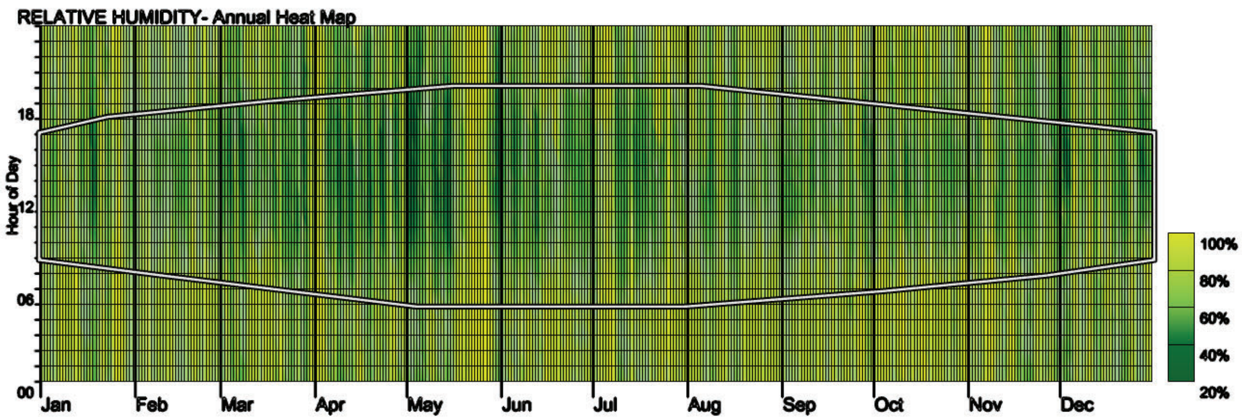
NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

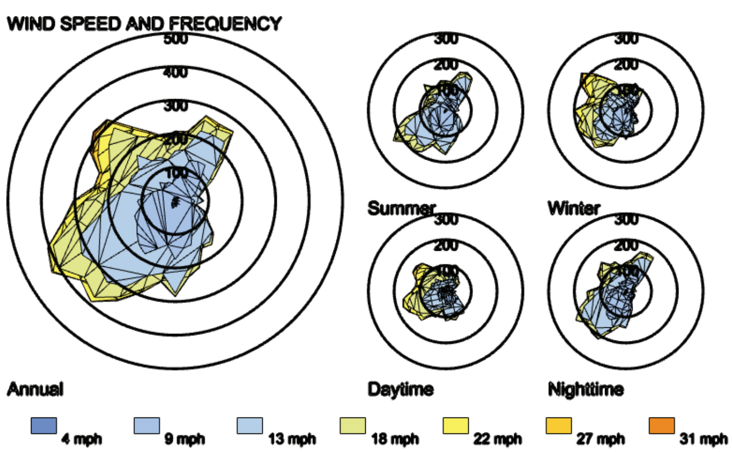
Climate Analysis

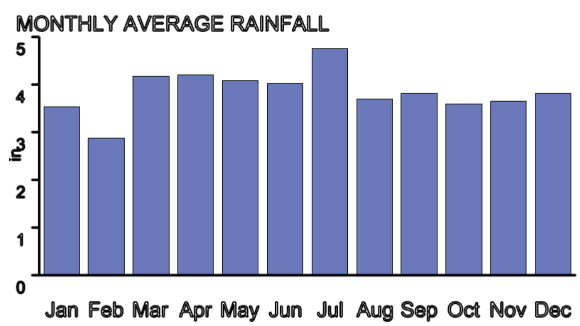
SD Scheme A

Weather Station: Newark Int'l AP
Source: EnergyPlus





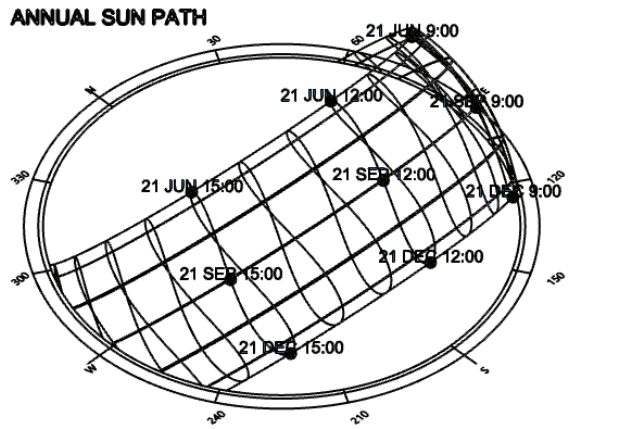


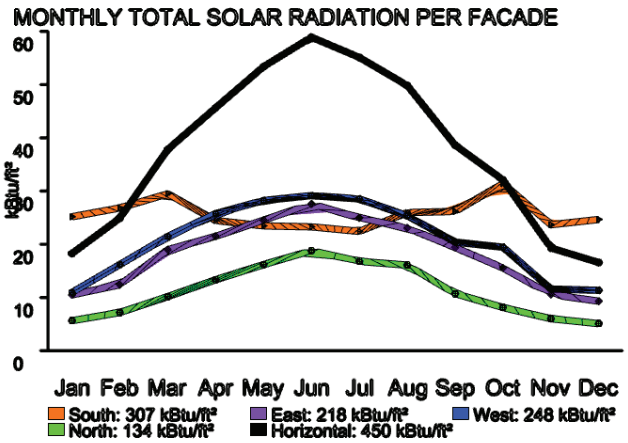


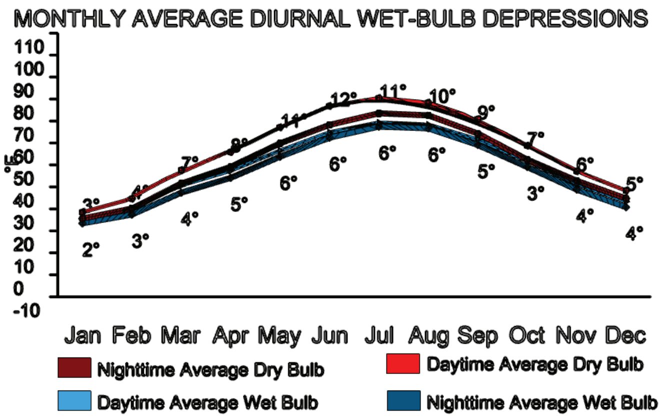
SD Scheme A

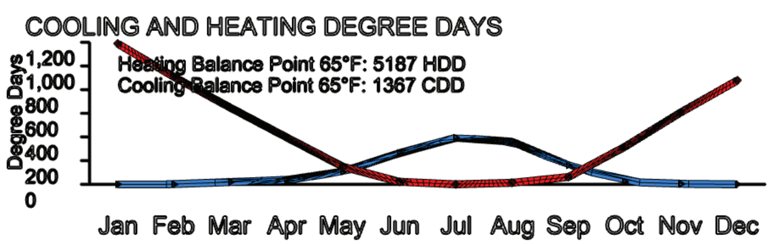
Weather Station: Newark Int'l AP
Source: EnergyPlus

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°



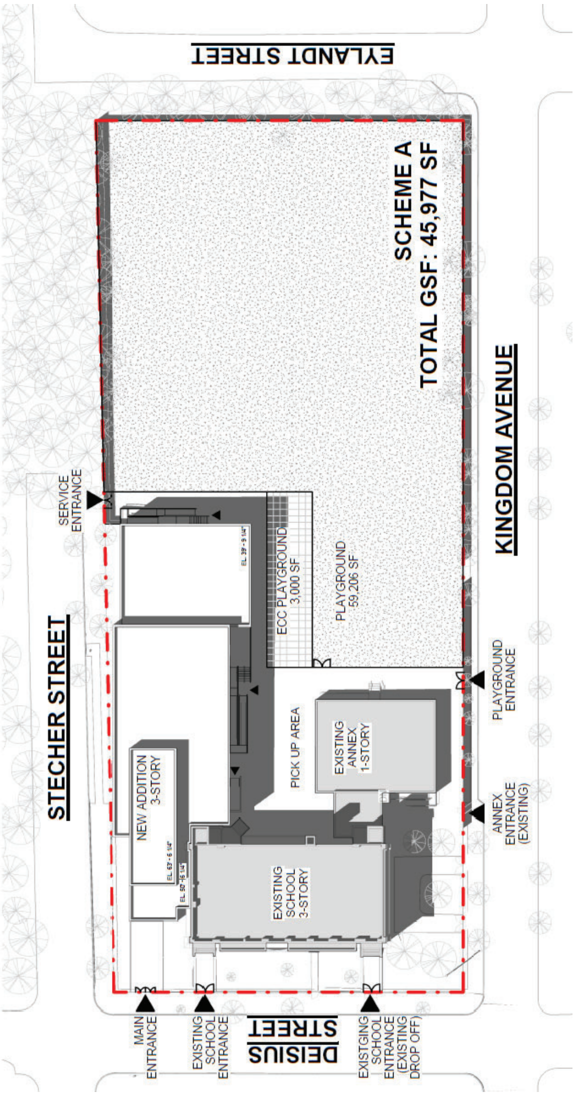




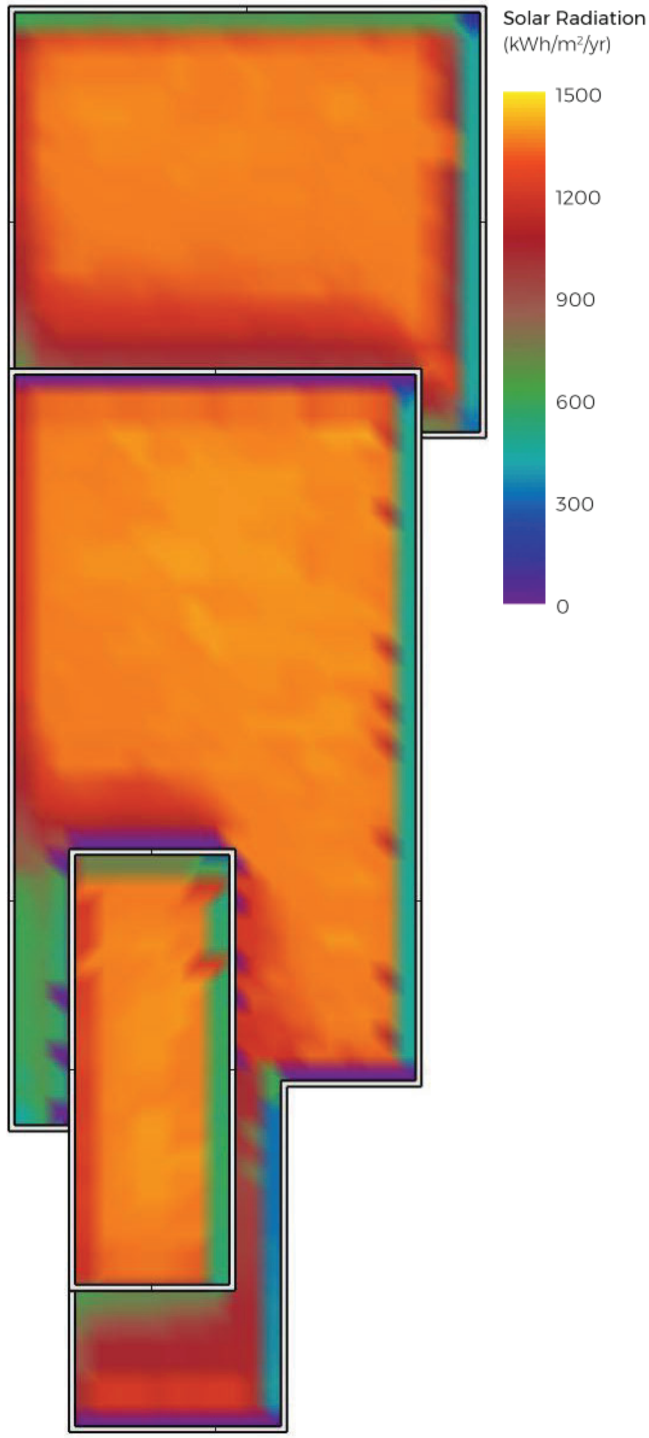


Climate Analysis
SD Scheme A

Solar Radiation Analysis



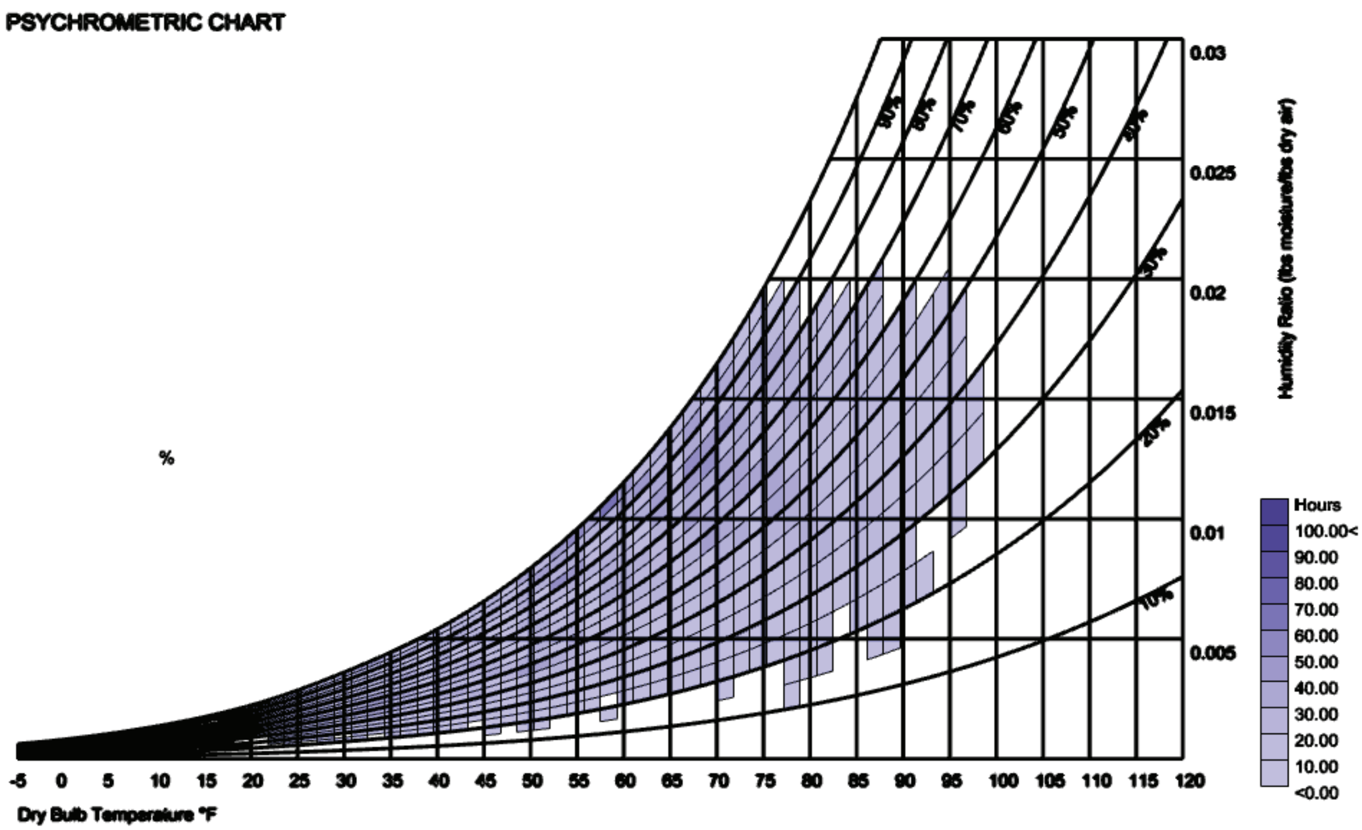
Site Plan, courtesy LHP Architects, 11/2/20

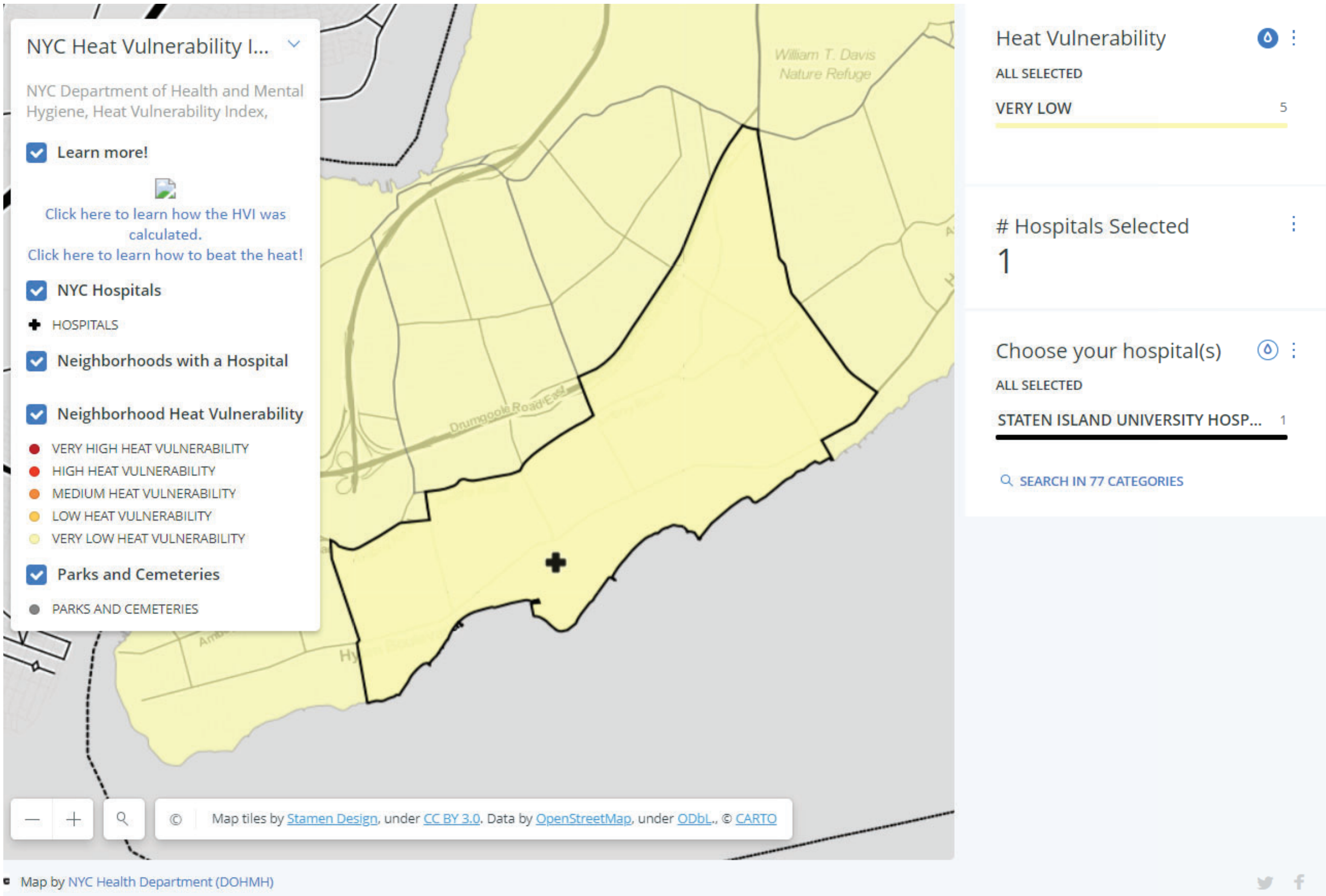


Climate Analysis

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
William T. Davis Nature Refuge
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)

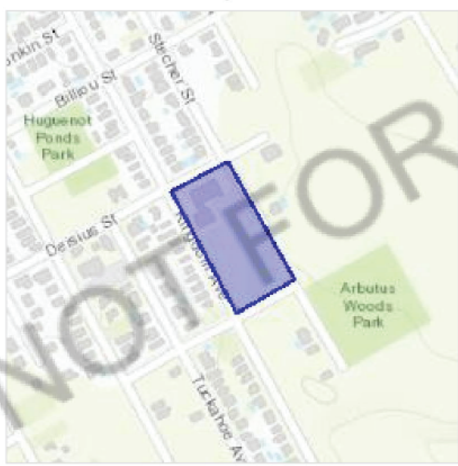
IPaC resource list

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.

N

0 100 200 400 600 Meters

0 300 600 1200 1800 Feet

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
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- 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
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- 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 ☐

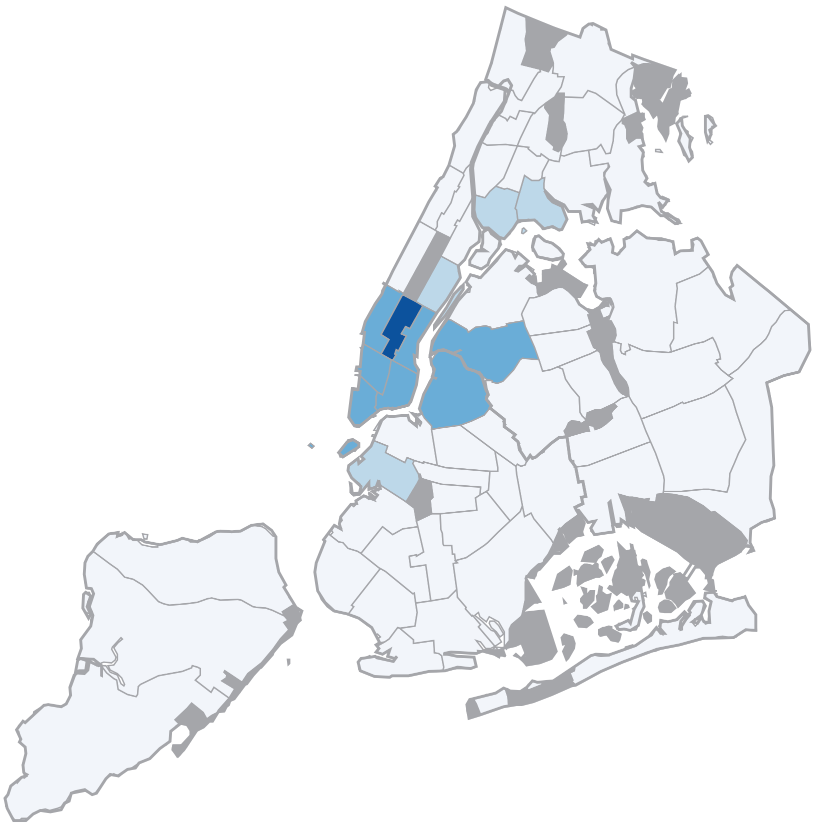
Aerial Imagery

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

NYC Health

Environment & Health Data Portal

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



Mean (mcg per cubic meter), Annual Average 2019

5.6 | 7.5 | 8.4 | 10 | 11 | 18.8

About the Indicators

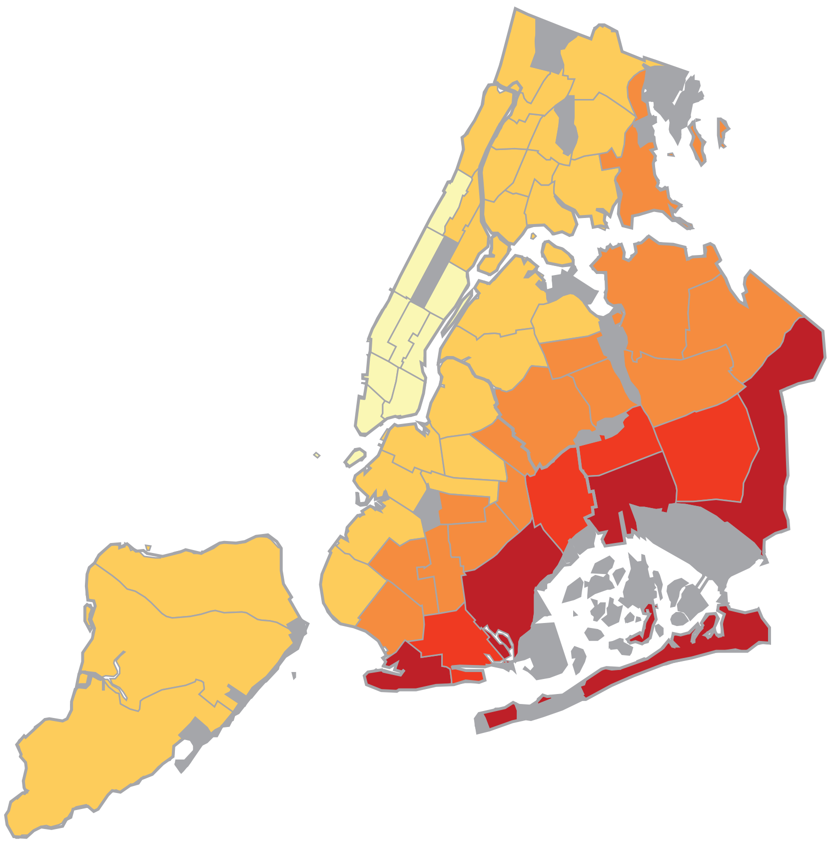
Fine particles are emitted by vehicles, building boilers, and other combustion - and are a major form of air pollution that harms health.

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

Environment & Health Data Portal

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



Mean (ppb), Summer 2019

14.4 | 27 | 30.35 | 32 | 33.55 | 40.4

About the Indicators

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

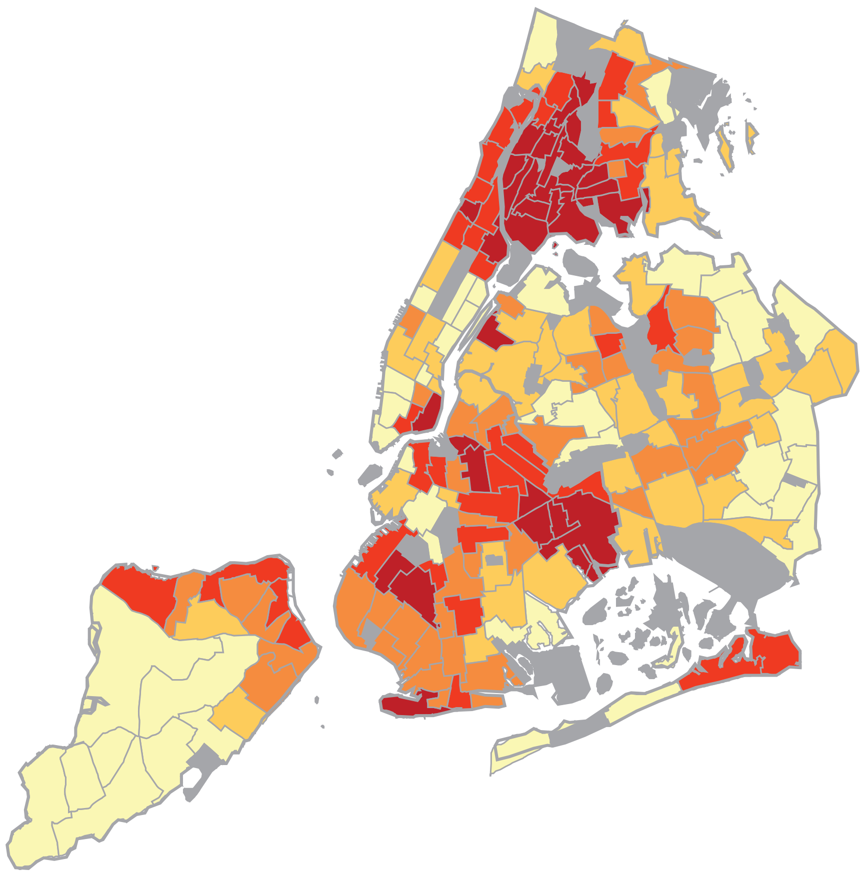
Name: Ozone (O3) **Measure:** Mean **How Calculated:**
Air samples collected at specific NYCCAS monitoring sites along with information about emissions sources were incorporated into a statistical model that predicted pollutant concentrations at all locations in NYC for the specified time period. The 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

Health

Environment & Health Data Portal

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



Percent , 2013-17

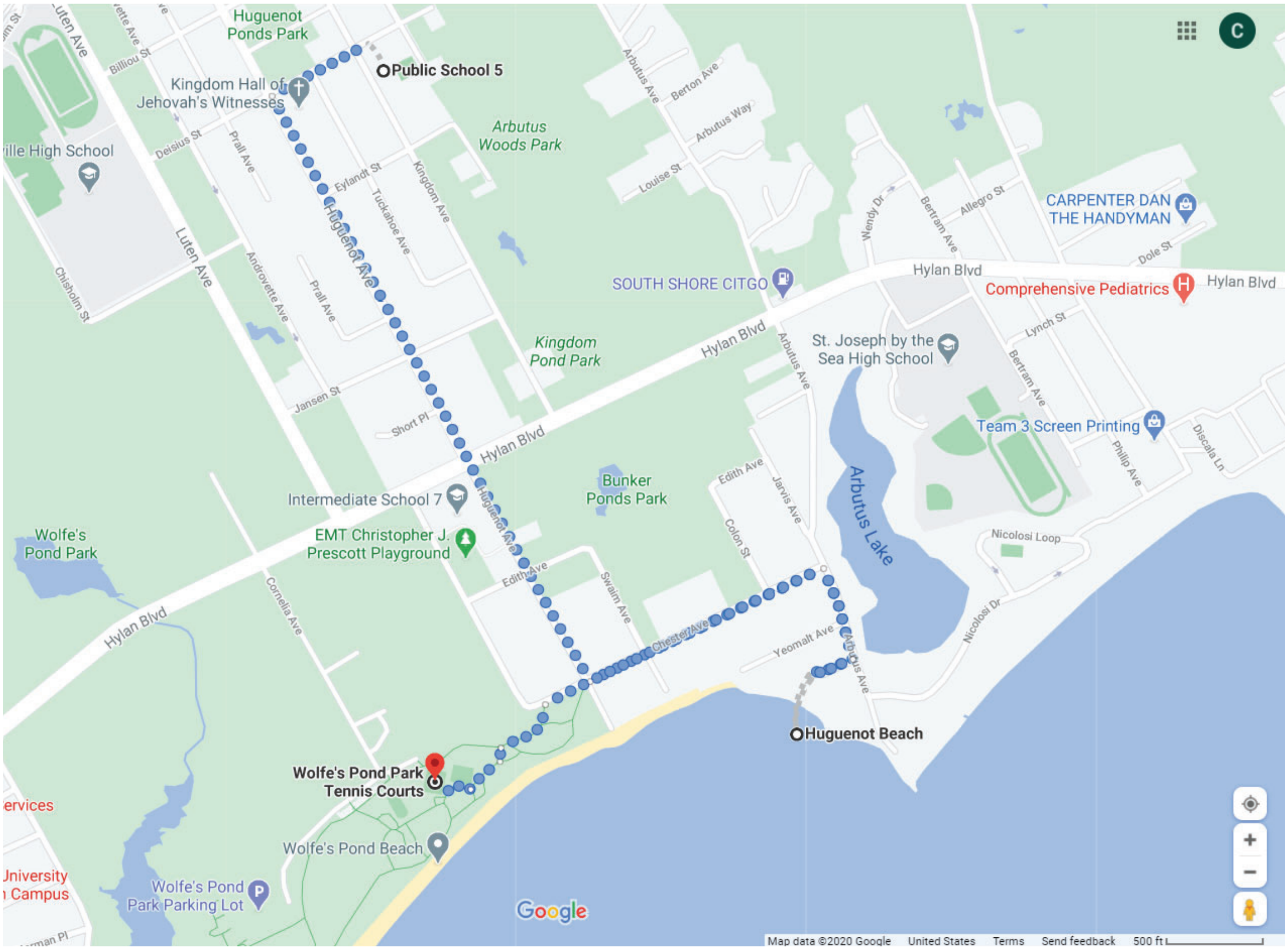
4.3% 9.9% 14.2% 20.6% 29% 57.8%

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% of 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
Intermediate School 7
Bunker Ponds Park
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

P S S c h o o l A d d i t i o n

Street Address (NOT P.O. BOX)

D e i s i u s S t r e e t

Side of Street

○ North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)

S t a t e n I s l a n d

State	Zip	County	DEC Region
N Y	1 0 3 1 2 -	R i c h m o n d	2

Name of Nearest Cross Street

K i n g d o m A v e n u e

Distance to Nearest Cross Street (Feet)

3 0

Project In Relation to Cross Street

○ North ○ South ● East ○ West

Tax Map Numbers
Section-Block-Parcel

3 6 0 9 - 1 6

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

8600089821

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? **If no, skip question 13.** ○ **Yes** ● **No**

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 / /

0005089822

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.

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	**CPv Provided**
___ . ___ **acre-feet**	___ . ___ **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	**Post-development**
10.72 **CFS**	___ . ___ **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development	**Post-development**
18.74 **CFS**	___ . ___ **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 N Y R
- ○ 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. N Y R

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

/ /

NYC Green Schools Rating System

School Construction Authority

CONSTRUCTION ACTIVITY POLLUTION PREVENTION
CREDIT FORM
Credit S2.1P

RESPONSIBLE PARTY:

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

Project:		Submission Phase:	100% Construction Design
Address:		Architect:	
LLW #:		Preparer:	
Design #:	0	Form Revision Date:	

INSTRUCTIONS:
Step 1) Insert date the Erosion and Sedimentation Control Plan was submitted.
Step 2) Mark Pollution Control Measures / Best Management Practices (BMP) included in the plan.

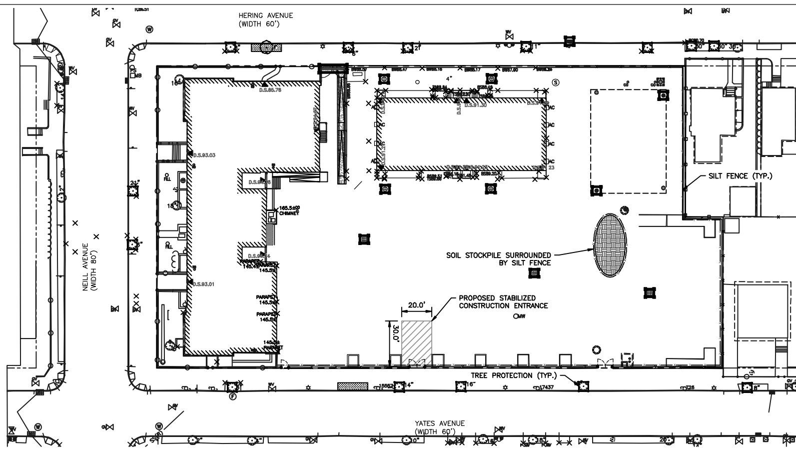
Step 1: Insert Date

Erosion and Sedimentation Control Plan Date Submitted: 1/15/2021

Step 2: Mark Pollution Control Measures / Best Management Practices (BMP) included

	Y	N
Inlet Barrier (i.e. gravel bags)	x	
Sediment Barrier (i.e. ditch checks)		x
Erosion Blankets, Hydromulch / Seed, etc.		x
Stabilized Construction Entrance	x	
Stream Crossings		x
Seed / Sod Areas		x
Sediment Basins & Discharge Locations		x
Borrow Areas		x
Other: Silt Fence	x	
Other:		
Other:		
Other:		

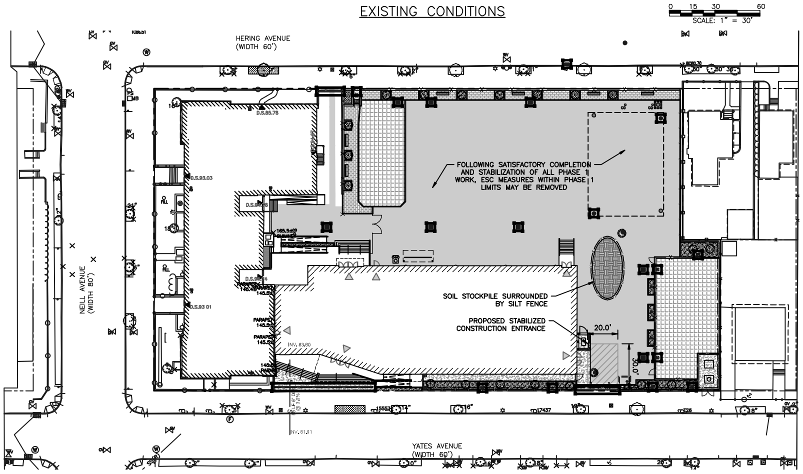
1/25/2021



EXISTING CONDITIONS

LEGEND

- PROPERTY LINE
- CONSTRUCTION LIMIT LINE
- SILT FENCE
- TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
- PROPOSED STOCKPILE LOCATION
- PROPOSED ASPHALT PAVEMENT
- PROPOSED PAVERS
- PROPOSED LANDSCAPING
- EXISTING CONCRETE PAVEMENT
- DRAIN
- TREE PROTECTION
- TEMPORARY DRAINAGE INLET PROTECTION



PROPOSED CONDITIONS (PHASE I)

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL INSTALL TEMPORARY SITE CONSTRUCTION FENCE AROUND PERIMETER OF WORK AREA PRIOR TO START OF CONSTRUCTION. FENCE SHALL BE COMPLIANT WITH BC 3307.7.
2. THE CONTRACTOR IS RESPONSIBLE TO EVALUATE AND IMPLEMENT ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES AS REQUIRED TO MEET THE OBJECTIVES OF THE STATE AND LOCAL STORMWATER REGULATIONS AND/OR CODE.
3. THE CONTRACTOR IS RESPONSIBLE TO INSTALL EROSION AND SEDIMENT CONTROL PRACTICES PRIOR TO ANY SOIL DISTURBANCE AND TO MAINTAIN THEM UNTIL PERMANENT PROTECTION IS ESTABLISHED. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED IN ACCORDANCE WITH THE CURRENT EDITION OF THE NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.
4. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION, INSPECTION, AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE PLANS AND AS DIRECTED BY THE PROJECT ENGINEER.
5. SITE EXCAVATION: ALL EXCAVATED SOIL SHALL BE STOCKPILED IN CONFORMANCE WITH THE EROSION AND SEDIMENT CONTROL DETAILS. ALL NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) AND UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA) REGULATIONS FOR REMOVAL OF CONTROLLED FILL SHALL BE ADHERED TO.
6. SITE SHALL BE WATERED DOWN DURING CONSTRUCTION TO MINIMIZE DUST. THIS ACTIVITY SHALL BE PERFORMED BY THE CONTRACTOR AS DEEMED NECESSARY BY THE PROJECT ENGINEER.
7. THE CONTRACTOR IS RESPONSIBLE TO KEEP PUBLIC RIGHTS-OF-WAYS ALONG SITE BOUNDARIES CLEAR OF SOIL AND DEBRIS AND IS RESPONSIBLE FOR ANY STREET CLEANING NECESSARY DURING THE COURSE OF THE PROJECT.
8. THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL THROUGHOUT CONSTRUCTION PERIODS AND UNTIL SITE IS PERMANENTLY STABILIZED.
9. THE CONTRACTOR IS RESPONSIBLE TO REMOVE EROSION AND SEDIMENT CONTROL MEASURES AFTER THE DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED, I.E. GREATER THAN 75% VEGETATIVE COVER.
10. PROVIDE INLET PROTECTION FOR DRAINAGE INLETS ON-SITE AND ADJACENT TO THE SITE THROUGHOUT CONSTRUCTION. INLET PROTECTION SHALL BE PROVIDED ON ANY NEW DRAINS ONCE INSTALLED
11. THE CONTRACTOR TO MODIFY THE LOCATION OF THE STABILIZED CONSTRUCTION ENTRANCE AS THE PROJECT PROGRESSES AND TO ACCOMMODATE DIFFERENT PHASES OF THE PROJECT.
12. THE LOCATION OF THE TEMPORARY SILT FENCE AT AREA WHERE BUILDING ABUTS THE PROPERTY LINE SHALL BE FIELD ADJUSTED AND PLACED ALONG THE PROPERTY LINE TO PREVENT SILT AND DEBRIS FROM ENTERING THE RIGHT-OF-WAY.
13. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THIS PLAN ARE SPECIFIC MEASURES THAT MAY REQUIRE ADJUSTMENTS AND/OR MODIFICATIONS THROUGHOUT THE DURATION OF CONSTRUCTION. THESE MODIFICATIONS MAY BE DUE TO SITE CONDITIONS AND/OR CONSTRUCTION SEQUENCE AND ACTIVITY. CONTRACTOR SHALL PROVIDE ROUTINE MAINTENANCE AND INSPECTION OF ALL EROSION AND SEDIMENT CONTROL MEASURES FOR THE DURATION OF CONSTRUCTION.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERMIT/APPROVAL COORDINATION WITH NYCDEP FOR STORMWATER AND/OR GROUNDWATER DEWATERING OPERATIONS (IF NECESSARY).

Do Not Use
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Plan Examiner's
Stamps

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DOB BScan

School Construction Authority

Architecture & Engineering

Dominick DeAngelis, 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:

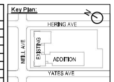
Preliminary
Not For Construction

NOTE: Drawing may be printed at reduced scale

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
	01/08/2021	100% Construction Documents
	03/16/2020	60% Construction Documents
	01/15/2020	DESIGN DEVELOPMENT

Key Plan:



BLOCK: 4275 LOT: 1

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:

Design No or LLW No.:	Facility Code:	Date: 01/08/2020

Reserved For
DOB NOW Job#

Project: P

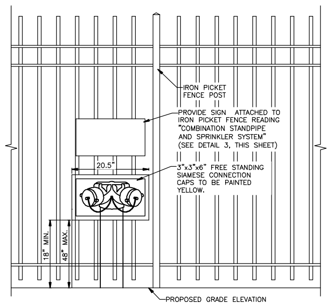
Address:

Drawing Title:
EROSION AND SEDIMENT CONTROL PLAN

Drawing No.: A044.00

Sheets in Contract Set: OF

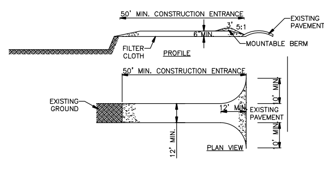
Sheets in DOB Set: OF



NOTE:
SIAMESE CONNECTION TO BE LOCATED SUCH THAT NO PART OF STRUCTURE SHALL PROTRUDE ACROSS PROPERTY LINE INTO CITY RIGHT-OF-WAY, WITH THE EXCEPTION OF THE SWIVELS CAPS OR PLUGS.

(1) STANDPIPE AT IRON PICKET FENCE DETAIL

N.T.S.

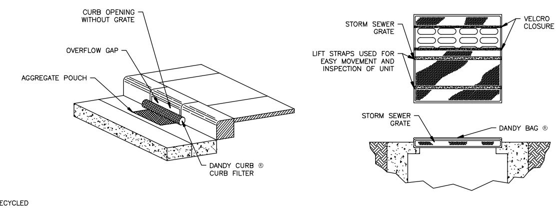


CONSTRUCTION SPECIFICATIONS:

1. STONE SIZE
   - 1.1. CONSTRUCTION ENTRANCE: USE 3" BROKEN STONE BALLAST, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. CONSTRUCTION ENTRANCE
   - 2.1. LENGTH – NOT LESS THAN 50 FEET
   - 2.2. THICKNESS – NOT LESS THAN TWELVE (12) INCHES.
   - 2.3. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
   - 2.4. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
   - 2.5. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
   - 2.6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY.
   - 2.7. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH BROKEN STONE BALLAST AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
   - 2.8. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED EVERY 7 CALENDAR DAYS AND AFTER EACH RAINFALL OF 0.5" OR GREATER IN A 24 HOUR PERIOD.

(4) STABILIZED CONSTRUCTION ENTRANCE

N.T.S.

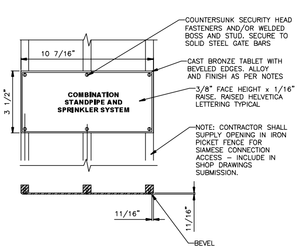


NOTES:

1. FOR CURB INLET CATCH BASINS, INLET SEDIMENT CONTROL DEVICE SHALL BE DANDY CURB BY DANDY PRODUCTS, OR APPROVED EQUAL.
2. FOR NON-CURB INLET CATCH BASINS, INLET SEDIMENT CONTROL DEVICE SHALL BE DANDY BAG BY DANDY PRODUCTS, OR APPROVED EQUAL.
3. INLET SEDIMENT CONTROL DEVICE SHALL BE MAINTAINED AS PER THE STANDARDS AND SPECIFICATIONS OF THE NYSDEC STANDARDS FOR EROSION AND SEDIMENT CONTROL (BLUE BOOK).
4. ONCE THE CONTRIBUTING DRAINAGE AREA HAS BEEN COMPLETELY STABILIZED (GREATER THAN 75% VEGETATIVE COVER) THE INLET SEDIMENT CONTROL DEVICE SHALL BE CLEANED OUT AND REMOVED FROM THE STRUCTURE.

(6) TEMPORARY INLET PROTECTION DETAIL

N.T.S.

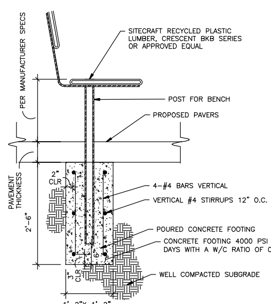


NOTE:

1. THE CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR ENGINEER REVIEW AND APPROVAL.
2. FINISH SHALL BE RAISED AREAS SATIN FINISH; BACKGROUND AREAS DARK, PEBBLE FINISH; PROVIDE CLEAR POLYURETHANE PROTECTIVE COATING.
3. LETTER STYLE SHALL BE HELVETICA.

(2) TYPICAL IRON PICKET FENCE SIGN FOR SIAMESE CONNECTION

N.T.S.

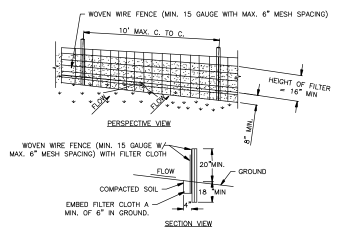


NOTE:

1. BENCHES SHALL BE 5' LONG AT LOCATIONS INDICATED ON DRAWINGS.
2. SUBMIT SHOP DRAWINGS FOR REVIEW. PROVIDE COLOR SAMPLES.
3. REPLACE ANY ITEMS DAMAGED IN TRANSIT.
4. INSTALL BENCH SUPPORT POST DIRECTLY IN CONCRETE OR PROVIDE SLEEVE AND NON-SHRINK GROUT (CROWN GROUT TO SHED WATER).
5. INSTALL BENCH AT CONSTANT HORIZONTAL ELEVATION AND IN ACCORDANCE W/ MANUFACTURERS STANDARD SPECIFICATIONS UNLESS OTHERWISE SPECIFIED BY SCHOOL.

(3) TYPICAL BENCH DETAIL

N.T.S.

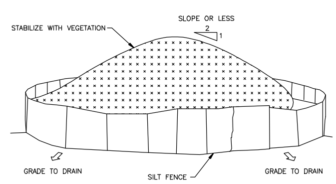


NOTES:

1. FENCE TO BE PROVIDED BY CONTRACTOR.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
3. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 15 GAUGE, 6" MAXIMUM MESH SPACING.
4. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
5. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

(5) TEMPORARY SILT FENCE DETAIL

N.T.S.



NOTES:

1. AREA CHOSEN FOR SOIL STOCKPILE SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF SOIL STOCKPILE SHALL BE 2:1.

(7) SOIL STOCKPILE DETAIL

N.T.S.

Do Not Use Reserved For Plan Examiner's Stamps

Do Not Use Reserved For Plan Examiner's Stamps

Do Not Use Reserved For DOB BScan

President & CEO
Lorraine Grillo

SCA School Construction Authority

Architecture & Engineering

Dominick DeAngelis, 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:
ESKW / ARCHITECTS
LORING CONSULTING ENGINEERING, INC.
YSRAEL A. SEINUK, PC
AKRF, INC.
ROMANO GATLAND
CBA ELEVATOR CONSULTANTS, LLC.
TRC COMPANIES, INC.

Preliminary Not For Construction

NOTE: Drawing may be printed at reduced scale

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
	01/08/2021	100% Construction Documents
	03/16/2020	60% Construction Documents
	01/15/2020	DESIGN DEVELOPMENT

Key Plan:
HERING AVE
NEILL AVE
EXISTING
ADDITION
YATES AVE
BLOCK: 4275 LOT: 1

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
Design No or LLW No.:
Facility Code:
Date: 01/08/2020

Reserved For DOB NOW Job#

Project:
Address:
Drawing Title: SITEWORK DETAILS X

Drawing No.: A059.00
Sheets in Contract Set: OF
Sheets in DOB Set: OF

S2.2 – OPEN SPACE

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

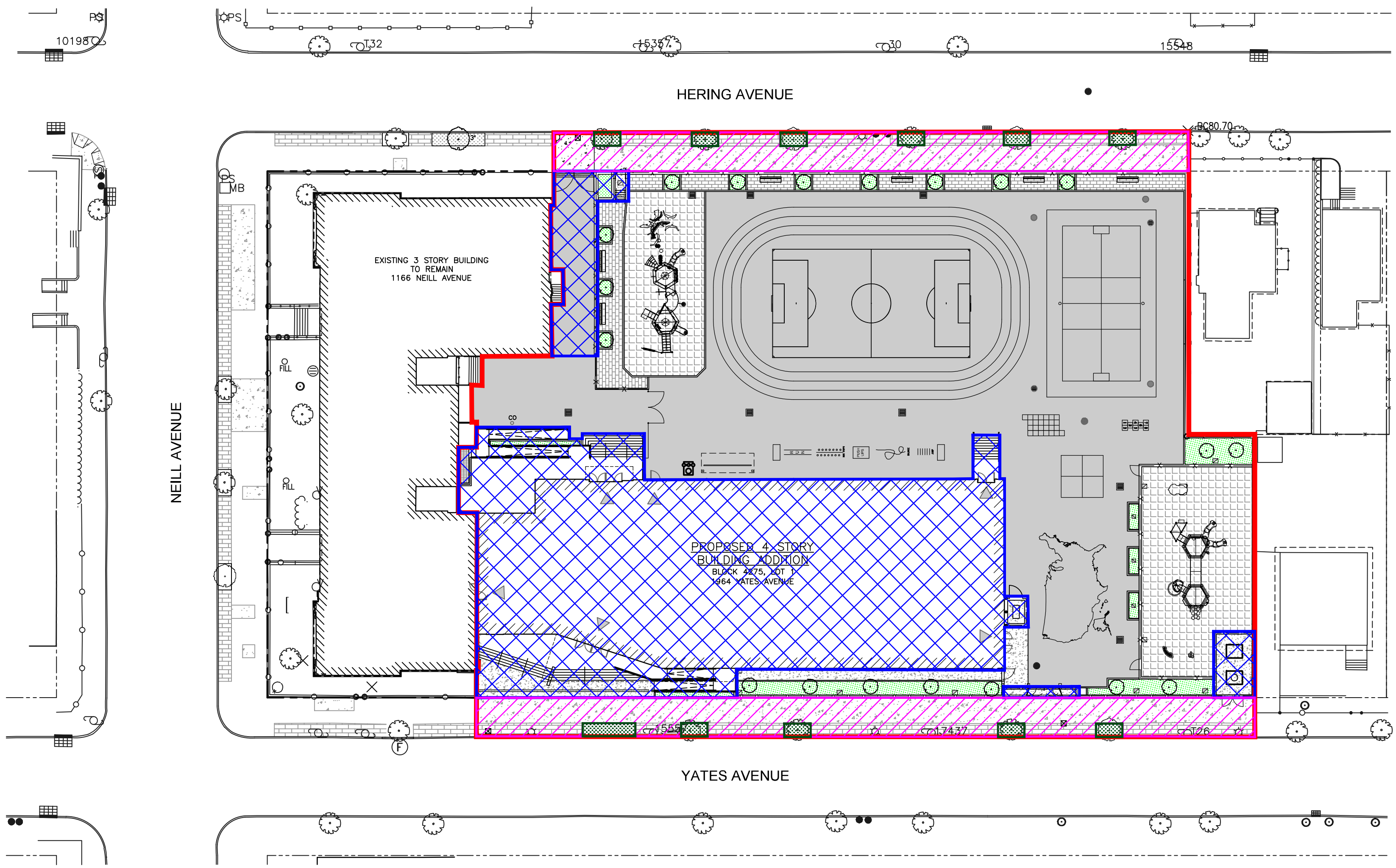
NOTE:

* 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



S2.2 OPEN SPACE - SITE PLAN

- GSG SITE BOUNDARY: 62,663 SF
- SIDEWALK IMPROVEMENTS (OUTSIDE LOT LINES): 7,367 SF
- VEGETATED AREA (OUTSIDE LOT LINES): 600 SF
- BUILDING AND OTHER AREAS NOT COUNTED AS OPEN SPACES: 18,994 SF
- PAVERS IN OPEN SPACE: 1,585 SF
- ASPHALT IN OPEN SPACE: 26,950 SF
- CONCRETE IN OPEN SPACE: 350 SF
- PLAYGROUND SAFETY SURFACE IN OPEN SPACE: 5,198 SF
- VEGETATED AREA IN OPEN SPACE: 1,619 SF

CALCULATIONS:

TOTAL ACCESSIBLE OPEN SPACE INCLUDING VEGETATED: 43,669 SF

ACCESSIBLE OPEN SPACE AS % OF GSG SITE BOUNDARY: 43,669 / 62,663 = 69.6% (COMPLIES)

VEGETATED SPACE AS % OF ACCESSIBLE OPEN SPACE: 2,219 / 43,669 = 5.0% (DEFICIENT)

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)

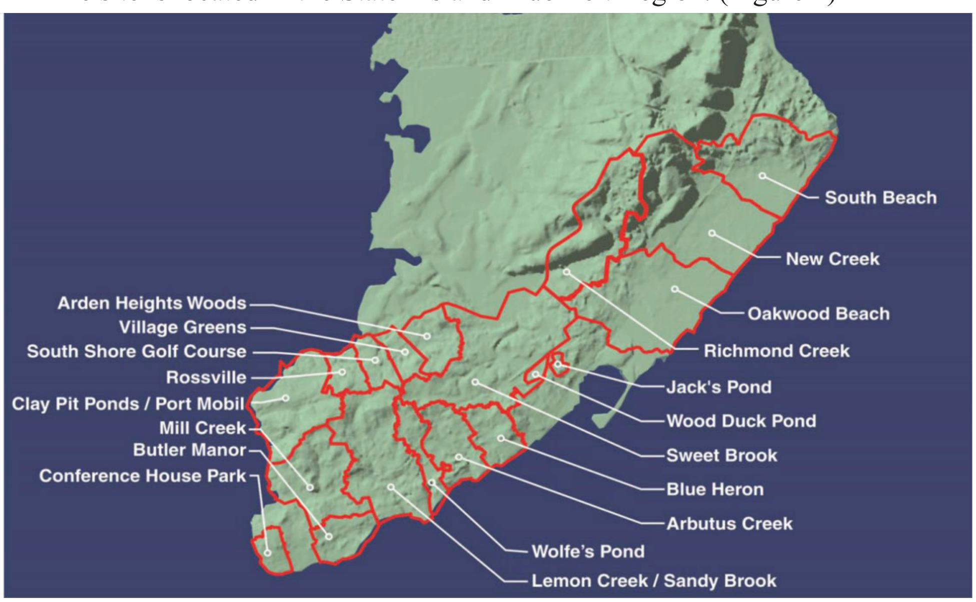


Figure 2. Staten Island Blue Belt

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.

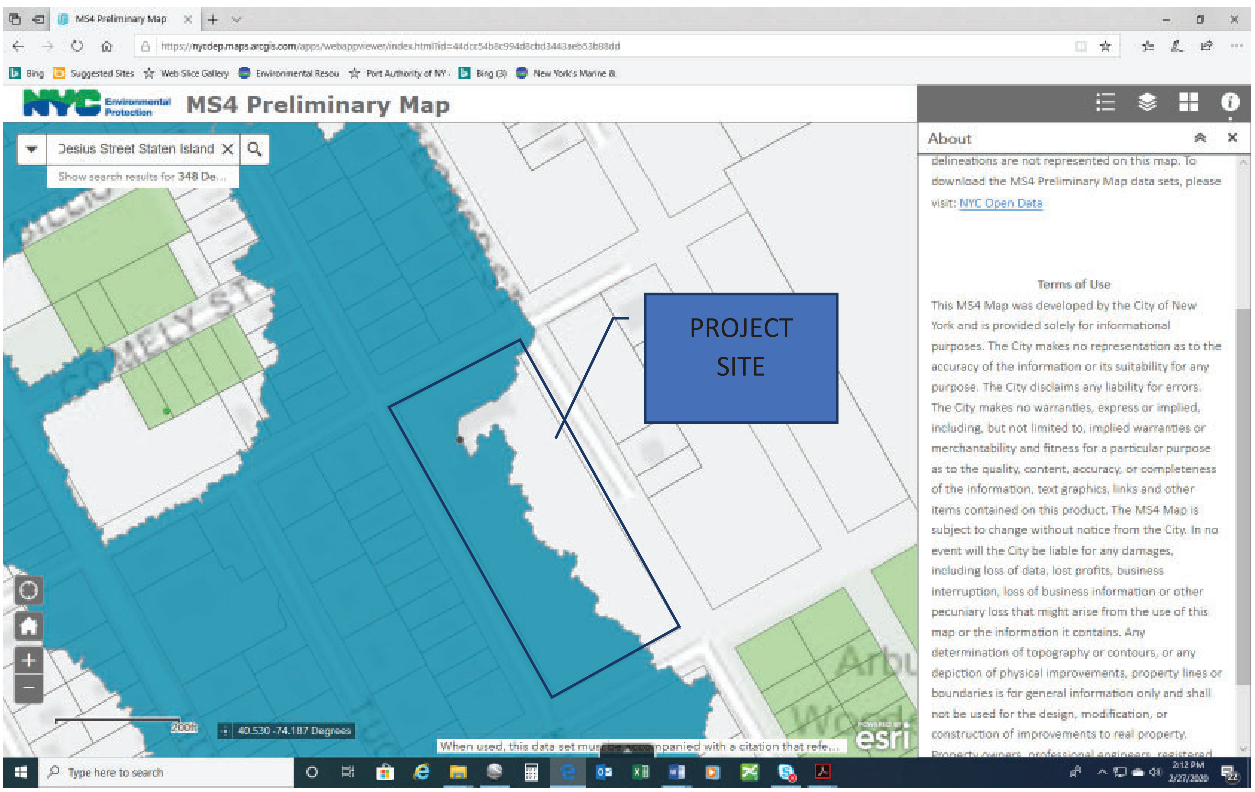


Figure 3 – MS4 Zone

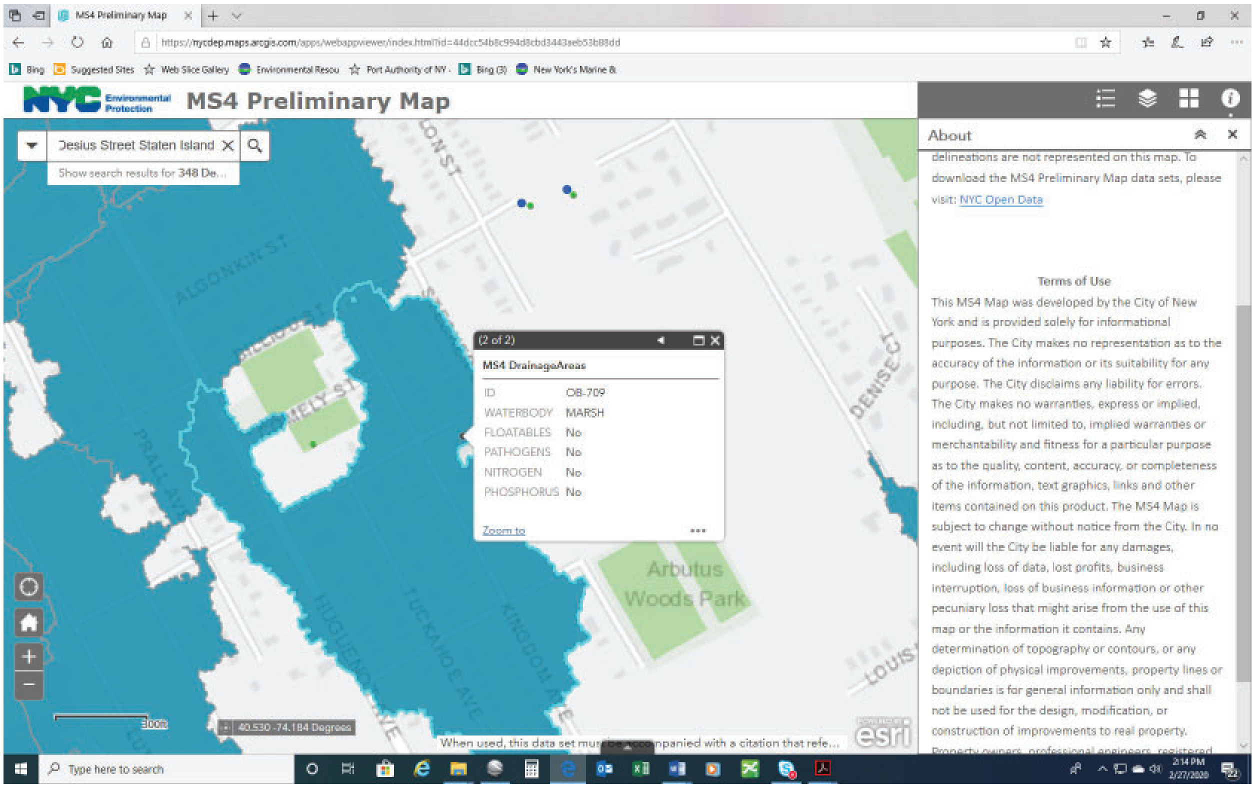


Figure 4 – MS4 Zone

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.

Sidewalk/Roadway Design

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.

Landscaping

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.

Stormwater Runoff Design

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)

TABLE OF CONTENTS

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

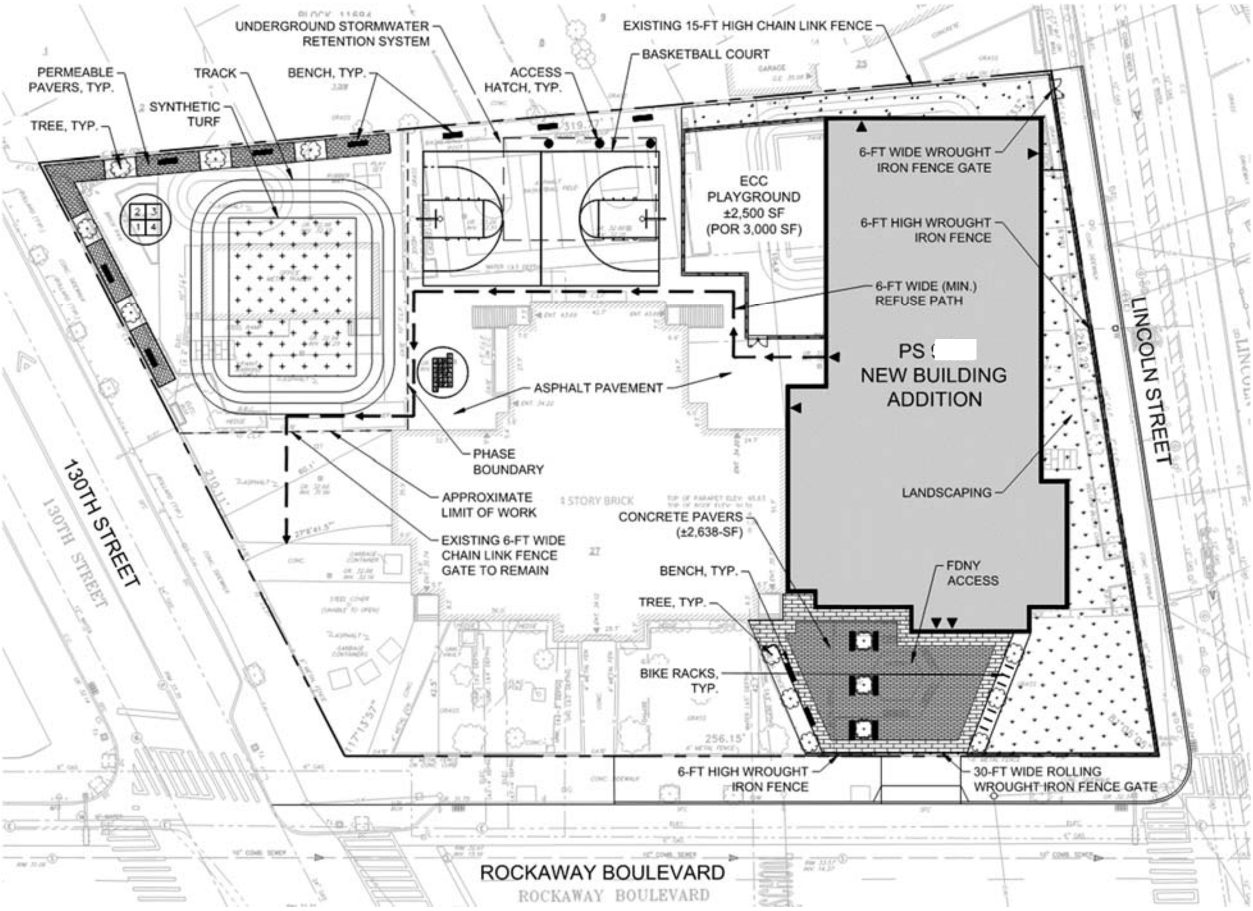
The implementation of green infrastructure practices was determined to be feasible.

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:	Schematic Design
Address:		Architect:	
LLW #:	112019	Preparer:	
Design #:	N/A	Form Revision Date:	4/12/2021

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	Light grey concrete	0.26	Initial	4,656	5,910
Paving material 2	Painted asphalt pavement	0.29	Initial	47,469	54,017
Paving material 3	Safety surface tile	TBD		0	3,200
Paving material 4	Asphalt	0.05	Initial	1,438	9,492
Area shaded by plant canopy within 10 years of planting and/or vegetated planters (SF)					2,000
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)					2,000
Total weighted area of qualifying nonroof measures (SF)					55,564

Notes

Materials must have a 3-year aged SR 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	High-reflectance roof paver	85.00	Initial	6,354	6,130
Low	Solar PV over high-refl. roof paver			0	4,848
Low	minum dunnage over high-refl. roof pa			0	3,719
Steep	Metal Roof	57.00	Initial	499	718
Total standard area of qualifying roof measures (SF)					6,130
Total weighted area of qualifying roof measures (SF)					6,853

Notes

Low-sloped roof must have a 3-year aged SRI 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)	

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

Site area and roof area

Total project paving area (SF)	72,619
Total project roof area (SF)	14,715
Sum of project paving and roof area (SF)	87,334

Weighted nonroof or roof caluclation equation

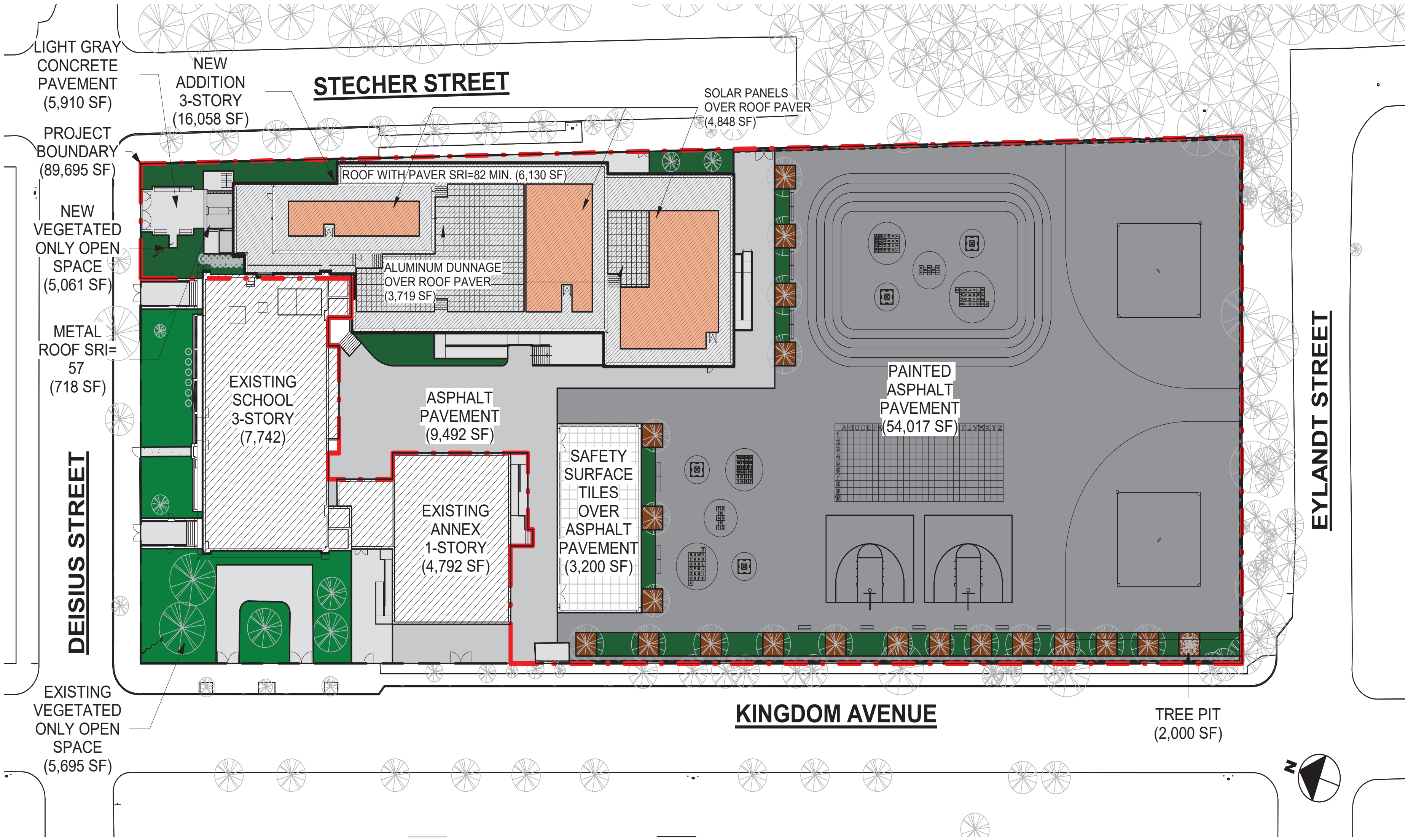
$$\frac{\left(\text{Area of high reflectance nonroof A} \times \frac{\text{SR of high reflectance nonroof A}}{\text{Required SR}}\right)^{1}}{0.5} + \frac{\text{Area of other nonroof measures}}{0.5} + \frac{\left(\text{Area of high reflectance roof A} \times \frac{\text{SRI of high reflectance roof A}}{\text{Required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

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)	2,000	55,564	111,128
Contributing high-reflectance roof (Step 2)	6,130	6,853	9,138
Vegetated roof (Step 3)	0	Not weighted	0
Total	62,417	8,130	**120,266**

Compliance	**Yes**

4/12/2021



STECHER STREET
KINGDOM AVENUE
DEISIUS STREET
EYLANDT STREET
LIGHT GRAY CONCRETE PAVEMENT (5,910 SF)
NEW ADDITION 3-STORY (16,058 SF)
PROJECT BOUNDARY (89,695 SF)
NEW VEGETATED ONLY OPEN SPACE (5,061 SF)
METAL ROOF SRI= 57 (718 SF)
EXISTING VEGETATED ONLY OPEN SPACE (5,695 SF)
SOLAR PANELS OVER ROOF PAVER (4,848 SF)
ROOF WITH PAVER SRI=82 MIN. (6,130 SF)
ALUMINUM DUNNAGE OVER ROOF PAVER (3,719 SF)
EXISTING SCHOOL 3-STORY (7,742)
ASPHALT PAVEMENT (9,492 SF)
EXISTING ANNEX 1-STORY (4,792 SF)
SAFETY SURFACE TILES OVER ASPHALT PAVEMENT (3,200 SF)
PAINTED ASPHALT PAVEMENT (54,017 SF)
TREE PIT (2,000 SF)
N

Roof Paver - SRI=85

Reflectance, Emittance & SRI Values

PREST® PAVERS				
PAVER COLOR AND FINISH	REFLECT. AVG.	EMITT. AVG.	SRI	COLOR
Antietam/Ground	0.460	0.900	53.0	BT
Antietam/Heavy Tudor®	0.374	0.950	43.0	BT
Brown/Tudor®	0.026	0.920	28.0	RB
Cream/Tudor®	0.330	0.970	39.0	BT
Charcoal/Tudor®	0.240	0.910	25.0	DGG
Charcoal/Heavy Tudor®	0.270	0.890	28.0	DGG
Glacier White/Diamond	0.620	0.960	77.0	WL
Glacier White/Finish #13	0.660	0.930	81.0	WL
Glacier White/Finish #13/Natural Sealer	0.513	0.910	60.0	WL
Glacier White/Finish #13/Intensifying Sealer	0.564	0.910	67.0	WL
Glacier White/Ground	0.600	0.890	72.0	WL
Glacier White/Stipple	0.680	0.930	84.0	WL
Glacier White/Stipple/Natural Sealer	0.610	0.900	73.0	WL
Glacier White/Stipple/Intensifying Sealer	0.609	0.910	73.0	WL
Glacier White/Tudor®	0.690	0.940	85.0	WL
Glacier White/Tudor®/Natural Sealer	0.587	0.910	70.0	WL
Glacier White/Tudor®/Intensifying Sealer	0.576	0.900	69.0	WL
Limestone Gray/Tudor®	0.250	0.920	26.0	LMG
Limestone Gray/Ground	0.320	0.880	33.0	LMG
Limestone Gray/Ground Tudor®	0.359	0.900	40.0	LMG
M929/Ground	0.440	0.880	50.0	BT
M929/Tudor®	0.350	0.950	40.0	BT
M1018/Tudor®	0.330	0.900	36.0	RB
M1025/Tudor®	0.344	0.910	38.0	LMG
M1031/Tudor®	0.426	0.910	49.0	WL
M1034/Ground Tudor®	0.493	0.880	57.0	WL
M1041/Tudor®	0.271	0.920	29.0	LMG
M1043/Tudor®	0.267	0.970	31.0	RB
M1064/Tudor®	0.290	0.910	31.0	LMG
M1072/Heavy Tudor®	0.318	0.890	34.0	LMG
M1078/Ground	0.430	0.880	48.0	LMG
M1078/Tudor®	0.330	0.950	38.0	LMG
M115/Finish #13	0.360	0.930	41.0	WL
M115/Ground	0.500	0.890	58.0	WL
M115/Tudor®	0.435	0.910	50.0	WL
M1106/Tudor®	0.207	0.920	21.0	LMG
M1109/Ground	0.425	0.830	46.0	LMG
M1119/Ground Tudor®	0.239	0.940	26.0	RB
M1119/Tudor®	0.233	0.890	23.0	RB
M1147/Tudor®	0.192	0.910	19.0	DGG
M1171/Ground Tudor®	0.314	0.950	36.0	BT

COLOR GROUP CODES	
WL =	White to Light Buffs and Grays
BT =	Buff to Tan
LMG =	Light Gray to Medium Gray
DGG =	Dark Gray to Green
RB =	Red to Brown

1 Revised 3/22/19

Metal Roof - SRI=57

TABLE 1A – Cool Roof Ratings Council Values for Min. 75% Roof Coverage, Min. SRI of 29 required, for Steep Slope Roofs

PAC-CLAD Finish	Solar Reflectance	Thermal Emittance	Solar Reflectance Index
Almond	0.56	0.83	64
Arcadia Green	0.33	0.84	33
Bone White	0.71	0.85	86
Cardinal Red	0.42	0.84	45
Cityscape	0.37	0.85	39
Colonial Red	0.34	0.85	35
Granite	0.36	0.84	37
Hemlock	0.30	0.85	30
Medium Bronze	0.30	0.85	30
Musket Gray	0.32	0.84	32
Patina Green	0.34	0.85	35
Sandstone	0.51	0.83	57
Sierra Tan	0.38	0.85	40
Slate Gray	0.38	0.84	40
Stone White	0.61	0.86	72
Terra Cotta	0.37	0.84	39
Champagne Metallic	0.45	0.78	57
Copper Penny Metallic	0.45	0.82	49
Silver Metallic	0.53	0.80	59
Zinc Metallic	0.30	0.85	30
Galvalume Plus (Non Kynar Finish)	0.68	0.14	57

Above chart represents PAC finishes/products that meet LEED requirements when roof panels cover a minimum of 75% of the roof surface. For projects in which 100% of the roof surface will be covered by metal roofing panels, the criteria for achieving 1 LEED point is SRI of 21.75 on steep slope roofs.

B. Air temperature during application must be 50°F and rising.

C. Do not apply when surface temperature is above 140°F.

PART 2 - PRODUCTS

2.01 MANUFACTURERS / SYSTEMS

A. California Products Corporation, Andover, MA. "Plexipave" system.

B. Nova Sport USA, Milford, MA. "Novacrylic Combination Surface" system.

C. SportMaster Sport Surfaces, Sandusky, OH. "SportMaster Color Concentrate" system; including Acrylic Patch Binder C1480, Acrylic Resurfacer C1300, "Color Concentrate With Sand" filler coat, and "Color Concentrate" finish coat.

D. The materials and execution methods described below are based on the "Plexipave" system in order to establish a basis of design, performance and quality. **Adjust materials and execution methods as required to conform to written installation procedures of other manufacturers.**

2.02 MATERIAL AND MIXES

A. Wearing Surface System - General

1. Combination of filler and finish coats providing long wearing color surface of uniform texture.

2. Material shall be 100% acrylic, asbestos free, formula of specially selected rounded silica particles.

3. System must resist fading and be capable of drying quickly.

B. The "Plexipave" athletic wearing surface system is composed of the following items:

1. Court Patch Binder:

Material Dilution Rate

ColorPlus™ System

FOREST GREEN

LIGHT GREEN
LEED CREDIT *SRI=31

DARK GREEN

BEIGE

BROWN

RED
LEED CREDIT *SRI=36

MAROON

TOURNAMENT PURPLE

GRAY

BLUE

LIGHT BLUE

DOVE GRAY
LEED CREDIT *SRI=33

ICE BLUE
LEED CREDIT *SRI=62

SANDSTONE
LEED CREDIT *SRI=46

ORANGE

YELLOW

NOTE: Colors will vary somewhat due to printing limitations. Ask your SealMaster® Representative for a color chip card for more accurate representation.

*Solar Reflectance Index (SRI) is the percentage of solar energy that is reflected by a surface. These specific colors qualify for the LEED (Leadership in Energy and Environmental Design) program under Section SS Credit 7.1: Heat Island Effect: Non-Roof. For more information visit www.usgbc.org or contact a LEED accredited professional.

SportMaster® SPORT SURFACES

A 100% Acrylic, Sport Surfacing System for Tennis, Basketball, and Multipurpose Court Surfaces. Ideal for application on Asphalt, Concrete, and existing acrylic surfaces.

Uses:

- Tennis Courts, Pickleball & Other Racquet Sports
- Basketball Courts
- Playgrounds & Game Courts
- Asphalt or Concrete Recreational Areas
- Multipurpose Courts

ColorPlus™ System
Thickness: Approx. 35-40 mils
1 Coat - Acrylic Resurfacer
2 Coats of Color

HOW THE SYSTEM WORKS: The ColorPlus™ System consists of a 100% acrylic Neutral Concentrate™ (available with or without sand) and the ColorPlus™ Pigment Dispersion. What is truly remarkable about the ColorPlus™ System is the fact that only 2 gallons of ColorPlus™ Pigment are needed to colorize an entire 30 gallon keg of Neutral Concentrate™.

EASE OF MIXING: ColorPlus™ is a highly concentrated pigment dispersion that disperses readily in Neutral Concentrate™. Our proprietary technology enables ColorPlus™ to disperse completely with minimal mixing.

Safety Surface Tiling - No SRI data* known.

**Assumed 0 in calculations.*

TM Safety Surfacing

PATENTED SAFETY SURFACING

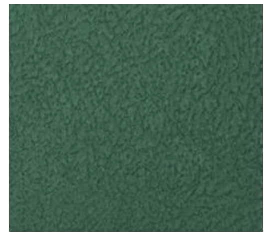
COLOR CHART

Solid EPDM Colors


TERRACOTTA RUST


GRAY


OCEAN BLUE

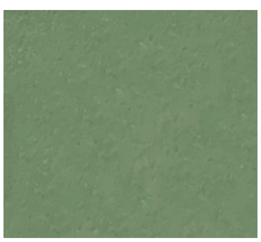

PARK GREEN


SANDY BEACH

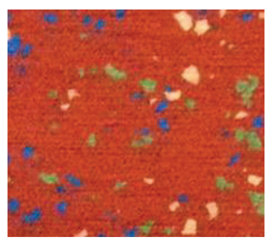

BLACK

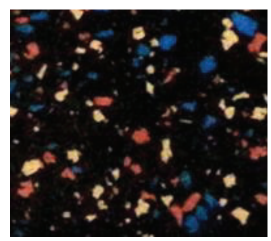

CORAL

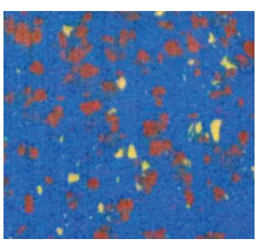

SKY BLUE

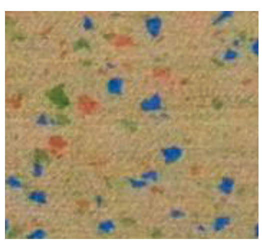

MED. GREEN

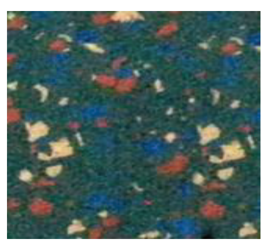

BLUE/PURPLE


PRAIRIE SUNRISE


MIDNIGHT SKY


SPECKLED OCEAN BLUE


SPECKLED SANDY BEACH

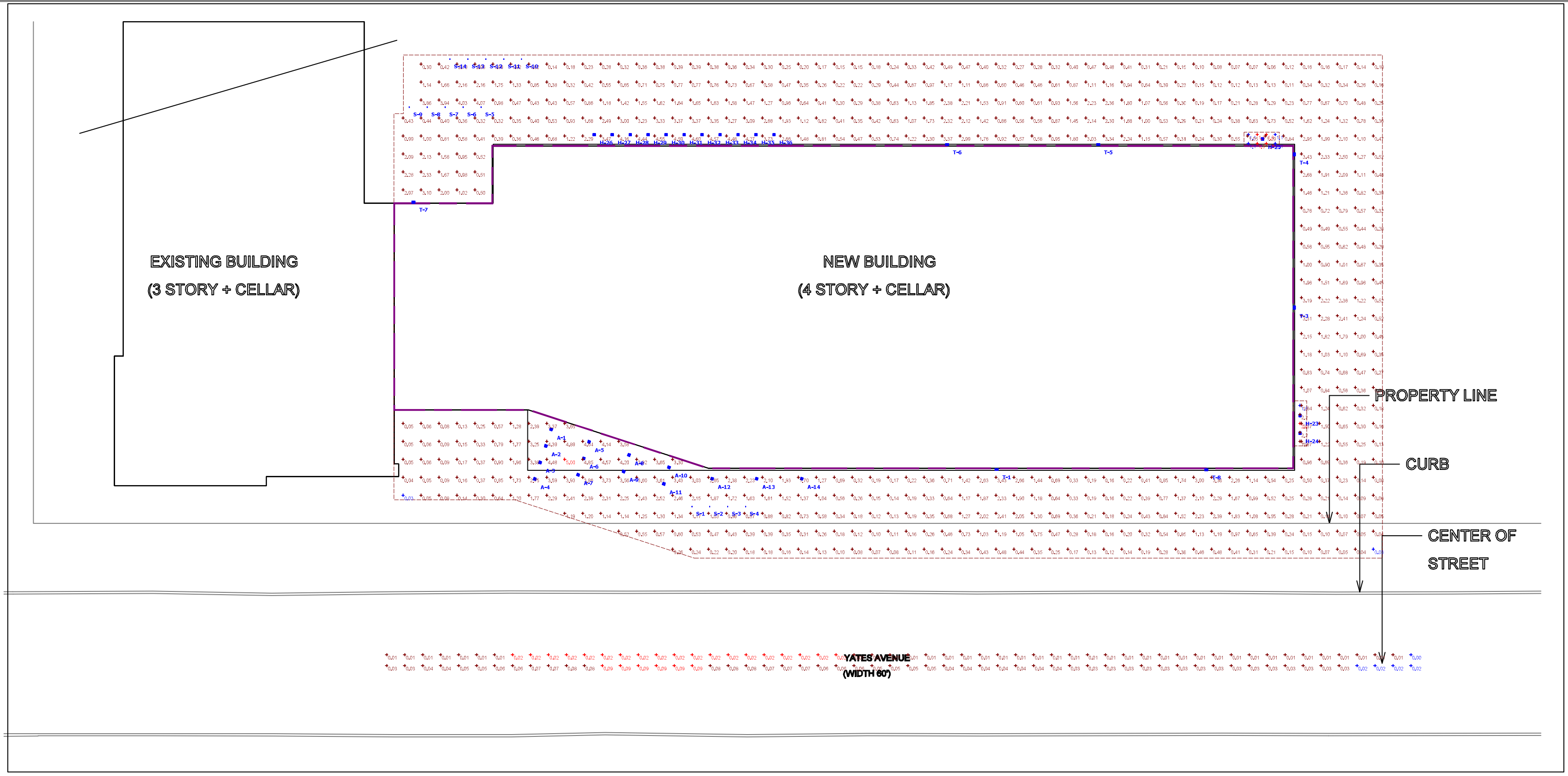

SPECKLED PARK GREEN

Matrix Encapsulated With EPDM Color Granules

Custom Color Granule Combinations are available upon request for Orders over 3,000 square feet

S2.6-Light Pollution Reduction

Consultant to use approved manufacturers listed in spec section 16530



Plan View
Scale - 1" = 12ft

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Building Perimeter	+	1.08 fc	5.00 fc	0.03 fc	166.7:1	36.0:1
CoS - Horizontal	+	0.05 fc	0.09 fc	0.02 fc	4.5:1	2.5:1
CoS - Vertical	+	0.01 fc	0.02 fc	0.00 fc	N/A	N/A
East Egress	+	2.1 fc	2.4 fc	1.8 fc	1.3:1	1.2:1
North Egress 1	+	1.2 fc	1.3 fc	1.1 fc	1.2:1	1.1:1

Schedule

Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	Lumen Multiplier	LLF	Wattage	Efficiency	Distribution	Polar Plot	Notes
	H		14		SL2L 4 FLP 80CRI 35K 400LMF	Slot 2 LED, 4ft Length, Flushed Lens Position, 80CRI, 3500K LED Boards, 400LMF	LED	1	SL2L_4_FLP_80CRI_35K_400LMF.ies	1234	1	0.225	13.75	100%			
	S		14		STEP11 RECT INT L LST1A 700mA WHT30K MVOLT SGB	1 NICHIA 219 3000K LED 4.625x2.5"STEPLIGHT LUMINAIRE LARGE ALUMINUM FACE PLATE w/BLACK RIBBED APERATURE & CLEAR ACRYLIC OPTIC MAGTECH DRIVER #WH--L03E-700 WATTS=3.49		1	STEP11_RECT_INT_L_LST1A_700mA_WHT30K_MVOLT_SGB.ies	87	1	0.7	3	100%			
	T		7		WDGE2 LED P1 35K 80CRI VW	WDGE2 LED WITH P1 - PERFORMANCE PACKAGE, 3500K, 80CRI, VISUAL COMFORT WIDE OPTIC		1	WDGE2_LED_P1_35K_80CRI_VW.ies	1284	1	0.7	9.81	100%			
	A		14		EVO6SQSH 35/10 DFR SOL	EVO 6IN SQUARE SHOWER, 3500K, 1000LM, REGRESSED SOLITE, 80CRI		1	EVO6SQSH_35_10_DFR_SOL.ies	649	0.5	0.9	9.6	100%	DIRECT, SC-0=0.85, SC-90=0.87	Max: 611cd	

EXTERIOR LIGHTING (GSG)

Designer
GMA/YD
Date
1/27/2021
Scale
Not to Scale
Drawing No.

Summary

Option 2 - Calculation Method

SCA School Construction Authority

NYC Green Schools Rating System

LIGHT POLLUTION REDUCTION

CREDIT FORM

Credit S2.6

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) Select MLO light zone assigned to project.
Step 2) Uplight: Select Option 1 or Option 2
- Option 1) Mark whether luminaries exceed the maximum for the BUG Rating Method and provide luminaire schedule.
- Option 2) Skip Option 1 and complete Option 2 table for all luminaires.

Step 3) Light Trespass: Select Option 1 or Option 2
- Option 1) Mark whether luminaries exceed the maximum for the BUG Rating Method and provide luminaire schedule.
- Option 2) Provide vertical illuminance calculations.

Step 1: Select lighting zone

MLO Lighting Zone	LZ2

Step 2: Uplight

Compliance Method:	Option 2: Calculation Method

Option 1: BUG Rating Method

		Y	N
Does not exceed luminaire uplight rating	u2	X	
Provided luminaire schedule showing the uplight rating of each		X	

Option 2: Calculation Method

Luminaire Description	Quantity of Installed Luminaires	Lumens per Luminaire	Lumens Above Horizontal	Total Luminaire Lumens	Total Luminaire Lumens Above Horizontal
Wallpack Fixture Z	12.00	1,500	0	18,000	0.00
				0	0.00
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
Total Luminaire Lumens				18,000	0.00
Allowable percentage above horizontal based on Lighting Zone (%)					1.50%
Percentage above horizontal (%)					0.00%

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(Form continued from previous page)

NYC Green Schools Rating System

School Construction Authority

LIGHT POLLUTION REDUCTION

CREDIT FORM

Credit S2.6

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:	1/0/1900

Option 1: BUG Rating Method

Backlight

		Y	N
Select luminaire mounting			
Does not exceed backlight rating	#N/A	X	
Provided luminaire schedule showing the backlight rating of each luminaire		X	

Glare

		Y	N
Select luminaire mounting			
Does not exceed glare rating	#N/A	X	
Provided luminaire schedule showing the glare rating of each luminaire		X	

Option 2: Calculation Method

Provide Vertical Illuminance calculations: Provide the calculation grid for the one vertical plane that has the greatest vertical illuminance (worst case scenario). Highlight the point of the greatest illuminance.

Option 1 - BUG Rating Method

NYC Green Schools Rating System
LIGHT POLLUTION REDUCTION
CREDIT FORM
Credit S2.6

SCA School Construction Authority

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) Select MLO light zone assigned to project.
Step 2) Uplight: Select Option 1 or Option 2
Option 1) Mark whether luminaries exceed the maximum for the BUG Rating Method and provide luminaire schedule.
Option 2) Skip Option 1 and complete Option 2 table for all luminaires.
Step 3) Light Trespass: Select Option 1 or Option 2
Option 1) Mark whether luminaries exceed the maximum for the BUG Rating Method and provide luminaire schedule.
Option 2) Provide vertical illuminance calculations.

Step 1: Select lighting zone

MLO Lighting Zone	LZ2

Step 2: Uplight

Compliance Method:	Option 1: BUG Rating Method

Option 1: BUG Rating Method

		Y	N
Does not exceed luminaire uplight rating	u2	X	
Provided luminaire schedule showing the uplight rating of each		X	

Option 2: Calculation Method

Luminaire Description	Quantity of Installed Luminaires	Lumens per Luminaire	Lumens Above Horizontal	Total Luminaire Lumens	Total Luminaire Lumens Above Horizontal
				0	0.00
				0	0.00
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
				-	-
Total Luminaire Lumens				-	0.00
Allowable percentage above horizontal based on Lighting Zone (%)					1.50%
Percentage above horizontal (%)					0.00%

(Form continues on following page)

(Form continued from previous page)

NYC Green Schools Rating System

School Construction Authority

LIGHT POLLUTION REDUCTION

CREDIT FORM

Credit S2.6

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:	1/0/1900

Option 1: BUG Rating Method

Backlight

		Y	N
Select luminaire mounting	1 to 2 mounting heights from lighting boundary and properly oriented		
Does not exceed backlight rating	B3	X	
Provided luminaire schedule showing the backlight rating of each luminaire		X	

Glare

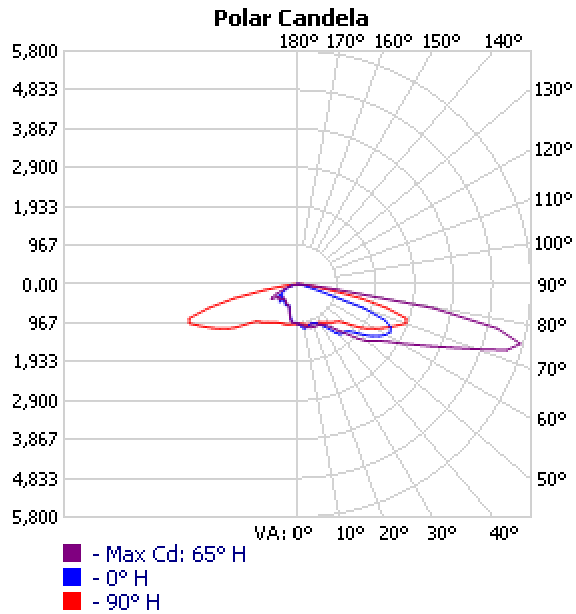
		Y	N
Select luminaire mounting	Building-mounted > 2 mounting heights from any lighting boundary		
Does not exceed glare rating	G2	X	
Provided luminaire schedule showing the glare rating of each luminaire		X	

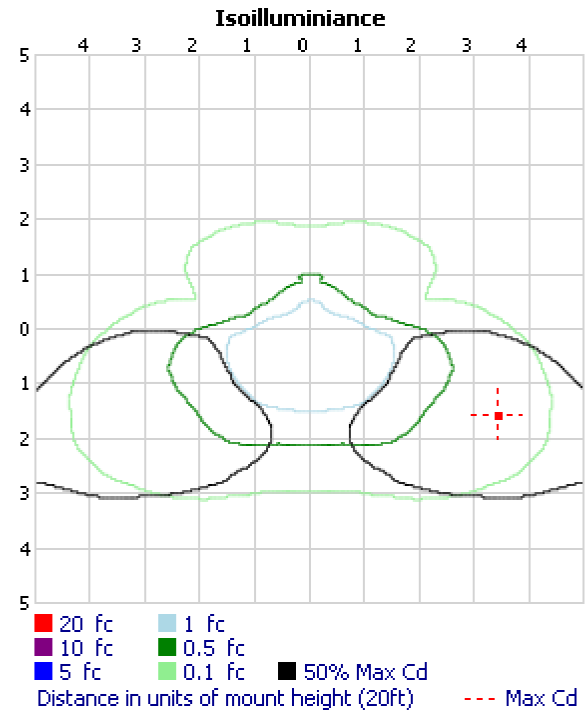
Option 2: Calculation Method

	Y	N
Provide Vertical Illuminance calculations: Provide the calculation grid for the one vertical plane that has the greatest vertical illuminance (worst case scenario). Highlight the point of the greatest illuminance.		

OUTDOOR PHOTOMETRIC REPORT
CATALOG: HLWPC2 P30 40K XX T3M

Test #:	ISF 36047P15
Test Lab:	SCALED PHOTOMETRY
Test Date:	9/5/2017
Catalog:	HLWPC2 P30 40K XX T3M
Description:	Wallpack Full Cutoff LED, LED Performance Package P10, 4000 series CCT, Voltage, Type III Medium
Series:	Wallpack Full Cutoff LED
Lamp Catalog:	LED
Lamp:	LED
Lamp Output:	Total luminaire Lumens: 7604, absolute photometry *
Ballast / Driver:	LED DRIVER
Input Wattage:	71
Luminous Opening:	Rectangle (L: 3", W: 11.04")
Max Cd:	5,724.9 at Horizontal: 65°, Vertical: 75°
Roadway Class:	MEDIUM, TYPE IV





*TEST BASED ON ABSOLUTE PHOTOMETRY WHERE LAMP LUMENS=LUMENS TOTAL.
*CUTOFF CLASSIFICATION AND EFFICIENCY CANNOT BE PROPERLY CALCULATED FOR ABSOLUTE PHOTOMETRY.

THIS PHOTOMETRIC REPORT HAS BEEN GENERATED USING METHODS RECOMMENDED BY THE IESNA. CALCULATIONS ARE BASED ON PHOTOMETRIC DATA PROVIDED BY THE MANUFACTURER, AND THE ACCURACY OF THIS PHOTOMETRIC REPORT IS DEPENDENT ON THE ACCURACY OF THE DATA PROVIDED. END-USER ENVIRONMENT AND APPLICATION (INCLUDING, BUT NOT LIMITED TO, VOLTAGE VARIATION AND DIRT ACCUMULATION) CAN CAUSE ACTUAL PHOTOMETRIC PERFORMANCE TO DIFFER FROM THE PERFORMANCE CALCULATED USING THE DATA PROVIDED BY THE MANUFACTURER. THIS REPORT IS PROVIDED WITHOUT WARRANTY AS TO ACCURACY, COMPLETENESS, RELIABILITY OR OTHERWISE. IN NO EVENT WILL ACUITY BRANDS LIGHTING BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF THIS REPORT.

OUTDOOR PHOTOMETRIC REPORT
CATALOG: HLWPC2 P30 40K XX T3M

Zonal Lumen Summary

Zone	Lumens	% Luminaire
0-30	778.1	10.2%
0-40	1,384.4	18.2%
0-60	3,647.5	48%
60-90	3,956.5	52%
70-100	1,971.2	25.9%
90-120	0.000	0%
0-90	7,604.0	100%
90-180	0.000	0%
0-180	7,604.0	100%

Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	96.3	1.3%	90-100	0.000	0%
10-20	269.9	3.5%	100-110	0.000	0%
20-30	412.0	5.4%	110-120	0.000	0%
30-40	606.3	8.0%	120-130	0.000	0%
40-50	906.9	11.9%	130-140	0.000	0%
50-60	1,356.3	17.8%	140-150	0.000	0%
60-70	1,985.2	26.1%	150-160	0.000	0%
70-80	1,745.2	23.0%	160-170	0.000	0%
80-90	226.0	3.0%	170-180	0.000	0%

Roadway Summary

Distribution:	TYPE IV, MEDIUM	
Max Cd, 90 Deg Vert:		0.000
Max Cd, 80 to <90 Deg:		3,400.9
	Lumens	% Lamp
Downward Street Side:	5,849.6	76.9%
Downward House Side:	1,753.7	23.1%
Downward Total:	7,603.3	100%
Upward Street Side:	0.000	0%
Upward House Side:	0.000	0%
Upward Total:	0.000	0%
Total Lumens:	7,603.3	100%

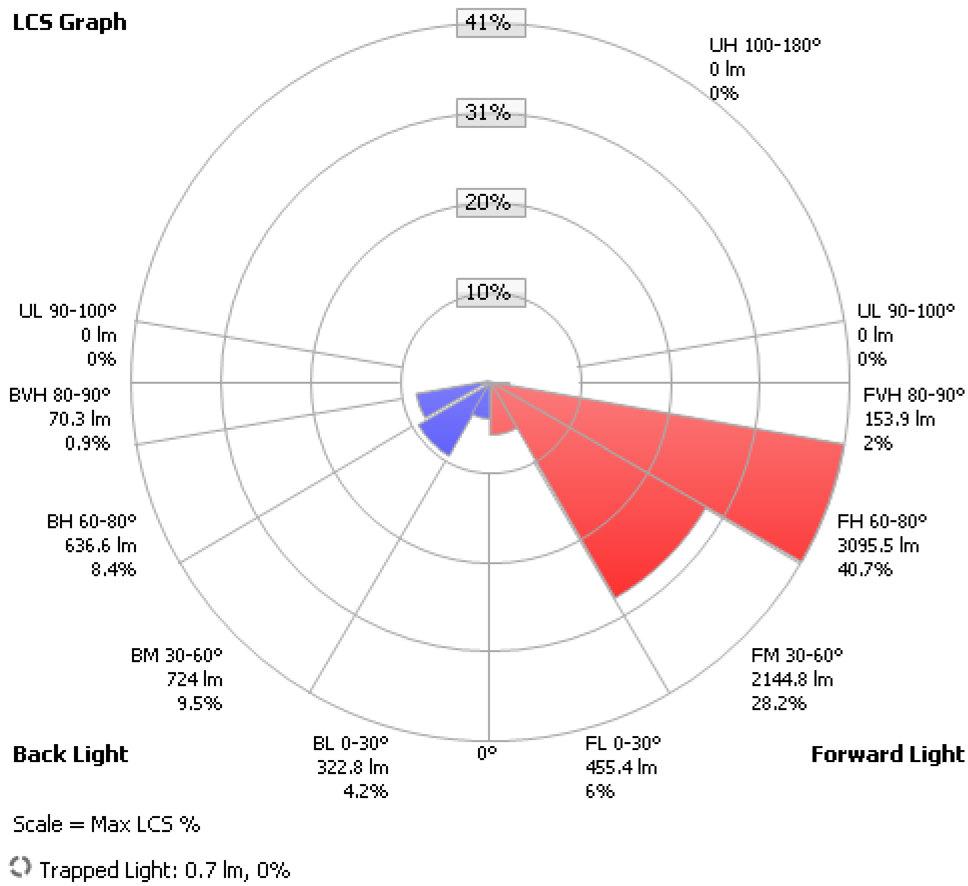
LCS Table

BUG Rating	**B2 - U0 - G2**	
Forward Light	Lumens	Lumens %
Low(0-30):	455.4	6%
Medium(30-60):	2,144.8	28.2%
High(60-80):	3,095.5	40.7%
Very High(80-90):	153.9	2%
Back Light		
Low(0-30):	322.8	4.2%
Medium(30-60):	724.0	9.5%
High(60-80):	636.6	8.4%
Very High(80-90):	70.3	0.9%
Uplight		
Low(90-100):	0.000	0%
High(100-180):	0.000	0%
Trapped Light:	0.7	0%

ISF 36047P15
VISUAL PHOTOMETRIC TOOL

PUBLISH

OUTDOOR PHOTOMETRIC REPORT
CATALOG: HLWPC2 P30 40K XX T3M



OUTDOOR PHOTOMETRIC REPORT
CATALOG: HLWPC2 P30 40K XX T3M

Candela Table - Type C

	0	15	25	35	45	55	65	75	85	90	105	115	125	135	145	155	165	175	180
0	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985	985
5	1066	1062	1055	1048	1036	1026	1018	1004	999	996	985	982	981	975	971	964	963	961	961
10	1103	1104	1104	1102	1095	1086	1067	1038	1022	1014	990	977	963	943	925	907	899	889	885
15	1049	1049	1052	1062	1081	1106	1110	1088	1052	1033	987	952	899	835	771	732	718	706	702
20	1038	1029	1028	1042	1058	1094	1130	1121	1074	1042	971	889	761	658	611	588	583	579	576
25	1074	1048	1050	1054	1062	1086	1131	1150	1102	1060	940	770	613	549	539	551	569	576	573
30	1179	1154	1139	1122	1109	1120	1160	1205	1151	1098	887	650	521	505	527	553	579	587	585
35	1373	1337	1321	1285	1250	1241	1261	1303	1227	1162	830	585	512	497	494	499	515	529	530
40	1620	1597	1571	1538	1504	1529	1476	1397	1313	1237	797	590	513	475	477	488	498	501	502
45	1669	1703	1802	1833	1781	1915	1776	1527	1433	1322	756	595	479	455	467	476	544	619	621
50	1876	1875	1963	2098	2133	2271	2190	1784	1651	1488	680	567	440	438	515	579	517	479	475
55	2256	2235	2319	2433	2490	2572	2452	2310	2162	1881	631	529	449	503	593	543	507	491	487
60	2513	2548	2774	2999	2936	2915	2945	2927	2667	2212	578	508	545	682	702	738	613	459	434
65	2540	2663	3141	3668	3608	3511	3649	3685	3260	2514	539	630	887	904	733	566	412	339	329
70	1736	2092	2935	4012	4441	4405	4716	4794	3980	2856	561	861	849	648	493	322	270	246	246
75	240	349	871	2386	4254	5223	**5725**	5017	3469	2269	680	813	607	364	233	162	143	127	126
80	132	153	203	330	716	1998	3401	2669	1302	812	668	694	364	129	58	38	29	29	29
85	38	48	62	70	82	135	237	304	207	193	364	287	107	40	19	6	2	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Catalog Number	
Notes	Type

HLWPC2

Wallpack® Full Cutoff LED

Mechanical

- Heavy grade A360 cast aluminum (aluminum with <1% copper)
- Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering
- Mounts to a standard junction box
- Wet location listed
- IP65 rated housing, down light only
- ¾" painted threaded entry(¾" - 14 NPT) on each side and on top, accepts ¾" and ½" condiut
- ¾" threaded plugs are painted on each side
- Vibration tested to 1.5G per ANSI C136.31.

Electrical

- Certified by UL or CSA
- Rated for -40°C (-40°F) minimum ambient
- A programmable electronic driver with 0-10V control leads
- Available in: 120-277V 50/60 Hz and 347-480V 50/60 Hz,
- Standard: 3000K, 4000K and 5000K CCT (>70 CRI)
- Optional >80 CRI (3000K, 4000K and 5000K CCT)
- Internally mounted emergency battery backup for operation in an ambient temperature ranging from -20°C (-4°F) to 30°C (86°F), available with P10 thru P40 performance packages, non CEC compliant
- All surge protection meets ANSI/IEEE C62.41.2 10kV/10kA
- Standard surge protection is 20kV/10kA per ANSI C136.2
- Optional surge protection is 10kV/5kA per ANSI C136.2

Optical

- Light engine housing is IP66 rated
- Acrylic optical system
  - Type V: E (entry), M (medium), R (rectangle) & W (wide)
  - Asymmetric

Controls

- Field adjustable output (AO)
- Button style photocontrol (PE)
- Motion sensor & ambient photocontrol combination for mounting low (8-15') (MASL) and high (15-30') (MASH) mounting heights

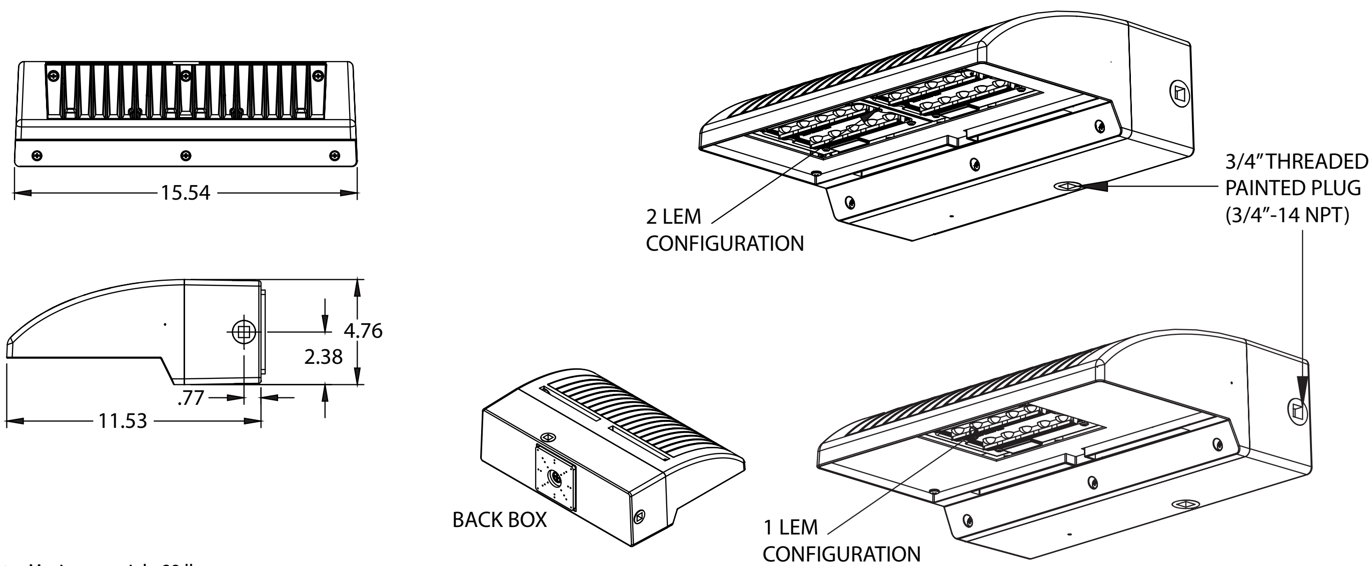
Certification and Standards

- Luminaire is CSA listed, US and Canada
- Suitable for operation in an ambient temperature up to 40°C/104°F per UL or CSA certification
- Design lights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.
- LM-79 compliant
- The projected LED Lumen Maintenance shall be based only on IES LM-80-08 and TM-21

Warranty

5-year limited warranty. Complete warranty terms located at:

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.



Note: Maximum weight 22 lbs.

HLWPC2

Wallpack® Full Cutoff LED

ORDERING INFORMATION

Example: HLWPC2 P20 40K AS T3M BZSDP

Series	Lumen Package	Color Temperature	Voltage	Optics	Color	CRI
HLWPC2 Wallpack Full Cutoff LED	1 LEM Package P10 3,100 lm P20 5,600 lm 2 LEM Package P30 7,800 lm P40 9,900 lm P50 11,700 lm (Nominal Lumens, 4000K)	AMB True Amber 30K 3,000 K CCT 40K 4,000 K CCT 50K 5,000 K CCT	AS Auto-Sensing Voltage (120V-277V) 50/60HZ AH Auto-Sensing Voltage (347V-480V) 50/60HZ 12 120V 20 208V 24 240V 27 277V 34 347V 48 480V	T2S Type 2 Short T2M Type 2 Medium T3S Type 3 Short T3M Type 3 Medium T4M Type 4 Medium TFTM Forward Throw Medium ASYDF Asymmetric Diffuse SYMDF Symmetric Diffuse	BKSDP Black BZSDP Bronze GYSDP Grey WHSDP White	Blank 70 CRI (STD) 80CRI 80 CRI

Options:

Adjustable/Programmable Options

AO Field Adjustable Output

Circuit Options

2CI 2 Independent Circuits

Control - Motion Sensor Options

MASL Motion / Ambient Sensor, 8-15' Mounting Height Ambient Sensor Enabled at 1 FC

MASH Motion / Ambient Sensor, 15-30' Mounting Height Ambient Sensor Enabled at 1 FC

Control - Photocontrol Options

PE Button Style Photocontrol

P3 N.E.M.A. Twistlock Recepactle Mount -3 PIN

P7 N.E.M.A. Twistlock Recepactle Mount -7 PIN

PCLL DTL Long Life Twistlock Photocontrol for Solid State

PSC Shorting Cap

Fuse Option

SF Single Fuse

DF Double Fuse

Safety Option

EM Integral Emergency Battery

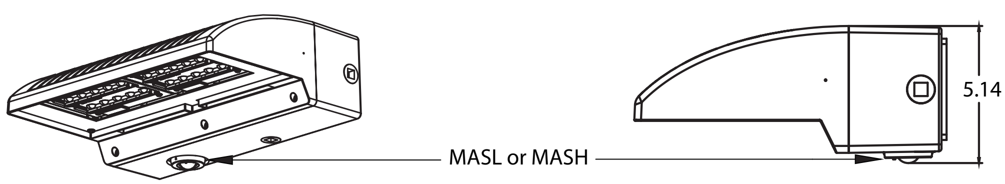
TP Tamper Resistant Hardware

Surge Protection Option - 20kV/10kA is Standard

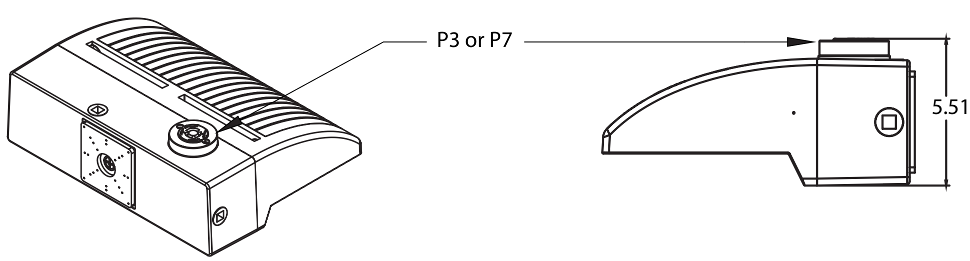
10KV 10kV/5kA Surge Protection, in place of 20kV/10kA

Options Location

Motion/Ambient Sensor mount options for Low (8-15') (MASL) and Height (15-30') (MASH) applications

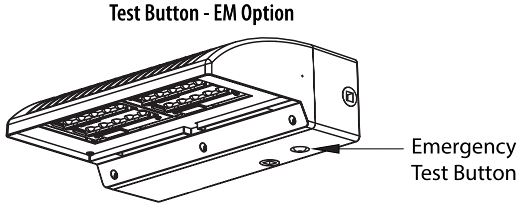


N.E.M.A. Twistlock Receptacle P3 and P7 Options, P7 Shown

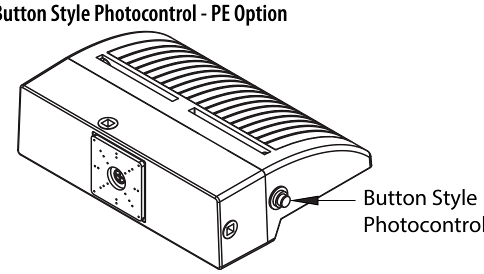


Internal Emergency Battery Test Button - EM Option

Test Button - EM Option



Button Style Photocontrol - PE Option



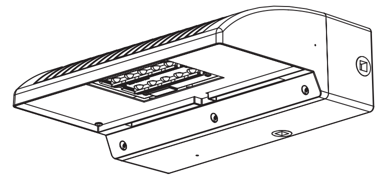
HLWPC2

Wallpack® Full Cutoff LED

Driver & LEM Configuration Based on Circuit Options

Number of LEMs & Drivers / Circuit		Sinlge Circuit (std.)		Two Circuit (2CI option)	
		LEMs	Drivers	LEMs	Drivers
Lumen Maintenance Factor	P10	1	1	-	-
	P20	1	1	2	2
	P30	2	1	2	2
	P40	2	1	2	2
	P50	2	1	-	-

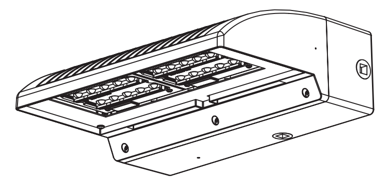
1 LEM Luminaire



SPD Based on Circuit Options

Number of LEMs & Drivers / Circuit		Sinlge Circuit (std.)				Two Circuit (2CI option)			
		LEMs	Drivers	No. of SPDs	SPD	LEMs	Drivers	No. of SPDs	SPD
Lumen Maintenance Factor	P10	1	1	1	20kV/10kA	-	-	-	-
	P20	1	1	1	20kV/10kA	2	2	2	10kV/5kA
	P30	2	1	1	20kV/10kA	2	2	2	10kV/5kA
	P40	2	1	1	20kV/10kA	2	2	2	10kV/5kA
	P50	2	1	1	20kV/10kA	-	-	-	-

2 LEM Luminaire



Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platform noted in a 25°C ambient, based on 6,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

The italicized data is extrapolated beyond the TM-21 standard.

E = (LM) x (CU) x (LAT) x (LLD)
LM and CU are obtained from published photometry.

Operating Hours (Standard)		0	25,000	30,000	36,000	45,000	50,000	60,000	75,000	100,000
Lumen Maintenance Factor	P10	1	0.98	0.97	0.96	0.96	0.95	0.95	0.94	0.92
	P20	1	0.97	0.95	0.94	0.93	0.92	0.90	0.88	0.85
	P30	1	0.98	0.97	0.96	0.96	0.95	0.95	0.94	0.92
	P40	1	0.97	0.95	0.94	0.93	0.92	0.90	0.88	0.85

Operating Hours (2CI Option)		0	25,000	30,000	36,000	45,000	50,000	60,000	75,000	100,000
Lumen Maintenance Factor	P10	1	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	P20	1	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	P30	1	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
	P40	1	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Single Circuit Application

Ambient		P10	P20	P30	P40	P50
0ºC	32ºF	1.02	1.03	1.03	1.04	1.05
10ºC	50ºF	1.01	1.02	1.02	1.03	1.03
20ºC	68ºF	1.01	1.01	1.01	1.01	1.01
25ºC	77ºF	1.00	1.00	1.00	1.00	1.00
30ºC	86ºF	0.99	0.99	0.99	0.99	0.99
40ºC	104ºF	0.98	0.97	0.98	0.97	0.97

Optional Two Independent Circuit (2CI) Application

Ambient		P20	P30	P40
0ºC	32ºF	1.02	1.02	1.02
10ºC	50ºF	1.01	1.01	1.02
20ºC	68ºF	1.00	1.01	1.01
25ºC	77ºF	1.00	1.00	1.00
30ºC	86ºF	0.99	0.99	0.99
40ºC	104ºF	0.98	0.98	0.98

Electrical Load

Single Circuit Application

			Current (A)					
LEDs	Drive Current (mA)	System Watts/ Circuit	120	208	240	277	247	480
P10	700	28	0.23	0.13	0.12	0.10	0.08	0.06
P20	1400	47	0.41	0.24	0.20	0.18	0.14	0.10
P30	1050	71	0.63	0.37	0.32	0.29	0.22	0.18
P40	1420	95	0.78	0.45	0.40	0.35	0.27	0.20
P50	1720	115	0.95	0.55	0.48	0.42	0.33	0.24

Optional Two Independent Circuit (2CI) Application

			Current (A)					
LEDs	Drive Current (mA)	System Watts/ Circuit	120	208	240	277	247	480
P10	-	-	-	-	-	-	-	-
P20	700	22	0.10	0.06	0.05	0.04	-	-
P30	1000	32	0.14	0.08	0.07	0.06	-	-
P40	1250	47	0.18	0.10	0.09	0.08	-	-
P50	-	-	-	-	-	-	-	-

Operating Characteristics

LED Package	Distribution	System Watts	30K (3000K, 70 CRI)					40K (4000K, 70 CRI)					50K (5000K, 70 CRI)				
			Lumens	LPW	B	U	G	Lumens	LPW	B	U	G	Lumens	LPW	B	U	G
P10	T2S	28	2,904	104	1	0	1	3,128	112	1	0	1	3,168	113	1	0	1
	T2M	28	2,887	103	1	0	1	3,110	111	1	0	1	3,149	112	1	0	1
	T3S	28	2,964	106	1	0	1	3,194	114	1	0	1	3,234	116	1	0	1
	T3M	28	2,801	100	1	0	1	3,017	108	1	0	1	3,055	109	1	0	1
	T4M	28	2,858	102	1	0	1	3,079	110	1	0	1	3,118	111	1	0	1
	TFTM	28	2,979	106	1	0	1	3,209	115	1	0	1	3,250	116	1	0	1
	SYMDF	28	2,771	99	1	0	1	2,986	107	1	0	1	3,023	108	1	0	1
	ASYDF	28	2,756	98	1	0	1	2,969	106	1	0	1	3,007	107	1	0	1
P20	T2S	47	5,303	113	1	0	1	5,713	122	1	0	1	5,785	123	1	0	1
	T2M	47	5,272	112	1	0	2	5,680	121	1	0	2	5,751	122	1	0	2
	T3S	47	5,414	115	1	0	2	5,832	124	1	0	2	5,906	126	1	0	2
	T3M	47	5,115	109	1	0	2	5,510	117	1	0	2	5,580	119	1	0	2
	T4M	47	5,220	111	1	0	2	5,623	120	1	0	2	5,694	121	1	0	2
	TFTM	47	5,440	116	1	0	2	5,861	125	1	0	2	5,935	126	1	0	2
	SYMDF	47	5,062	108	2	0	2	5,453	116	2	0	2	5,522	117	2	0	2
	ASYDF	47	5,033	107	1	0	1	5,422	115	2	0	1	5,491	117	2	0	1
P30	T2S	71	7,319	103	2	0	2	7,884	111	2	0	2	7,984	112	2	0	2
	T2M	71	7,276	102	2	0	2	7,838	110	2	0	2	7,937	112	2	0	2
	T3S	71	7,472	105	1	0	2	8,049	113	2	0	2	8,151	115	2	0	2
	T3M	71	7,059	99	2	0	2	7,604	107	2	0	2	7,700	108	2	0	2
	T4M	71	7,203	101	2	0	2	7,760	109	2	0	2	7,858	111	2	0	2
	TFTM	71	7,508	106	1	0	2	8,088	114	2	0	2	8,190	115	2	0	2
	SYMDF	71	6,985	98	2	0	2	7,525	106	3	0	3	7,620	107	3	0	3
	ASYDF	71	6,946	98	2	0	2	7,483	105	2	0	2	7,578	107	2	0	2
P40	T2S	95	9,320	98	2	0	2	10,041	106	2	0	2	10,168	107	2	0	2
	T2M	95	9,266	98	2	0	2	9,982	105	2	0	3	10,108	106	2	0	3
	T3S	95	9,515	100	2	0	2	10,251	108	2	0	2	10,381	109	2	0	2
	T3M	95	8,989	95	2	0	2	9,684	102	2	0	2	9,807	103	2	0	2
	T4M	95	9,174	97	2	0	2	9,883	104	2	0	3	10,008	105	2	0	3
	TFTM	95	9,561	101	2	0	2	10,300	108	2	0	2	10,431	110	2	0	2
	SYMDF	95	8,896	94	3	0	3	9,583	101	3	0	3	9,705	102	3	0	3
	ASYDF	95	8,846	93	2	0	2	9,530	100	2	0	2	9,650	102	2	0	2
P50	T2S	115	10,972	95	2	0	2	11,820	103	2	0	2	11,969	104	2	0	2
	T2M	115	10,908	95	2	0	3	11,751	102	2	0	3	11,900	103	2	0	3
	T3S	115	11,202	97	2	0	2	12,067	105	2	0	2	12,220	106	2	0	2
	T3M	115	10,582	92	2	0	2	11,400	99	2	0	3	11,544	100	2	0	3
	T4M	115	10,799	94	2	0	3	11,634	101	2	0	3	11,781	102	2	0	3
	TFTM	115	11,256	98	2	0	2	12,126	105	2	0	2	12,279	107	2	0	2
	SYMDF	115	10,472	91	3	0	3	11,282	98	3	0	3	11,424	99	3	0	3
	ASYDF	115	10,414	91	2	0	2	11,219	98	3	0	2	11,361	99	3	0	2

Use the following to scale 70CRI to 80CRI.

CCT	Multiplier
3000K	0.909
4000K	0.886
5000K	0.865

All IES files available on product web page

Operating Characteristics (continued)

LED Package	Distribution	System Watts	30K + 2CI Option (3000K, 70 CRI)					40K + 2CI Option (4000K, 70 CRI)					50K + 2CI Option (5000K, 70 CRI)				
			Lumens	LPW	B	U	G	Lumens	LPW	B	U	G	Lumens	LPW	B	U	G
P20	T2S	49	5,015	102	1	0	1	5,402	110	1	0	1	5,471	112	1	0	1
	T2M	49	4,985	102	1	0	2	5,371	110	1	0	2	5,439	111	1	0	2
	T3S	49	5,120	104	1	0	1	5,515	113	1	0	2	5,585	114	1	0	2
	T3M	49	4,837	99	1	0	2	5,210	106	1	0	2	5,276	108	1	0	2
	T4M	49	4,936	101	1	0	2	5,317	109	1	0	2	5,385	110	1	0	2
	TFTM	49	5,144	105	1	0	2	5,542	113	1	0	2	5,612	115	1	0	2
	SYMDF	49	4,786	98	2	0	2	5,156	105	2	0	2	5,222	107	2	0	2
	ASYDF	49	4,760	97	1	0	1	5,127	105	1	0	1	5,192	106	1	0	1
P30	T2S	70	6,769	97	1	0	1	7,293	104	2	0	2	7,385	106	2	0	2
	T2M	70	6,730	96	2	0	2	7,250	104	2	0	2	7,342	105	2	0	2
	T3S	70	6,911	99	1	0	2	7,445	106	1	0	2	7,539	108	1	0	2
	T3M	70	6,529	93	2	0	2	7,033	100	2	0	2	7,123	102	2	0	2
	T4M	70	6,663	95	2	0	2	7,178	103	2	0	2	7,269	104	2	0	2
	TFTM	70	6,945	99	1	0	2	7,481	107	1	0	2	7,576	108	2	0	2
	SYMDF	70	6,461	92	2	0	2	6,960	99	2	0	2	7,049	101	2	0	2
	ASYDF	70	6,425	92	2	0	2	6,922	99	2	0	2	7,009	100	2	0	2
P40	T2S	89	8,370	94	2	0	2	9,017	101	2	0	2	9,131	103	2	0	2
	T2M	89	8,321	93	2	0	2	8,964	101	2	0	2	9,078	102	2	0	2
	T3S	89	8,545	96	2	0	2	9,205	103	2	0	2	9,322	105	2	0	2
	T3M	89	8,073	91	2	0	2	8,696	98	2	0	2	8,807	99	2	0	2
	T4M	89	8,238	93	2	0	2	8,875	100	2	0	2	8,987	101	2	0	2
	TFTM	89	8,586	96	2	0	2	9,250	104	2	0	2	9,367	105	2	0	2
	SYMDF	89	7,989	90	3	0	3	8,606	97	3	0	3	8,715	98	3	0	3
	ASYDF	89	7,944	89	2	0	2	8,558	96	2	0	2	8,666	97	2	0	2

Use the following to scale 70CRI to 80CRI.

CCT	Multiplier
3000K	0.909
4000K	0.886
5000K	0.865

All IES files available on product web page

LED Package	Distribution	System Watts	AMB (Wavelength)					LED Package	Distribution	System Watts	AMB (Wavelength)				
			Lumens	LPW	B	U	G				Lumens	LPW	B	U	G
P10	T2S	28	1,061	38	0	0	1	P30	T2S	28	1,975	71	0	0	1
	T2M	28	1,054	38	0	0	1		T2M	28	1,964	70	0	0	1
	T3S	28	1,083	39	0	0	1		T3S	28	2,016	72	0	0	1
	T3M	28	1,023	37	0	0	1		T3M	28	1,905	68	0	0	1
	T4M	28	1,044	37	0	0	1		T4M	28	1,944	69	0	0	1
	TFTM	28	1,088	39	0	0	1		TFTM	28	2,026	72	0	0	1
	SYMDF	28	1,012	36	1	0	1		SYMDF	28	1,885	67	1	0	1
	ASYDF	28	1,007	36	0	0	1		ASYDF	28	1,875	67	0	0	1

HLWPC2

Wallpack® Full Cutoff LED

Options Matrix

Parameters		LED AMB	Options (Start with SF, DF, 2CI or EM if being used)													
			PE	P3	P7	PSC	PCLL	MASH	MASL	SF	DF	TP	10kV	AO	2CI	EM
LED Performance Package	P10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
	P20	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P30	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P40	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P50	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Voltage	AS	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
	AH	Y	N	Y	Y	Y	N	N	N	N	N	Y	Y	Y	N	N
	12	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	20	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
	24	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
	27	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	34	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	N
	48	Y	N	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	N	N
Options	PE	Y		N	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y
	P3	Y	N		N	M	Y	N	N	Y	Y	Y	Y	N	N	N
	P7	Y	N	N		M	Y	N	N	Y	Y	Y	Y	N	N	N
	PSC	Y	N	M	M		N	N	N	Y	Y	Y	Y	N	N	N
	PCLL	Y	N	Y	Y	N		N	N	Y	Y	Y	Y	N	N	N
	MASH	Y	N	N	N	N	N		N	Y	Y	Y	Y	N	N	N
	MASL	Y	N	N	N	N	N	N		Y	Y	Y	Y	N	N	N
	SF	Y	Y	Y	Y	Y	Y	Y	Y		N	Y	Y	Y	Y	Y
	DF	Y	Y	Y	Y	Y	Y	Y	Y	N		Y	Y	Y	Y	Y
	TP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
	10kV	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	M	M
	AO	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y		N	N
	2CI	P30	N	N	N	N	N	N	N	Y	Y	Y	M	N		N
	EM	Y	Y	N	N	N	N	N	N	Y	Y	Y	M	N	N	

Notes

I = Included with option

M = Must have: one of these must be installed for the luminaire to operate

N = Combination Not available

P30 = Valid Option Combination, not available with P10 Performance Packabe

Y = Valid Option Combination

HLWPC2

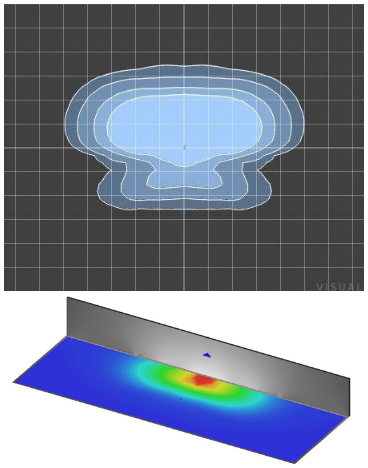
Wallpack® Full Cutoff LED

Photometric Diagrams

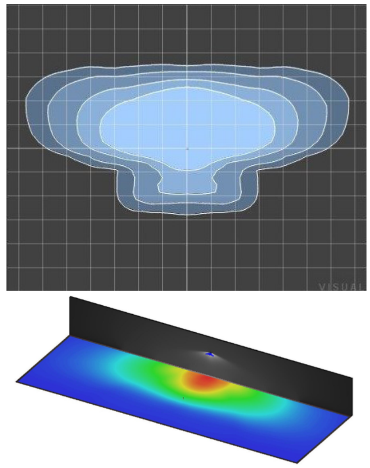
To see complete photometric reports or download .ies files for this product, visit the Holophane's Wallpack FCO LED homepage.
Isofootcandle plots for the HLWPC2 P30 40K. Distance are in units of mounting height (12"). Grid is 10'x10'.

0.1 fc	1 fc	0.2 fc	0.5 fc

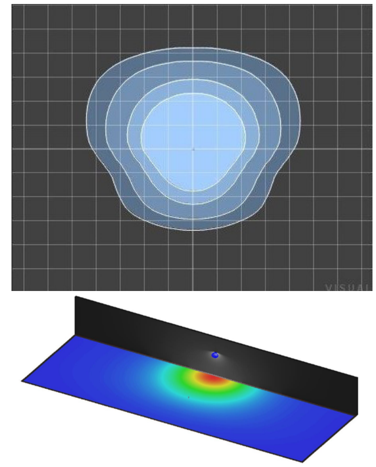
HLWPC2 P30 40K XX T2S



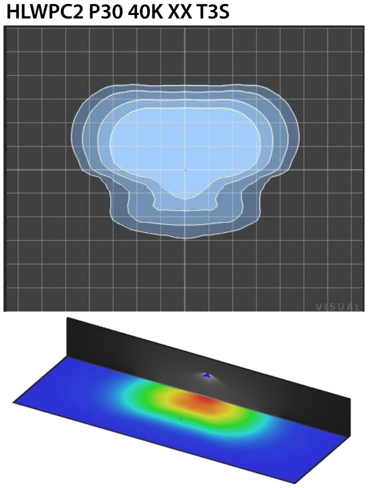
HLWPC2 P30 40K XX T2M



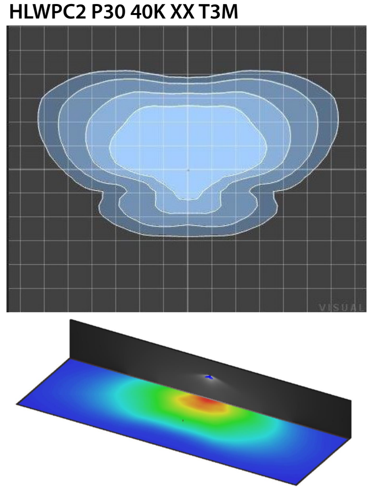
HLWPC2 P30 40K XX ASYDF



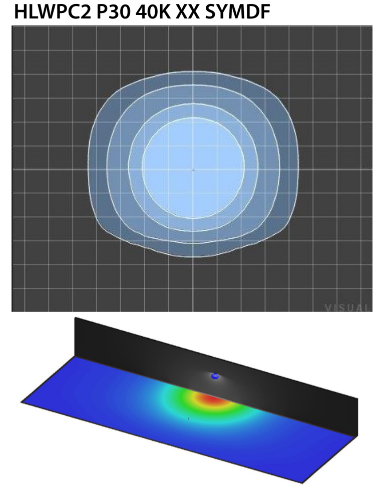
HLWPC2 P30 40K XX T3S



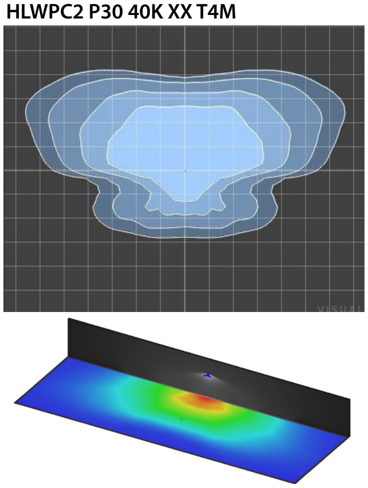
HLWPC2 P30 40K XX T3M



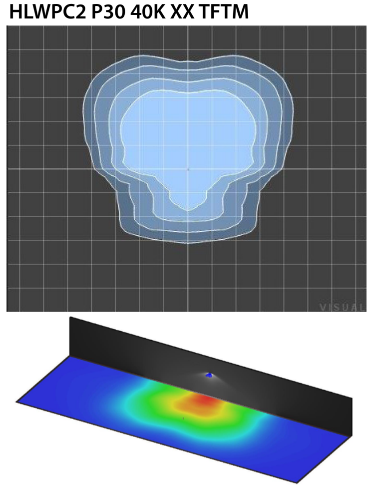
HLWPC2 P30 40K XX SYMDF



HLWPC2 P30 40K XX T4M



HLWPC2 P30 40K XX TFTM

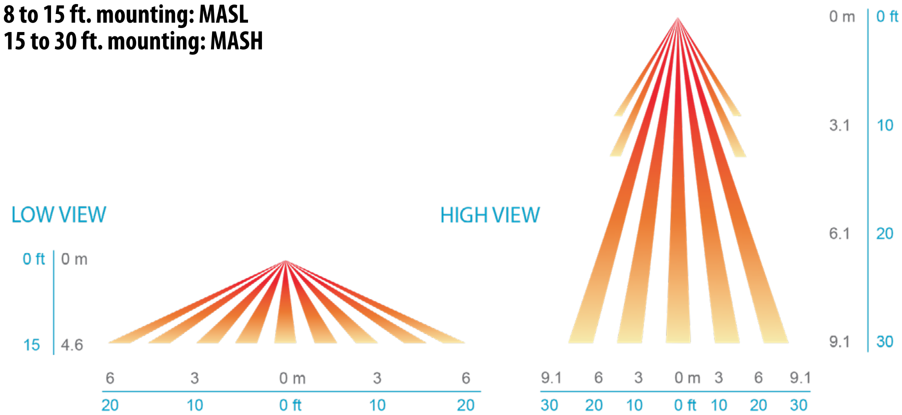


HLWPC2

Wallpack® Full Cutoff LED

Coverage Pattern

8 to 15 ft. mounting: MASL
15 to 30 ft. mounting: MASH



Control Options

Button Style Photocontrol

PE

N.E.M.A. Receptacle

P3

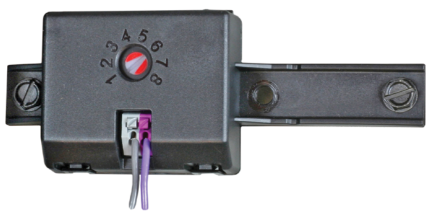
P7

Motion & Ambient Combined Sensor

MASL/MASH

Field Adjustable Output Module

The Field Adjustable Output (AO) module is an onboard device that adjusts the light output and input voltage to meet specific requirements, allowing a single fixture configuration to be flexibly applied in many different applications. The AO option is available on the HLWPC2 series.



P10 - AS and AH		
AO Position	% Lumens	% Wattage
8	100%	100%
7	94%	95%
6	83%	82%
5	71%	69%
4	59%	57%
3	46%	45%
2	34%	33%
1	21%	21%

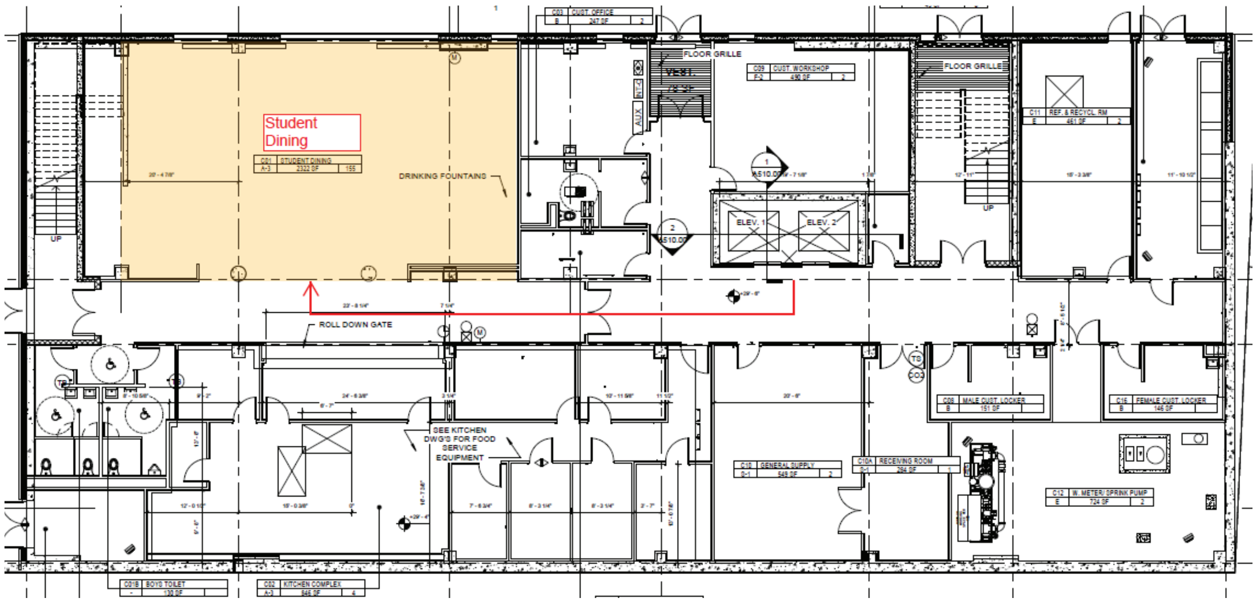
P20 - AS and AH		
AO Position	% Lumens	% Wattage
8	100%	100%
7	95%	94%
6	84%	80%
5	73%	67%
4	61%	54%
3	48%	42%
2	35%	30%
1	21%	18%

P30 - AS and AH		
AO Position	% Lumens	% Wattage
8	100%	100%
7	95%	94%
6	84%	80%
5	73%	67%
4	61%	54%
3	48%	42%
2	35%	30%
1	21%	18%

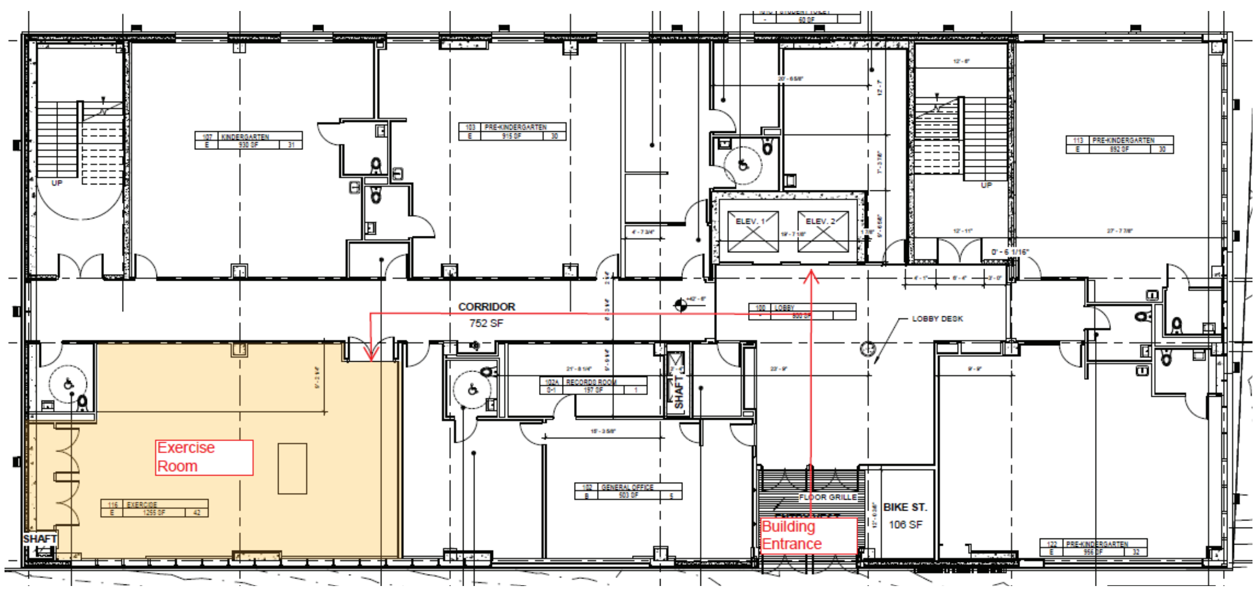
P40 - AS and AH		
AO Position	% Lumens	% Wattage
8	100%	100%
7	95%	95%
6	85%	82%
5	74%	68%
4	62%	55%
3	49%	43%
2	36%	30%
1	21%	17%

P50 - AS and AH		
AO Position	% Lumens	% Wattage
8	100%	100%
7	96%	95%
6	86%	81%
5	75%	68%
4	64%	55%
3	51%	42%
2	37%	29%
1	22%	17%

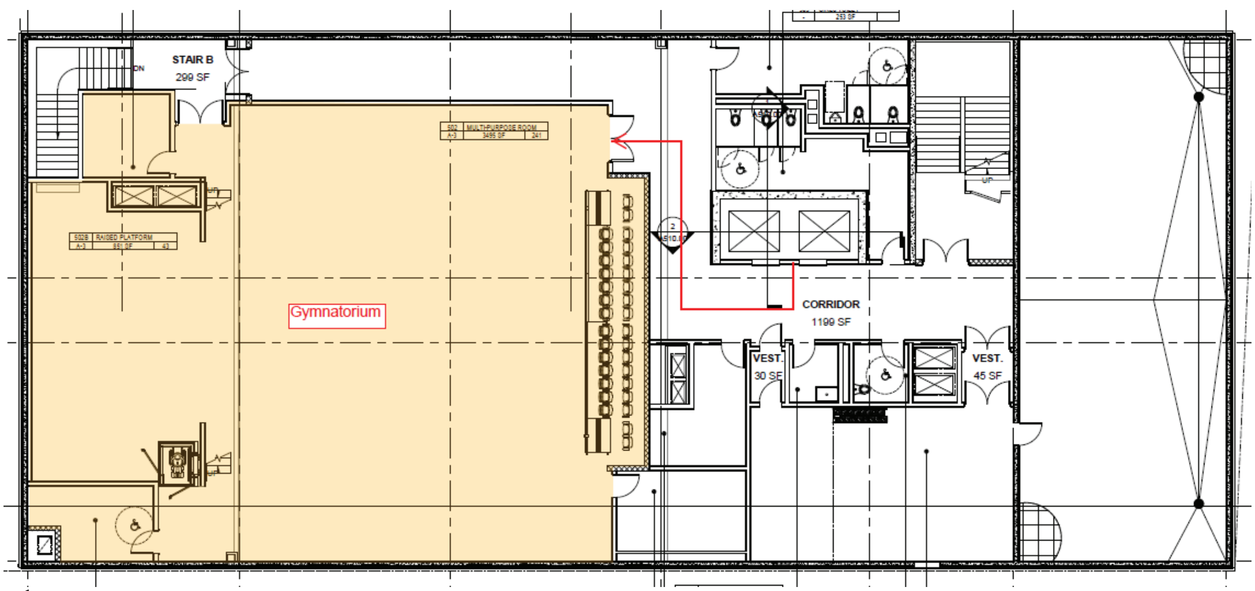
S3.1R-Joint Use of Facilities



Cellar Plan



1st Floor Plan



5th Floor Plan

S3.2-Active Design in a School Environment

NYC Green Schools Rating System

School Construction Authority

ACTIVE DESIGN IN A SCHOOL ENVIRONMENT

CREDIT FORM

Credit S3.2

RESPONSIBLE PARTY:

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

Project:		Submission Phase:	100% CD Report Submission
Address:		Architect:	
LLW #:		Preparer:	
Design #:		Form Revision Date:	6/10/2021

INSTRUCTIONS:
Step 1) Enter project compliance and supporting documents in Step 1 table. Reference documents provided must refer to the location of this feature within the Construction Documents and provide a narrative to explain how the requirements were interpreted.
Step 2) Enter project compliance and supporting documents in Step 2 table: Design for Increased Active Modes of Vertical Circulation. Include seven strategies to achieve compliance. Team required to provide Reference Docs in Support of Claim if marked "Yes".

Step 1: Comply with both of the following strategies

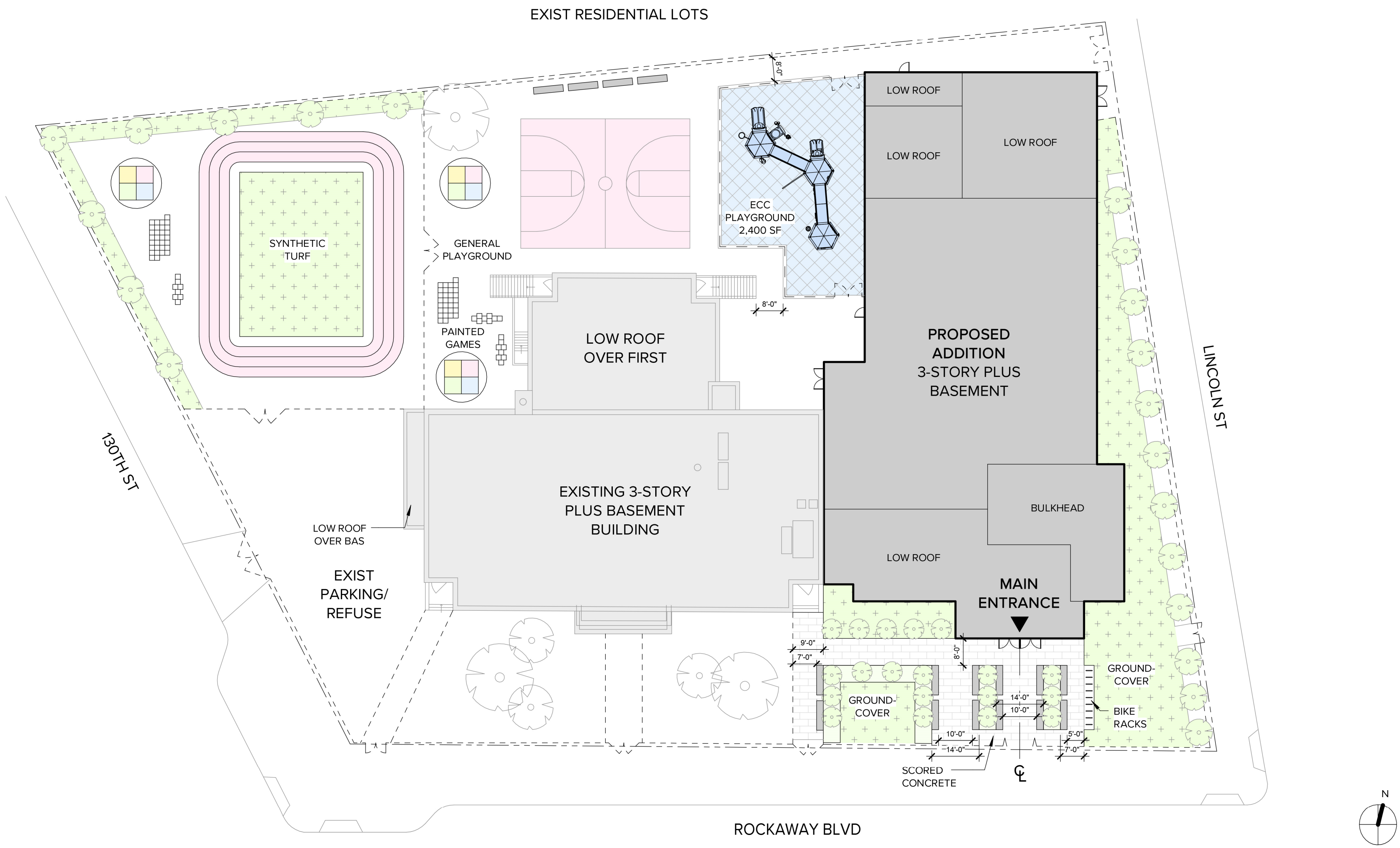
#	Design Case	Measurement or Doc Method	Base Case Code Minimum	Project Complies?	Provide Reference Docs in Support of Claim
R	Building occupants shall have access via at least one main active mode of vertical circulation to and from all common use floors, and occupant's own floor(s)	Reference to applicable floor plan and door hardware schedule. Accompanying narrative.	In schools, doors may be locked on the stair side except at intervals of 4 stories or less.	Yes	
R	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.	Reference to applicable floor plan showing exercise space. Accompanying narrative.	Not applicable	Yes	Outdoor play area will be provided including ECC playground

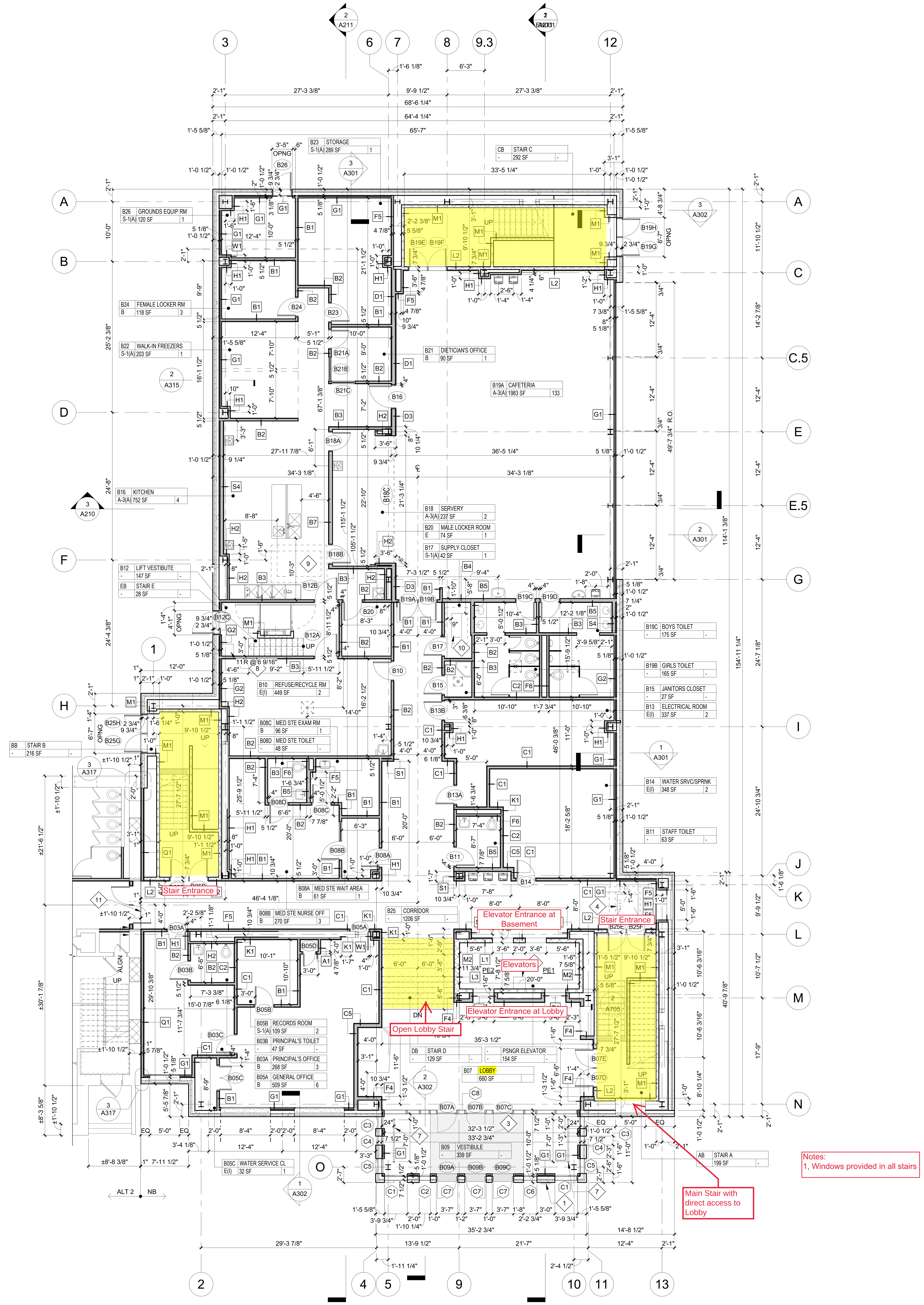
Step 2: Comply with seven of the following strategies

#	Design Case	Measurement or Doc Method	Base Case Code Minimum	Project Complies?	Provide Reference Docs in Support of Claim
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.	Reference to applicable floor plan and door hardware schedule. Accompanying narrative.	In schools, doors may be locked on the stair side except at intervals of 4 stories or less.	Yes	Egress stairs on all levels have re-entry
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.	Reference to applicable floor plan and door schedule. Accompanying narrative.	Not applicable	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.	Plan drawing demonstrating the principal path of travel and active vertical circulation location. Accompanying narrative.	Exact location not mandated	Yes	Stair from Lobby to Basement is an open stair
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.	Plan drawing showing adjacency of active mode of vertical circulation to lobby. Accompanying narrative.	Exact location not mandated, follow SCA Design Requirements	Yes	Stair A is accessed directly from the lobby
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.	Plan drawing showing accessibility of active mode of vertical circulation immediately adjacent to motorized vertical circulation. Accompanying narrative.	Exact location not mandated, follow SCA Design Requirements	No	
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.	Reference to applicable lighting plan, lighting cut sheets & calculations. Accompanying narrative.	200 lux recommended by IES.	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.	Plan drawing showing location and dimensions of skylight/windows in relation to stairs. Accompanying narrative.	Follow SCA Design Requirements	Yes	Windows provided at the intermediate landings
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.	Drawings of signs. Plan drawing showing location. Accompanying narrative.	Not applicable	Yes	
9	Use inviting sensory stimulation such as artwork and/or music in stairwells.	Plan drawing showing location of artwork or music system. Accompanying narrative.	Not applicable	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.	Plan showing exercise equipment, staff calculation. Accompanying narrative.	Not applicable	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.	Plan showing exercise room with equipment layout, staff calculation. Accompanying narrative.	Not applicable	Yes	A storage room is proposed adjacent to the Gym

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
Project Complies	**Yes**


EXIST RESIDENTIAL LOTS
SYNTHETIC TURF
GENERAL PLAYGROUND
PAINTED GAMES
ECC PLAYGROUND 2,400 SF
LOW ROOF
LOW ROOF
LOW ROOF
LOW ROOF OVER FIRST
PROPOSED ADDITION 3-STORY PLUS BASEMENT
LINCOLN ST
130TH ST
EXISTING 3-STORY PLUS BASEMENT BUILDING
BULKHEAD
LOW ROOF OVER BAS
EXIST PARKING/ REFUSE
LOW ROOF
MAIN ENTRANCE
GROUND-COVER
GROUND-COVER
BIKE RACKS
SCORED CONCRETE
ROCKAWAY BLVD
N



FLOOR PLAN - BASEMENT
1/8" = 1'-0"

KEYNOTES

1. PROVIDE 24" DIAM CAST IRON METAL SEAL OF THE CITY OF NEW YORK MOUNTED AT 5'-0" FROM CENTERLINE OF SEAL TO THE TOP OF THE FINISHED FLOOR
2. PROVIDE LADDER, SEE DETAIL 5/A404
3. PROVIDE FOOT GRILLE, SEE DETAILS 1,2/A915
4. PROVIDE CYRSTALIINE WATERPROOFING AT HOUSE TRAP PIT - SEE 2/A704
5. SEE 5/A316 FOR ROOF ACCESS DOOR DETAILS
6. PROVIDE LADDER, SEE DETIAL 6/A404
7. PROVIDE BIKE RACK, SEE DETAIL 6/A704
8. SUMP PIT
9. GREASE INTERCEPTOR PIT
10. GREASE TRAP PIT FOR MILK SINK
11. PROVIDE FLOOR AND WALL EXPANSION JOINTS SEE DETAILS 4 AND 5/A704
12. REMOVE AND REPLACE TWO COURSE OF EXISTING BRICK AND INSTALL 2-PIECE CAP FLASHIN. SEE DETAILS 1/A316

LEGEND

- DOUBLE WYTHE INSULATED PRECAST CONCRETE WALL PANELS (REFER TO ARCHITECTURAL PRECAST CONCRETE PERFORMANCE REQUIREMENTS PC SERIES DRAWINGS, WALL SECTIONS AND EXTERIOR DETAILS)
- A# GYPSUM BOARD PARTITION OR FURRING- TAG IDENTIFIES TYPE
- A# MASONRY PARTITION- TAG IDENTIFIES TYPE
- CONCRETE FOUNDATION WALL
- EXISTING CONSTRUCTION TO REMAIN

PLAN NOTES

1. +/- INDICATES THAT THE DIMENSION IS TO BE FIELD VERIFIED. WHEN +/- IS NOT INDICATED, THE DIMENSION IS A HOLD DIMENSION.
2. INTERIOR LAYOUT DIMENSIONS ARE SHOWN TO FACE OF PARTITION.
3. TOILETS AND ROOMS TO RECEIVE WALL TILE ARE DIMENSIONED TO FACE OF GWB OR MASONRY, NOT TILE.
4. DIMENSION AT DOORS REFER TO NOMINAL DOOR OPENING WIDTH.
5. FLOOR PLANS ARE CUT 4'-0" AFF TYP.
6. FOR REQUIRED FIRE RESISTANCE RATINGS OF STRUCTURAL ELEMENTS, FIRE RATINGS OF EXTERIOR WALLS AND FIRE RATED PARTITIONS/BARRIERS SEE DRAWING SERIES A020.
7. FOR INTERIOR PARTITION REQUIREMENTS, TYPES THICKNESS AND PARTITION BASE DETAILS SEE DRAWING SERIES A700.
8. PROVIDE VERTICAL CONTROL JOINTS AT GWB PARTITIONS AT SPACING NOT EXCEEDING 30'-0" ON CENTER. U.O.N. CONTROL JOINTS SHALL BE ALIGNED WITH THE EDGES OF OPENINGS IN THE PARTITION (SUCH AS DOOR FRAMES, WINDOW, LOUVERS OR VISION PANEL FRAMES). CONTROL JOINTS SHALL NOT BE PAINTED.
9. PROVIDE VERTICAL CONTROL JOINTS AT CMU PARTITIONS. PROVIDE CONTROL JOINTS AT A DISTANCE NOT MORE THAN 1.5 TIMES THE HEIGHT OF THE WALL OR 25'-0" ON CENTER, WHICHEVER IS LESS. CONTINUE CONTROL JOINT THROUGH WAINSCOTING.
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13. ALL MASONRY PARTITIONS ARE TO EXTEND TO THE UNDERSIDE OF THE METAL DECK, UON. A 1" JOINT IS TO BE PROVIDED, REFER TO HEAD OF WALL DETAILS IN DRAWING SERIES A700.
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15. PROVIDE 2" PERIMETER RIGID INSULATION EXTENDING 2'-0" MINIMUM BELOW GRADE OR TO TOP OF FOOTINGS AS NOTED ON THE ALL WALL SECTIONS. PROVIDE 3" RIGID INSULATION UNDER THE ENTIRE SLAB ON GRADE.
16. ALL DOORS ARE TO BE INSTALLED 6" ON HINGE SIDE FROM PERPENDICULAR PARTITIONS U.O.N. MEASURED FROM FACE OF PARTITION TO FACE OF DOOR RABBET.
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20. FOR CONCRETE SHELF SEE EXTERIOR ELEVATIONS.
21. FOR TOP OF SLAB (T.O.S), SLAB EDGE, DEPRESSIONS AND OPENINGS SEE SLAB EDGE AND OPENING PLANS A120.
22. AT ENTIRE BUILDING PERIMETER, WHERE CONCRETE PAVEMENT ABUTS THE EXTERIOR WALL PROVIDE AN EXPANSION JOINT PER DETAIL 3/A315.
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26. ALL CONVECTOR/FIN TUBE RADIATOR COVERS ARE TO BE VP-1 BRIGHT WHITE (BASIS OF DESIGN-MESTEK INC).
27. AT INTERSECTION OF EXISTING BUILDING AND DOUBLE WYTHE INSULATED PRECAST CONCRETE WALLS PROVIDE PRE-COMPRESSED IMPREGNATED OPEN CELL EXPANSION JOINT VERTICALLY FOR ENTIRE HEIGHT OF WALL.
28. FOR SLAB ELEVATIONS REFER TO HEIGHT DIAGRAM ON DRAWING A300

NYC School Construction Authority

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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:

gineer:

nt:

nsultant:

360 Park Avenue South, 15th Floor, New York, NY 10010 (t) 212-689-5389

Environmental Consultant to SCA:

NOTE: Drawing may be printed at reduced scale

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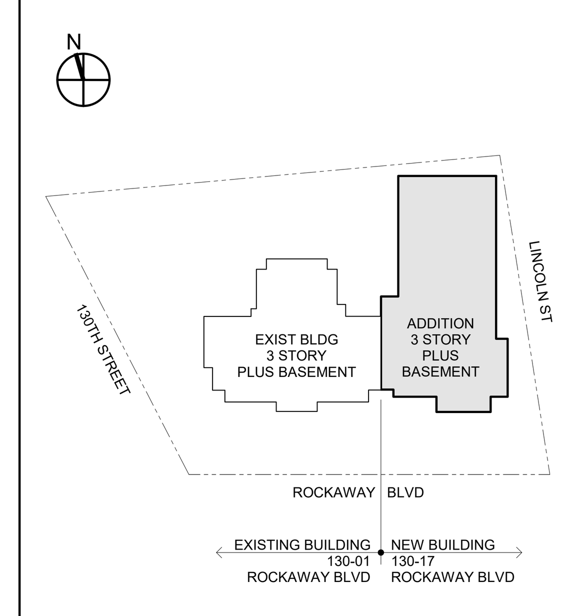

Block No. 11694 Lot No. 27

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
LLW No: Facility Code: Date: 7/22/2021

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P.S. - QUEENS
ADDITION AND EXISTING BUILDING RENOVATION WORK
Address:

Drawing Title:
FLOOR PLAN - BASEMENT

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A100.00

Sheets in Contract Set:
of XXX

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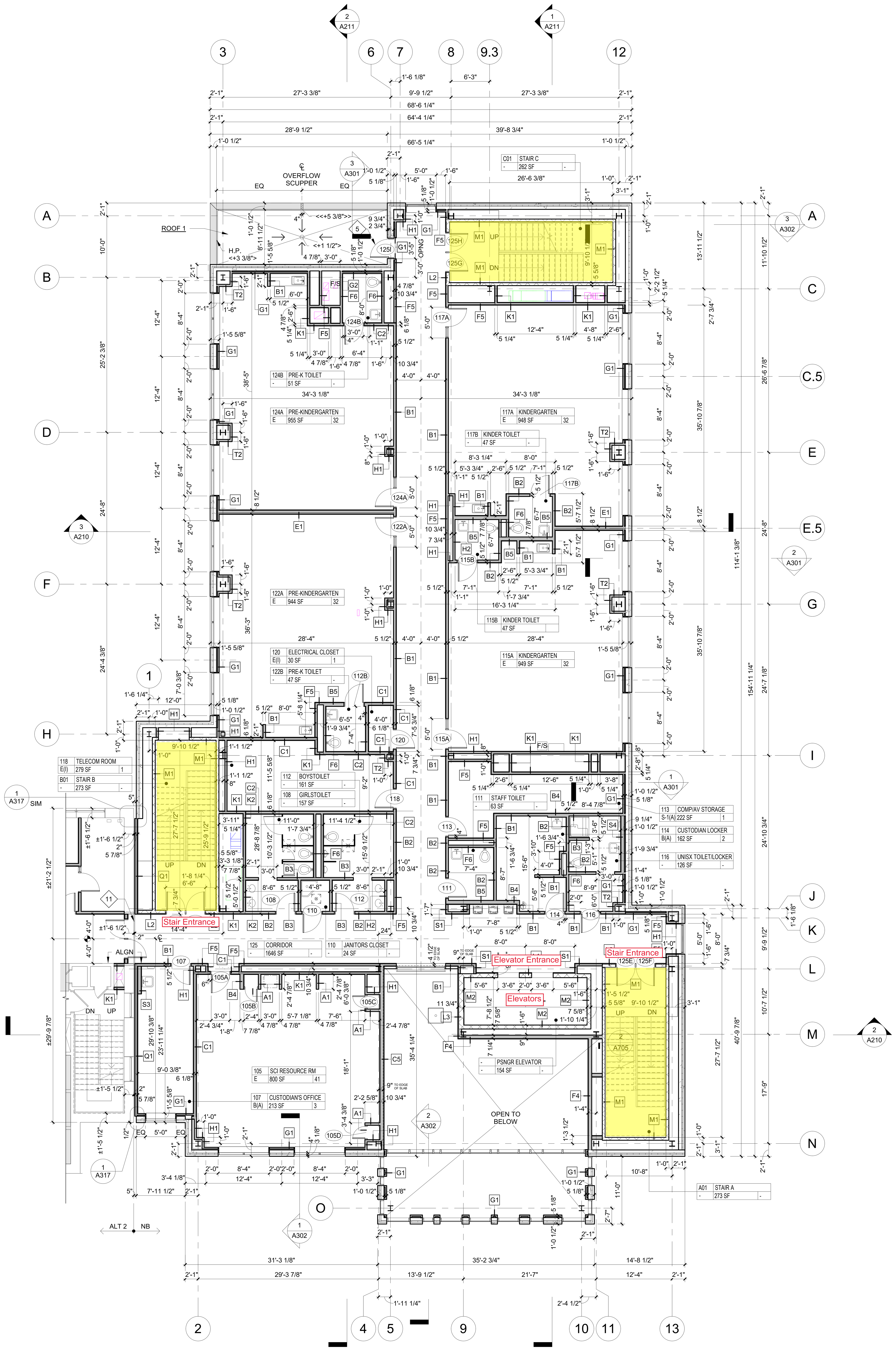

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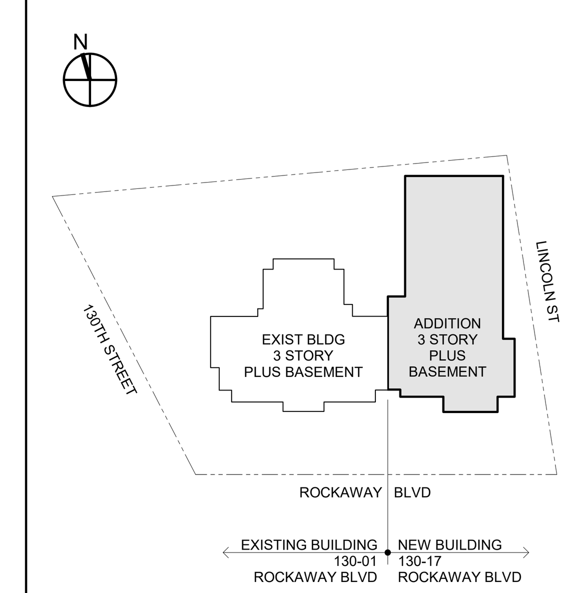

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Project Architect/Engineer:

Discipline Lead:

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Drawn by:

Checked by:

LLW No.: Facility Code: Date: 7/22/2021

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Drawing Title:
FLOOR PLAN - FIRST FLOOR

Drawing No.:
A101.00

Sheets in Contract Set:
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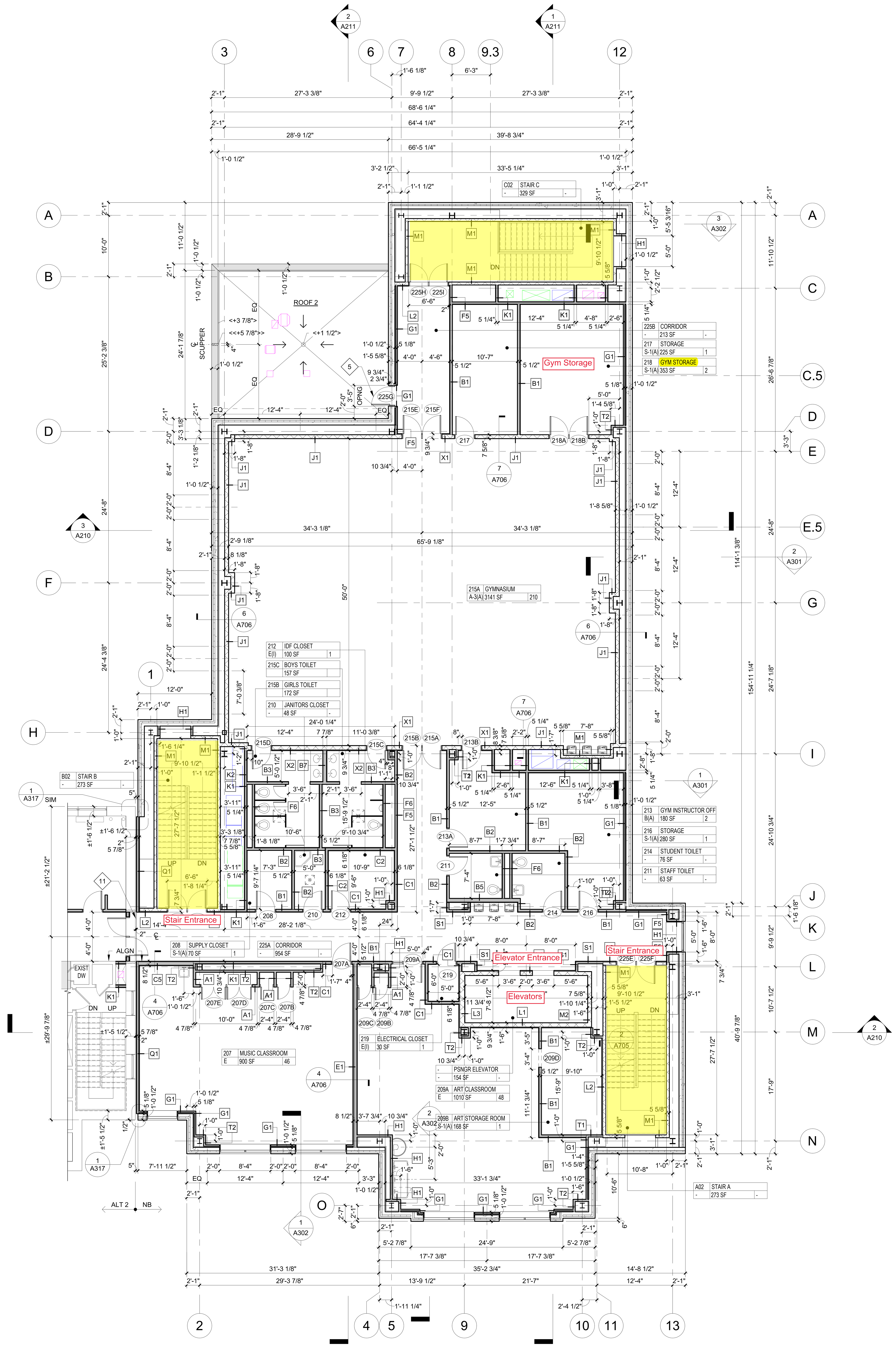

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17. PROVIDE FIRE-STOPPING AT ALL PIPE/CONDUIT PENETRATIONS IN FIRE RATED CONSTRUCTION. PROVIDE SEALANT AT NON FIRE RATED CONSTRUCTION.
18. PROVIDE STAINLESS STEEL CORNER PROTECTION AT ALL OUTSIDE CORNERS OF GYPSUM BOARD PARTITIONS WITH CERAMIC TILE, FROM FLOOR TO FULL HEIGHT OF CERAMIC TILE. FOR TYPICAL DETAILS REFER TO DRAWING SERIES A700.
19. FOR WATERSTOP DETAILS REFER TO STRUCTURAL DETAILS.
20. FOR CONCRETE SHELF SEE EXTERIOR ELEVATIONS.
21. FOR TOP OF SLAB (T.O.S), SLAB EDGE, DEPRESSIONS AND OPENINGS SEE SLAB EDGE AND OPENING PLANS A120.
22. AT ENTIRE BUILDING PERIMETER, WHERE CONCRETE PAVEMENT ABUTS THE EXTERIOR WALL PROVIDE AN EXPANSION JOINT PER DETAIL 3/A315.
23. FOR EQUIPMENT CONCRETE PADS REFER TO MEP DRAWINGS AND STRUCTURAL DRAWINGS FOR DETAIL.
24. FOR MASONRY DIMENSIONING REFER TO DRAWING SERIES A700.
25. FOR LOCATION OF FIRE EXTINGUISHER CABINETS, FIRE HOSE CABINET AND FIRE VALVE CABINETS REFER TO FIRE PROTECTION DRAWINGS A020 SERIES
26. ALL CONVECTOR/FIN TUBE RADIATOR COVERS ARE TO BE VP-1 BRIGHT WHITE (BASIS OF DESIGN- MESTEK INC).
27. AT INTERSECTION OF EXISTING BUILDING AND DOUBLE WYTHE INSULATED PRECAST CONCRETE WALLS PROVIDE PRE-COMPRESSED IMPREGNATED OPEN CELL EXPANSION JOINT VERTICALLY FOR ENTIRE HEIGHT OF WALL.
28. FOR SLAB ELEVATIONS REFER TO HEIGHT DIAGRAM ON DRAWING A300

NYC School Construction Authority

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Stacey Spann-Thom, Director, Operations Support

Consultants:

gineer:

nt:

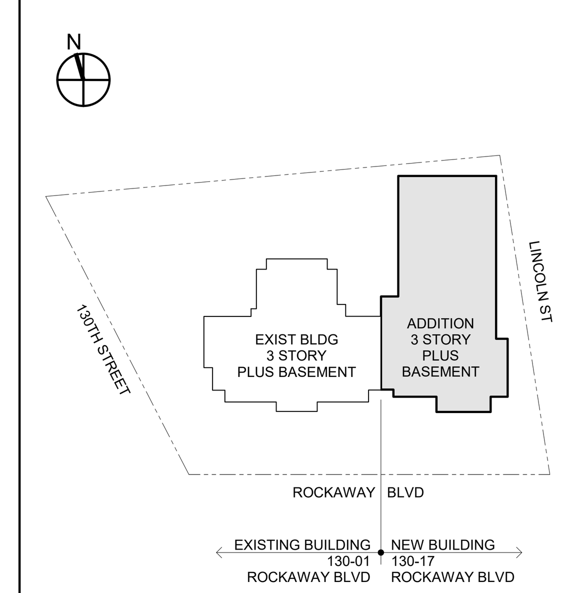
nsultant:

Environmental Consultant to SCA:

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
	2/23/2021	30% DD SUBMISSION
	4/1/2021	60% CD SUBMISSION
	5/27/2021	100% 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

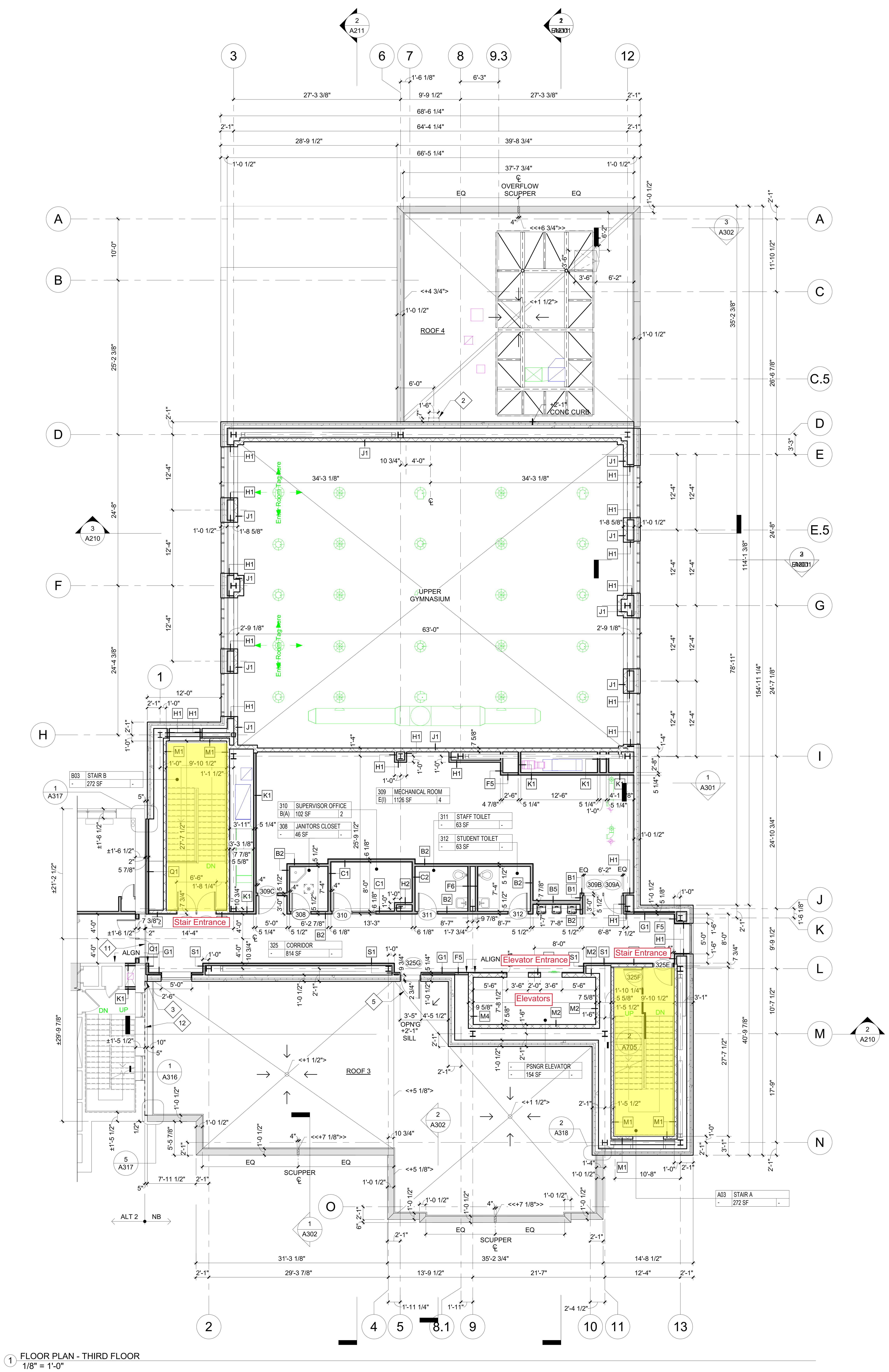
Project:
P.S. - QUEENS
ADDITION AND EXISTING BUILDING RENOVATION WORK
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - SECOND FLOOR

Drawing No.:
A102.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX



1 FLOOR PLAN - THIRD FLOOR
1/8" = 1'-0"

KEYNOTES

1. PROVIDE 24" DIAM CAST IRON METAL SEAL OF THE CITY OF NEW YORK MOUNTED AT 5'-0" FROM CENTERLINE OF SEAL TO THE TOP OF THE FINISHED FLOOR
2. PROVIDE LADDER, SEE DETAIL 5/A404
3. PROVIDE FOOT GRILLE, SEE DETAILS 1,2/A915
4. PROVIDE CYRSTALINE WATERPROOFING AT HOUSE TRAP PIT - SEE 2/A704
5. SEE 5/A316 FOR ROOF ACCESS DOOR DETAILS
6. PROVIDE LADDER, SEE DETAIL 6/A404
7. PROVIDE BIKE RACK, SEE DETAIL 6/A704
8. SUMP PIT
9. GREASE INTERCEPTOR PIT
10. GREASE TRAP PIT FOR MILK SINK
11. PROVIDE FLOOR AND WALL EXPANSION JOINTS SEE DETAILS 4 AND 5/A704
12. REMOVE AND REPLACE TWO COURSE OF EXISTING BRICK AND INSTALL 2-PIECE CAP FLASHIN. SEE DETAILS 1/A316

LEGEND

DOUBLE WYTHE INSULATED PRECAST CONCRETE WALL PANELS (REFER TO ARCHITECTURAL PRECAST CONCRETE PERFORMANCE REQUIREMENTS PC SERIES DRAWINGS, WALL SECTIONS AND EXTERIOR DETAILS)

A# GYPSUM BOARD PARTITION OR FURRING- TAG IDENTIFIES TYPE

A# MASONRY PARTITION- TAG IDENTIFIES TYPE

CONCRETE FOUNDATION WALL

EXISTING CONSTRUCTION TO REMAIN

PLAN NOTES

1. +/- INDICATES THAT THE DIMENSION IS TO BE FIELD VERIFIED. WHEN +/- IS NOT INDICATED, THE DIMENSION IS A HOLD DIMENSION.
2. INTERIOR LAYOUT DIMENSIONS ARE SHOWN TO FACE OF PARTITION.
3. TOILETS AND ROOMS TO RECEIVE WALL TILE ARE DIMENSIONED TO FACE OF GWB OR MASONRY, NOT TILE.
4. DIMENSION AT DOORS REFER TO NOMINAL DOOR OPENING WIDTH.
5. FLOOR PLANS ARE CUT 4'-0" AFF TYP.
6. FOR REQUIRED FIRE RESISTANCE RATINGS OF STRUCTURAL ELEMENTS, FIRE RATINGS OF EXTERIOR WALLS AND FIRE RATED PARTITIONS/BARRIERS SEE DRAWING SERIES A020.
7. FOR INTERIOR PARTITION REQUIREMENTS, TYPES THICKNESS AND PARTITION BASE DETAILS SEE DRAWING SERIES A700.
8. PROVIDE VERTICAL CONTROL JOINTS AT GWB PARTITIONS AT SPACING NOT EXCEEDING 30'-0" ON CENTER. U.O.N. CONTROL JOINTS SHALL BE ALIGNED WITH THE EDGES OF OPENINGS IN THE PARTITION (SUCH AS DOOR FRAMES, WINDOW, LOUVERS OR VISION PANEL FRAMES). CONTROL JOINTS SHALL NOT BE PAINTED.
9. PROVIDE VERTICAL CONTROL JOINTS AT CMU PARTITIONS. PROVIDE CONTROL JOINTS AT A DISTANCE NOT MORE THAN 1.5 TIMES THE HEIGHT OF THE WALL OR 25'-0" ON CENTER, WHICHEVER IS LESS. CONTINUE CONTROL JOINT THROUGH WAINSCOTING.
10. CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF BLOCKS LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE PIECES LESS THAN 4" EXPOSED.
11. WHERE DIFFERENT FLOOR MATERIALS MEET, THEY SHALL MEET UNDER THE CENTERLINE OF THE DOOR UNLESS NOTED OTHERWISE.
12. ALL GYPSUM BOARD PARTITIONS ARE TO EXTEND TO THE UNDERSIDE OF THE METAL DECK, UON. A DEFLECTION TRACK AND ¾"JOINT IS TO BE PROVIDED. REFER TO HEAD OF WALL DETAILS IN DRAWING SERIES A700.
13. ALL MASONRY PARTITIONS ARE TO EXTEND TO THE UNDERSIDE OF THE METAL DECK, UON. A 1" JOINT IS TO BE PROVIDED, REFER TO HEAD OF WALL DETAILS IN DRAWING SERIES A700.
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Stacey Spann-Thom, Director, Operations Support

Consultants:

gineer:

nt:

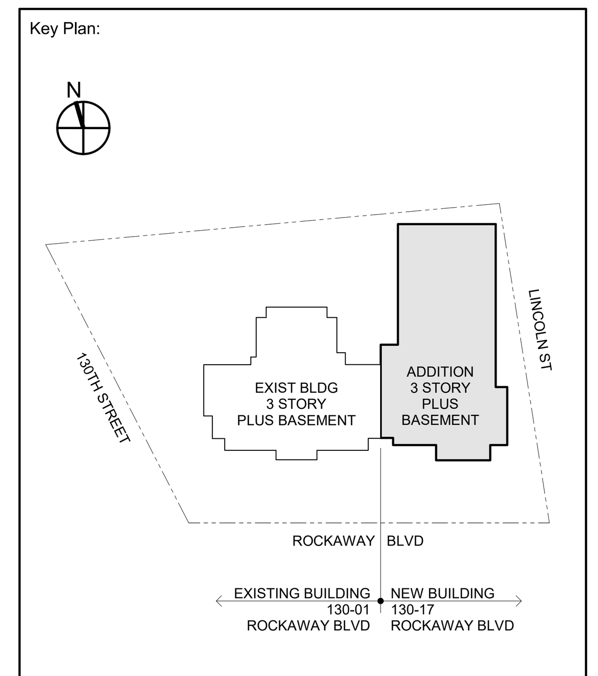
nsultant:

Environmental Consultant to SCA:

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
	2/23/2021	30% DD SUBMISSION
	4/1/2021	60% CD SUBMISSION
	5/27/2021	100% 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 AND EXISTING BUILDING RENOVATION WORK

Address:

Drawing Title:
FLOOR PLAN -THIRD FLOOR

Drawing No.:
A103.00

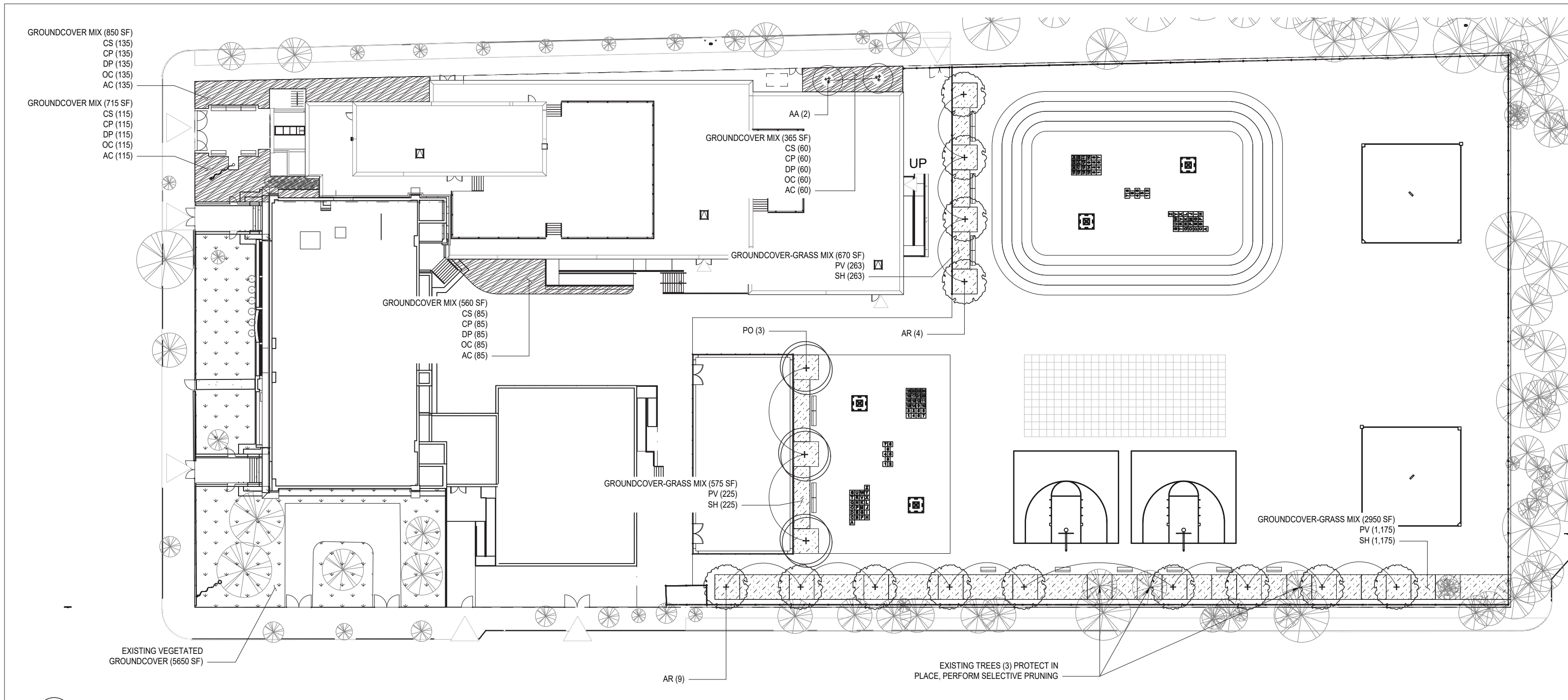
Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX

W1.1P/W1.2R – Outdoor Water Use Reduction

Plant species should be selected from the Native Species Planting Guide for New York City

60% CD Planting Plan & Schedule



1 PLANTING PLAN

SCALE: 1" = 20'-0"

PLANTING NOTES

1. CONTRACTOR SHALL INSPECT AREA TO RECEIVE PLANTING PRIOR TO BEGINNING PLANTING OPERATIONS AND NOTIFY THE CONSTRUCTION MANAGER OF ANY CONDITIONS THAT ARE NOT SUITABLE TO PERFORMING PLANTING OPERATIONS. CONTRACTOR SHALL NOTIFY CONSTRUCTION MANAGER OF ANY CONDITIONS THAT WOULD PREVENT HEALTHY GROWTH OF PLANT MATERIALS.

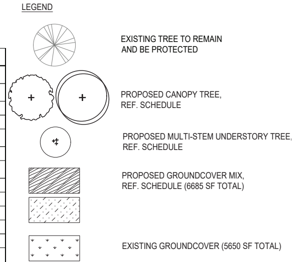
2. PLANT GROUPINGS & LOCATIONS ARE DIAGRAMMATIC. THE ACTUAL LOCATION OF PLANTS SHALL BE LAID OUT AND MARKED BY THE CONTRACTOR AND APPROVED IN THE FIELD BY THE CONSTRUCTION MANAGER.

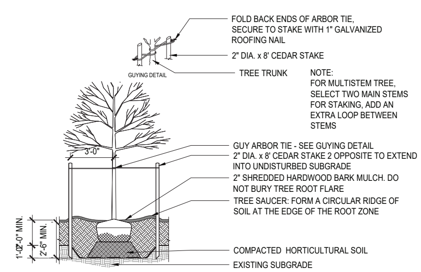
3. ALL PLANTS IN THE SAME PLANTING BED SHALL BE PLANTED AT THE SAME TIME. ANY PLANTS REMAINING UNPLANTED ON THE SITE FOR MORE THAN 24 HR. SHALL BE PROTECTED AND MAINTAINED INCLUDING BUT NOT LIMITED TO WATER AND SHADE. CONTRACTOR RESPONSIBLE FOR PROVIDING ADEQUATE WATER SUPPLY. ANY DAMAGED PLANTS SHALL BE REPLACED AS DIRECTED, AT THE CONTRACTOR'S EXPENSE.

4. THERE WILL BE NO SUBSTITUTIONS OF PLANT MATERIAL WITHOUT PRIOR WRITTEN APPROVAL BY THE LANDSCAPE ARCHITECT AND CONSTRUCTION MANAGER.

PLANTING SCHEDULE

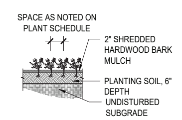
QTY	SYMB	SCIENTIFIC NAME	COMMON NAME	SIZE***	ROOT	SPACING	DEER RESISTANT	NATIVE	HABIT
CANOPY TREES									
3	PO	*Platanus occidentalis*	American Sycamore	5" - 6" cal	B & B	As per plan	Y	Y	Strong Central Leader, Limb up to 6' ht.
13	AR	*Acer rubrum*	Red Maple	5" - 6" cal	B & B	As per plan	Y	Y	Strong Central Leader, Limb up to 6' ht.
UNDERSTORY TREES									
2	AA	*Amelanchier arborea*	Common Serviceberry	7'-8' ht.	B & B	As Shown	Y	Y	Multi-stem, bird habitat,
GROUNDCOVER, PERENNIAL & FERN MIX**									
289	CS	*Carex stricta*	Tussock Sedge	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
820	CP	*Carex pennsylvanica*	Pennsylvania Sedge	1 quart	Cont.	14" O.C.	Y	Y	Native low-growing, fine textured Sedge
279	DP	*Dennstaedtia punctilobula*	Hay Scented Fern	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
279	OC	*Osmundastrum cinnamomea*	Cinnamon Fern	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
279	AC	*Asarum canadense*	Wild Ginger	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
GROUNDCOVER-NATIVE GRASS MIX									
1663	PV	*Panicum virgatum 'Cape Breeze'*	Dwarf Switch Grass	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast
1663	SH	*Sporobolus heterlepsis*	Northern Prairie Dropseed	1 quart	Cont.	14" O.C.	Y	Y	Native to northeast





2 TREE PLANTING

SCALE: 1/4" = 1'-0"



3 GROUNDCOVER PLANTING

SCALE: 1/4" = 1'-0"

Do Not Use Reserved For Plan Examiner's Stamps

Do Not Use Reserved For DOB BScan

Acting President & CEO
A. Nina Kubota

SCA School Construction Authority

Architecture & Engineering

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George D. Roussey, P.E., LEED A.P., Director, Technical Standards
Stacey Spann-Thom, Director, Operations Support

Consultants: Architect, Structural, MEP & FP, Civil & Geotech, Vertical Transportation, Food Service, Acoustical, Sustainability, Landscape Architect, Expeditor

NOTE: Drawing may be printed at reduced scale

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
1	3/30/21	60% CD SUBMISSION

Key Plan: Block # 6566 Lot # 1

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
Date: 03/30/2021

RESERVED FOR DOB NOW JOB#

NEW ADDITION

Drawing Title: PLANTING PLAN

Drawing No.: L101.00

Sheets in Contract Set: OF

Sheets in DOB Set: OF

3/26/2021 7:54:25 PM

Note that this form should be filled out and included in the GSG-60% submission if there is irrigation (atypical) such as vegetable garden.

NYC Green Schools Rating System

School Construction Authority

OUTDOOR WATER USE REDUCTION

CREDIT FORM

Credits W1.1P, W1.2R

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:
[Note: If project does not contain landscaping, do not submit form, because project earns 2 points automatically.]
If project does contain landscaping, designer to demonstrate outdoor water use reduction of 30% through plant species selection and irrigation system efficiency in WaterSense Water Budget Tool
Step 1) Follow link to EPA WaterSense Water Budget Tool: (https://www.epa.gov/watersense/water-budget-tool) and copy Step 1A and Step 1B fields from tab 1.
Step 2) Input Step 2A field from Tab 2 of the WaterSense Water Budget Tool, complete Table 1 and attach.
Step 3) Input results from PART 3 of the EPA WaterSense Water Budget Tool.
Step 4) If applicable, submit any additional reductions beyond 30%, which may be achieved using any combination of efficiency, alternative water sources, and smart scheduling technologies.

Step 1: Insert values from WaterSense Water Budget Tool PART 1 - Baseline & LWA (Tab 1)

Step 1A - Landscaped Area		SF
Step 1B - Average monthly reference evapotranspiration (ETo)		inches/month
OUTPUT - Monthly Baseline	0	gal/month (based on peak month)
OUTPUT Monthly Water Allowance for the Site	0	gal/month (based on peak month)

Step 2: Complete and insert values from WaterSense Water Budget Tool PART 2 - LWR (Tab 2)

Step 2A - Average Monthly Rainfall | | inches/month

Step 2B - Completed Table 1: Landscape Water Requirement in Part 2 - LWR (Tab 2) Y ☐ N ☐

Step 3: Complete and input results from WaterSense Water Budget Tool PART 3 - Results

Step 3A - LWA	0	gallons/month			
Step 3A - LWR		gallons/month			
Step 3B - Design landscape contains		SF of turfgrass*	This is	0%	of the landscaped area.

*This includes the area of any pools and/or water features which are designated by WaterSense to be counted as turfgrass.

Designed reduction from baseline | 0%

Step 4: Minimum Outdoor Water Use Reduction, Reduce Potable Water 50%-100%

Step 4A - Project implemented alternative water sources or smart scheduling technologies Y ☐ N ☐

Alternative water source strategy	Green roof	Size		SF
Alternative water source strategy		Size		SF
Alternative water source strategy		Size		SF
		Total	0	SF

Landscape Water Requirement (LWR)	0	gallons/month	-	square inches
Monthly rainfall collected	0.00	inches/month	-	cubic inches / month
	0	gallons per month collected		
	0%	reduction in potable water		

W2.1P/W2.2R – Indoor Water Use Reduction

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: 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) Insert Occupancy Info:
Insert number of D75 students with toilets in regular school year
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	160	48
Total number of staff	40	12
Number of D75 students in classrooms with toilets	0	0
Total students PK to K	76	23
Conventional Water Closet (male 1-12)	42	13
Conventional Urinal (male 1-12)	42	13
Conventional Water Closet (female 1-12)	42	13

Reference Table 1: Instructional Days	
Annual Instruction Days School is in Full Operation	180
Annual Instructional Days School is in Summer Operation	30

Note that CSD spaces are not considered D75 spaces

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	120	36	3.0	0.125	1	60	18
	Conventional Lavatory (Adult) (cycle)	3.0	0.25	1	30	9	3.0	0.125	1	15	5
	Shower (gpm, seconds)	0.1	2.50	1	10	10	0.1	1.80	1	7	7
	Hand Sink (cycle)	4.0	0.25	1	200	60	4.0	0.125	1	100	30
Flush Fixtures	Conventional Water Closet (male 1-12)	1.0	1.60	1	67	20	1.0	1.28	1	54	16
	Conventional Urinal (male 1-12)	2.0	1.00	1	84	25	2.0	0.125	1	11	3
	Conventional Water Closet (female 1-12)	3.0	1.60	1	202	60	3.0	1.28	1	161	48
	Conventional Water Closet (PK, K classrm w/ toilet)	3.0	1.60	1	365	109	3.0	1.28	1	292	88
	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	192	58	3.0	1.28	1	154	46
	BASE CASE TOTALS				1,270	388	DESIGN CASE TOTALS			853	261

Regular Operation + Summer Operation Summary

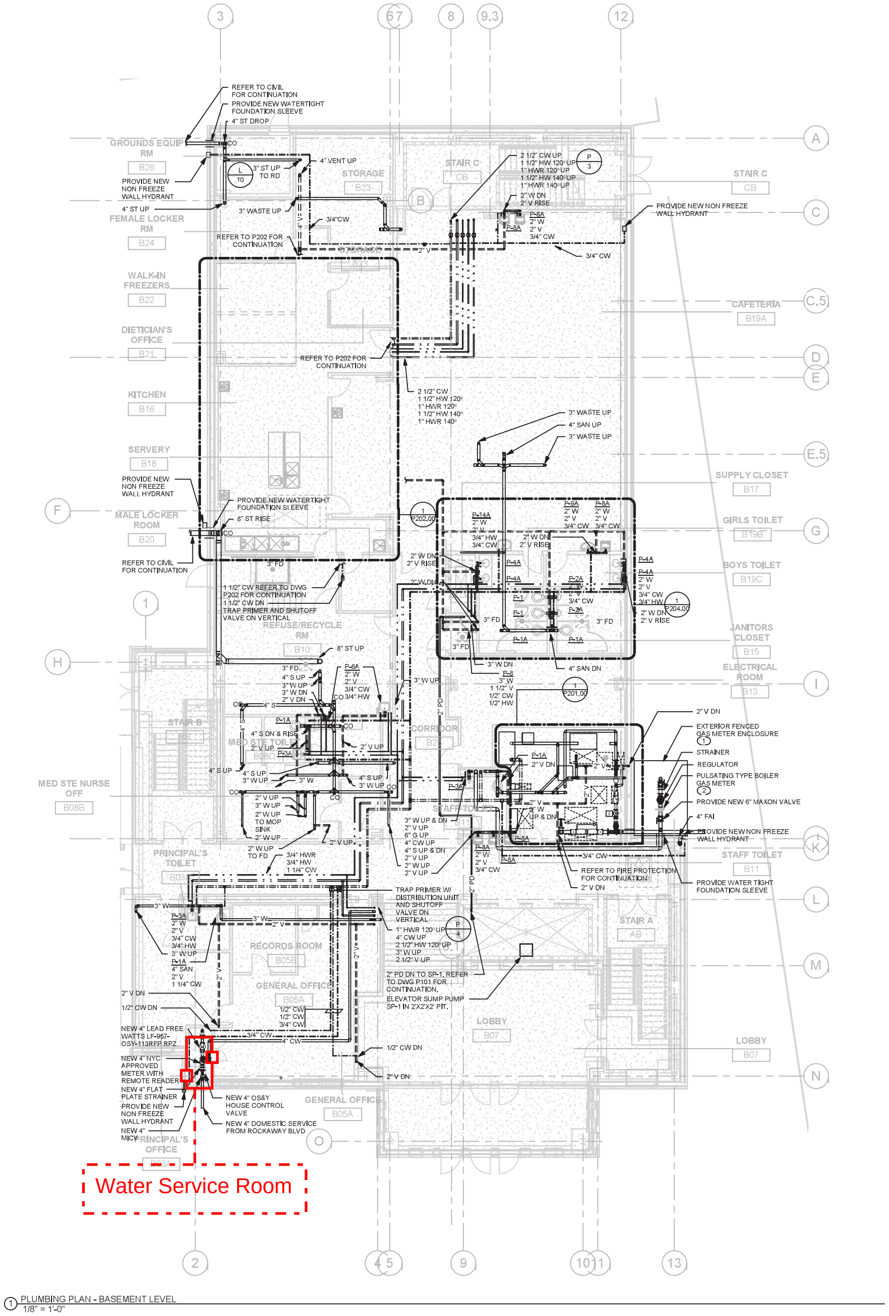
	Base Case	Design Case
Total "Regular Operation" + Summer Operation" Annual Volume	240,164	161,402
Total: Water Use Reduction for "Regular Operation" + "Summer Operation"		33%

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 Service 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".
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.

W3.1P – Building Level Water Metering

W3.2R – Enhanced Water Metering



GENERAL NOTES

1. REFER TO DRAWING P001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS

KEY NOTES

1. PROVIDE EXTERIOR FENCED GAS METER ENCLOSURE WITH ACCESS DOOR. REFER TO ARCH FOR DETAILS.
2. PROVIDE NEW GAS METER RIG COMPLETE PER UTILITY COMPANY'S REQUIREMENTS INCLUDING ALL PULSATING METERS, VALVES, STRAINERS, REGULATORS, VENTS AND DEVICES.

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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:

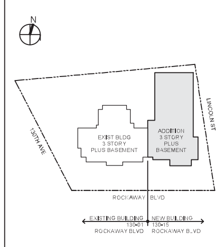
Sustainability Consultant:

Environmental Consultant to SCA:

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
	2/23/2021	30% DD SUBMISSION
	4/1/2021	60% CD SUBMISSION
	5/27/2021	100% 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 AND EXISTING BUILDING RENOVATION WORK

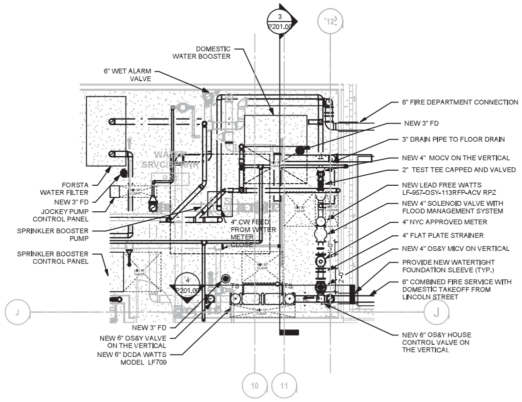
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
PLUMBING BASEMENT PLAN

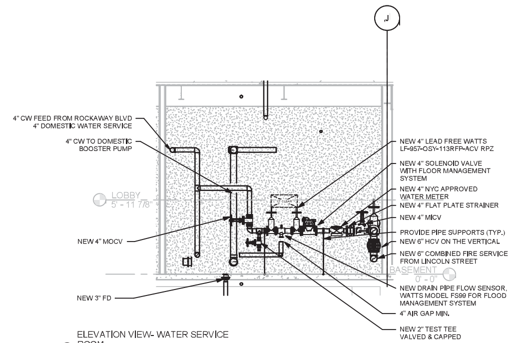
Drawing No.:
P102.00

Sheets in Contract Set: of XXX

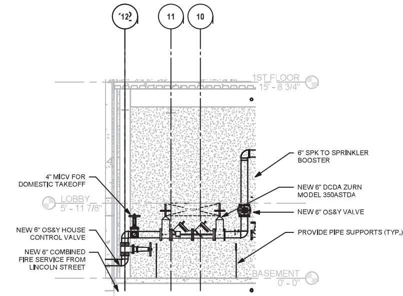
Sheets in DOB Set: of XXX



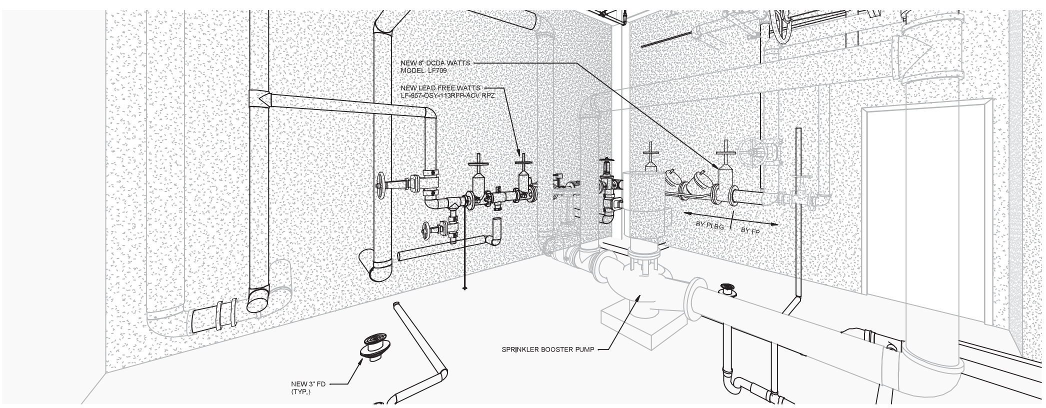
PLUMBING PLAN - BASEMENT LEVEL - WATER SERVICE ROOM PART PLAN
1
1/4" = 1'-0"



ELEVATION VIEW- WATER SERVICE ROOM
3
1/4" = 1'-0"



ELEVATION VIEW- 6" DCDA FOR 6" COMBINED FIRE SERVICE FROM LINCOLN STREET
4
1/4" = 1'-0"



PLUMBING-WATER SERVICE ROOM 3D VIEW
2

SCA NYC School Construction Authority

Architecture & Engineering
Dominick DeAngelis, AIA, Vice President
Aileen del Prado, P.E., LEED AP BD+C, Senior Director, Design Consultant Management
Maria 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
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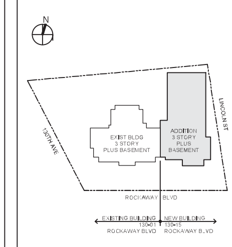

Block No. 11694
Lot No. 27

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 AND EXISTING BUILDING RENOVATION WORK
Address

Drawing Title
PLUMBING WATER SERVICE ROOM PART PLAN

Drawing No.
P201.00

Sheets in Contract Set: of XXX
Sheets in DOB Set: of XXX

E1.1P – FUNDAMENTAL COMMISSIONING & VERIFICATION

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

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2/23/21

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$\boxed{1}$

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DWG. NO.

ARCHITECTURAL

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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

* * *

HVAC CONSTRUCTION CHECKLIST (GENERAL)

GENERAL INSTRUCTIONS:

1. This Construction Checklist is to be used during the course of construction and is to be submitted every 3 months for review until final completion. The Checklist shall be formally submitted as part of the Green Schools Guide Construction phase submission within 30 days of the building obtaining Temporary Certificate of Occupancy (TCO). The work does not need to be 100% complete at this point but the checklist should be materially complete and reflect current installation progress at the time of submission. The status of items not completed but planned to be implemented should be indicated in Section 2.
2. Complete Section 1 as installation progresses.
3. Document status as indicated. **Where an item is not applicable to the project, mark as "NA".**
4. Complete Section 2 –as required to clarify reason for negative responses.

Contractor's Affidavit (*To be signed at formal submission*):

1. Items in the construction checklists have been verified only by parties having direct knowledge of the event. The status for all checklist items below reflects current installation progress.

____________________	____________	____________________	____________
Prime Trade Contractor	**Date**	**General Contractor**	**Date**

1. INSTALLATION

A	General Installation	Status
1	Equipment is covered with plastic and weather protected from the time of delivery to installation	Yes / No / N/A
2	Installed equipment matches the approved submittals and approved locations	Yes / No / NA
3	All equipment/components are in good condition and are securely installed	Yes / No / NA
4	All equipment is installed level	Yes / No / NA
5	Wiring diagrams laminated to the inside of control panel door for Boilers, Chillers and Air Handling Units	Yes / No / NA
6	Air-Cooled Chillers and AHUs are installed on structural steel dunnage with walkway and platform access ladders	Yes / No / NA
7	Installation complies with recommendations noted in manufacturer's Installation manual	Yes / No / NA
8	All fan equipment is mounted on vibration isolators where specified on contract documents	Yes / No / NA
9	Motorized dampers provided for exhaust fans over 300 CFM	Yes / No / NA
10	Smoke purge control integrates into fire alarm panel where specified on plans	Yes / No / NA
11	All pumps are supported on vibration isolators where specified in the contract documents	Yes / No / NA
12	Where applicable, pump and motor lubricated per specification requirements	Yes / No / NA
13	Required tube pull clearances provided at plate heat exchangers	Yes / No / NA
14	Opened and closed all isolation valves and confirmed proper operation	Yes / No / NA
15	Coupling guards in place for all mechanical equipment shafts	Yes / No / NA
16	All applicable bolts tightened down and checked	Yes / No / NA
17	All equipment coils are clean and coil fins are straight where applicable	Yes / No / NA
18	Electrical and Plumbing work associated with HVAC equipment / components is complete (e.g. power, disconnects, drain piping, cold water piping etc.)	Yes / No / NA
19	All equipment labels & nameplates affixed	Yes / No / NA

20	Motor safeties in place and operational for all HVAC equipment	Yes / No / NA
21	Manufacturer's startup procedures have been followed for all HVAC equipment	Yes / No / NA
22	All HVAC equipment has been started up	Yes / No / NA
23	No unusual noise or vibration for all operating HVAC equipment	Yes / No / NA
24	Contractor provided Post Cleaning report (per specification 15992)	Yes / No / NA
25	Testing and Balancing work is completed	Yes / No / NA
26	HVAC Controls work is completed	Yes / No / NA
B	**General Ductwork**	**Status**
1	Prior to installation, ductwork is covered with plastic on the exposed ends, kept dry and stored on pallets	Yes / No / NA
2	All ductwork is properly supported from the building structure	Yes / No / NA
3	Trapeze hangers are used for ductwork that will operate above 2" WC	Yes / No / NA
4	All ductwork with pressure class ratings are constructed to Seal Class A, Duct Leakage Class 6	Yes / No / NA
5	All joints, seams and connections securely fastened and sealed per SMACNA Standards to specified pressure class ratings	Yes / No / NA
6	Sound traps installed at specified locations	Yes / No / NA
7	Ductwork associated with shower, locker, and can washing rooms are fabricated from Aluminum	Yes / No / NA
8	Fire dampers, fire smoke dampers and smoke purge dampers are installed where specified on plans	Yes / No / NA
9	Fire dampers installed at duct penetrations through roof	Yes / No / NA
10	Fire damper installations comply with manufacturer's recommendation and installation guidelines (retaining angles, required clearances for expansion and breakaway connections, picture framing clearances, etc.)	Yes / No / NA
11	Fire smoke damper installations comply with manufacturer's recommendation and installation guidelines (retaining angles, required clearances for expansion and breakaway connections, picture framing clearances, etc.)	Yes / No / NA
12	Duct penetrations through fire rated partitions (as defined in the fire protection plans) are fire protected	Yes / No / NA
13	Firestopping installed at penetrations of fire rated construction	Yes / No / NA
14	Damper handles or actuators installed in proper direction and dampers do not bind or rattle	Yes / No / NA
15	All individual air inlets and outlets have balancing dampers (typically located right after branch duct connection). Any additional volume dampers shown or specified have been provided	Yes / No / NA
16	All connections of metal ductwork to equipment containing rotating machinery or equipment mounted on vibration isolators made with flexible connectors	Yes / No / NA
17	Motorized dampers stroke fully & easily with the operation of the damper actuator. Actuator span is calibrated	Yes / No / NA
18	All Transfer openings above ceiling are equipped with wire mesh screen	Yes / No / NA
19	Diffusers, registers, and grilles have hard ducted connections	Yes / No / NA
20	Kitchen Range Hood Exhaust Ductwork is insulated using fire-rated wrap or Calcium or Magnesium Silicate with minimum thickness of 2"	Yes / No / NA
21	Access/Cleanout doors are provided at all change in direction and at every floor penetration for Kitchen Hood Exhaust Duct	Yes / No / NA
22	Access doors for Kitchen hood exhaust ductwork is 20"x20" when duct width is 24" or larger	Yes / No / NA
23	No leaking apparent around fittings, joints, seams, or connections	Yes / No / NA
24	Performed specified leakage tests on ductwork per contract document and per SMACNA guidelines	Yes / No / NA
25	All supply and return ductwork are insulated and insulation is in accordance with specifications	Yes / No / NA
26	Ductwork labeled properly and as specified	Yes / No / NA
27	Ductwork installation is complete and is installed per contract documents and in accordance with SMACNA HVAC Duct Construction Standards	Yes / No / NA

C	**General Piping**	**Status**
1	Prior to installation, piping is capped, kept dry and stored on pallets	Yes / No / NA
2	Pipe materials match specifications	Yes / No / NA
3	Approved pipe hangers installed	Yes / No / NA
4	Piping supports are installed at the proper spacing intervals	Yes / No / NA
5	Piping supports are independent from equipment supports	Yes / No / NA
6	Riser clamps provided at each floor for riser piping	Yes / No / NA
7	Balancing valves are installed where shown on the Drawings	Yes / No / NA
8	Joints between different ferrous and non-ferrous metallic piping materials made with approved dielectric unions or brass converter fittings (per Sections MC 1203.1.1 and 1303.1.1)	Yes / No / NA
9	Screwed or flanged fittings provided where specified in specifications	Yes / No / NA
10	Union fittings provided at equipment connections	Yes / No / NA
11	Provided expansion loops, anchors, and/or guides as required and where specified	Yes / No / NA
12	No piping run through transformer vaults and other electrical or electronic equipment spaces and enclosures, unless unavoidable. Drip pan installed below pipe per specifications in areas where required	Yes / No / NA
13	No exposed piping run in stairwells or elevator equipment rooms except for systems serving those spaces	Yes / No / NA
14	Pressure relief valves installed where indicated on plans	Yes / No / NA
15	All piping strainers are clean	Yes / No / NA
16	Pipe sleeves are installed where piping passes through walls, floors, ceilings, and roofs.	Yes / No / NA
17	Proper flashing provided for pipe penetrations through roof	Yes / No / NA
18	Flow meters provided and installed with manufacturer recommended straight pipe runs for each hydronic system	Yes / No / NA
19	Installed thermometers and pressure gauges, where indicated on drawings or as specified	Yes / No / NA
20	Air vents and drain valves installed per design documents for all high and low point locations within piping systems	Yes / No / NA
21	Condensate piping installed with check valve and p-trap for split ac units	Yes / No / NA
22	Piping wells for all control sensors provided	Yes / No / NA
23	Expansion tanks are installed on the suction side of the system pumps. Expansion tank to be tied into system piping in close proximity to air separator and system fill line.	Yes / No / NA
24	Valves located more than 7' above finished floor in equipment room areas are provided with chain operated sheaves with chains extended to about 5' above floor	Yes / No / NA
25	Performed operational and hydrostatic tests in accordance with the specification section 15592	Yes / No / NA
26	No leaks apparent anywhere within the piping systems	Yes / No / NA
27	Pipe flushing completed per specification 15992 prior to adding glycol (for glycol system)	Yes / No / NA
28	Piping insulated per specifications	Yes / No / NA
29	Valves are insulated up to packing unit	Yes / No / NA
30	Insulation on all cold surfaces shall be applied with a continuous, unbroken vapor seal	Yes / No / NA
31	Inserts made from rigid calcium silicate pipe insulation are installed at all points of support	Yes / No / NA
32	Each pipe hanger supporting insulated piping is provided with a pipe covering protection shield	Yes / No / NA
33	Outdoor piping insulation is protected from weather by installation of aluminum or stainless-steel jacketing	Yes / No / NA
34	Chilled and Hot water loops exposed to outside ambient environment are provided with 30% propylene glycol solution	Yes / No / NA
35	Valves are properly tagged	Yes / No / NA

36	Valve tag chart is provided	Yes / No / NA
37	Water treatment of all hydronic systems performed as required per specifications	Yes / No / NA
38	Strainers installed where specified and are clean	Yes / No / NA
39	Pressure relief valves installed where indicated on plans	Yes / No / NA
		Yes / No / NA
D	**Boilers**	**Status**
1	Boilers installed and fully secured on 6" high concrete pad	Yes / No / NA
2	Combustion air intakes are installed per design & are unobstructed	Yes / No / NA
3	Flue gas exhaust vent supported/braced per manufacturer's installation and UL listing, with exhaust pipe pitching down towards boiler as required	Yes / No / NA
4	Sealed joints between sections of positive pressure vents in accordance with manufacturer's installation and UL listing	Yes / No / NA
5	For vent penetrations through roof, proper flashing provided, and terminates with a vent outlet in accordance with manufacturer's listing	Yes / No / NA
6	Condensate drainpipe provided at bottom of the each boiler vent and is connected to acid waste pH neutralization system for each boiler	Yes / No / NA
7	Smoke test of the boiler breeching, and stack was completed	Yes / No / NA
8	Pressure relief valves installed at boiler	Yes / No / NA
9	Relief valves piped to the nearest floor drain	Yes / No / NA
10	Shutoff valves provided for each boiler supply and return piping	Yes / No / NA
11	Automatic shutoff valve provided on each boiler return	Yes / No / NA
12	Glass thermometer gauge and pressure gauge installed on the boiler supply and return piping. All installed gauges can easily be read from a standing position on the floor	Yes / No / NA
13	Test ports provided for combustion efficiency test and subsequently sealed	Yes / No / NA
14	Confirmation that Gas supply is delivering the design pressure and volume	Yes / No / NA
15	Boilers have been flushed and cleaned on completion of installation, in accordance with manufacturer's written instructions and specification requirements	Yes / No / NA
16	Boiler labels & nameplates affixed	Yes / No / NA
17	Break glasses are installed outside all entrances to the boiler room & labeled accordingly "REMOTE CONTROL FOR BURNER"	Yes / No / NA
18	Framed Boiler/Burner interface drawing installed in boiler room	Yes / No / NA
19	Manufacturer's Startup report provided and includes combustion / thermal efficiency measurements	Yes / No / NA
20	Boiler lead/lag control capability provided	Yes / No / NA
21	No damage is visible to boiler jacket, refractory, or combustion chamber.	
22	Clearances have been provided and piping is flanged for easy removal and servicing.	
23	Heating circuit pipes have been connected to correct ports.	
24	Boiler, burner, and flue are clean and free of construction debris.	
25	Control devices are completely and correctly installed.	
26	Operation of gas train system: pressure reducing valve on gas train has been checked and the venting of the gas trains has been checked .	
27	Gas piping test was completed and signed-off by Special Inspector.	
28	Fluid level and high temperature interlocks are in place and operational.	
29	Check and record performance of factory provided boiler protection devices.	
30	Check and record performance of boiler fluid low level, cutout sensors and high temperature interlocks.	
E	**Chillers**	**Status**

1	Chillers are installed on vibration absorbing supports?	Yes / No / NA
2	Chillers installed in accordance with manufacturer's written installation instructions	Yes / No / NA
3	Factory provided refrigerant piping/equipment insulation is in good condition	Yes / No / NA
4	Installed Chillers are located to maintain manufacturer's recommended clearances	Yes / No / NA
5	Weather proofed disconnect provided within line of sight of Chiller modules	Yes / No / NA
6	Chiller OEM controls provided with LCD interface for each Chiller module	Yes / No / NA
7	Master Controller for Chiller modules provided	Yes / No / NA
8	Flow switch, flowmeter and ports for differential pressure sensor installed at Chiller.	Yes / No / NA
9	Isolation valves, thermometers and pressure gauges installed across Chiller	Yes / No / NA
10	Checked for correct oil level at oil sight glass on compressors	Yes / No / NA
11	No oil and/or refrigerant leaks present	Yes / No / NA
12	Chiller refrigerant charge confirmed appropriate	Yes / No / NA
13	Condenser fan motor operation is based on refrigerant head pressure control	Yes / No / NA
14	Compressors and condenser fans operate without unusual noise or vibration	Yes / No / NA
15	Manufacturer's Startup report provided	Yes / No / NA
F	**Air Handling Units**	**Status**
1	Factory test report provided	Yes / No / NA
2	All equipment and components are accessible	Yes / No / NA
3	Unit is installed level on dunnage and is properly supported	Yes / No / NA
4	Casing condition good: no dents, cleaned up, no debris	Yes / No / NA
5	Enthalpy Energy Recovery Wheels provided where specified	Yes / No / NA
6	Heat Wheels provided where specified	Yes / No / NA
7	Fan drives properly aligned and belts/direct-drive coupling properly adjusted and secure	Yes / No / NA
8	All fan blades move freely	Yes / No / NA
9	All fans rotate in the proper direction	Yes / No / NA
10	Fans are properly lubricated and grease fittings made accessible	Yes / No / NA
11	VFD provided for all fans	Yes / No / NA
12	Return and outdoor air filters installed to protect enthalpy and heat wheel	Yes / No / NA
13	Filters and support racks clean and tight fitting	Yes / No / NA
14	Piping arrangements to coils match approved details	Yes / No / NA
15	Condensate drain trapped and condensate piping routed to nearest roof drain	Yes / No / NA
16	Smoke dampers installed where specified on plans	Yes / No / NA
17	Smoke detectors installed where shown on plans	Yes / No / NA
18	Static pressure sensor locations matches approved submittal	Yes / No / NA
19	Outside air and exhaust air dampers close tightly when closed	Yes / No / NA
20	Outside air flow rates confirmed appropriate	Yes / No / NA
21	Access doors gasketed and close tightly	Yes / No / NA
22	Vibration isolation devices installed and operational	Yes / No / NA
23	Compressors installed where specified and crankcase heater operation is as expected	Yes / No / NA

G	Miscellaneous Equipment	Status
1	Floor mounted pumps are located on 4” concrete pad with inertia base and anchor bolts poured in concrete pad	Yes / No / NA
2	Check valve and balancing valve (discharge side), isolation valves, pressure gauges, strainer and suction diffuser (suction side) installed with each floor mounted pump.	Yes / No / NA
3	Pump rotation confirmed correct for all pumps	Yes / No / NA
4	VFDs provided for all HVAC pumps	Yes / No / NA
5	VFD lower frequency limit coordinated with balancer and pump & VFD manufacturer	Yes / No / NA
6	Heat exchanger frame securely mounted on a 4-inch concrete foundation pad	Yes / No / NA
7	Heat Exchangers provided with unions, shut-off valves, pressure gauge and thermometer on inlet and outlet for each circuit (hot side and cold side piping)	Yes / No / NA
8	For each heat exchanger, control valve is installed on primary return water circuit and pressure relief valve is installed on piping to heat exchanger	Yes / No / NA
9	The Mechanical Contractor provided Gas Leak Detection and Alarm Panel (Multi-Channel Gas Controller) in the Boiler Room, audio/visual alarms (Custodian's Alarm Panel) in the Custodian's Office, all sensors and control wiring for equipment, and all work completed	Yes / No / NA
10	Calibration for gas detection sensors confirmed correct	Yes / No / NA
11	Contractor submitted signed start-up affidavit signed by the factory authorized service representative indicating that all pre-start-up and start-up procedures were successfully completed for the Gas Leak Detection system	Yes / No / NA
12	For split ac units, refrigerant piping has been leak tested (test reports submitted) and subsequently piping has been evacuated and dehydrated in accordance with prevailing good refrigeration practices and contract documents	Yes / No / NA
13	For split ac units, correct refrigerant has been used with piping system charge confirmed appropriate. Additionally, weight in lbs. for each refrigerant system has been formally documented	Yes / No / NA
14	Outdoor Condensing Units are installed with vibration isolators	Yes / No / NA
15	For all fin tube radiators and convectors, lockable access doors are installed and provide proper access to heating elements, controls, valves and other fittings	Yes / No / NA
16	Shutoff valves on inlet and outlet, and balancing valve on outlet are installed for each hot water convector	Yes / No / NA
17	Shutoff valves on inlet and outlet, and balancing valve on outlet are installed for each fin tube radiator	Yes / No / NA
18	Piping hookup to Unit Heaters/Cabinet Unit Heaters is installed per construction documents - unless otherwise indicated, installed union, gate/ball valve and aquastat on supply-water connection and union, strainer, control valve, and calibrated balancing valve on return-water connection	Yes / No / NA
19	As specified on contract documents, sound traps are installed with VAV boxes or immediately downstream of VAV boxes	Yes / No / NA
20	Thermostat, Space temperature sensors, Humidistats and carbon dioxide sensors are installed at approved locations?	Yes / No / NA
21	Piping hookup to Air Curtains is installed per construction documents - unless otherwise indicated, installed union, gate/ball valve and aquastat on supply-water connection and union, strainer, control valve, and calibrated balancing valve on return-water connection	Yes / No / NA
22	Roof curb installed at the correct height above finished roof for relevant HVAC equipment	Yes / No / NA
23	Motorized / backdraft dampers associated with exhaust fans close tightly when fans are off	Yes / No / NA
24	Local disconnect provided for fan powered equipment	Yes / No / NA
25	Final filters installed and are clean	Yes / No / NA
26	Glycol feed units installed and are functional	Yes / No / NA

2. NEGATIVE RESPONSES (ATTACH SHEETS AS NECESSARY)

Item	Reason for negative response	Resolution

DOMESTIC HOT WATER SYSTEM /PLUMBING PUMPS CONSTRUCTION CHECKLIST

GENERAL INSTRUCTIONS:

1. This Construction Checklist is to be used during the course of construction and is to be submitted every 3 months for review until final completion. The Checklist shall be formally submitted as part of the Green Schools Guide Construction phase submission within 30 days of the building obtaining Temporary Certificate of Occupancy (TCO). The work does not need to be 100% complete at this point but the checklist should be materially complete and reflect current installation progress at the time of submission. The status of items not completed but planned to be implemented should be indicated in Section 2.
2. Complete Section 1 as installation progresses.
3. Document status as indicated. **Where an item is not applicable, mark as "NA".**
4. Complete Section 2 – as required to clarify reason for negative responses.

Contractor's Affidavit (*To be signed at formal submission*)**:**

1. Items in the construction checklists have been verified only by parties having direct knowledge of the event.
2. The status for all checklist items below reflects current installation progress.

______________________ ____________ ______________________ ____________

Prime Trade Contractor **Date** **General Contractor** **Date**

1. INSTALLATION

A	General	Status
1	All equipment/components are in good condition and are securely mounted	Yes / No / NA
2	Adequate service clearance provided for all equipment/components	Yes / No / NA
3	Installation complies with recommendations noted in manufacturer's Installation manual	Yes / No / NA
4	Concrete pad (typically 4") installed for Water Heater and floor mounted plumbing pumps	Yes / No / NA
5	HLW stamp provided for Water Heater	Yes / No / NA
6	Smoke testing of the heater's breeching and stack were completed	Yes / No / NA
7	Cold water connection to domestic water system protected by reduced pressure zone backflow preventer	Yes / No / NA
8	Overhead piping is not located above panelboards/switchboards or the electrical equipment is otherwise protected from dripping piping	Yes / No / NA
9	Check valve and balancing valve installed at the base of Domestic Hot Water risers.	Yes / No / NA
10	Master tempering mixing valve installed in same room as Water Heater.	Yes / No / NA
11	Sub-meter installed on the water line feeding the kitchen plumbing fixtures	Yes / No / NA
12	Kitchen Master Gas Control valve assembly is installed within a vented enclosure or cabinet	Yes / No / NA
13	All gas vents equipped with a utility approved weatherproof vent cap	Yes / No / NA
14	Piping hookup to Water Heater(s) comply with the design documents (and includes condensate piping/neutralizing system for condensing domestic hot water heaters, if applicable)	Yes / No / NA
15	Piping hookup to Booster Pumps comply with the design documents	Yes / No / NA
16	Piping hookup to Domestic Hot Water Recirculation Pump(s) complies with the design documents	Yes / No / NA
17	Equipment disconnects installed per approved plans	Yes / No / NA
18	Factory Authorized Rep confirmed appropriate VFD settings for each Booster pump	Yes / No / NA
19	Manufacturer's startup report for Water Heater provided and all operational deficiencies are resolved	Yes / No / NA
20	Factory Authorized Rep confirmed appropriate VFD settings for each Booster pump.	Yes / No / NA
21	All controls work complete (including aquastat controls for DHW recirculation pumps)	Yes / No / NA
22	Potable water disinfection procedures and reports completed per specifications	Yes / No / NA
23	No leaks apparent anywhere within the piping systems	Yes / No / NA

24	Valves tag chart submitted	Yes / No / NA
25	Plumbing work associated with all HVAC equipment is complete	Yes / No / NA
26	Compressors for water heater heat pumps operate as expected	Yes / No / NA
B	**General Piping**	**Status**
1	Horizontal piping is properly pitched so that it can drained at low points and hose bibs are provided at low points in piping	Yes / No / NA
2	Valves located more than 7' from floor in equipment room areas are provided with chain operated sheaves with chains extended to about 5' above floor	
3	Piping supports are installed at the proper spacing intervals	Yes / No / NA
4	Riser clamps provided at each floor for riser piping	Yes / No / NA
5	Sleeves installed for all pipes passing through floors, roofs, walls, partitions, furring, beams, and trenches	Yes / No / NA
6	Piping insulation is continuous and complies with the NYC Energy Conservation Code	Yes / No / NA
7	Inserts are installed at all points of support between the insulation and support apparatus	Yes / No / NA
8	For insulated piping, a galvanized metal shield is installed at all points of support between the hanger and piping	Yes / No / NA
9	Fire stopping material installed at all floor and fire-rated penetrations	Yes / No / NA
10	Type "L" and Type "K" copper tubing used for water distribution piping above ground and below ground, respectively	Yes / No / NA
11	Thermometers installed where specified on plans including: Kitchen hot water circulating line, building hot water circulating line, Tempered water (temperature downstream of 3-way mixing valve), and hot water storage tank temperature.	Yes / No / NA
12	Escutcheons installed on pipes passing through walls, partitions, and floors	Yes / No / NA
13	Proper access provided for all valves, flush valves, and any other equipment or accessories that may require access for maintenance or operation including valves located behind walls, partitions or concealed in drywall ceilings	Yes / No / NA
14	Valves are installed with sufficient clearances so that they can be fully opened & closed	Yes / No / NA
15	Piping is not supported from other pipes, ductwork, electric conduits or work of other trades	Yes / No / NA
16	Installed valves sizes match adjacent pipe size	Yes / No / NA
17	Gas and hot water piping/valves are identified with tags and labels	Yes / No / NA
18	Gas Cocks provided at each gas appliance	Yes / No / NA
19	Gas distribution piping (up to 0.5psig) tested at 3psig for at least 30 minutes	Yes / No / NA
20	Gas control, Vent and Relief Piping successfully tested at 3 PSIG for a minimum of 1 hour	Yes / No / NA
21	Gas piping is not painted prior to the gas piping being pressure tested	Yes / No / NA
22	Hot water system tested to 150psig for at least one hour	
23	Sink mixing valves installed where specified on plans and set for required temperature	Yes / No / NA
24	All pressure test reports provided	Yes / No / NA
25	No leaks apparent in system	Yes / No / NA

2. NEGATIVE RESPONSES (ATTACH SHEETS AS NECESSARY)

Item	Reason for negative response	Resolution

LIGHTING CONTROLS/ELECTRICAL DISTRIBUTION CONSTRUCTION CHECKLIST

GENERAL INSTRUCTIONS:

1. This Construction Checklist is to be used during the course of construction and is to be submitted every 3 months for review until final completion. The Checklist shall be formally submitted as part of the Green Schools Guide Construction phase submission within 30 days of the building obtaining Temporary Certificate of Occupancy (TCO). The work does not need to be 100% complete at this point but the checklist should be materially complete and reflect current installation progress at the time of submission. The status of items not completed but planned to be implemented should be indicated in Section 2.
2. Complete Section 1 as installation progresses.
3. Document status as indicated. **Where an item is not applicable, mark as "NA".**
4. Complete Section 2 – as required to clarify reason for negative responses.

Contractor's Affidavit *(To be signed at formal submission)*:

1. Items in the construction checklists have been verified only by parties having direct knowledge of the event.
2. The status for all checklist items below reflects current installation progress.

Prime Trade Contractor	Date	General Contractor	Date

1. INSTALLATION

A	General	Status
1	Approved plans located onsite and reflect installation.	Yes / No / NA
2	Light fixtures installed where shown on plans	Yes / No / NA
3	Occupant sensors (Auto On & Off) and Vacancy Sensors (Manual On/Auto Off) installed where indicated in drawings, such as storerooms	Yes / No / NA
4	Occupancy/Vacancy sensors are calibrated and provide optimum coverage for controlled areas (detects motion throughout the required detection zone but sensors do not activate from motion/normal sounds outside the detection zone and sensors are not distorted by sound emissions from HVAC ducted air outlets within detection zone)	Yes / No / NA
5	Time out feature for vacancy and occupancy sensors is programmed per specifications	Yes / No / NA
6	Daylight Harvesting sensors are installed for perimeter room with windows to maintain lighting level at required foot-candle (per contract documents)	Yes / No / NA
7	Photocell sensor calibrated for required lighting levels and room lighting responds appropriately for space lighting changes	Yes / No / NA
8	Time clock-controlled lighting is configured per contract documents with current time set and daylight savings times updated automatically at controller	Yes / No / NA
9	Time schedule for all time clocks have been coordinated with School	Yes / No / NA
10	All Lighting Control Panel relay schedules, control stations and input device schedules are accurately labeled	Yes / No / NA
11	Control of lighting circuits is available on the Lighting Control Panel display	Yes / No / NA
12	Lighting Control devices control the required lights and all interlocked lighting fixtures with a control zone maintain the required light level	Yes / No / NA
13	Lighting controls for Assembly Spaces is complete	Yes / No / NA
14	Local On/Off switches and dimmers are functional	Yes / No / NA
15	Exterior lighting is both time clock and photocell controlled	Yes / No / NA
16	Light fixtures and Control Devices are in good condition and are securely mounted	Yes / No / NA

17	Switched outlet (receptacles) are installed per contract documents and with specified receptacle faceplate color	Yes / No / NA
18	Adequate service clearance provided for all equipment components (including junction boxes)	Yes / No / NA
19	All electrical components are properly grounded and wiring is complete	Yes / No / NA
20	All electrical wire sizes are in accordance applicable codes and all electrical connectors/terminals are properly tightened	Yes / No / NA
21	All electrical panel directories are accurately labelled	Yes / No / NA
22	Installation complies with recommendations noted in manufacturer's Installation manual	Yes / No / NA
23	Battery-powered and/or line voltage Illuminated Emergency Lighting Fixtures are provided per the approved contract documents	Yes / No / NA
24	Remote control relays to control emergency lighting and battery-operated emergency lighting provided per contract documents	Yes / No / NA
25	Automatic Transfer Switch confirmed functional	Yes / No / NA
26	Power provided for all Plumbing, HVAC and HVAC Controls Equipment	Yes / No / NA
27	Megger testing completed for Panelboards/Switchboard (per the contract documents)	Yes / No / NA
28	Electrical work associated with HVAC and Plumbing equipment/components is complete	Yes / No / NA

2. NEGATIVE RESPONSES (ATTACH SHEETS AS NECESSARY)

Item	Reason for negative response	Resolution

PHOTOVOLTAIC SYSTEM

CONSTRUCTION CHECKLIST

GENERAL INSTRUCTIONS:

1. This Construction Checklist is to be used during the course of construction and is to be submitted every 3 months for review until final completion. The Checklist shall be formally submitted as part of the Green Schools Guide Construction phase submission within 30 days of the building obtaining Temporary Certificate of Occupancy (TCO). The work does not need to be 100% complete at this point but the checklist should be materially complete and reflect current installation progress at the time of submission. The status of items not completed but planned to be implemented should be indicated in Section 2.
2. Complete Section 1 as installation progresses.
3. Document status as indicated. **Where an item is not applicable, mark as "NA".**
4. Complete Section 2 – as required to clarify reason for negative responses.

Contractor's Affidavit *(To be signed at formal submission)*:

1. Items in the construction checklists have been verified only by parties having direct knowledge of the event.
2. The status for all checklist items below reflects current installation progress.

Prime Trade Contractor	Date	General Contractor	Date

1 INSTALLATION

A	General	Status
1	PV panel quantity and capacity conforms to design documents	Yes / No / NA
2	PV panel orientation and angle of installation conform to design documents	Yes / No / NA
3	PV wires are installed in accordance with design documents and latest NEC code	Yes / No / NA
4	PV module wiring is secured with metal clips as per NECA requirements	Yes / No / NA
5	Required ground fault protection provided	Yes / No / NA
6	PV equipment labeled in accordance with contract documents	Yes / No / NA
7	PV components are accessible	Yes / No / NA
8	Weatherproof enclosures provided for AC combiner boxes (NEMA 3R unless stated otherwise on contract documents)	Yes / No / NA
9	For venting purposes, pin holes provided at bottom of combiner boxes	Yes / No / NA
10	Combiner box conduit connections are not from the top	Yes / No / NA
11	Wire Integrity tests performed, passed and submitted to the SCA and Commissioning Authority	Yes / No / NA
12	PV Panels, inverters, and combiner boxes are securely anchored in accordance to design documents and manufacturer's recommendations	Yes / No / NA
13	Exterior PV equipment, wiring connections and all penetrations including building envelope are properly weatherproofed	Yes / No / NA
14	Required metering and monitoring equipment installed per plans	Yes / No / NA
15	Data acquisition system provided as per specifications	Yes / No / NA
16	Wire loss documentation from PV array to the combiner box and combiner box to the inverter provided by installing contractor	Yes / No / NA
B	**Load Side Tap**	**Status**
1	PV breakers are located in the opposite end from the input breaker inside the electrical panel	Yes / No / NA
2	Back fed fuse switch is identified and labeled	Yes / No / NA
3	Installation complies with the 120% rule (the sum of the main fuse switch rating (if installed) + the PV	Yes / No / NA

	breaker(s) rating cannot exceed 120% of the bus rating)	
C	**Line Side Tap**	**Status**
1	Main disconnect is “Service Rated”, identified, labeled and located within a maximum of 25 ft of the point of tapping but within the same room	Yes / No / NA
D	**Dedicated Service Switch (Integral to main switchboard)**	**Status**
1	Service rated fuse switch provided	Yes / No / NA
2	Short circuit rating of PV service switch is coordinated with other service switches within same switchboard (up to 100% of main service rating)	Yes / No / NA

2. NEGATIVE RESPONSES (ATTACH SHEETS AS NECESSARY)

Item	Reason for negative response	Resolution

E2.2 – ENHANCED REFRIGERANT MANAGEMENT

NYC Green Schools Rating System

SCA School Construction Authority

ENHANCED REFRIGERANT MANAGEMENT

CREDIT FORM

Credit E2.2

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 every refrigerant used on the project, enter description of HVAC&R equipment followed by its properties.
The weighted average will calculate automatically in the grey shaded cells. Reference equations are at the bottom of the form.

Table 1: Mechanical Cooling and Refrigeration Equipment

Description of HVAC&R equipment	N No. of Units	Q unit (tons)	GWPr	ODPr	Rc (lb/ton)	Life (yrs)	Lr (%)	Mr (%)	Q total (tons)	Tr (Lr x Life +Mr)	LCGWP (GWPr x Tr x Rc/Life)	LCODP x 10000	RAI = LCGWP+ LCODPx 100000	(LCGWP + LCODP x 100000) x Qtotal
Reciprocating and scroll compressor, reciprocating chiller	5	30	1,890	0.00	1.5	20	2%	10%	150	0.5	71	0	71	10,631
Unitary, split, packaged air-conditioner, package heat pump, DX Cooling/heating/ventilating un	1	3	1,890	0.00	3.46	15	2%	10%	3	0.4	174	0	174	523
Unitary, split, packaged air-conditioner, package heat pump, DX Cooling/heating/ventilating un	2	2	1,890	0.00	3.84	15	2%	10%	4	0.4	194	0	194	774
Unitary, split, packaged air-conditioner, package heat pump, DX Cooling/heating/ventilating un	1	1.5	1,890	0.00	3.46	15	2%	10%	2	0.4	174	0	174	262
Walk-In refrigerator and freezer	2	0.87	1,390	0.00	12	10	2%	10%	2	0.3	500	0	500	871
Walk-In refrigerator and freezer	2	0.95	1,390	0.00	14.3	10	2%	10%	2	0.3	596	0	596	1,133
Other Mechanical Cooling and Refrigeration Equipment														
									162				Subtotal =	14,194
													Weighted Average Atmospheric Impact [Σ (LCGWP + LCODP x 100,000) x Qunit] / Qtotal =	88

Ozone-depletion and global warming potentials of refrigerants (100-yr values)

Refrigerant		ODP	GWP
Chlorofluorocarbons	CFC-11	1.0	4,680
	CFC-12	1.0	10,720
	CFC-114	0.94	9,800
	CFC-500	0.605	7,900
	CFC-502	0.221	4,600
Hydrochlorofluorocarbons	HCFC-22	0.04	1,780
	HCFC-123	0.02	76
Hydrofluorocarbons	HFC-23	~0	12,240
	HFC-134a	~0	1,320
	HFC-245fa	~0	1,020
	HFC-404A	~0	3,900
	HFC-407C	~0	1,700
	HFC-410A	~0	1,890
	HFC-507A	~0	3,900
Natural Refrigerants	CO2	0	1.0
	Ammonia (NH3	0	0
	Propane	0	3

Reference Equipment Life

Terminal Equipment	Equipment Life
Window air-conditioner	10
Walk-In refrigerator and freezer	10
Unitary, split, packaged air-conditioner, package heat pump, DX Cooling/heating/ventilating unit	15
Reciprocating and scroll compressor, reciprocating chiller	20
Water-cooled packaged air-conditioner	**25**

Definitions

LCGWP: Lifecycle Direct Global Warming Potential (lbCFC11.Ton-Year) = [GWPr x (Lr x life + Mr) x Rc]/life

LCODP: Lifecycle Ozone Depletion Potential (lbCFC11.Ton-Year) = [ODPr x (Lr x life + Mr) x Rc]/life

GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lbCO2/lbr).

ODPr: Ozone Depletion Potential of Refrigerant (0 to .2lbCFC11/lbr).

Q unit: Cooling capacity of an individual HVAC or refrigeration unit in tons.

Rc: ACTUAL Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of mechanical-cooling capacity)

Life: Equipment Life (based on equipment type, 15 years unless otherwise demonstrated)

Lr: Refrigerant Leakage Rate (0.5% to 2%; default of 2% unless otherwise demonstrated)

Mr: End-of-life Refrigerant Loss

The matrix below is to assist in calculating the refrigerant impact using the following calculation:
LCGWP + LCODP x 100,000 is less than or equal to 100

Weighted average for multiple pieces of equipment:
[Σ (LCGWP + LCODP x 100,000) x Qunit] / Qtotal is less than or equal to 100

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

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

TABLE OF CONTENTS

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 ft^2 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

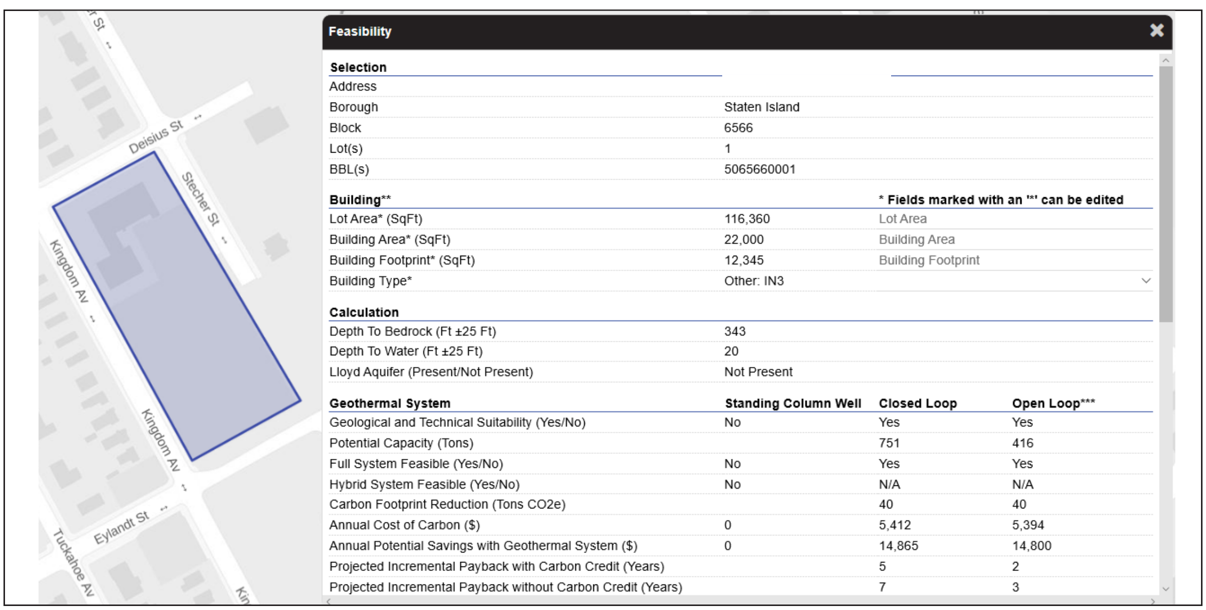
The costing for the heating and cooling system was found to be in line with the ranges noted in the SCA Geothermal System Feasibility Tool. It is believed that the costing for the boiler and chiller systems on this project will fall in the lower end of this range.

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 (ft^2)	45,837
No. of Floors	3
Lot Area (ft^2)	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 (ft^2/ton)	Cooling Load (tons)	Baseline Heating System Type	Heating Load (Btuh/ft^2)	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.

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

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 CO2 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

SCA School Construction Authority

GEOTHERMAL FEASIBILITY

CREDIT FORM

Credit E3.1R

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 ☐

Insert Updated Energy Model

(based on the latest CDs)

School Information	
School Name	
Address	
Building Type	
Number of Stories	
Submission	
Template Used	
Date	

Baseline Information	
LL32 Baseline	ASHRAE 90.1-2016 ECB
GSG Baseline	ASHRAE 90.1-2010 PRM
GSG Version	2019 Rating System
% Renovation	0%

Energy Modeling Information	
Drawing Set	
Modeling Software & version	0
Weather File	0.00
Window/Wall Ratio	#VALUE!
Total Modeled Square Feet (from LV-B)	0
Area of plenums/ dummy zones	0
Modeled Gross Building Area	0
Unconditioned Area	0
Conditioned SQFT	0
Proposed Unmet Load Hours	0
LL32 Baseline Unmet Load Hours	0
GSG Baseline Unmet Load Hours	

LL32 Results	
LL32 Regulated Electric Cost	0
LL32 Regulated Gas Cost	0
LL32 Unregulated Electic Cost	$ -
LL32 Unregulated Gas Cost	$ -
Proposed Regulated Electric Cost	0
Proposed Regulated Gas Cost	0
LL32 Baseline Regulated Cost	$ -
Proposed Regulated Cost	$ -
Regulated Cost Savings	
LL32 Baseline Total Cost	
Proposed Total Cost	
Total Cost Savings	
LL32 Baseline Site EUI	#DIV/0!
Proposed Site EUI	#DIV/0!
Site EUI Savings	
LL32 Source EUI	
Proposed Source EUI	
Source EUI Savings	
LL32 Compliant?	Compliant
Proposed Carbon (Ton CO2e)	
Proposed Carbon (Ton CO2e/ft2)	

GSG Results	
GSG Baseline Electric Cost	$ -
GSG Baseline Gas Cost	$ -
Proposed Electric Cost	$ -
Proposed Gas Cost	$ -
GSG Baseline Total Cost	$ -
Proposed Total Cost	
Total Cost Savings	
GSG Baseline Site EUI	0.0
Proposed Site EUI	#DIV/0!
Site EUI Savings	
GSG Source EUI	
Proposed Source EUI	
Source EUI Savings	
GSG Compliant?	Compliant
Optimize Energy Points	

Utility Rates	
Average Electricity Cost ($/kWh)	
Average Gas Cost ($/Therm)	

Energy Efficiency Measure Summary

Note: Only required for measures that are **NOT** included in proposed design

Have additional measures been included for evaluation that are not part of the proposed design?		

No additional measures modeled. This form does not need to be completed

		Electricity		Natural Gas		Total Cost	Source Energy Use	
Measure #	Description of Measure	kWh	Cost	Therms	Cost		Total (kBtu)	EUI (kBtu/ft2)
0	Proposed Design	0	0	0	0	0	0.0	
1						0	0	
2						0	0	
3						0	0	
4						0	0	
5						0	0	
6						0	0	
7						0	0	
8						0	0	
9						0	0	
10						0	0	

5	Energy Modeling Usage Summary							
	LL32 Baseline ASHRAE 90.1-2016 ECB		**GSG Baseline ASHRAE 90.1-2010 PRM**		**Proposed Model**			
	Electric Usage (kwh)	Gas/Steam Usage (Therm)	Electric Usage (kwh)	Gas/Steam Usage (Therm)	Electric Usage (kwh)	Gas/Steam Usage (Therm)	Energy Savings Per End Use (%) vs LL32	Energy Savings Per End Use (%) vs GSG
Interior Lighting	-	-	-	-	-	-	0%	0%
Misc. Equip.	-	-	-	-	-	-	0%	0%
Space Heat	-	-	-	-	-	-	0%	0%
Space Cool	-	-	-	-	-	-	0%	0%
Heat Rejection	-	-	-	-	-	-	0%	0%
Pumps & Misc	-	-	-	-	-	-	0%	0%
Vent Fans	-	-	-	-	-	-	0%	0%
Dom. Hot Water	-	-	-	-	-	-	0%	0%
Exterior Lighting	-	-	-	-	-	-	0%	0%
Exterior Misc.	-	-	-	-	-	-	0%	0%
TOTAL	0	0		0		0	#VALUE!	0%

5a	Energy Related Design Features

List energy related features that are included in the design and contribute to the energy savings in Section 5.
Include any ECM's that are not part of the SCA standard design requirements

6b	Vertical Fenestration												
Model Input Parameter	Item	LL32 Baseline ASHRAE 90.1-2016 ECB				GSG Baseline ASHRAE 90.1-2010 PRM				Proposed Case			
		Description (from ASHRAE)	U-factor	SHGC	VLT	Description (from ASHRAE)	U-factor	SHGC	VLT	Description (from design)	U-factor	SHGC	VLT
Vertical	1												
Vertical	2												
Vertical	3												
Vertical	4												
Vertical	5												
Vertical	6												
Vertical	7												
Skylight	1												
Skylight	2												
Shading Devices		☐No shading projections, manual shading devices, or self-shading have been modeled.				☐No shading projections, manual shading devices, or self-shading have been modeled.				List any permanent or auto-controlled shading devices:			
		☐Any shading by adjacent structures has been modeled identically to the proposed case.				☐Any shading by adjacent structures has been modeled identically to the proposed case.							

	Space-Conditioning Category	Item #	LL32 Baseline ASHRAE 90.1-2016 ECB		GSG Baseline ASHRAE 90.1-2010 PRM		Proposed Case		
Model Input Parameter			Description	U-factor/ C-factor/ F-factor	Description	U-factor/ C-factor/ F-factor	Description	Assembly U-factor/ C-factor/ F-factor	% of above-grade wall
Roof Construction		1							
			Solar Reflectance	SR =	Solar Reflectance	SR =	Solar Reflectance		
		2							
			Solar Reflectance	SR =	Solar Reflectance	SR =	Solar Reflectance		
Above-Grade Exterior Wall Construction		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
Below-Grade Exterior Wall Construction		1							
		2							
Exposed Floor Construction		1							
Slab-On-Grade Floors		1							
Opaque Doors		1							
		2							

Space Type (Table 9.6.1) or Building Area Type (Table 9.5.1)	Total Area Space/Blg Type (ft^2)	LL32 Baseline ASHRAE 90.1-2016 ECB			GSG Baseline ASHRAE 90.1-2010 PRM			Proposed Case		
		Auto. Controls (Yes/No)	Daylight Ctrls (Yes/No)	Modeled LPD (W/ft2)	Auto. Controls (Yes/No)	Daylight Ctrls (Yes/No)	Modeled LPD (W/ft2)	Auto. Controls (Yes/No)	Daylight Ctrls (Yes/No)	Modeled LPD (W/ft2)
			No							
Total										

Exterior Lighting Power			
	LL32 Baseline (Watts)	GSG Baseline (Watts)	Proposed Design (Watts)
Tradable Lighting Power		0.00	
Non-Tradable Lighting Power		0.00	
Base Site Allowance		0.00	
Total Lighting Power	0.00	0.00	0.00

Process/Receptacle Equipment				
Space Type (or Equipment Type)	Space Area (or # Equip.)	Proposed Design Equipment Power Density (W/SF)	LL32 Baseline Design Equipment Power Density (W/SF)	GSG Baseline Design Equipment Power Density (W/SF)
	SQFT	W/SF	W/SF	
Elevators				
Comm. Kitchen Equip				
TOTAL				

Lighting Zone	
0	Base Site Allowance (watts)

	Area Type	Area Parameters			Length or Area (FT or SQFT)	Proposed Watts	GSG Baseline Watts	Unit Allowances	
Tradable Surfaces	Parking Areas	Total area of uncovered parking and drive areas (sq.ft):				-	-	0	W/SF
	Building Grounds	Length of walkways less than 10' wide				-	-	0	W/SF
		Area of walkways greater than 10' wide				-	-	0	W/SF
		Plaza areas (sqft)				-	-	0	W/SF
		Special feature areas (sqft)				-	-	0	W/SF
		Area of stairways (sqft)				-	-	0	W/SF
		Area of pedestrian tunnels (sqft)				-	-	0	W/SF
		Area of landscaping (sq.ft):				-	-	0	W/SF
	Building Entrances & Exits	Total door width of primary entrances (ft):				-	-	0	W/FT
		Total door width of other entrances & exits (ft):				-	-	0	W/FT
		Area of canopies at entrances or exits (sq.ft):				-	-	0	W/SF
	Sales canopies	Area of canopies over sales functions (sq.ft):				-	-	0	W/SF
	Outdoor sales areas	Area of sales functions (sq.ft):				-	-	0	W/SF
		Total length of street frontage for vehicle sales (ft):				-	-	0	W/FT
Non Tradable Surfaces	Building façades	Area of façade #1 (sqft)		Length of façade #1 (ft)		-		2.50	W/FT
		Area of façade #2 (sqft)		Length of façade #2 (ft)		-		2.50	W/FT
		Area of façade #3 (sqft)		Length of façade #3 (ft)		-		2.50	W/FT
		Area of façade #4 (sqft)		Length of façade #4 (ft)		-		2.50	W/FT
	ATMs	# of Locations:		Total # of ATMs:		-	-	Allowance = 270W per location plus 90W per additional ATM per location.	
	Guarded facility entrances	Area of uncovered entrances and gatehouse inspection areas at guarded facilities (sq.ft):				-	-	0.00	W/SF
	Emergency Vehicle Loading Area	Area of uncovered loading areas for emergency service vehicles (sq.ft):				-	-	0.00	W/SF
	Drive-throughs	# of drive-throughs:				-	-	0.00	Watts/drive thru
	Parking near 24-hour retail entrances (main only)	# of main entrances:				-	-	0.00	Watts/entrance

Air-Side HVAC Systems						
	HVAC System / Group LL32 Baseline ASHRAE 90.1-2016 ECB		HVAC System / Group GSG Baseline ASHRAE 90.1-2010 PRM		HVAC System / Group (PROPOSED DESIGN)	
	Description	Units	Description	Units	Description	Units
System Type						
System Designation(s)						
# of Similar Systems						
Total Cooling Capacity		kBtu/h		kBtu/h		kBtu/h
*Table 6.8.1 Unitary Cooling Capacity Range		kBtu/h		kBtu/h		kBtu/h
*Unitary Cooling Eff. (EER or SEER)		EER		EER		EER
*Unitary Cooling Part-load Eff. (if applicable)		IEER		IEER		IEER
Total Heating Capacity		kBtu/h		kBtu/h		kBtu/h
*Table 6.8.1 Unitary Heating Capacity Range		kBtu/h		kBtu/h		kBtu/h
*Unitary Heating Efficiency		COP		COP		COP
*Fan Control						
Supply Airflow		cfm		cfm		cfm
Outdoor Airflow		cfm		cfm		cfm
*Demand Control Ventilation						
*Economizer High-Limit Shutoff (°F)						
Exhaust Air Energy Recovery Systems						
*Exhaust Air Energy Recovery Effectiveness						
Supply Fan Power		kW		kW		kW
Return/Relief Fan Power		kW		kW		kW
Exhaust Fan Power		kW		kW		kW
System Fan Power		kW		kW		kW
Allowed Fan Power:		kW		kW		kW
Pressure Drop Adjustments	cfm	in w.c.	cfm	in w.c.		
Fully Ducted Return		0.5		0.5		
Filters: MERV 13-15		0.9		0.9		
Heat Recovery Device		0.6		0.6	Based on 50% efficiency for 1 stream. Enter cfm for supply + exhaust through ERV	
Sound Attenuation Section		0.15		0.15		
Other						
Other						
Equipment Included (per Mechanical Schedules)						

Hot Water or Steam						
Model Input Parameter	LL32 Baseline ASHRAE 90.1-2016 ECB		GSG Baseline ASHRAE 90.1-2010 PRM		HVAC System / Group (PROPOSED DESIGN)	
	Description	Units	Description	Units	Description	Units
Number and Type of Boilers						
Total Boiler Capacity						
Boiler Efficiency						
Hot Water or Steam (HHW) Supply Temp		°F		°F		°F
HHW ΔT		°F		°F		°F
HHW Temp Reset Parameters						
HHW Loop Configuration						
Number of Primary HHW Pumps				#		#
Primary HHW Pump Power						
Primary HHW Pump Flow		gpm		gpm		gpm
Primary HHW Pump Control						
Number of Secondary HHW Pumps		#		#		#
Secondary HHW Pump Power						
Secondary HHW Pump Flow		gpm		gpm		gpm
Secondary HHW Pump Control						
Other (describe)						
Other (describe)						
Other (describe)						
Other (describe)						

Chilled Water				
Model Input Parameter	GSG Baseline ASHRAE 90.1-2010 PRM		HVAC System / Group (PROPOSED DESIGN)	
	Description	Units	Description	Units
# and Type of Chillers (and capacity of chiller if more than 1 type or size)	0- Building area < 150,000		0	
Total Chiller Capacity			0	0
Chiller Efficiency - Full Load			0	0
Chiller Efficiency - Part Load			0	0
Chilled Water (CHW) Supply Temp		°F	0	°F
CHW ΔT		°F	0	°F
CHW Supply Temp Reset Parameters			0	
CHW Loop Configuration			0	
Number of Primary CHW Pumps		#	0	#
Primary CHW Pump Power			0	0
Primary CHW Pump Flow		gpm	0	gpm
Primary CHW Pump Control			0	
Number of Secondary CHW Pumps		#	0	#
Secondary CHW Pump Power			0	0
Secondary CHW Pump Flow		gpm	0	gpm
Secondary CHW Pump Control			0	
Water-Side Economizer				
Water-Side Energy Recovery				
Number of Cooling Towers/Fluid Coolers				
Cooling Tower Fan Power				
Cooling Tower Fan Control				
Condenser Water (CW) Leaving Temp		°F		
CW ΔT		°F		
CW Loop Temp Reset Parameters				
Number of CW Pumps		#		
CW Pump Power				
CW Pump Flow		gpm		
CW Pump Control				
Other (describe)				
Other (describe)				
Other (describe)				
Other (describe)				

eQuest Model Review Checklist- Output Report Verification

eQuest Model Review Checklist

General information	Response
Does the project area include a kitchen?	N/A
Verify the kitchen type (full gas, full electric, or warming) been modeled per the proposed design and the kitchen loads reflect the number of students in the POR.	N/A
Verify the occupancy and ventilation requirements in the classrooms been updated to match the POR.	N/A
Is the net modeled project area within 1% of the design area?	Yes

Describe any changes between this submission and the previous submission:
Describe deviations from the SCA Standard Details (Including SCA approved ECMs)

Automatic Checks	Explanation, if required
The "Ext Usage" EFLH is more than 4,500 per the report design value. Exterior lighting is only to be run during dark hours, even worst cases should not exceed this value. Please correct or provide an explanation.	
The sum of the hours above cooling throttling range and heating throttling is above 300. Please correct.	
The total amount of hours the design is out of range (heating + cooling) differs from the GSG baseline by more than 50 hours. Please correct or provide an explanation.	
The calculated lighting EFLH is -1 hrs. Between 1,600 and 2,500 is expected using the template schedules. Please correct or provide explanation.	
The Misc Equipment is -100.0% of the total electricity. It is expected to be between 20-35%. Please correct or provide an explanation.	
The Misc Equipment is not the same in baseline and proposed designs. Please correct or provide an explanation.	
The Domestic Hot Water is -100.0% of the total heating fuel. It is expected to be less than 10% for projects without kitchens and 10-20% for projects with kitchens. Please correct or provide an explanation.	
The proposed Space Cooling is -100.0% of the total electricity. It is typically less than 30%. Please correct or provide an explanation	
The proposed Vent Fans is -100.0% of the total electricity. It is typically less than 30%. Please correct or provide an explanation.	

The GSG baseline does not show Zero electric use for heating. Electric heating should only happen under special circumstances. Please correct or provide an explanation.	

eQuest Model Review Checklist- Output Report Verification

BEPU report information	Yes/No	Explanation, if required	Reference Number
Is the "Weather file" consistent with the building location.	Yes		1
Is "Task Lighting" the same between baselines and proposed cases? If no, fix or provide supporting documentation.	Yes		3
Is the split between electricity and natural gas "Space Heating" consistent with the design and report documentation?	Yes		6
Is the "Pumps and Aux" EFLH consistent with the design? i.e. total pump EFLH should be roughly equal to the sum of respective plant EFLH for plants with pumps.	Yes		9
Is the split between electricity and natural gas "Domest Hot Wtr" consistent with the DHW system design?	Yes		11
Is “Percent of hours any plant load not satisfied” 0%? If no, fix or provide supporting documentation.	Yes		14
Is "Heat Rejection" zero ? If no, provide an explanation. Heat rejection should only be more than zero for water-cooled units (GSG Baseline > 150,000 ft2 and designs that deviate from the standard)	Yes		14
ES-D report information	**Yes/No**	**Explanation, if required**	**Reference Number**
Do the utility costs match the values in the report?	Yes		1
LV-B report information	**Yes/No**	**Explanation, if required**	**Reference Number**
Are the lighting power densities consistent with the report/photometric drawing/code requirements? Have lighting schedules been assigned that reflect mandatory controls (template defaults should be sufficient)?	Yes		1
Are the equipment power densities consistent with the input summary?	Yes		2

LV-D report information	Yes/No	Explanation, if required	Reference Number
Is the "Window Area" divided by the "Window+Wall Area" for the "All Walls" line consistent with the report window to wall ratio?	Yes		1
Is the roof area consistent with the footprint of the building?	Yes		2
Select a few representative wall definitions, are their U-values consistent with report values? Note: The LV-D and LV-I reports calculations are not consistent with the protocol established by ASHRAE 90.1 Appendix A. The interior air film coefficient default does not account for the orientation of the construction. The LV-I U-value calculation does not consider the exterior air film, and the LV-D U-value calculation uses a different value than specified by ASHRAE 90.1 Appendix A. During the simulation, eQuest calculates the exterior air film hourly based on the wind speed from the weather file.	Yes		3
Select a few representative window definitions, are their U-values consistent with report values? Note: The window U-values include an exterior film with R-value = 0.3. NFRC uses 0.17 to calculate the U-factor. The U-value from the LV-D report will be 3-5% lower than reported value.	Yes		4

LV-H report information	Yes/No	Explanation, if required	Reference Number
Is the weighted average U-value consistent with the report values for frame and glass U-values?	Yes		1
Is the "Glass Shading Coeff" and "Glass Visible Trans" consistent with the report and design values?	Yes		2
Is a "setback" modeled? If yes, is it consistent with the design? No setback should be modeled in the baseline condition for new construction projects.	Yes		3

LV-I report information	Yes/No	Explanation, if required	Reference Number
Are U-Values within the acceptable range of the reported values? Note: Compare U-values reported in the LV-D report to those in the LV-I report. The LV-I report values will be higher, with variation depending on the thermal properties of the wall. LV-I values may vary from LV-D report as follows LV-D U-value - LV-I Deviation <0.07 - <5% higher 0.07 - 0.13 - 5-10% higher 0.13 - 0.17 - 10-15% higher 0.17 - 0.20 - 15-20% higher	Yes		1
Are "Delayed" surface types used for exterior wall and roof construction definitions? If no, explain where building massing is being accounted for in the model.	Yes		2
Are the "Number of Response Factors" consistent with report mass vs. framed construction?	Yes		3

SV-A report information	Yes/No	Explanation, if required	Reference Number
Has an SV-A report been provided for all systems referenced in the report?	Yes		NA
Is there 1-1 correspondence in the number of systems between the LL32 baseline and proposed design?	Yes		NA
Is there one system per floor for the GSG baseline, with the exception of the public assembly spaces and 24hr data rooms?	Yes		NA
Are "Capacity (CFM)" and "Power Demand" consistent with the report?	Yes		1
Is the "Outside Air Ratio" consistent with the ratio calculated using the report values?	Yes		2
Is the "Outside Air Ratio" lower than the "Minimum Flow"? If no, correct this. Note: eQuest has a known bug where the software will not reset minimum flow up to the outside air ratio.	Yes		3
Are there "Baseboards" defined in the Proposed system? Is this consistent with the report? No baseboards should be defined in the baseline systems.	Yes		4

PV-A report information	Yes/No	Explanation, if required	Reference Number
Is the "rated capacity" of proposed equiment consistent with the report and design values?	Yes		1
Does pump "Head" match between proposed and LL32 baseline?	Yes		2
Calculate the GSG baseline "Power"/"Flow" for secondary and primary pumps. Does this value add up to 19 W/gpm for heating, 22 W/gpm for cooling, and 19 W/gpm for the condenser loop? Chilled and condenser water loops should be present in schools >150,000 ft2 only.	Yes		3
Are "Capacity Control" values consistent with the report? Note: If a loop is served by more than 1 pump, the variable speed pumps will be reported as "VFD & STAGED"	Yes		4

PS-E report information	Yes/No	Explanation, if required	Reference Number
Do "Task Lighting", "Misc Equip", "Domest Hot Wtr", and "Ext Usage" all have the same Max kW for all months? If not, is this explained?	Yes		2
If daylighting is specified, does "lights" Max kW have a minimum in the summer and maximum in the winter? Note: if daylighting is claimed but not modeled the lighting use will only be determined by the schedule and the peak will not vary. The peak vaires becaue of the change in solar angle from summer to winter. The use varies also because the number of hours of daylight changes as well. When daylighting is modeled, the EFLH will not match the schedule.	Yes		3
Is "Space Heating" zero for June to Sept? If not, is it explained in the report? Is there reheat specified?	Yes		4
Is "space cooling" minimal in the winter? Are these values consistent with the data room equipment sizes? Note: peaks in winter should be equal to the power input of data or EMR dedicated units.	Yes		5

Insert Modeling Output Reports

ASHRAE 90.1 APPENDIX G ENERGY MODEL FOR GSG BASELINE

Insert Modeling Output Reports

ASHRAE 90.1 ENERGY MODEL

FOR LL32 BASELINE

Insert Modeling Output Reports
PROPOSED DESIGN

E3.3R – HVAC SYSTEM SIZING, AVOID OVERSIZING

HVAC Load Analysis

for

Prepared By:

Building Summary Loads

Building peaks in August at 3pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	2,888	4,845	1.84	0	556	556	0.06
Wall	12,552	47,167	17.94	0	7,309	7,309	0.81
Glass	5,537	167,178	63.57	0	268,952	268,952	29.63
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		219,189	83.35	0	276,817	276,817	30.50
Lighting	23,011	0	0.00	0	86,369	86,369	9.52
Equipment	16,437	0	0.00	0	61,692	61,692	6.80
Pool Latent	0	0	0.00	0	0	0	0.00
People	883	0	0.00	194,260	242,825	437,085	48.16
Partition	342	2,270	0.86	0	3,071	3,071	0.34
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	4,176	4,176	0.46
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	27,682	10.53	0	30,679	30,679	3.38
Return Duct	0	13,841	5.26	0	7,670	7,670	0.85
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		262,983	100.00	194,260	713,300	907,560	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Room Loads	221,459	84.21	194,260	670,775	865,035	95.31
Plenum Loads	0	0.00	0	0	0	0.00
Fan/Duct/Misc Loads	41,524	15.79	0	42,525	42,525	4.69
Building Totals	262,983	100.00	194,260	713,300	907,560	100.00

Check Figures

Total Building Supply Air (based on a 23° TD):	28,049 CFM
Total Building Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	32,873 Sq.ft
Supply Air Per Unit Area:	0.8533 CFM/Sq.ft
Area Per Cooling Capacity:	434.7 Sq.ft/Ton

Building Summary Loads (cont'd)

Check Figures

Cooling Capacity Per Area:	0.0023 Tons/Sq.ft
Heating Capacity Per Area:	8.00 Btuh/Sq.ft
Total Heating Required With Outside Air:	262,983 Btuh
Total Cooling Required With Outside Air:	75.63 Tons

Air Handler #1 - AHU-CR1 (South) - Summary Loads

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
10	300 Corridor South	826	2,094	8,445	0	None	None
	10am August	0	122	353	0	0	0
		8,260	0.15	0.43	0	0	0
11	344 4th	684	5,688	19,789	7,480	None	None
	8am August	34	331	828	0	0	0
		6,840	0.48	1.21	0	0	0
12	346 5th	676	4,680	18,408	7,480	None	None
	8am August	34	272	770	0	0	0
		6,760	0.40	1.14	0	0	0
13	348 5th	676	6,550	21,579	7,480	None	None
	8am August	34	381	902	0	0	0
		6,760	0.56	1.33	0	0	0
14	349 4th	766	5,709	26,649	8,360	None	None
	4pm August	38	332	1,114	0	0	0
		7,660	0.43	1.45	0	0	0
15	353 5th	745	5,709	26,555	8,360	None	None
	4pm August	38	332	1,110	0	0	0
		7,450	0.45	1.49	0	0	0
16	355 CSD SP ED	468	4,340	16,916	5,500	None	None
	4pm August	25	253	707	0	0	0
		4,680	0.54	1.51	0	0	0
23	200 Corridor South	824	2,082	8,434	0	None	None
	10am August	0	121	353	0	0	0
		8,240	0.15	0.43	0	0	0
24	248 Kinder	917	6,892	21,600	6,600	None	None
	8am August	30	401	903	0	0	0
		9,170	0.44	0.98	0	0	0
25	250 1st	691	6,511	22,468	8,140	None	None
	8am August	37	379	940	0	0	0
		6,910	0.55	1.36	0	0	0
26	243 Kinder	907	8,885	32,980	6,600	None	None
	4pm August	30	517	1,379	0	0	0
		9,070	0.57	1.52	0	0	0
27	247 1st	677	4,594	23,056	7,920	None	None
	4pm August	36	267	964	0	0	0
		6,770	0.39	1.42	0	0	0

Air Handler #1 - AHU-CR1 (South) - Summary Loads (cont'd)

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
28	249 CSP SP ED	455	4,280	16,844	5,500	None	None
	4pm August	25	249	704	0	0	0
		4,550	0.55	1.55	0	0	0
43	100 Corridor South	1,029	0	4,635	0	None	None
	12am August	0	0	194	0	0	0
		10,290	0.00	0.19	0	0	0
44	146 Pre-K	895	6,909	21,502	6,600	None	None
	8am August	30	402	899	0	0	0
		8,950	0.45	1.00	0	0	0
45	150 Pre-K	867	6,665	21,351	6,600	None	None
	8am August	30	388	893	0	0	0
		8,670	0.45	1.03	0	0	0
46	143 Pre-K	935	7,812	30,747	6,820	None	None
	4pm August	31	455	1,286	0	0	0
		9,350	0.49	1.38	0	0	0
47	147 Pre-K	919	5,853	25,684	6,820	None	None
	4pm August	31	341	1,074	0	0	0
		9,190	0.37	1.17	0	0	0
	Room Peak Totals:	13,957	95,254	367,642	106,260		
	Total Rooms: 18	483	5,544	15,373	0	0	0
	Unique Rooms: 18	139,570	0.40	1.10	0	0	0

Air Handler #1 - AHU-CR1 (South) - Total Load Summary

Air Handler Description:	AHU-CR1 (South) Variable Air Volume
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0.79 HP
Fan Input:	80% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0.76 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	3pm in August.
Outdoor Conditions:	Clg: 89° DB, 73° WB, 97.07 grains, Htg: 11° DB
Indoor Conditions:	Clg: 78° DB, 50% RH, Htg: 72° DB

Summer: Exhaust controls outside air, ----- Winter: Exhaust controls outside air.

Room Space sensible loss:	95,254 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	11,907 Btuh		
Return Duct sensible loss:	5,953 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			113,114 Btuh
Heating Supply Air: 107,161 / (.994 X 1.08 X 18) =		5,544 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Room space sensible gain:	322,229 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	2,006 Btuh		
Supply duct sensible gain:	14,738 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			338,973 Btuh
Cooling Supply Air: 338,973 / (.994 X 1.1 X 23) =		13,474 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	3,684 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			3,684 Btuh
Total sensible gain on air handling system:			342,658 Btuh
Room space latent gain:	106,260 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			106,260 Btuh
Total system sensible and latent gain:			448,918 Btuh

Check Figures

Total Air Handler Supply Air (based on a 23° TD):	13,474 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	13,957 Sq.ft
Supply Air Per Unit Area:	0.9654 CFM/Sq.ft
Area Per Cooling Capacity:	373.1 Sq.ft/Ton
Cooling Capacity Per Area:	0.0027 Tons/Sq.ft

Air Handler #1 - AHU-CR1 (South) - Total Load Summary (cont'd)

Check Figures

Heating Capacity Per Area:	8.10 Btuh/Sq.ft
Total Heating Required With Outside Air:	113,114 Btuh
Total Cooling Required With Outside Air:	37.41 Tons

Air Handler #2 - AHU-CR2 (North) - Summary Loads

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	433 Supervisory 5pm August	102 1 1,020	1,690 98 0.96	2,761 115 1.13	220 0 0	None 0 0	None 0 0
2	400 4th Fl Corridor 3pm August	2,786 0 27,860	36,479 2,123 0.76	40,848 1,708 0.61	0 0 0	None 0 0	None 0 0
3	300 Corridor North 12am August	1,111 0 11,110	547 32 0.03	5,165 216 0.19	0 0 0	None 0 0	None 0 0
4	338 Staff Lunch 8am August	471 5 4,710	1,632 95 0.20	5,083 213 0.45	1,100 0 0	None 0 0	None 0 0
5	340 2nd 8am August	684 33 6,840	5,314 309 0.45	19,688 823 1.20	7,260 0 0	None 0 0	None 0 0
6	342 3rd 8am August	688 33 6,880	4,672 272 0.40	18,115 758 1.10	7,260 0 0	None 0 0	None 0 0
7	337 2nd 4pm August	781 39 7,810	7,516 437 0.56	30,185 1,262 1.62	8,580 0 0	None 0 0	None 0 0
8	343 3rd 4pm August	779 39 7,790	6,619 385 0.49	30,075 1,258 1.61	8,580 0 0	None 0 0	None 0 0
9	347 4th 4pm August	744 37 7,440	5,287 308 0.41	26,441 1,106 1.49	8,140 0 0	None 0 0	None 0 0
17	200 Corridor North 12am August	1,093 0 10,930	516 30 0.03	5,074 212 0.19	0 0 0	None 0 0	None 0 0
18	242 Kinder 8am August	935 30 9,350	6,977 406 0.43	21,690 907 0.97	6,600 0 0	None 0 0	None 0 0
19	244 Kinder 8am August	939 30 9,390	7,011 408 0.43	21,711 908 0.97	6,600 0 0	None 0 0	None 0 0

Air Handler #2 - AHU-CR2 (North) - Summary Loads (cont'd)

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
20	237 Staff Workroom	399	3,957	10,630	880	None	None
	4pm August	4	230	445	0	0	0
		3,990	0.58	1.11	0	0	0
21	239 Kinder	903	6,739	27,693	6,600	None	None
	4pm August	30	392	1,158	0	0	0
		9,030	0.43	1.28	0	0	0
22	241 Kinder	904	6,739	27,698	6,600	None	None
	4pm August	30	392	1,158	0	0	0
		9,040	0.43	1.28	0	0	0
29	136 Med Suite Nurse's Office	250	2,268	4,046	660	None	None
	8am August	3	132	169	0	0	0
		2,500	0.53	0.68	0	0	0
30	136A Med Suite Waiting Area	76	0	617	220	None	None
	12am August	1	0	26	0	0	0
		760	0.00	0.34	0	0	0
31	136B Med Suite Examination	123	0	829	220	None	None
	12am August	1	0	35	0	0	0
		1,230	0.00	0.28	0	0	0
32	100 Lobby	1,317	0	5,932	0	None	None
	12am August	0	0	248	0	0	0
		13,170	0.00	0.19	0	0	0
33	140 Guidance Waiting Area	158	0	1,262	440	None	None
	12am August	2	0	53	0	0	0
		1,580	0.00	0.33	0	0	0
34	140A Guidance Office	100	0	725	220	None	None
	12am August	1	0	30	0	0	0
		1,000	0.00	0.30	0	0	0
35	140B Guidance Office	104	0	743	220	None	None
	12am August	1	0	31	0	0	0
		1,040	0.00	0.30	0	0	0

Air Handler #2 - AHU-CR2 (North) - Summary Loads (cont'd)

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
36	140C Guidance Conf Room 8am August	166 9 1,660	3,361 196 1.18	7,824 327 1.97	1,980 0 0	None 0 0	None 0 0
37	140D Guidance Storeroom 12am August	71 0 710	0 0 0.00	320 13 0.19	0 0 0	None 0 0	None 0 0
38	144 Music Room 8am August	711 36 7,110	6,523 380 0.53	22,284 932 1.31	7,920 0 0	None 0 0	None 0 0
39	137 General Office 4pm August	513 5 5,130	4,064 237 0.46	12,026 503 0.98	1,100 0 0	None 0 0	None 0 0
40	137A Records Room 12am August	101 0 1,010	0 0 0.00	455 19 0.19	0 0 0	None 0 0	None 0 0
41	137B Principals Office 4pm August	331 3 3,310	2,052 119 0.36	6,349 266 0.80	660 0 0	None 0 0	None 0 0
42	141 CSP SP ED 4pm August	507 25 5,070	3,696 215 0.42	16,907 707 1.39	5,500 0 0	None 0 0	None 0 0
48	C108 Cust Office 12am August	250 2 2,500	2,543 148 0.59	4,794 200 0.80	440 0 0	None 0 0	None 0 0
49	C001 Corridor 12am August	819 0 8,190	0 0 0.00	3,689 154 0.19	0 0 0	None 0 0	None 0 0
	Room Peak Totals: Total Rooms: 31 Unique Rooms: 31	18,916 400 189,160	126,205 7,345 0.39	381,659 15,960 0.84	88,000 0 0	 0 0	 0 0

Air Handler #2 - AHU-CR2 (North) - Total Load Summary

Air Handler Description:	AHU-CR2 (North) Variable Air Volume		
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0.86 HP		
Fan Input:	80% motor and fan efficiency with 0 in. water across the fan		
Sensible Heat Ratio:	0.81	--- This system occurs 1 time(s) in the building. ---	

Air System Peak Time:	3pm in August.
Outdoor Conditions:	Clg: 89° DB, 73° WB, 97.07 grains, Htg: 11° DB
Indoor Conditions:	Clg: 78° DB, 50% RH, Htg: 72° DB

Summer: Exhaust controls outside air, ----- Winter: Exhaust controls outside air.

Room Space sensible loss:	126,205 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	15,776 Btuh		
Return Duct sensible loss:	7,888 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			149,868 Btuh
Heating Supply Air: 141,980 / (.994 X 1.08 X 18) =		7,345 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Room space sensible gain:	348,546 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	2,170 Btuh		
Supply duct sensible gain:	15,942 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			366,657 Btuh
Cooling Supply Air: 366,657 / (.994 X 1.1 X 23) =		14,575 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	3,985 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			3,985 Btuh
Total sensible gain on air handling system:			370,643 Btuh
Room space latent gain:	88,000 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			88,000 Btuh
Total system sensible and latent gain:			458,643 Btuh

Check Figures

Total Air Handler Supply Air (based on a 23° TD):	14,575 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	18,916 Sq.ft
Supply Air Per Unit Area:	0.7705 CFM/Sq.ft
Area Per Cooling Capacity:	494.9 Sq.ft/Ton
Cooling Capacity Per Area:	0.0020 Tons/Sq.ft

Air Handler #2 - AHU-CR2 (North) - Total Load Summary (cont'd)

Check Figures

Heating Capacity Per Area:	7.92 Btuh/Sq.ft
Total Heating Required With Outside Air:	149,868 Btuh
Total Cooling Required With Outside Air:	38.22 Tons

Room Detailed Loads (At Room Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 1-433 Supervisory peaks (sensible) in August at 5pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 102.0, Construction Type: 1 (Light)								
Roof-1-11-Susp.C-L	102	0.50	8.5	0.025	22		1.525	156
Wall-1-W-A-M	236	0.83	10.4	0.056	138		3.416	804
Gls-W-1-90-Tran	21.0	1.000	9	0.450	80		27.450	576
0%S-0-UNS-Solar	21.0	0.380	216	0.930	1,603			
Lights-Prof=0	71	1.000			244			
Equipment-Prof=0	51	1.000			174	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					2,510	200		1,536
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					2,761	220		1,690
Room 2-400 4th Fl Corridor peaks (sensible) in August at 3pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 2,786.0, Construction Type: 1 (Light)								
Roof-1-11-Susp.C-L	2,786	0.50	7.0	0.025	488		1.525	4,249
Wall-1-NW-A-M	251	0.83	5.5	0.056	77		3.416	857
Wall-2-SW-A-M	350	0.83	11.3	0.056	221		3.416	1,195
Wall-3-NE-A-M	2,657	0.83	8.0	0.056	1,183		3.416	9,075
Gls-SW-1-90-Tran	240.0	1.000	10	0.450	1,026		27.450	6,588
0%S-0-UNS-Solar	240.0	0.380	196	0.940	16,803			
Gls-NE-1-90-Tran	240.0	1.000	10	0.450	1,026		27.450	6,588
0%S-0-UNS-Solar	240.0	0.380	135	0.200	2,462			
Gls-NE-1-90-Tran	168.0	1.000	10	0.450	718		27.450	4,612
0%S-0-UNS-Solar	168.0	0.380	135	0.200	1,724			
Lights-Prof=0	1,950	1.000			6,654			
Equipment-Prof=0	1,393	1.000			4,753	0		
Sub-total					37,134	0		33,163
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					40,848	0		36,479

Equipment Cooling Loads

Item Name	Nominal Output Sensible	Quantity Type Sensible	Nominal Output Latent	Quantity Type Latent	Sensible Load (Btuh)	Latent Load (Btuh)
MISC	0	watts/sq.ft.	0	Btuh	4,753	0
Miscellaneous Equipment	0	watts	0	Btuh	0	0
Total					4,753	0

Lighting Cooling Loads

Room Detailed Loads (At Room Peak Times) (cont'd)

Item Name	Nominal Output Sensible	Quantity Type Sensible	Nominal Output Latent	Quantity Type Latent	Sensible Load (Btuh)	Latent Load (Btuh)

Item Name	Quantity	Quantity Type	Special Allowance Factor	Space Fraction	Occur-rences	Usage Factor	Load (Btuh)
LIGHTING	1	watts/sq.ft.	0.7	1	1	1	6,654
Miscellaneous Lighting	0	watts	1	1	1	1	0
Total							6,654

Room 3-300 Corridor North peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 1,111.0, Construction Type: 1 (Light)

Wall-1-SW-A-M	146	0.83	17.9	0.056	146		3.416	498
Lights-Prof=0	778	1.000			2,654			
Equipment-Prof=0	556	1.000			1,895	0		
Sub-total					4,695	0		498
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					5,165	0		547

Room 4-338 Staff Lunch peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 471.0, Construction Type: 1 (Light)

Wall-1-NE-A-M	177	0.83	6.3	0.056	62		3.416	605
Gls-NE-1-90-Tran	32.0	1.000	-5	0.450	-65		27.450	878
0%S-0-UNS-Solar	32.0	0.380	135	0.880	1,445			
Lights-Prof=0	330	1.000			1,125			
Equipment-Prof=0	236	1.000			804	0		
People-Prof=0	5.0	1.000			1,250	1,000		
Sub-total					4,621	1,000		1,484
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					5,083	1,100		1,632

Room 5-340 2nd peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 684.0, Construction Type: 1 (Light)

Wall-1-NE-A-M	148	0.83	6.3	0.056	52		3.416	505
Gls-NE-1-90-Tran	157.6	1.000	-5	0.450	-319		27.450	4,326
0%S-0-UNS-Solar	157.6	0.380	135	0.880	7,115			
Lights-Prof=0	479	1.000			1,634			
Equipment-Prof=0	342	1.000			1,167	0		
People-Prof=0	33.0	1.000			8,250	6,600		

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Sub-total					17,898	6,600		4,831
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					19,688	7,260		5,314

Room 6-342 3rd peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 688.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	253	0.83	6.3	0.056	89		3.416	866
Gls-NE-1-90-Tran	123.2	1.000	-5	0.450	-249		27.450	3,382
0%S-0-UNS-Solar	123.2	0.380	135	0.880	5,562			
Lights-Prof=0	482	1.000			1,643			
Equipment-Prof=0	344	1.000			1,174	0		
People-Prof=0	33.0	1.000			8,250	6,600		
Sub-total					16,469	6,600		4,248
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					18,115	7,260		4,672

Room 7-337 2nd peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 781.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NW-A-M	181	0.83	5.5	0.056	55		3.416	619
Wall-2-SW-A-M	276	0.83	11.3	0.056	174		3.416	943
Gls-SW-1-90-Tran	192.0	1.000	10	0.450	821		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	196	0.940	13,442			
Lights-Prof=0	547	1.000			1,865			
Equipment-Prof=0	391	1.000			1,332	0		
People-Prof=0	39.0	1.000			9,750	7,800		
Sub-total					27,441	7,800		6,833
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					30,185	8,580		7,516

Room 8-343 3rd peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 779.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	219	0.83	11.3	0.056	138		3.416	747
Gls-SW-1-90-Tran	192.0	1.000	10	0.450	821		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	196	0.940	13,442			
Lights-Prof=0	545	1.000			1,861			
Equipment-Prof=0	390	1.000			1,329	0		
People-Prof=0	39.0	1.000			9,750	7,800		

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Sub-total					27,341	7,800		6,018
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					30,075	8,580		6,619

Room 9-347 4th peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 744.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	147	0.83	11.3	0.056	93		3.416	502
Gls-SW-1-90-Tran	156.8	1.000	10	0.450	670		27.450	4,304
0%S-0-UNS-Solar	156.8	0.380	196	0.940	10,978			
Lights-Prof=0	521	1.000			1,777			
Equipment-Prof=0	372	1.000			1,269	0		
People-Prof=0	37.0	1.000			9,250	7,400		
Sub-total					24,037	7,400		4,806
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					26,441	8,140		5,287

Room 10-300 Corridor South peaks (sensible) in August at 10am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 826.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SE-A-M	62	0.83	12.1	0.056	42		3.416	213
Gls-SE-1-90-Tran	61.6	1.000	-1	0.450	-14		27.450	1,691
0%S-0-UNS-Solar	61.6	0.380	196	0.930	4,267			
Lights-Prof=0	578	1.000			1,973			
Equipment-Prof=0	413	1.000			1,409	0		
Sub-total					7,677	0		1,904
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					8,445	0		2,094

Room 11-344 4th peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 684.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	286	0.83	6.3	0.056	101		3.416	976
Gls-NE-1-90-Tran	152.8	1.000	-5	0.450	-309		27.450	4,194
0%S-0-UNS-Solar	152.8	0.380	135	0.880	6,898			
Lights-Prof=0	479	1.000			1,634			
Equipment-Prof=0	342	1.000			1,167	0		
People-Prof=0	34.0	1.000			8,500	6,800		
Sub-total					17,990	6,800		5,171

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					19,789	7,480		5,688

Room 12-346 5th peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 676.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	243	0.83	6.3	0.056	85		3.416	829
Gls-NE-1-90-Tran	124.8	1.000	-5	0.450	-253		27.450	3,426
0%S-0-UNS-Solar	124.8	0.380	135	0.880	5,634			
Lights-Prof=0	473	1.000			1,615			
Equipment-Prof=0	338	1.000			1,153	0		
People-Prof=0	34.0	1.000			8,500	6,800		
Sub-total					16,735	6,800		4,254
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					18,408	7,480		4,680

Room 13-348 5th peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 676.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	200	0.83	6.3	0.056	71		3.416	684
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	473	1.000			1,615			
Equipment-Prof=0	338	1.000			1,153	0		
People-Prof=0	34.0	1.000			8,500	6,800		
Sub-total					19,617	6,800		5,954
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					21,579	7,480		6,550

Room 14-349 4th peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 766.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	285	0.83	11.3	0.056	180		3.416	974
Gls-SW-1-90-Tran	153.6	1.000	10	0.450	657		27.450	4,216
0%S-0-UNS-Solar	153.6	0.380	196	0.940	10,754			
Lights-Prof=0	536	1.000			1,830			
Equipment-Prof=0	383	1.000			1,307	0		
People-Prof=0	38.0	1.000			9,500	7,600		
Sub-total					24,227	7,600		5,190

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					26,649	8,360		5,709

Room 15-353 5th peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 745.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	285	0.83	11.3	0.056	180		3.416	974
Gls-SW-1-90-Tran	153.6	1.000	10	0.450	657		27.450	4,216
0%S-0-UNS-Solar	153.6	0.380	196	0.940	10,754			
Lights-Prof=0	522	1.000			1,779			
Equipment-Prof=0	373	1.000			1,271	0		
People-Prof=0	38.0	1.000			9,500	7,600		
Sub-total					24,141	7,600		5,190
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					26,555	8,360		5,709

Room 16-355 CSD SP ED peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 468.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	87	0.83	11.3	0.056	55		3.416	297
Wall-2-SE-A-M	322	0.83	14.6	0.056	263		3.416	1,101
Gls-SW-1-90-Tran	92.8	1.000	10	0.450	397		27.450	2,547
0%S-0-UNS-Solar	92.8	0.380	196	0.940	6,497			
Lights-Prof=0	328	1.000			1,118			
Equipment-Prof=0	234	1.000			798	0		
People-Prof=0	25.0	1.000			6,250	5,000		
Sub-total					15,378	5,000		3,946
Safety factors:					+10%	+10%		+10%
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Total w/ safety factors:					16,916	5,500		4,340

Room 17-200 Corridor North peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 1,093.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	137	0.83	17.9	0.056	138		3.416	469
Lights-Prof=0	765	1.000			2,611			
Equipment-Prof=0	547	1.000			1,865	0		
Sub-total					4,613	0		469
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					5,074	0		516

Room Detailed Loads (At Room Peak Times) (cont'd)

Room 18-242 Kinder peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 935.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	314	0.83	6.3	0.056	111		3.416	1,072
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	655	1.000			2,233			
Equipment-Prof=0	468	1.000			1,595	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					19,718	6,000		6,343
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					21,690	6,600		6,977

Room 19-244 Kinder peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 939.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	323	0.83	6.3	0.056	114		3.416	1,103
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	657	1.000			2,243			
Equipment-Prof=0	470	1.000			1,602	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					19,737	6,000		6,373
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					21,711	6,600		7,011

Room 20-237 Staff Workroom peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 399.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NW-A-M	177	0.83	5.5	0.056	54		3.416	604
Wall-2-SW-A-M	131	0.83	11.3	0.056	82		3.416	446
Gls-SW-1-90-Tran	92.8	1.000	10	0.450	397		27.450	2,547
0%S-0-UNS-Solar	92.8	0.380	196	0.940	6,497			
Lights-Prof=0	279	1.000			953			
Equipment-Prof=0	200	1.000			681	0		
People-Prof=0	4.0	1.000			1,000	800		
Sub-total					9,664	800		3,597
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					10,630	880		3,957

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 21-239 Kinder peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 903.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	302	0.83	11.3	0.056	191		3.416	1,032
Gls-SW-1-90-Tran	185.6	1.000	10	0.450	793		27.450	5,095
0%S-0-UNS-Solar	185.6	0.380	196	0.940	12,994			
Lights-Prof=0	632	1.000			2,157			
Equipment-Prof=0	452	1.000			1,541	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					25,176	6,000		6,127
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					27,693	6,600		6,739
Room 22-241 Kinder peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 904.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	302	0.83	11.3	0.056	191		3.416	1,032
Gls-SW-1-90-Tran	185.6	1.000	10	0.450	793		27.450	5,095
0%S-0-UNS-Solar	185.6	0.380	196	0.940	12,994			
Lights-Prof=0	633	1.000			2,159			
Equipment-Prof=0	452	1.000			1,542	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					25,180	6,000		6,127
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					27,698	6,600		6,739
Room 23-200 Corridor South peaks (sensible) in August at 10am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 824.0, Construction Type: 1 (Light)								
Wall-1-SE-A-M	59	0.83	12.1	0.056	40		3.416	202
Gls-SE-1-90-Tran	61.6	1.000	-1	0.450	-14		27.450	1,691
0%S-0-UNS-Solar	61.6	0.380	196	0.930	4,267			
Lights-Prof=0	577	1.000			1,968			
Equipment-Prof=0	412	1.000			1,406	0		
Sub-total					7,667	0		1,893
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					8,434	0		2,082

Room Detailed Loads (At Room Peak Times) (cont'd)

Room 24-248 Kinder peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 917.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	291	0.83	6.3	0.056	103		3.416	995
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	642	1.000			2,190			
Equipment-Prof=0	459	1.000			1,564	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					19,636	6,000		6,265
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					21,600	6,600		6,892

Room 25-250 1st peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 691.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	190	0.83	6.3	0.056	67		3.416	649
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	484	1.000			1,650			
Equipment-Prof=0	346	1.000			1,179	0		
People-Prof=0	37.0	1.000			9,250	7,400		
Sub-total					20,425	7,400		5,920
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					22,468	8,140		6,511

Room 26-243 Kinder peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 907.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	359	0.83	11.3	0.056	227		3.416	1,226
Gls-SW-1-90-Tran	249.6	1.000	10	0.450	1,067		27.450	6,852
0%S-0-UNS-Solar	249.6	0.380	196	0.940	17,475			
Lights-Prof=0	635	1.000			2,166			
Equipment-Prof=0	454	1.000			1,547	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					29,982	6,000		8,078
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					32,980	6,600		8,885

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 27-247 1st peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 677.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	245	0.83	11.3	0.056	155		3.416	838
Gls-SW-1-90-Tran	121.6	1.000	10	0.450	520		27.450	3,338
0%S-0-UNS-Solar	121.6	0.380	196	0.940	8,513			
Lights-Prof=0	474	1.000			1,617			
Equipment-Prof=0	339	1.000			1,155	0		
People-Prof=0	36.0	1.000			9,000	7,200		
Sub-total					20,960	7,200		4,176
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					23,056	7,920		4,594
Room 28-249 CSP SP ED peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 455.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	82	0.83	11.3	0.056	52		3.416	281
Wall-2-SE-A-M	311	0.83	14.6	0.056	254		3.416	1,063
Gls-SW-1-90-Tran	92.8	1.000	10	0.450	397		27.450	2,547
0%S-0-UNS-Solar	92.8	0.380	196	0.940	6,497			
Lights-Prof=0	319	1.000			1,087			
Equipment-Prof=0	228	1.000			776	0		
People-Prof=0	25.0	1.000			6,250	5,000		
Sub-total					15,313	5,000		3,891
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					16,844	5,500		4,280
Room 29-136 Med Suite Nurse's Office peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 250.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	266	0.83	6.3	0.056	94		3.416	909
Gls-NE-1-90-Tran	42.0	1.000	-5	0.450	-85		27.450	1,153
0%S-0-UNS-Solar	42.0	0.380	135	0.880	1,896			
Lights-Prof=0	175	1.000			597			
Equipment-Prof=0	125	1.000			427	0		
People-Prof=0	3.0	1.000			750	600		
Sub-total					3,678	600		2,062
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					4,046	660		2,268

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 30-136A Med Suite Waiting Area peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 76.0, Construction Type: 1 (Light)								
Lights-Prof=0	53	1.000			182			
Equipment-Prof=0	38	1.000			130	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					561	200		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					617	220		0
Room 31-136B Med Suite Examination peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 123.0, Construction Type: 1 (Light)								
Lights-Prof=0	86	1.000			294			
Equipment-Prof=0	62	1.000			210	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					754	200		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					829	220		0
Room 32-100 Lobby peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 1,317.0, Construction Type: 1 (Light)								
Lights-Prof=0	922	1.000			3,146			
Equipment-Prof=0	659	1.000			2,247	0		
Sub-total					5,393	0		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					5,932	0		0
Room 33-140 Guidance Waiting Area peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 158.0, Construction Type: 1 (Light)								
Lights-Prof=0	111	1.000			377			
Equipment-Prof=0	79	1.000			270	0		
People-Prof=0	2.0	1.000			500	400		
Sub-total					1,147	400		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					1,262	440		0

Room Detailed Loads (At Room Peak Times) (cont'd)

Room 34-140A Guidance Office peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 100.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Lights-Prof=0	70	1.000			239			
Equipment-Prof=0	50	1.000			171	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					659	200		0
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					725	220		0

Room 35-140B Guidance Office peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 104.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Lights-Prof=0	73	1.000			248			
Equipment-Prof=0	52	1.000			177	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					676	200		0
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					743	220		0

Room 36-140C Guidance Conf Room peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 166.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	123	0.83	6.3	0.056	43		3.416	420
Gls-NE-1-90-Tran	96.0	1.000	-5	0.450	-194		27.450	2,635
0%S-0-UNS-Solar	96.0	0.380	135	0.880	4,334			
Lights-Prof=0	116	1.000			396			
Equipment-Prof=0	83	1.000			283	0		
People-Prof=0	9.0	1.000			2,250	1,800		
Sub-total					7,112	1,800		3,055
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					7,824	1,980		3,361

Room 37-140D Guidance Storeroom peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 71.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Lights-Prof=0	50	1.000			170			
Equipment-Prof=0	36	1.000			121	0		
Sub-total					291	0		0

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					320	0		0

Room 38-144 Music Room peaks (sensible) in August at 8am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 711.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	193	0.83	6.3	0.056	68		3.416	659
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	498	1.000			1,698			
Equipment-Prof=0	356	1.000			1,213	0		
People-Prof=0	36.0	1.000			9,000	7,200		
Sub-total					20,258	7,200		5,930
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					22,284	7,920		6,523

Room 39-137 General Office peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 513.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-W-A-M	203	0.83	10.4	0.056	118		3.416	692
Wall-2-SW-A-M	108	0.83	11.3	0.056	68		3.416	367
Gls-W-1-90-Tran	48.0	1.000	10	0.450	205		27.450	1,318
0%S-0-UNS-Solar	48.0	0.380	216	0.920	3,625			
Gls-SW-1-90-Tran	48.0	1.000	10	0.450	205		27.450	1,318
0%S-0-UNS-Solar	48.0	0.380	196	0.940	3,361			
Lights-Prof=0	359	1.000			1,225			
Equipment-Prof=0	257	1.000			875	0		
People-Prof=0	5.0	1.000			1,250	1,000		
Sub-total					10,932	1,000		3,695
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					12,026	1,100		4,064

Room 40-137A Records Room peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 101.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Lights-Prof=0	71	1.000			241			
Equipment-Prof=0	51	1.000			172	0		
Sub-total					414	0		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Total w/ safety factors:					455	0		0

Room 41-137B Principals Office peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 331.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	160	0.83	11.3	0.056	101		3.416	548
Gls-SW-1-90-Tran	48.0	1.000	10	0.450	205		27.450	1,318
0%S-0-UNS-Solar	48.0	0.380	196	0.940	3,361			
Lights-Prof=0	232	1.000			791			
Equipment-Prof=0	166	1.000			565	0		
People-Prof=0	3.0	1.000			750	600		
Sub-total					5,772	600		1,865
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					6,349	660		2,052

Room 42-141 CSP SP ED peaks (sensible) in August at 4pm, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 507.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-SW-A-M	238	0.83	11.3	0.056	150		3.416	813
Gls-SW-1-90-Tran	92.8	1.000	10	0.450	397		27.450	2,547
0%S-0-UNS-Solar	92.8	0.380	196	0.940	6,497			
Lights-Prof=0	355	1.000			1,211			
Equipment-Prof=0	254	1.000			865	0		
People-Prof=0	25.0	1.000			6,250	5,000		
Sub-total					15,370	5,000		3,360
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					16,907	5,500		3,696

Room 43-100 Corridor South peaks (sensible) in August at 12am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 1,029.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Lights-Prof=0	720	1.000			2,458			
Equipment-Prof=0	515	1.000			1,756	0		
Sub-total					4,213	0		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					4,635	0		0

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 44-146 Pre-K peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 895.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	296	0.83	6.3	0.056	104		3.416	1,010
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	627	1.000			2,138			
Equipment-Prof=0	448	1.000			1,527	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					19,548	6,000		6,281
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					21,502	6,600		6,909
Room 45-150 Pre-K peaks (sensible) in August at 8am, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 867.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	231	0.83	6.3	0.056	81		3.416	788
Gls-NE-1-90-Tran	192.0	1.000	-5	0.450	-389		27.450	5,270
0%S-0-UNS-Solar	192.0	0.380	135	0.880	8,668			
Lights-Prof=0	607	1.000			2,071			
Equipment-Prof=0	434	1.000			1,479	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					19,410	6,000		6,059
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					21,351	6,600		6,665
Room 46-143 Pre-K peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 935.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	331	0.83	11.3	0.056	209		3.416	1,129
Gls-SW-1-90-Tran	217.6	1.000	10	0.450	930		27.450	5,973
0%S-0-UNS-Solar	217.6	0.380	196	0.940	15,234			
Lights-Prof=0	655	1.000			2,233			
Equipment-Prof=0	468	1.000			1,595	0		
People-Prof=0	31.0	1.000			7,750	6,200		
Sub-total					27,952	6,200		7,102
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					30,747	6,820		7,812

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 47-147 Pre-K peaks (sensible) in August at 4pm, Air Handler 1 (AHU-CR1 (South)), Zone 0, 1.0 x 919.0, Construction Type: 1 (Light)								
Wall-1-SW-A-M	298	0.83	11.3	0.056	188		3.416	1,017
Gls-SW-1-90-Tran	156.8	1.000	10	0.450	670		27.450	4,304
0%S-0-UNS-Solar	156.8	0.380	196	0.940	10,978			
Lights-Prof=0	643	1.000			2,195			
Equipment-Prof=0	460	1.000			1,568	0		
People-Prof=0	31.0	1.000			7,750	6,200		
Sub-total					23,349	6,200		5,321
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					25,684	6,820		5,853

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 48-C108 Cust Office peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 250.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	73	0.83	10.4	0.056	42		3.416	248
Partition-2-1	91.96		23/17	0.355	751		6.035	555
Partition-3-1	250		23/17	0.355	2,041		6.035	1,509
Lights-Prof=0	175	1.000			597			
Equipment-Prof=0	125	1.000			427	0		
People-Prof=0	2.0	1.000			500	400		
Sub-total					4,358	400		2,312
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					4,794	440		2,543

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 49-C001 Corridor peaks (sensible) in August at 12am, Air Handler 2 (AHU-CR2 (North)), Zone 0, 1.0 x 819.0, Construction Type: 1 (Light)								
Lights-Prof=0	573	1.000			1,956			
Equipment-Prof=0	410	1.000			1,397	0		
Sub-total					3,353	0		0
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					3,689	0		0

HVAC Load Analysis

for

Prepared By:

Building Summary Loads

Building peaks in August at 5pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	4,791	10,287	40.04	0	1,433	1,433	0.49
Wall	1,670	6,276	24.43	0	1,074	1,074	0.37
Glass	168	5,073	19.74	0	14,813	14,813	5.04
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		21,636	84.21	0	17,321	17,321	5.90
Lighting	3,450	0	0.00	0	12,950	12,950	4.41
Equipment	2,465	0	0.00	0	9,250	9,250	3.15
Pool Latent	0	0	0.00	0	0	0	0.00
People	491	0	0.00	108,020	135,025	243,045	82.77
Partition	0	0	0.00	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	1,087	1,087	0.37
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	2,705	10.53	0	7,983	7,983	2.72
Return Duct	0	1,352	5.26	0	1,996	1,996	0.68
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		25,693	100.00	108,020	185,612	293,632	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Room Loads	21,636	84.21	108,020	174,546	282,566	96.23
Plenum Loads	0	0.00	0	0	0	0.00
Fan/Duct/Misc Loads	4,057	15.79	0	11,066	11,066	3.77
Building Totals	25,693	100.00	108,020	185,612	293,632	100.00

Check Figures

Total Building Supply Air (based on a 23° TD):	7,299	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	4,929	Sq.ft
Supply Air Per Unit Area:	1.4808	CFM/Sq.ft
Area Per Cooling Capacity:	201.4	Sq.ft/Ton

Building Summary Loads (cont'd)

Check Figures

Cooling Capacity Per Area:	0.0050 Tons/Sq.ft
Heating Capacity Per Area:	5.21 Btuh/Sq.ft
Total Heating Required With Outside Air:	25,693 Btuh
Total Cooling Required With Outside Air:	24.47 Tons

Air Handler #1 - AHU-GA - Summary Loads

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	437 Gymnatorium	3,722	18,013	157,288	99,000	None	None
	5pm August	450	1,048	6,577	0	0	0
		37,220	0.28	1.77	0	0	0
2	437A Health Instructor	166	356	1,084	220	None	None
	11pm August	1	21	45	0	0	0
		1,660	0.12	0.27	0	0	0
3	437B Stage	903	1,939	15,401	8,800	None	None
	11pm August	40	113	644	0	0	0
		9,030	0.12	0.71	0	0	0
4	437C Gym Storage	138	1,327	1,011	0	None	None
	2am August	0	77	42	0	0	0
		1,380	0.56	0.31	0	0	0
	Room Peak Totals:	4,929	21,636	174,784	108,020		
	Total Rooms: 4	491	1,259	7,309	0	0	0
	Unique Rooms: 4	49,290	0.26	1.48	0	0	0

Air Handler #1 - AHU-GA - Total Load Summary

Air Handler Description:	AHU-GA Variable Air Volume
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0.43 HP
Fan Input:	80% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	0.63 --- This system occurs 1 time(s) in the building. ---
Air System Peak Time:	5pm in August.
Outdoor Conditions:	Clg: 87° DB, 73° WB, 99.84 grains, Htg: 11° DB
Indoor Conditions:	Clg: 78° DB, 50% RH, Htg: 72° DB

Summer: Exhaust controls outside air, ----- Winter: Exhaust controls outside air.

Room Space sensible loss:	21,636 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	2,705 Btuh		
Return Duct sensible loss:	1,352 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			25,693 Btuh
Heating Supply Air: 24,341 / (.994 X 1.08 X 18) =		1,259 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Room space sensible gain:	174,546 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	1,087 Btuh		
Supply duct sensible gain:	7,983 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			183,616 Btuh
Cooling Supply Air: 183,616 / (.994 X 1.1 X 23) =		7,299 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	1,996 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			1,996 Btuh
Total sensible gain on air handling system:			185,612 Btuh
Room space latent gain:	108,020 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			108,020 Btuh
Total system sensible and latent gain:			293,632 Btuh

Check Figures

Total Air Handler Supply Air (based on a 23° TD):	7,299 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	4,929 Sq.ft
Supply Air Per Unit Area:	1.4808 CFM/Sq.ft
Area Per Cooling Capacity:	201.4 Sq.ft/Ton
Cooling Capacity Per Area:	0.0050 Tons/Sq.ft

Air Handler #1 - AHU-GA - Total Load Summary (cont'd)

Check Figures

Heating Capacity Per Area:	5.21	Btuh/Sq.ft
Total Heating Required With Outside Air:	25,693	Btuh
Total Cooling Required With Outside Air:	24.47	Tons

Room Detailed Loads (At Room Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 1-437 Gymnatorium peaks (sensible) in August at 5pm, Air Handler 1 (AHU-GA), Zone 0, 1.0 x 3,722.0, Construction Type: 1 (Light)								
Roof-1-11-Susp.C-L	3,722	0.50	8.5	0.032	1,012		1.952	7,265
Wall-1-W-A-M	1,317	0.83	10.4	0.056	770		3.416	4,499
Gls-W-1-90-Tran	168.0	1.000	9	0.450	643		27.450	4,612
0%S-0-UNS-Solar	168.0	0.380	216	0.930	12,824			
Lights-Prof=0	2,605	1.000			8,890			
Equipment-Prof=0	1,861	1.000			6,350	0		
People-Prof=0	450.0	1.000			112,500	90,000		
Sub-total					142,989	90,000		16,376
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					157,288	99,000		18,013
Room 2-437A Health Instructor peaks (sensible) in August at 11pm, Air Handler 1 (AHU-GA), Zone 0, 1.0 x 166.0, Construction Type: 1 (Light)								
Roof-1-11-Susp.C-L	166	0.50	10.5	0.032	56		1.952	324
Lights-Prof=0	116	1.000			396			
Equipment-Prof=0	83	1.000			283	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					985	200		324
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					1,084	220		356
Room 3-437B Stage peaks (sensible) in August at 11pm, Air Handler 1 (AHU-GA), Zone 0, 1.0 x 903.0, Construction Type: 1 (Light)								
Roof-1-11-Susp.C-L	903	0.50	10.5	0.032	303		1.952	1,763
Lights-Prof=0	632	1.000			2,157			
Equipment-Prof=0	452	1.000			1,541	0		
People-Prof=0	40.0	1.000			10,000	8,000		
Sub-total					14,001	8,000		1,763
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					15,401	8,800		1,939

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 4-437C Gym Storage peaks (sensible) in August at 2am, Air Handler 1 (AHU-GA), Zone 0, 1.0 x 138.0, Construction Type: 1 (Light)								
Wall-1-W-A-M	353	0.83	17.9	0.056	354		3.416	1,207
Lights-Prof=0	97	1.000			330			
Equipment-Prof=0	69	1.000			235	0		
Sub-total					919	0		1,207
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					1,011	0		1,327

- RTU-KC
HVAC Load Analysis

for

Prepared By:

Building Summary Loads

Building peaks in August at 8am.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	0	0	0.00	0	0	0	0.00
Wall	1,509	5,671	6.36	0	1,211	1,211	0.34
Glass	149	4,484	5.03	0	11,870	11,870	3.36
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		10,155	11.39	0	13,082	13,082	3.71
Lighting	4,616	0	0.00	0	17,325	17,325	4.91
Equipment	10,675	0	0.00	0	40,065	40,065	11.35
Pool Latent	0	0	0.00	0	0	0	0.00
People	357	0	0.00	78,540	98,175	176,715	50.08
Partition	9,777	64,907	72.82	0	87,815	87,815	24.88
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	1,757	1,757	0.50
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	9,383	10.53	0	12,911	12,911	3.66
Return Duct	0	4,691	5.26	0	3,228	3,228	0.91
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		89,136	100.00	78,540	274,357	352,897	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Room Loads	75,062	84.21	78,540	256,461	335,001	94.93
Plenum Loads	0	0.00	0	0	0	0.00
Fan/Duct/Misc Loads	14,074	15.79	0	17,896	17,896	5.07
Building Totals	89,136	100.00	78,540	274,358	352,898	100.00

Check Figures		
Total Building Supply Air (based on a 21° TD):	11,804	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	6,594	Sq.ft
Supply Air Per Unit Area:	1.7901	CFM/Sq.ft
Area Per Cooling Capacity:	224.2	Sq.ft/Ton

Building Summary Loads (cont'd)

Check Figures

Cooling Capacity Per Area:	0.0045	Tons/Sq.ft
Heating Capacity Per Area:	13.52	Btuh/Sq.ft
Total Heating Required With Outside Air:	89,136	Btuh
Total Cooling Required With Outside Air:	29.41	Tons

Air Handler #3 Summary Loads

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	Student Dining 9am August	4,885 326 48,850	46,666 2,716 0.56	177,490 8,169 1.67	71,720 0 0	None 0 0	None 0 0
2	Kitchen 2am August	1,245 30 12,450	22,752 1,324 1.06	70,109 3,227 2.59	6,600 0 0	None 0 0	None 0 0
3	Corridor 2am August	184 0 1,840	1,583 92 0.50	2,851 131 0.71	0 0 0	None 0 0	None 0 0
4	Non-Food Storage 2am August	203 0 2,030	2,944 171 0.84	4,287 197 0.97	0 0 0	None 0 0	None 0 0
5	Dietician Office 2am August	77 1 770	1,116 65 0.84	1,900 87 1.14	220 0 0	None 0 0	None 0 0
	Room Peak Totals: Total Rooms: 5 Unique Rooms: 5	6,594 357 65,940	75,062 4,369 0.66	256,638 11,812 1.79	78,540 0 0	 0 0	 0 0

Air Handler #3 Total Load Summary

Air Handler Description:	Variable Air Volume		
Supply Air Fan:	Draw-Thru with program estimated horsepower of 0.70 HP		
Fan Input:	80% motor and fan efficiency with 0 in. water across the fan		
Sensible Heat Ratio:	0.78 --- This system occurs 1 time(s) in the building. ---		

Air System Peak Time:	8am in August.
Outdoor Conditions:	Clg: 75° DB, 70° WB, 102.95 grains, Htg: 11° DB
Indoor Conditions:	Clg: 78° DB, 50% RH, Htg: 72° DB

Summer: Exhaust controls outside air, ----- Winter: Exhaust controls outside air.

Room Space sensible loss:	75,062 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	9,383 Btuh		
Return Duct sensible loss:	4,691 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			89,136 Btuh
Heating Supply Air: 84,445 / (.994 X 1.08 X 18) =		4,369 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Room space sensible gain:	256,461 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	1,757 Btuh		
Supply duct sensible gain:	12,911 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			271,130 Btuh
Cooling Supply Air: 271,130 / (.994 X 1.1 X 21) =		11,804 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	3,228 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			3,228 Btuh
Total sensible gain on air handling system:			274,358 Btuh
Room space latent gain:	78,540 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			78,540 Btuh
Total system sensible and latent gain:			352,898 Btuh

Check Figures

Total Air Handler Supply Air (based on a 21° TD):	11,804 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	6,594 Sq.ft
Supply Air Per Unit Area:	1.7901 CFM/Sq.ft
Area Per Cooling Capacity:	224.2 Sq.ft/Ton
Cooling Capacity Per Area:	0.0045 Tons/Sq.ft

Air Handler #3 Total Load Summary (cont'd)

Check Figures

Heating Capacity Per Area:	13.52	Btuh/Sq.ft
Total Heating Required With Outside Air:	89,136	Btuh
Total Cooling Required With Outside Air:	29.41	Tons

Room Detailed Loads (At Room Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 1-Student Dining peaks (sensible) in August at 9am, Air Handler 3, Zone 0, 1.0 x 4,885.0, Construction Type: 1 (Light)								
Wall-3-E-A-M	710	0.83	11.3	0.056	448		3.416	2,424
Partition-1-1	1072.5		23/17	0.355	8,757		6.035	6,473
Partition-2-1	4880		23/17	0.355	39,845		6.035	29,451
Gls-E-1-90-Tran	148.5	1.000	-3	0.450	-167		27.450	4,076
0%S-0-UNS-Solar	148.5	0.380	216	0.900	10,970			
Lights-Prof=0	3,420	1.000			11,668			
Equipment-Prof=0	2,443	1.000			8,334	0		
People-Prof=0	326.0	1.000			81,500	65,200		
Sub-total					161,355	65,200		42,423
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					177,490	71,720		46,666
Room 2-Kitchen peaks (sensible) in August at 2am, Air Handler 3, Zone 0, 1.0 x 1,245.0, Construction Type: 1 (Light)								
Wall-1-W-A-M	558	0.83	17.9	0.056	560		3.416	1,906
Partition-2-1	697.5		23/17	0.355	5,695		6.035	4,209
Partition-3-1	2414		23/17	0.355	19,710		6.035	14,568
Lights-Prof=0	872	1.000			2,974			
Equipment-Prof=0	8,000	1.000			27,297	0		
People-Prof=0	30.0	1.000			7,500	6,000		
Sub-total					63,736	6,000		20,684
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					70,109	6,600		22,752
Room 3-Corridor peaks (sensible) in August at 2am, Air Handler 3, Zone 0, 1.0 x 184.0, Construction Type: 1 (Light)								
Wall-1-W-A-M	30	0.83	17.9	0.056	30		3.416	102
Partition-2-1	37.5		23/17	0.355	306		6.035	226
Partition-3-1	184		23/17	0.355	1,502		6.035	1,110
Lights-Prof=0	129	1.000			439			
Equipment-Prof=0	92	1.000			314	0		
Sub-total					2,592	0		1,439
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					2,851	0		1,583

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 4-Non-Food Storage peaks (sensible) in August at 2am, Air Handler 3, Zone 0, 1.0 x 203.0, Construction Type: 1 (Light)								
Wall-1-W-A-M	154	0.83	17.9	0.056	154		3.416	525
Partition-2-1	153.6		23/17	0.355	1,254		6.035	927
Partition-3-1	203		23/17	0.355	1,657		6.035	1,225
Lights-Prof=0	142	1.000			485			
Equipment-Prof=0	102	1.000			346	0		
Sub-total					3,897	0		2,677
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					4,287	0		2,944

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 5-Dietician Office peaks (sensible) in August at 2am, Air Handler 3, Zone 0, 1.0 x 77.0, Construction Type: 1 (Light)								
Wall-1-W-A-M	58	0.83	17.9	0.056	58		3.416	199
Partition-2-1	58.2		23/17	0.355	475		6.035	351
Partition-3-1	77		23/17	0.355	629		6.035	465
Lights-Prof=0	54	1.000			184			
Equipment-Prof=0	39	1.000			131	0		
People-Prof=0	1.0	1.000			250	200		
Sub-total					1,728	200		1,015
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					1,900	220		1,116

HVAC Load Analysis

for

Prepared By:

Building Summary Loads

Building peaks in August at 3pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	12,958	27,823	8.13	0	3,193	3,193	0.50
Wall	21,606	81,187	23.73	0	13,755	13,755	2.17
Glass	5,350	161,541	47.22	0	258,048	258,048	40.78
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		270,552	79.08	0	274,995	274,995	43.46
Lighting	45,179	0	0.00	0	169,574	169,574	26.80
Equipment	32,271	0	0.00	0	121,125	121,125	19.14
Pool Latent	0	0	0.00	0	0	0	0.00
People	0	0	0.00	0	0	0	0.00
Partition	2,646	17,565	5.13	0	23,765	23,765	3.76
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	4,254	4,254	0.67
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	36,015	10.53	0	31,248	31,248	4.94
Return Duct	0	18,007	5.26	0	7,812	7,812	1.23
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		342,139	100.00	0	632,773	632,773	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Room Loads	288,117	84.21	0	589,459	589,459	93.15
Plenum Loads	0	0.00	0	0	0	0.00
Fan/Duct/Misc Loads	54,022	15.79	0	43,314	43,314	6.85
Building Totals	342,139	100.00	0	632,773	632,773	100.00

Check Figures

Total Building Supply Air (based on a 20° TD):	28,569	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	64,542	Sq.ft
Supply Air Per Unit Area:	0.4426	CFM/Sq.ft
Area Per Cooling Capacity:	1,224.0	Sq.ft/Ton

Building Summary Loads (cont'd)

Check Figures

Cooling Capacity Per Area:	0.0008	Tons/Sq.ft
Heating Capacity Per Area:	5.30	Btuh/Sq.ft
Total Heating Required With Outside Air:	342,139	Btuh
Total Cooling Required With Outside Air:	52.73	Tons

Air Handler #1 - Block Load - Summary Loads

Rm No	Description Room Peak Time Flr No.	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	Cellar 8am August Flr 1	12,950 0 168,350	31,434 1,829 0.14	90,877 4,404 0.34	0 0 0	None 0 0	None 0 0
2	1st Floor 3pm August Flr 0	12,718 0 127,180	57,369 3,339 0.26	123,447 5,983 0.47	0 0 0	None 0 0	None 0 0
3	2nd Floor 3pm August Flr 0	12,958 0 129,580	63,600 3,702 0.29	142,169 6,890 0.53	0 0 0	None 0 0	None 0 0
4	3rd Floor 3pm August Flr 0	12,958 0 129,580	63,600 3,702 0.29	142,169 6,890 0.53	0 0 0	None 0 0	None 0 0
5	4th Floor 3pm August Flr 0	12,958 0 129,580	72,115 4,197 0.32	95,596 4,633 0.36	0 0 0	None 0 0	None 0 0
	Room Peak Totals: Total Rooms: 5 Unique Rooms: 5	64,542 0 684,270	288,117 16,768 0.26	594,257 28,802 0.45	0 0 0	 0 0	 0 0

Air Handler #1 - Block Load - Total Load Summary

Air Handler Description:	Block Load Variable Air Volume
Supply Air Fan:	Draw-Thru with program estimated horsepower of 1.68 HP
Fan Input:	80% motor and fan efficiency with 0 in. water across the fan
Sensible Heat Ratio:	1.00 --- This system occurs 1 time(s) in the building. ---
Air System Peak Time:	3pm in August.
Outdoor Conditions:	Clg: 89° DB, 73° WB, 97.07 grains, Htg: 11° DB
Indoor Conditions:	Clg: 78° DB, 50% RH, Htg: 72° DB

Summer: Exhaust controls outside air, ----- Winter: Exhaust controls outside air.

Room Space sensible loss:	288,117 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	36,015 Btuh		
Return Duct sensible loss:	18,007 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			342,139 Btuh
Heating Supply Air: 324,132 / (.994 X 1.08 X 18) =		16,768 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Room space sensible gain:	589,459 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	4,254 Btuh		
Supply duct sensible gain:	31,248 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			624,961 Btuh
Cooling Supply Air: 624,961 / (.994 X 1.1 X 20) =		28,569 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	7,812 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			7,812 Btuh
Total sensible gain on air handling system:			632,773 Btuh
Room space latent gain:	0 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			0 Btuh
Total system sensible and latent gain:			632,773 Btuh

Check Figures

Total Air Handler Supply Air (based on a 20° TD):	28,569 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	64,542 Sq.ft
Supply Air Per Unit Area:	0.4426 CFM/Sq.ft
Area Per Cooling Capacity:	1,224.0 Sq.ft/Ton
Cooling Capacity Per Area:	0.0008 Tons/Sq.ft

Air Handler #1 - Block Load - Total Load Summary (cont'd)

Check Figures

Heating Capacity Per Area:	5.30	Btuh/Sq.ft
Total Heating Required With Outside Air:	342,139	Btuh
Total Cooling Required With Outside Air:	52.73	Tons

Room Detailed Loads (At Room Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Room 1-Cellar peaks (sensible) in August at 8am, Air Handler 1 (Block Load), Zone 0, Floor Number 1, 1.0 x 12,950.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	902	0.83	6.3	0.056	318		3.416	3,080
Wall-2-SE-A-M	414	0.83	12.9	0.056	300		3.416	1,414
Wall-3-SW-A-M	1,182	0.83	14.6	0.056	966		3.416	4,038
Partition-4-1	2646		23/17	0.355	21,605		6.035	15,969
Gls-NE-1-90-Tran	148.5	1.000	-5	0.450	-301		27.450	4,076
0%S-0-UNS-Solar	148.5	0.380	135	0.880	6,704			
Lights-Prof=0	9,065	1.000			30,931			
Equipment-Prof=0	6,475	1.000			22,094	0		
Sub-total					82,615	0		28,576
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					90,877	0		31,434
Room 2-1st Floor peaks (sensible) in August at 3pm, Air Handler 1 (Block Load), Zone 0, 1.0 x 12,718.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	1,988	0.83	8.0	0.056	885		3.416	6,792
Wall-2-SE-A-M	844	0.83	13.8	0.056	650		3.416	2,882
Wall-3-SW-A-M	1,962	0.83	11.3	0.056	1,238		3.416	6,701
Gls-NE-1-90-Tran	611.8	1.000	10	0.450	2,615		27.450	16,794
0%S-0-UNS-Solar	611.8	0.380	135	0.200	6,277			
Gls-SE-1-90-Tran	53.2	1.000	10	0.450	227		27.450	1,460
0%S-0-UNS-Solar	53.2	0.380	196	0.210	832			
Gls-SW-1-90-Tran	638.4	1.000	10	0.450	2,729		27.450	17,524
0%S-0-UNS-Solar	638.4	0.380	196	0.940	44,695			
Lights-Prof=0	8,903	1.000			30,377			
Equipment-Prof=0	6,359	1.000			21,698	0		
Sub-total					112,224	0		52,153
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					123,447	0		57,369
Room 3-2nd Floor peaks (sensible) in August at 3pm, Air Handler 1 (Block Load), Zone 0, 1.0 x 12,958.0, Construction Type: 1 (Light)								
Wall-1-NE-A-M	1,936	0.83	8.0	0.056	862		3.416	6,612
Wall-2-SE-A-M	844	0.83	13.8	0.056	650		3.416	2,882
Wall-3-SW-A-M	1,749	0.83	11.3	0.056	1,104		3.416	5,974
Gls-NE-1-90-Tran	638.4	1.000	10	0.450	2,729		27.450	17,524
0%S-0-UNS-Solar	638.4	0.380	135	0.200	6,550			

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Gls-SE-1-90-Tran	53.2	1.000	10	0.450	227		27.450	1,460
0%S-0-UNS-Solar	53.2	0.380	196	0.210	832			
Gls-SW-1-90-Tran	851.2	1.000	10	0.450	3,639		27.450	23,365
0%S-0-UNS-Solar	851.2	0.380	196	0.940	59,594			
Lights-Prof=0	9,071	1.000			30,950			
Equipment-Prof=0	6,479	1.000			22,107	0		
Sub-total					129,244	0		57,818
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					142,169	0		63,600

Room 4-3rd Floor peaks (sensible) in August at 3pm, Air Handler 1 (Block Load), Zone 0, 1.0 x 12,958.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Wall-1-NE-A-M	1,936	0.83	8.0	0.056	862		3.416	6,612
Wall-2-SE-A-M	844	0.83	13.8	0.056	650		3.416	2,882
Wall-3-SW-A-M	1,749	0.83	11.3	0.056	1,104		3.416	5,974
Gls-NE-1-90-Tran	638.4	1.000	10	0.450	2,729		27.450	17,524
0%S-0-UNS-Solar	638.4	0.380	135	0.200	6,550			
Gls-SE-1-90-Tran	53.2	1.000	10	0.450	227		27.450	1,460
0%S-0-UNS-Solar	53.2	0.380	196	0.210	832			
Gls-SW-1-90-Tran	851.2	1.000	10	0.450	3,639		27.450	23,365
0%S-0-UNS-Solar	851.2	0.380	196	0.940	59,594			
Lights-Prof=0	9,071	1.000			30,950			
Equipment-Prof=0	6,479	1.000			22,107	0		
Sub-total					129,244	0		57,818
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					142,169	0		63,600

Room 5-4th Floor peaks (sensible) in August at 3pm, Air Handler 1 (Block Load), Zone 0, 1.0 x 12,958.0, Construction Type: 1 (Light)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Roof-1-11-Susp.C-L	12,958	0.50	7.0	0.032	2,903		1.952	25,294
Wall-1-NE-A-M	2,128	0.83	8.0	0.056	947		3.416	7,269
Wall-2-SE-A-M	791	0.83	13.8	0.056	609		3.416	2,701
Wall-3-SW-A-M	2,340	0.83	11.3	0.056	1,477		3.416	7,994
Gls-NE-1-90-Tran	345.8	1.000	10	0.450	1,478		27.450	9,492
0%S-0-UNS-Solar	345.8	0.380	135	0.200	3,548			
Gls-SE-1-90-Tran	106.4	1.000	10	0.450	455		27.450	2,921

Room Detailed Loads (At Room Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
0%S-0-UNS-Solar	106.4	0.380	196	0.210	1,664			
Gls-NE-1-90-Tran	100.3	1.000	10	0.450	429		27.450	2,754
0%S-0-UNS-Solar	100.3	0.380	135	0.200	1,029			
Gls-SW-1-90-Tran	159.6	1.000	10	0.450	682		27.450	4,381
0%S-0-UNS-Solar	159.6	0.380	196	0.940	11,174			
Gls-SW-1-90-Tran	100.3	1.000	10	0.450	429		27.450	2,754
0%S-0-UNS-Solar	100.3	0.380	196	0.940	7,024			
Lights-Prof=0	9,071	1.000			30,950			
Equipment-Prof=0	6,479	1.000			22,107	0		
Sub-total					86,905	0		65,559
Safety factors:					+10%	+10%		+10%
					---------	---------		---------
Total w/ safety factors:					95,596	0		72,115

E4.1 - BUILDING MANAGEMENT SYSTEM CONTROLS

E5.1P – BUILDING LEVEL ENERGY METERING

E5.2R – ADVANCED ENERGY METERING

ABBREVIATIONS

TS-1 RETURN TEMP. (140° LOOP)
TS-2 RETURN TEMP. (120° LOOP)
TS-3 SUPPLY TEMP. 140°F
TS-4 SUPPLY TEMP. 120°F

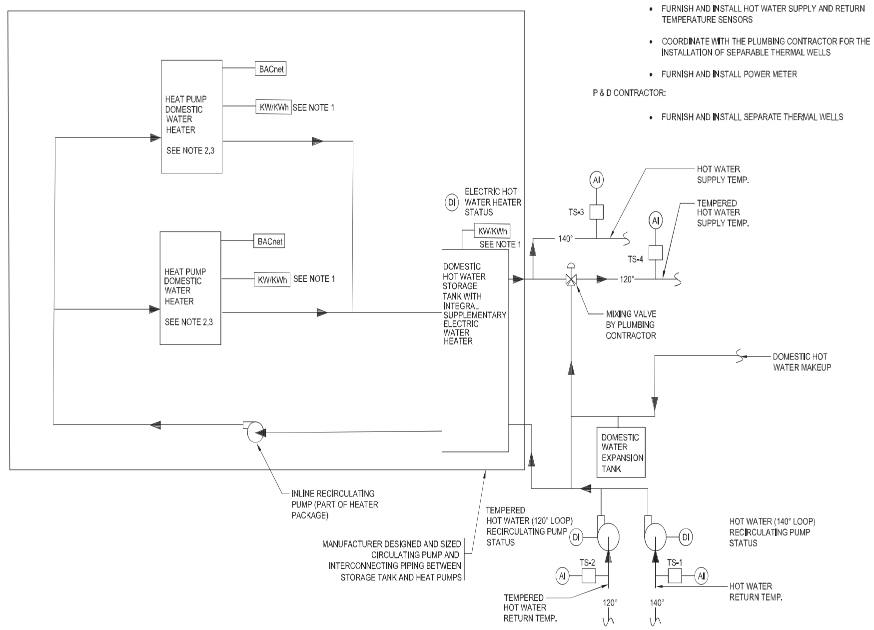
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BACnet	BACnet INTERFACE TO BMS

NOTE:

1. POWER METER IN MECHANICAL EQUIPMENT ROOM IS PROVIDED BY THE TEMPERATURE CONTROLS CONTRACTOR. TEMPERATURE CONTROLS CONTRACTOR (TCC) SHALL INTEGRATE POWER METER WITH THE BMS SYSTEM. THE POWER METER IS TO BE PROVIDED AS PART OF CONTRACT SPECIFICATION 15970, AND SHALL BE MONITORED THROUGH THE BMS.
2. OEM DOMESTIC HOT WATER CONTROL PANEL SHALL MODULATE BOTH HEAT PUMP HEATER, SUPPLEMENTAL ELECTRIC HEATER AND CONTROL THE INLINE RECIRCULATING PUMPS. BMS/DDC SYSTEM SHALL ONLY MONITOR, NOT CONTROL THE HEAT PUMP HEATER AND SUPPLEMENTAL ELECTRIC HEATER. SUPPLEMENTAL ELECTRIC HEATER SHALL ONLY BE ENABLED IF THE HEAT PUMP HEATER ALONE CANNOT MEET THE LOAD.
3. TEMPERATURE CONTROL CONTRACTOR SHALL INTEGRATE THE TEMPERATURE SENSORS AND BACnet INTERFACE FOR THE HEAT PUMPS AND SUPPLEMENTAL ELECTRIC HEATER INTO THE BMS/DDC SYSTEM.
4. CONTRACTUAL OBLIGATIONS:

   TEMPERATURE CONTROL CONTRACTOR (TCC):
   - FURNISH AND INSTALL HOT WATER SUPPLY AND RETURN TEMPERATURE SENSORS
   - COORDINATE WITH THE PLUMBING CONTRACTOR FOR THE INSTALLATION OF SEPARABLE THERMAL WELLS
   - FURNISH AND INSTALL POWER METER

   P & D CONTRACTOR:
   - FURNISH AND INSTALL SEPARATE THERMAL WELLS



TYPICAL CONTROL DIAGRAM CENTRAL HEAT PUMP DOMESTIC WATER HEATER 1

NOT TO SCALE

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"CENTRAL HEAT PUMP DOMESTIC WATER HEATER"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communicatio	Trended Value	Misc. Other	Network Variable Type	Notes
1	DHW Supply Temp- 140°F	X									150°F					X		Input	
2	DHW Return Temp- 140°F	X														X		Input	
3	DHW Supply Temp- 120°F	X									130°F					X		Input	
4	DHW Return Temp- 120°F	X														X		Input	
5	Heat Pump Unit 1 KW	X					KW								X	X		Input	4,5
6	Heat Pump Unit 1 KWh	X						KWh							X	X		Input	4,5
7	Heat Pump Unit 2 KW	X					KW								X	X		Input	4,5
8	Heat Pump Unit 2 KWh	X						KWh							X	X		Input	4,5
9	Electric Hot Water Heater KW	X					KW								X	X		Input	4,5
10	Electric Hot Water Heater KWh	X						KWh							X	X		Input	4,5
11	Electric Hot Water Heater Status			X												X		Input	4,5
12	Heat Pump 1 Common Alarm			X						X					X	X		Input	4,5
13	Heat Pump 2 Common Alarm			X						X					X	X		Input	4,5
14	Heat Pump 1 Command				X										X	X		Output	4,5
15	Heat Pump 2 Command				X										X	X		Output	4,5
16	Heat Pump 1 Leaving Temp Set Pt	X													X	X		Set Point	4,5
17	Heat Pump 2 Leaving Temp Set Pt	X													X	X		Set Point	4,5
18	Heat Pump 1 Compressor Command				X										X	X		Output	4,5
19	Heat Pump 2 Compressor Command				X										X	X		Output	4,5
20	DHW Pump- 140°F Status			X						X						X		Input	
21	DHW Pump- 120°F Status			X						X						X		Input	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all Trending and alarm logic. All Trending and alarms shall be part of the BACnet database.

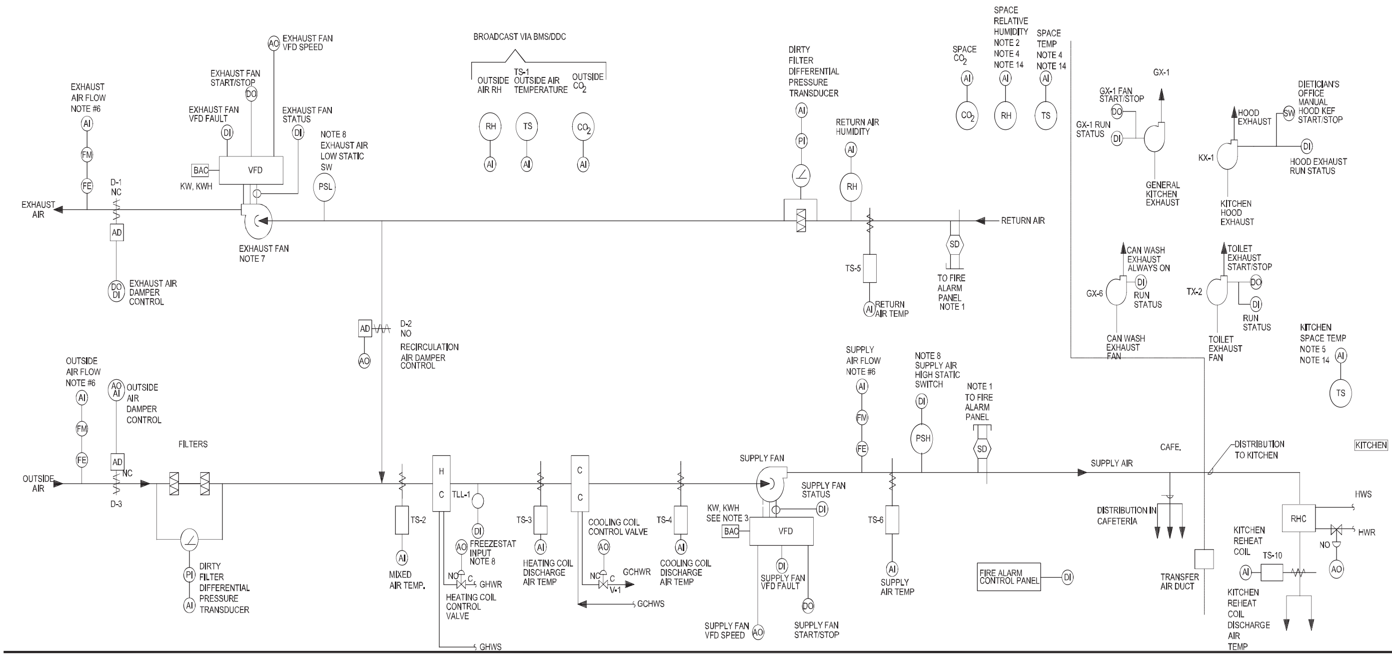
3. For BMS/DDC projects, the TCC shall provide all trending and alarming via the HMI/SCADA Software.

4. Provide BACnet communication connection to this device mapping all required points into the BACnet database.

5. Coordinate BMS connections with Mechanical Contractor and vendor for details

TYPICAL CONTROL POINT LIST HEAT PUMP DOMESTIC WATER HEATER 2

NOT TO SCALE



ABBREVIATIONS:

TS-1	OUTSIDE AIR TEMP
TS-2	MIXED AIR TEMP
TS-3	HEATING COIL DISCHARGE AIR TEMP
TS-4	COOLING COIL DISCHARGE AIR TEMP
TS-5	RETURN AIR TEMP
TS-6	SUPPY AIR TEMP
FE	FLOW ELEMENT
FM	FLOW METER
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BAC	BUILDING AUTOMATION CONTROL NETWORK
PSL	PRESSURE SWITCH LOW
PSH	PRESSURE SWITCH HIGH
AD	DPR ACTUATORS
RH	RELATIVE HUMIDITY
H	HUMIDITY SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSDUCER
OEM	ORIGINAL EQUIPMENT MANUFACTURER
PI	PRESSURE INDICATOR

NOTES:

1. CONTROL WIRING OF SMOKE DETECTORS AND SMOKE DAMPERS IS BY DIV.16.
2. PROVIDE ONE SPACE HUMIDITY SENSOR PER SYSTEM AS SHOWN ON THE DRAWINGS.
3. SUPPLY FAN AND EXHAUST FAN SHALL HAVE SCHEDULED START/STOP COMMAND.
4. DEVICES MOUNTED IN CAFETERIA
5. DEVICES MOUNTED IN KITCHEN
6. INTEGRATE AIR FLOW MEASURING APPARATUS INTO THE BMS/DDC NETWORK.
7. PROVIDE VARIABLE FREQUENCY DRIVES FOR SUPPLY AND EXHAUST FANS. VARIABLE FREQUENCY DRIVES USED TO FACILITATE BALANCING PROCEDURE.
8. SAFETY SHUTDOWN DEVICES SHALL BE HARDWIRED TO THE FAN STARTER CIRCUITS IN ADDITION TO THE DDC SYSTEM. COORDINATE WITH VFD VENDORS FOR SHUTDOWN UNDER ALL MODES OF OPERATION.
9. FAN ELECTRICAL USAGE (KW, KWH) IS AVAILABLE FOR EACH FAN FROM VFD DRIVES.
10. PROVIDE ONE OUTSIDE AIR FLOW MEASURING STATION FOR EACH OUTSIDE AIR INTAKE PORT.
11. DUCT SMOKE DETECTORS SHALL BE PROVIDED IN MAIN SUPPLY AND RETURN DUCT FOR SYSTEMS OVER 2,000 CFM.
12. DIVISION 16 FIRE ALARM CONTRACTOR SHALL FURNISH FIRE ALARM SYSTEM COMPLIANT SMOKE DETECTORS TO THE MECHANICAL CONTRACTOR WHO SHALL IN TURN FURNISH THEM TO THE CENTRAL ROOFTOP UNIT OR CENTRAL AIR HANDLING UNIT MANUFACTURER FOR FACTORY INSTALLATION. DIVISION 16 CONTRACTOR SHALL PROVIDE ALL SIGNAL AND CONTROL POWER WIRING.
13. PROVIDED BY AHU OEM. INSTALLATION AND WIRED BY TCC.

TYPICAL SYSTEM CONTROL DIAGRAM SINGLE ZONE VARIABLE AIR VOLUME (SZVAV) AIR HANDLER KITCHEN AND CAFETERIA (AHU-3) 1

NOT TO SCALE

"SZVAV AIR HANDLING UNIT FOR KITCHEN AND CAFETERIA"		Input/Output (Note 1): Sensed				Calculated			Software/Firmware Features (Note 2,3): Alarms and Advisories (with Instructions)					Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
1	Outside Air Temp	X														X		Input	
2	Outside Air Humidity	X														X		Input	
3	Outside Air Enthalpy		X													X		Input	
4	System Operating Status "A" mode			X						X						X		Input	
5	Supply Airflow Setpoint		X													X		Set Point	3
6	Supply Airflow	X									20% over SP	20% under SP				X		Input	
7	Exhaust Airflow Setpoint		X													X		Set Point	3
8	Exhaust Airflow	X									20% over SP	20% under SP				X		Input	
9	Supply Pre-Filter Pressure Drop	X									per Mfr					X		Input	
10	Exhaust/Return Pre-Filter Pressure Drop	X									per Mfr					X		Input	
11	Supply Air Temp Heating Setpoint		X													X		Set Point	3
12	Exhaust/Return Air Temp	X														X		Input	
13	Exhaust Air Temp Frost Control Setpoint		X													X		Set Point	3
14	Heating Coil Discharge Air Temp Setpoint		X													X		Set Point	3
15	Heating Coil Discharge Air Temp	X														X		Input	
16	Heating Coil Hot Water Valve		X													X		Output	
17	Cooling Coil Discharge Air Temp Setpoint		X								51°FDB					X		Set Point	3
18	Cooling Coil Discharge Air Temp	X														X		Input	
19	Cooling Coil Chilled Water Valve		X													X		Output	
20	Active Supply Air Temp Setpoint		X													X		Set Point	3
21	Supply Air Temp Minimum Setpoint		X													X		Set Point	3
22	Supply Air Temp Maximum Setpoint		X													X		Set Point	3
23	Supply Air Temp	X														X		Input	
24	Kitchen Reheat Coil Valve		X													X		Output	
25	Exhaust/Return Air Relative Humidity	X														X		Input	
26	Exhaust/Return Air Temp	X														X		Input	
27	Exhaust/Return Air Temp Setpoint		X													X		Set Point	3
28	Exhaust/Return Air Dewpoint	X	X													X		Input	
29	Exhaust/Return Air Enthalpy	X	X													X		Input	
30	Exhaust/Return Air (Over Cooling) Temp Setpoint		X													X		Set Point	3
31	Outside Air Supply Damper Cmd		X													X		Output	
32	Exhaust Air Damper Cmd				X											X		Output	

"SZVAV AIR HANDLING UNIT FOR KITCHEN AND CAFETERIA"		Input/Output (Note 1): Sensed				Calculated			Software/Firmware Features (Note 2,3): Alarms and Advisories (with Instructions)					Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
33	Recirculation Air Damper Cmd		X													X		Output	
34	Cafeteria Relative Humidity	X									Note 9					X		Input	7
35	Cafeteria Room Temp	X									Note 8					X		Input	6
36	Cafeteria Room Temp Unoccupied Cut-In Heating Setpoint			X												X		Set Point	3
37	Cafeteria Room Temp Unoccupied Cut-Out Heating Setpoint			X												X		Set Point	3
38	Cafeteria Room Temp Warm-In Cut-Out Setpoint			X												X		Set Point	3
39	Cafeteria Room Temp Warm-Up Cut-Out Setpoint			X												X		Set Point	3
40	Cafeteria Room Unoccupied Dewpoint Cut-In Setpoint		X													X		Set Point	3
41	Cafeteria Room Unoccupied Dewpoint Cut-Out Setpoint		X													X		Set Point	3
42	Cafeteria Room Calculated Enthalpy	X	X													X		Input	
43	Cafeteria Room Calculated Dewpoint	X	X													X		Input	
44	SF High Static Pressure			X						X	[TBD]					X		Input	5
45	EF Low Suction Pressure			X						X		[TBD]				X		Input	5
46	Supply Fan Status			X									1,000			X		Input	
47	Supply Fan VFD															X		Input	
48	Supply Fan VFD S/S				X											X		Output	
49	Supply Fan VFD Fault			X						X						X		Input	
50	Supply Fan VFD Speed	X														X		Input	
51	Supply Fan Failure				X				X							X		Output	
52	Supply Fan VFD "A" Mode			X												X		Input	
53	Exhaust Fan Status			X									1,000			X		Input	
54	Exhaust Fan VFD															X		Input	
55	Exhaust Fan VFD S/S				X											X		Output	
56	Exhaust Fan VFD Fault			X						X						X		Input	
57	Exhaust Fan VFD Speed		X													X		Output	
58	Exhaust Fan Failure				X				X							X		Output	
59	Exhaust Fan VFD "A" Mode			X												X		Input	
60	Outside Air Flow	X					cfm	CCF			SP-20%	SP+20%				X		Input	
61	Outside Air Flow Setpoint		X													X		Set Point	3
62	Common Fire Alarm			X						X						X		Input	
63	Freezestat Alarm			X						X		39°F				X		Input	4
64	HVAC Mode					X										X		Input	
65	Occupancy Mode (Bypass Mode)			X												X		Input	

"SZVAV AIR HANDLING UNIT FOR KITCHEN AND CAFETERIA"		Input/Output (Note 1): Sensed				Calculated			Software/Firmware Features (Note 2,3): Alarms and Advisories (with Instructions)					Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
66	Occupancy Mode					X										X		Input	
67	General Kitchen Exhaust Fan S/S				X											X		Output	
68	General Kitchen Exhaust Fan Status			X												X		Input	
69	General Kitchen Exhaust Fan Failure				X				X							X		Output	
70	Can Wash Exhaust Fan Status			X												X		Input	
71	Staff Toilet Exhaust Fan S/S				X											X		Output	
72	Staff Toilet Exhaust Fan Status			X												X		Input	
73	Staff Toilet Exhaust Fan Failure				X				X							X		Output	
74	Kitchen Hood Exhaust Fan Status			X												X		Input	
75	Mixed Air Temp	X														X		Input	
76	Outside Air CO_2	X														X		Input	
77	Space CO_2	X														X		Input	
78	Kitchen Space Temp	X														X		Input	
79	Kitchen Reheat Coil Discharge Air Temp	X														X		Input	
80	Kitchen Reheat Coil Valve		X													X		Output	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. Alarms shall be viewable at the POT when the POT is connected to the digital controller. Digital controller shall store all trended data.

3. Provide Occupied and Unoccupied setpoints.

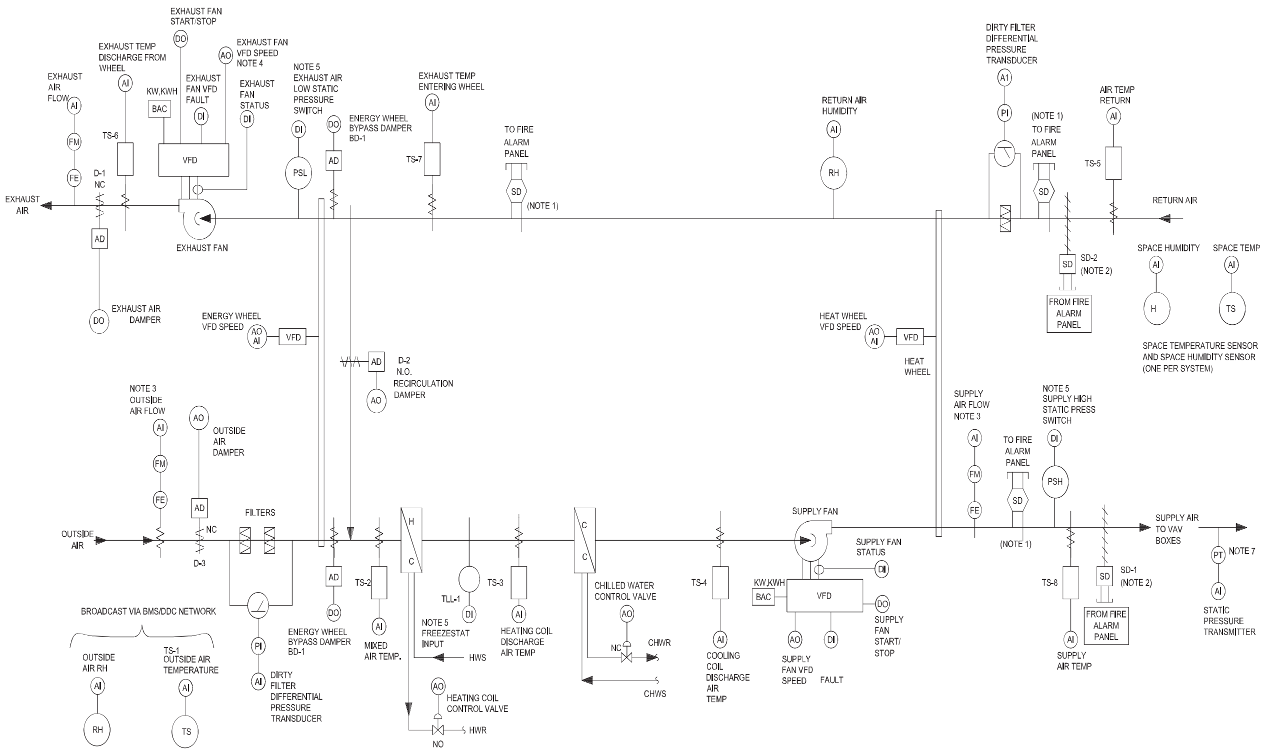
4. Provide manual reset device. Note that this device both alarms on the digital controller and is hardwired to the VFD's for shutdown of the fans in all operating conditions of the VFD.

5. Alarm at 60° FDB occupied heating, 45° FDB unoccupied heating, 85° FDB occupied cooling.

6. 60% RH Occupied cooling, 75° FDP unoccupied cooling.

TYPICAL SYSTEM CONTROL POINT LIST SINGLE ZONE VARIABLE AIR VOLUME (SZVAV) AIR HANDLER KITCHEN AND CAFETERIA (AHU-3) 2

NOT TO SCALE



ABBREVIATIONS

TLL-1	TEMPERATURE LOW LIMIT
TS-1	OUTSIDE AIR TEMP
TS-2	MIXED AIR TEMP
TS-3	HEATING COIL AIR TEMPERATURE
TS-4	COOLING COIL DISCHARGE AIR TEMP
TS-5	RETURN AIR TEMP
TS-6	EXHAUST TEMP DISCHARGE FROM ENERGY WHEEL
TS-7	EXHAUST TEMP ENTERING ENERGY WHEEL
TS-8	SUPPLY AIR TEMP
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
RH	RELATIVE HUMIDITY
FE	FLOW ELEMENT
PSL	PRESSURE SWITCH LOW
PSH	PRESSURE SWITCH HIGH
PT	PRESSURE TRANSMITTER
AD	DPR ACTUATOR
BAC	BACnet BUILDING AUTOMATION NETWORK

NOTES:

1. DUCT SMOKE DETECTORS SHALL BE PROVIDED IN MAIN SUPPLY AND RETURN DUCT FOR SYSTEMS OVER 2,000 CFM AND ALSO UPSTREAM OF EACH STORY RETURN DUCT/ RISER CONNECTION WHERE RETURN AIR RISERS SERVE TWO OR MORE STORIES FOR SYSTEMS OVER 15,000 CFM.
2. SMOKE DAMPERS SHALL BE PROVIDED IN MAIN SUPPLY AND RETURN DUCTS FOR SYSTEMS OVER 15,000 CFM.
3. INTEGRATE FLOW MEASURING APPARATUS INTO THE NETWORK.
4. EXHAUST FAN VFD SHALL BE ADJUSTED TO MAINTAIN REQUIRED EXHAUST RATE AS MEASURED BY EXHAUST AIR FLOW MONITORING STATION.
5. SAFETY DEVICES SHALL BE HARDWIRED TO THE FAN STARTER CIRCUIT IN ADDITION TO THE DDC SYSTEM. COORDINATE WITH THE VFD VENDOR FOR SHUTDOWN UNDER ALL MODES OF OPERATION.
6. DIVISION 16 FIRE ALARM CONTRACTOR SHALL FURNISH FIRE ALARM SYSTEM COMPLIANT SMOKE DETECTORS TO THE MECHANICAL CONTRACTOR WHO SHALL IN TURN FURNISH THEM TO THE CENTRAL ROOFTOP UNIT OR CENTRAL AIR HANDLING UNIT MANUFACTURER FOR FACTORY INSTALLATION OR TO THE SHEET METAL CONTRACTOR FOR FIELD DUCTWORK INSTALLATION FOR THE FLOOR RETURN/RISER RETURN CONNECTIONS AS APPLICABLE. DIVISION 16 CONTRACTOR SHALL PROVIDE ALL SIGNAL AND CONTROL POWER WIRING.
7. THE SUPPLY DUCT STATIC PRESSURE SENSOR SHALL BE LOCATED IN ACCORDANCE WITH ASHRAE 90.1-13 SECTION 6.5.3.2.2 (SUCH THAT THE INITIAL CONTROLLER SETPOINT (SUBJECT TO RESET) IS NO GREATER THAN 1.2" WC). IF LOCATING THE STATIC PRESSURE TO ACHIEVE THIS RESULTS IN SENSOR BEING LOCATED DOWNSTREAM OF MAJOR DUCT SPLITS, SENSORS SHALL BE INSTALLED IN EACH MAJOR BRANCH TO INSURE THAT STATIC PRESSURE CAN BE MAINTAINED IN EACH DUCT. STATIC PRESSURE SET POINT SHALL BE RESET UP OR DOWN BASED ON THE ZONE REQUIRING THE MOST PRESSURE; I.E. THE SET POINT IS RESET UNTIL ONE ZONE DAMPER IS NEARBY WIDE OPEN.

TYPICAL SYSTEM CONTROL DIAGRAM VARIABLE AIR VOLUME (AHU-1 & AHU-2) AIR HANDLER 1

NOT TO SCALE

"VARIABLE AIR VOLUME AIR HANDLING UNIT"		Input/Output (Note 1) Sensed				Input/Output (Note 1) Calculated			Software/Firmware Features (Note 2,3) Alarms and Advisories (with Instructions)					Software/Firmware Features (Note 2,3) Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
1	Outside Air Temp	X												X		X		nvo	
2	Outside Air Humidity	X												X		X		nvo	
3	Mixed Air Temp	X										40°F				X		nvo	
4	Heating Coil Discharge Temp	X										40°F				X		nvo	
5	Supply Air Temp	X														X		nvo	
6	Return Air Temp	X										55°F				X		nvo	
7	Return Air Humidity	X														X		nvo	
8	Space Temp	X										45°F				X		nvo	
9	Space Humidity	X														X		nvo	
10	Dirty Filter Alarms	X								X	per Mfr							nvo	
11	Freezestat Alarm			X						X		39°F						nvo	
12	Supply Air Static Pressure	X														X		nvo	11
13	Supply Air Static Pressure Setpoint		X															nvi/nvo	
14	SF High Static Pressure			X						X	[TBD]							nvo	7
15	EF Low Suction Pressure			X						X		[TBD]						nvo	7
16	Outside Air Damper		X															nvo	
17	Exhaust Air Damper				X													nvo	
18	Recirculation Air Damper		X															nvo	
19	Cooling Coil Valve		X															nvo	
20	Heating Coil Valve		X															nvo	
21	Outside Air Flow	X					cfm	CCF			SP-10%	SP+10%				X		nvo	6
22	Supply Fan Status			X									1,000					nvo	
23	Supply Fan VFD														X			nvo	4
24	Supply Fan VFD S/S				X													nvo	
25	Supply Fan VFD Fault			X						X								nvo	
26	Supply Fan VFD Speed	X																nvo	
27	Supply Fan Failure				X				X									nvo	2
28	Exhaust Fan Status			X									1,000					nvo	
29	Exhaust Fan VFD														X			nvo	4
30	Exhaust Fan VFD S/S				X													nvo	
31	Exhaust Fan VFD Fault			X						X								nvo	
32	Exhaust Fan VFD Speed		X															nvo	
33	Exhaust Fan Failure				X				X									nvo	2
34	Common Fire Alarm			X						X				X				nvo	
35	Supply Air Temp Active Setpoint		X													X		nvo	
36	Supply Air Temp Setpoint		X															nvi/nvo	
37	Manual Supply Air Temp Override				X													nvi/nvo	
38	Space Humidity Setpoint		X															nvi/nvo	5
39	HVAC Mode					X								X				nvo	
40	Occupancy Mode					X												nvo	
41	Exhaust Air Flow	X																nvo	
42	Supply Air Flow	X																nvo	
43	Exhaust Temp Entering Wheel	X																nvo	
44	Exhaust Temp Discharge From Wheel	X																nvo	
45	Enthalpy Wheel Rotation Sensor	X																nvo	
46	Enthalpy Wheel VFD Speed		X															nvo	
47	Heat Pipe Bypass Damper		X															nvo	
48	Energy Wheel Bypass Damper				X											X		nvo	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all digital alarm logic. All digital alarms shall be part of the LNS database.

3. The FMSI will provide all trending and analog alarming via the Wonderware Software.

4. Provide Lon communication connection to this device mapping all required points into the LNS database.

5. Provide Occupied and Unoccupied setpoints.

6. Provide accumulated air flow for validation of purge-mode and for permanent validation of occupant ventilation

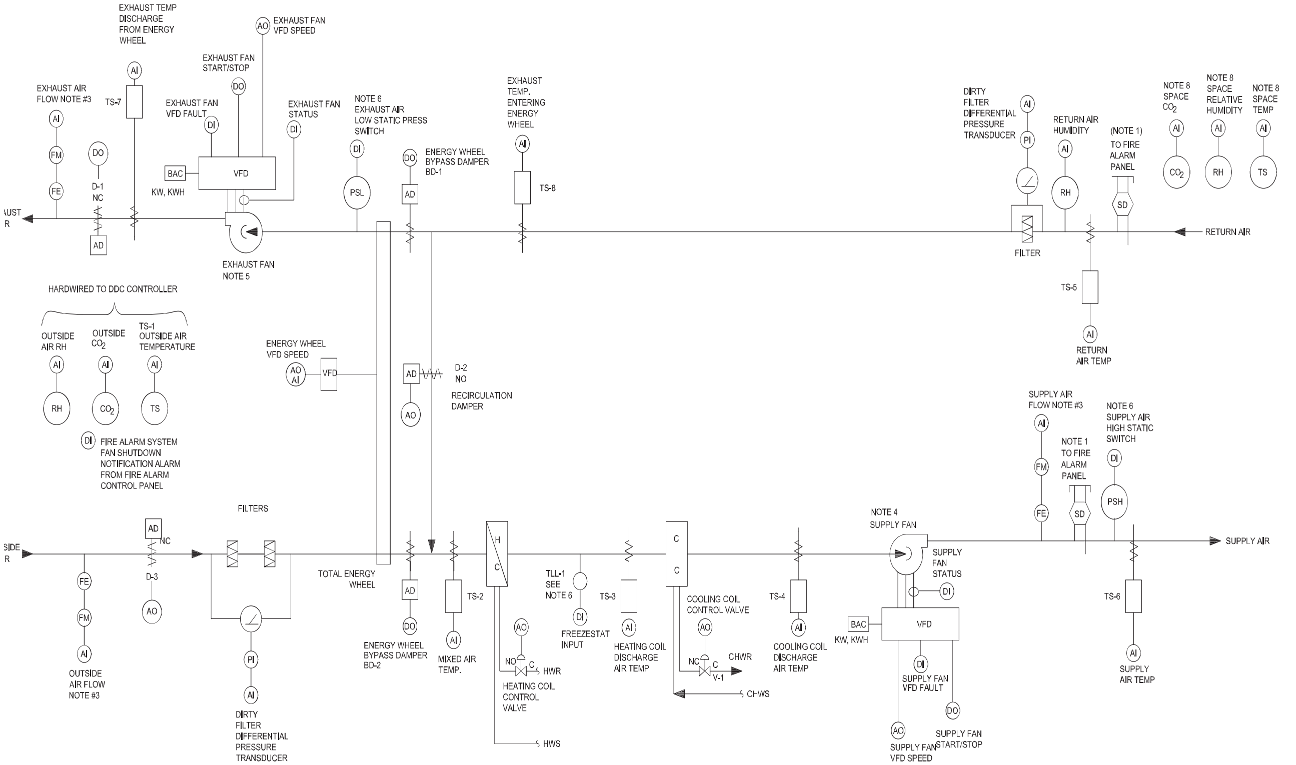
7. Provide manual reset device. Note that this device both alarms in the BMS and is hardwired to the VFD's for shutdown of the fans in all operating conditions of the VFD.

8. NVO is network variable output. NVI is network variable input.

9. Static Pressure sensor to be field located as per note 7 on the drawing.

TYPICAL SYSTEM CONTROL POINT LIST VARIABLE AIR VOLUME (AHU-1 & AHU-2) AIR HANDLER 2

NOT TO SCALE



ABBREVIATIONS

TLL-1	TEMPERATURE LOW LIMIT
TS-1	OUTSIDE AIR TEMP
TS-2	MIXED AIR TEMP
TS-3	HEATING COIL DISCHARGE AIR TEMP
TS-4	COOLING COIL DISCHARGE AIR TEMP
TS-5	EXHAUST AIR TEMP
TS-6	SUPPLY AIR TEMP
TS-7	EXHAUST TEMP DISCHARGE FROM ENERGY WHEEL
TS-8	EXHAUST TEMP. ENTERING ENERGY WHEEL
FE	FLOW ELEMENT
FM	FLOW METER
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BAC	BACnet DDC CONTROLLER
PSL	PRESSURE SWITCH LOW
PSH	PRESSURE SWITCH HIGH
AD	DPR ACTUATORS
RH	RELATIVE HUMIDITY

NOTES:

1. DUCT SMOKE DETECTORS SHALL BE PROVIDED IN MAIN SUPPLY DUCT AND RETURN DUCT FOR SYSTEMS OVER 2,000 CFM AND ALSO UPSTREAM OF EACH STORY RETURN DUCT/RISER CONNECTION WHERE RETURN AIR RISERS SERVE TWO OR MORE STORIES FOR SYSTEMS OVER 15,000 CFM.
2. SMOKE DAMPERS SHALL BE PROVIDED IN MAIN SUPPLY AND RETURN DUCT FOR SYSTEMS OVER 15,000 CFM.
3. INTEGRATE AIR FLOW MEASURING APPARATUS INTO THE BMS/DDC NETWORK.
4. EXHAUST FAN VFD SHALL HAVE SCHEDULED START/STOP COMMAND.
5. PROVIDE VARIABLE FREQUENCY DRIVE SUPPLY AND EXHAUST FANS.
6. SAFETY SHUTDOWN DEVICES SHALL BE HARDWIRED TO THE FAN STARTER CIRCUIT IN ADDITION TO THE DDC SYSTEM. COORDINATE WITH VFD VENDOR FOR SHUTDOWN UNDER ALL MODES OF OPERATION.
7. DIVISION 16 FIRE ALARM CONTRACTOR SHALL FURNISH FIRE ALARM SYSTEM COMPLIANT SMOKE DETECTORS TO THE MECHANICAL CONTRACTOR WHO SHALL IN TURN FURNISH THEM TO THE AIR HANDLING UNIT MANUFACTURER FOR FACTORY INSTALLATION OR TO THE SHEET METAL CONTRACTOR FOR FIELD DUCTWORK INSTALLATION. DIVISION 16 CONTRACTOR SHALL PROVIDE ALL SIGNAL AND CONTROL POWER WIRING.
8. PROVIDED BY OEM. WIRED AND INSTALLED BY TCC.

YPICAL SYSTEM CONTROL DIAGRAM SINGLE ZONE VARIABLE AIR VOLUME (SZVAV) GYMATORIUM (AHU-4) 1

IOT TO SCALE

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"VARIABLE VOLUME SINGLE ZONE AIR HANDLING UNIT WITH ENTHALPY WHEEL AND HEAT PIPE"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Charge-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct Lon Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Outside Air Temp	X												X		X		nvo	
2	Outside Air Humidity	X												X		X		nvo	
3	Outside Air Enthalpy		X											X				nvo	
4	Outside Air CO2	X												X		X		nvo	
5	System Operating Status "A" mode			X						X						X		nvo	
6	Supply Airflow Setpoint		X															nvi/nvo	
7	Supply Airflow	X									20% over SP	20% under SP				X		nvo	
8	Exhaust/Return Airflow Setpoint		X															nvi/nvo	
9	Exhaust/Return Airflow	X									20% over SP	20% under SP						nvo	
10	Supply Pre-Filter Pressure Drop	X									per Mfr					X		nvo	
11	Exhaust/Return Pre-Filter Pressure Drop	X									per Mfr					X		nvo	
12	Supply Air Enthalpy Wheel Discharge Temp	X														X		nvo	
13	Supply Air Temp Heating Setpoint (Leaving The Wheel)		X															nvi/nvo	
14	Exhaust/Return Air Temp (Entering The Wheel)	X														X		nvo	
15	Enthalpy Wheel Rotation Sensor	X																nvo	
16	Enthalpy Wheel VFD Speed		X															nvo	
17	Exhaust/Return Air Temp (Leaving The Wheel)	X																nvo	
18	Exhaust/Return Air Temp Frost Control Setpoint		X															nvi/nvo	
19	Heating Coil Discharge Air Temp Setpoint		X															nvi/nvo	
20	Heating Coil Discharge Air Temp	X														X		nvo	
21	Heating Coil Hot Water Valve		X															nvo	
22	Cooling Coil Discharge Air Temp Setpoint		X								51°FDB							nvi/nvo	
23	Cooling Coil Discharge Air Temp	X														X		nvo	
24	Cooling Coil Chilled Water Valve		X															nvo	
25	Supply Air Temp Setpoint		X															nvi/nvo	
26	Supply Air Temp Minimum Setpoint		X															nvi/nvo	
27	Supply Air Temp Maximum Setpoint		X															nvi/nvo	
28	Supply Air Temp	X														X		nvo	

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"VARIABLE VOLUME SINGLE ZONE AIR HANDLING UNIT WITH ENTHALPY WHEEL AND HEAT PIPE"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct Lon Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
29	Heat Pipe Bypass Damper Signal		X															nvo	
30	Exhaust/Return Air Relative Humidity	X																nvo	
31	Exhaust/Return Air Relative Humidity Setpoint		X															nvi/nvo	
32	Exhaust/Return Air Temp	X														X		nvo	
33	Exhaust/Return Air Temp Setpoint		X															nvi/nvo	5
34	Exhaust/Return Air Dewpoint	X	X															nvo	
35	Exhaust/Return Air Dewpoint Setpoint		X															nvi/nvo	5
36	Exhaust/Return Air Enthalpy	X	X															nvo	
37	Exhaust/Return Air (Over Cooling) Temp Setpoint		X															nvi/nvo	
38	Outside Air Supply Damper Status			X														nvo	
39	Exhaust/Return Air Damper Status				X													nvo	
40	Recirculation Air Damper Status			X														nvo	
39	Room Space Relative Humidity	X									Note 9					X		nvo	
40	Room Temp	X									Note 8					X		nvo	
41	Room Temp Unoccupied Cut-In Heating Setpoint			X														nvi/nvo	
42	Room Temp Unoccupied Cut-Out Heating Setpoint			X														nvi/nvo	
43	Room Temp Warm-In Cut-Out Setpoint			X														nvi/nvo	
44	Room Temp Warm-Up Cut-Out Setpoint			X														nvi/nvo	
45	Room Unoccupied Dewpoint Cut-In Setpoint		X															nvi/nvo	
46	Room Unoccupied Dewpoint Cut-Out Setpoint		X															nvi/nvo	
47	Room Occupied Dewpoint Setpoint		X															nvi/nvo	
48	Room Calculated Enthalpy	X	X															nvo	
49	Room Calculated Dewpoint	X	X															nvo	
50	Room CO2	X																nvo	
51	Differential CO2 (Calculated)					X					1000 ppm							nvo	11
52	SF High Static Pressure			X						X	[TBD]							nvo	7
53	EF/RF Low Suction Pressure			X						X		[TBD]						nvo	7
54	Supply Fan Status			X									1,000					nvo	
55	Supply Fan VFD														X			nvo	4
56	Supply Fan VFD S/S				X													nvo	

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"VARIABLE VOLUME SINGLE ZONE AIR HANDLING UNIT WITH ENTHALPY WHEEL AND HEAT PIPE"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct Lon Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
57	Supply Fan VFD Fault			X						X								nvo	
58	Supply Fan VFD Speed		X															nvo	
59	Supply Fan Failure				X				X									nvo	2
60	Supply Fan VFD "A" Mode			X														nvo	
61	Supply Fan VFD Power KW,KWH													X	X			nvo	
62	Exhaust Fan Status			X									1,000					nvo	
63	Exhaust Fan VFD														X			nvo	4
64	Exhaust Fan VFD S/S				X													nvo	
65	Exhaust Fan VFD Fault			X						X								nvo	
66	Exhaust Fan VFD Speed		X															nvo	
67	Exhaust Fan Failure				X				X									nvo	2
68	Exhaust Fan VFD "A" Mode			X														nvo	
69	Exhaust Fan VFD Power KW,KWH													X	X			nvo	
70	Outside Air Flow	X					cfm	CCF			SP-20%	SP+20%				X		nvo	6
71	Outside Air Flow Setpoint		X															nvi/nvo	
72	Common Fire Alarm			X						X				X				nvo	
73	Freezestat Alarm			X						X		39°F						nvo	
74	Supply Air Temp Active Setpoint		X													X		nvo	
75	Space Humidity Setpoint		X															nvi/nvo	5
76	HVAC Mode					X								X				nvo	
77	Occupancy Mode (Bypass Mode)			X														nvo	
78	Occupancy Mode					X												nvo	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all digital alarm logic. All digital alarms shall be part of the LNS database.

3. The FMSI will provide all trending and analog alarming via the Wonderware Software.

4. Provide Lon communication connection to this device mapping all required points into the LNS database.

5. Provide Occupied and Unoccupied setpoints.

6. Provide accumulated air flow for validation of purge-mode and for permanent validation of occupant ventilation

7. Provide manual reset device. Note that this device both alarms in the BMS and is hardwired to the VFD's for shutdown of the fans in all operating conditions of the VFD.

8. Alarm at 60° FDB occupied heating, 45° FDB unoccupied heating, 85° FDB occupied cooling.

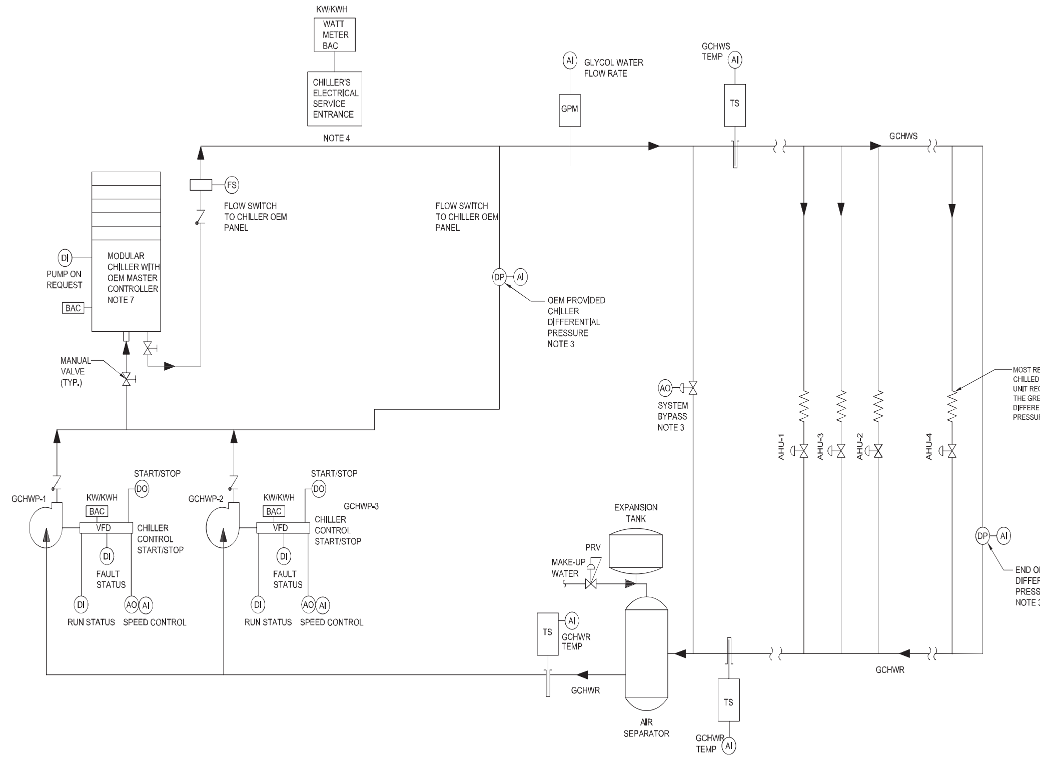
9. 55% RH Occupied cooling, 63° FDB unoccupied cooling.

10. NVO is network variable output. NVI is network variable input.

11. Provide an alarm when at the calculated differential between outside air and space air CO2 value is 1000ppm.

TYPICAL SYSTEM CONTROL DIAGRAM SINGLE ZONE VARIABLE AIR VOLUME (SZVAV) GYMATORIUM (AHU-4) 2

NOT TO SCALE



ABBREVIATIONS

DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
GCHWP	GLYCOL CHILLED WATER PUMP
DP	DIFFERENTIAL PRESSURE TRANSMITTER
FS	FLOW SWITCH
VFD	VARIABLE FREQUENCY DRIVE
TS	TEMPERATURE SENSOR
AHU	AIR HANDLING UNIT
HX	HEAT EXCHANGER
GCHWS	GLYCOL CHILLED WATER SUPPLY
GCHWR	GLYCOL CHILLED WATER RETURN

NOTES:

1. FOR COMPLETE VALVE AND INSTRUMENTATION REQUIREMENTS SEE CONTRACT SPECIFICATION.
2. USE MODULATING 2-WAY VALVES FOR THROTTLING OF AHU AND CHILLED WATER TERMINAL UNITS.
3. PROVIDE A SYSTEM DIFFERENTIAL PRESSURE TRANSMITTER TO PROVIDE VARIABLE FLOW CONTROL SIGNAL TO AUTOMATICALLY CONTROL THE SPEED OF THE GLYCOL CHILLED WATER PUMP. PROVIDE SEPARATE CHILLER DIFFERENTIAL PRESSURE TRANSMITTER(S) TO MODULATE SYSTEM BYPASS VALVE(S). PROVIDE MODULATING 2-WAY BYPASS VALVES SIZED IN THE AGGREGATE FOR THE FLOW REQUIRED TO SATISFY THE CRITICAL MINIMUM FLOW OF GLYCOL PUMP (40-45% VFD) AND FOR FLOW REQUIREMENT OF CHILLER AT TRANSIENT FULL LOAD WITH MINIMUM FLOW. COORDINATE WITH CHILLER MANUFACTURER AND WATER BALANCER TO SET REQUIRED FLOW AND MINIMUM AMOUNT OF MODULAR CHILLER MODULES REQUIRED TO BE OPEN WHEN CHILLER IS IDLE TO ENSURE PRIMARY LOOP GLYCOL PUMP IS NEVER "DEAD HEADED".
4. THE TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE AND INTEGRATE A WATT METER FOR EACH FEEDER THAT SERVES THE CHILLER FOR KW AND KWH MONITORING.

   ENERGY MONITORING (KW, KWH) FOR EACH PRIMARY PUMP SHALL BE THROUGH THEIR RESPECTIVE VARIABLE FREQUENCY DRIVES AND SHALL BE INTEGRATED INTO THE BMS/DDC SYSTEM.
5. LOCAL MODULAR MASTER CHILLER CONTROL PANEL SHALL STAGE ON AS REQUIRED THE INTERNAL MODULAR CHILLER MODULES TO SATISFY THE WATER TEMPERATURE SETPOINT. CHILLER MANUFACTURER SHALL ROTATE LEAD MODULE TO ENSURE EQUAL RUN TIME ON ALL MODULES. CHILLER MANUFACTURER SHALL CONFIGURE MASTER CHILLER CONTROL PANEL TO ALLOW CURRENT LEAD MODULE AND ANY OTHER MODULE NEEDED TO BE OPEN TO ALLOW SYSTEM FLOW, EVEN IF THE CHILLER IS IDLE. TCC SHALL WIRE AN OEM PROVIDED FLOW SWITCH TO CHILLER MASTER PANEL AS SAFETY INTERLOCK. TCC SHALL INTEGRATE CHILLER OEM MASTER PANEL VIA BACNET INTERFACE TO THE BMS/DDC SYSTEM. TCC SHALL PROVIDE ALL PRIMARY LOOP CONTROL AND MONITORING REQUIREMENTS AS PER THE POINTS LIST.
6. EACH MODULE SHALL BE PROVIDED WITH A MOTORIZED ISOLATION VALVE (NOT SHOWN) CONTROLLED BY OEM.
7. PROVIDE OEM SUPERVISORY MASTER CONTROLLER TO LEAD/LAG CONTROL MULTIPLE CHILLER BANKS.
8. DIFFERENTIAL PRESSURE SHALL BE MEASURED AT OR NEAR THE MOST REMOTE CHILLED WATER UNIT OR UNIT REQUIRING THE GREATEST DIFFERENTIAL PRESSURE.

TYPICAL SYSTEM CONTROL DIAGRAM VARIABLE FLOW CHILLED WATER PLANT PRIMARY LOOP PIPING 1

NOT TO SCALE

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"CHILLED WATER PLANT MONITORING"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Chiller Differential Pressure	X									SP+10%	SP-10%			X	X		Input	8
2	Differential Water Pressure	X									SP+10%	SP-10%			X				8
3	GCHW Supply Temp- Primary	X													X	X		Input	8
4	GCHW Return Temp- Primary Pre-System Bypass	X									SP+10°F	SP-10°F			X	X		Input	8
5	GCHW Return Temp- Primary POST-System Bypass	X									SP+10°F	SP-10°F			X	X		Input	8
6	CHW Supply Temp- Each Chiller	X													X	X		Input	8
7	CHW Return Temp- Each Chiller	X													X	X		Input	8
8	Primary GCHW Pump VFD			X											X	X		Input	4,8
9	Primary GCHW Pump VFD S/S				X										X	X		Output	7,8
10	Primary GCHW Pump VFD Status			X											X	X		Input	7,8
11	Primary GCHW Pump VFD Speed		X												X	X		Output	7,8
12	Primary GCHW Pump VFD Fault			X											X	X		Input	7,8
13	Primary GCHW Pump VFD Power KW,KWH													X	X	X		Input	7,8
14	Primary GCHW Pump Failure			X					X						X	X		Input	2,7,8
15	Chiller Controller														X	X		Input	7,8
16	Each Chiller	X					KW	KWH							X	X		Input	4
17	Primary Water Flow Rate	X					gpm								X	X		Input	8
18	Chiller Common Alarm			X						X					X	X		Input	8
19	Primary Differential Pressure Valve		X												X	X		Output	8
20	Chiller Differential Pressure Setpoint		X												X	X		Set Point	8
21	Primary GCHW Temperature Setpoint		X												X	X		Set Point	8
22	Primary GCHW Differential Pressure Setpoint		X												X	X		Set Point	8
23	Chiller Enable Command				X										X	X		Output	8
24	Chiller Enable Setpoint		X												X	X		Set Point	8

Symbol:

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. All alarms shall be part of the BACnet database.

3. The TCC will provide all trending and alarming via the HMI/SCADA Software.

4. Provide BACnet communication connection to this device mapping all required points into the BACnet database.

5. Provide remote chilled water setpoint adjustment.

6. When using thermistor sensors use matched-pair elements to eliminate inter-sensor error factor.

7. Provide points for each pump.

8. Chiller Equipment Manufacturer to provide data points via BACnet Interface to BMS

TYPICAL SYSTEM CONTROL POINT LIST VARIABLE FLOW CHILLED WATER PLANT PRIMARY LOOP PIPING 2

NOT TO SCALE

ABBREVIATIONS

TS-1 RETURN TEMP. (140° LOOP)
TS-2 RETURN TEMP. (120° LOOP)
TS-3 SUPPLY TEMP. 140°F
TS-4 SUPPLY TEMP. 120°F

DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BACnet	BACnet INTERFACE TO BMS

NOTE:

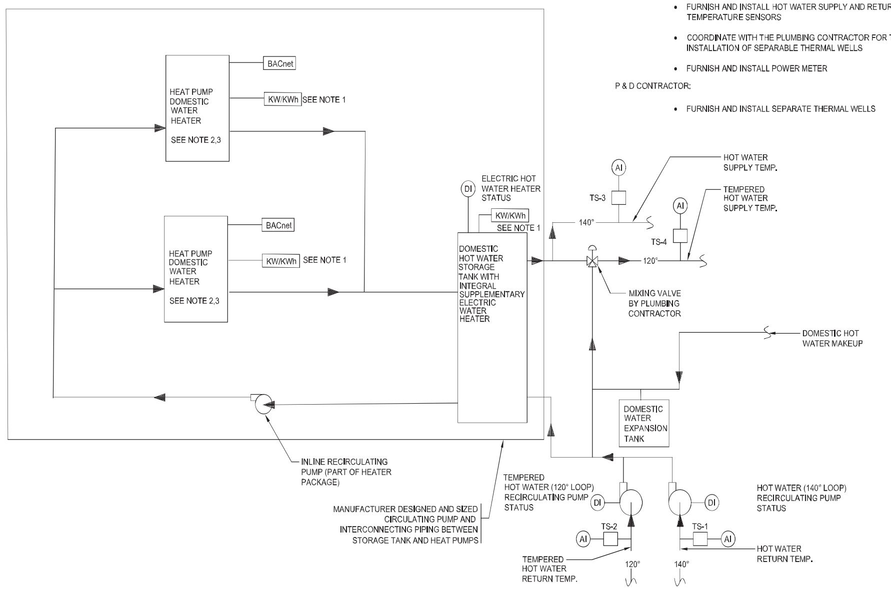
1. POWER METER IN MECHANICAL EQUIPMENT ROOM IS PROVIDED BY THE TEMPERATURE CONTROLS CONTRACTOR. TEMPERATURE CONTROLS CONTRACTOR (TCC) SHALL INTEGRATE POWER METER WITH THE BMS SYSTEM. THE POWER METER IS TO BE PROVIDED AS PART OF CONTRACT SPECIFICATION 15970, AND SHALL BE MONITORED THROUGH THE BMS.
2. OEM DOMESTIC HOT WATER CONTROL PANEL SHALL MODULATE BOTH HEAT PUMP HEATER, SUPPLEMENTAL ELECTRIC HEATER AND CONTROL THE INLINE RECIRCULATING PUMPS. BMS/DDC SYSTEM SHALL ONLY MONITOR, NOT CONTROL THE HEAT PUMP HEATER AND SUPPLEMENTAL ELECTRIC HEATER. SUPPLEMENTAL ELECTRIC HEATER SHALL ONLY BE ENABLED IF THE HEAT PUMP HEATER ALONE CANNOT MEET THE LOAD.
3. TEMPERATURE CONTROL CONTRACTOR SHALL INTEGRATE THE TEMPERATURE SENSORS AND BACnet INTERFACE FOR THE HEAT PUMPS AND SUPPLEMENTAL ELECTRIC HEATER INTO THE BMS/DDC SYSTEM.
4. CONTRACTUAL OBLIGATIONS:

   TEMPERATURE CONTROL CONTRACTOR (TCC):

   - FURNISH AND INSTALL HOT WATER SUPPLY AND RETURN TEMPERATURE SENSORS
   - COORDINATE WITH THE PLUMBING CONTRACTOR FOR THE INSTALLATION OF SEPARABLE THERMAL WELLS
   - FURNISH AND INSTALL POWER METER

   P & D CONTRACTOR:

   - FURNISH AND INSTALL SEPARATE THERMAL WELLS



TYPICAL CONTROL DIAGRAM CENTRAL HEAT PUMP DOMESTIC WATER HEATER 1

NOT TO SCALE

"CENTRAL HEAT PUMP DOMESTIC WATER HEATER"		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)											Notes
		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features						
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communicatio	Trended Value	Misc. Other	Network Variable Type	Notes	
1	DHW Supply Temp- 140°F	X									150°F					X		Input		
2	DHW Return Temp- 140°F	X														X		Input		
3	DHW Supply Temp- 120°F	X									130°F					X		Input		
4	DHW Return Temp- 120°F	X														X		Input		
5	Heat Pump Unit 1 KW	X					KW								X	X		Input	4,5	
6	Heat Pump Unit 1 KWh	X						KWh							X	X		Input	4,5	
7	Heat Pump Unit 2 KW	X					KW								X	X		Input	4,5	
8	Heat Pump Unit 2 KWh	X						KWh							X	X		Input	4,5	
9	Electric Hot Water Heater KW	X					KW								X	X		Input	4,5	
10	Electric Hot Water Heater KWh	X						KWh							X	X		Input	4,5	
11	Electric Hot Water Heater Status			X												X		Input	4,5	
12	Heat Pump 1 Common Alarm			X						X					X	X		Input	4,5	
13	Heat Pump 2 Common Alarm			X						X					X	X		Input	4,5	
14	Heat Pump 1 Command				X										X	X		Output	4,5	
15	Heat Pump 2 Command				X										X	X		Output	4,5	
16	Heat Pump 1 Leaving Temp Set Pt	X													X	X		Set Point	4,5	
17	Heat Pump 2 Leaving Temp Set Pt	X													X	X		Set Point	4,5	
18	Heat Pump 1 Compressor Command				X										X	X		Output	4,5	
19	Heat Pump 2 Compressor Command				X										X	X		Output	4,5	
20	DHW Pump- 140°F Status			X						X						X		Input		
21	DHW Pump- 120°F Status			X						X						X		Input		

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all Trending and alarm logic. All Trending and alarms shall be part of the BAcnet database.

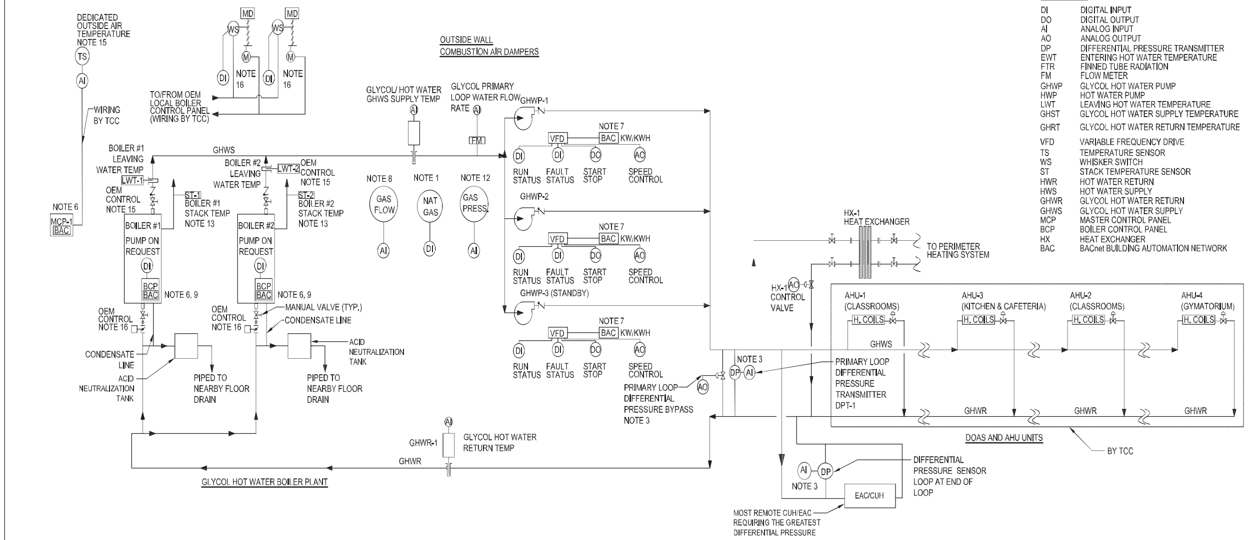
3. For BMS/DDC projects, the TCC shall provide all trending and alarming via the HMI/SCADA Software.

4. Provide BAcnet communication connection to this device mapping all required points into the BAcnet database.

5. Coordinate BMS connections with Mechanical Contractor and vendor for details

TYPICAL CONTROL POINT LIST HEAT PUMP DOMESTIC WATER HEATER 2

NOT TO SCALE



ABBREVIATIONS

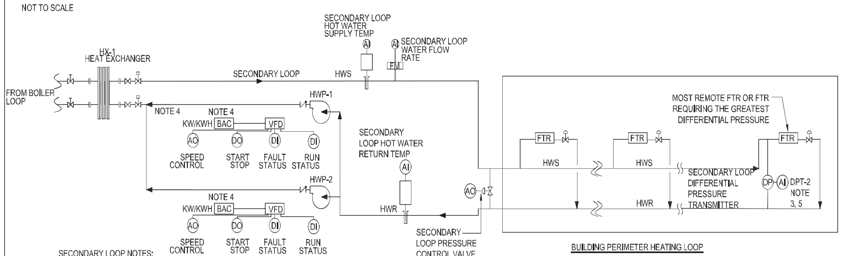
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DP	DIFFERENTIAL PRESSURE TRANSMITTER
EWT	ENTERING HOT WATER TEMPERATURE
FTR	FINNED TUBE RADIATION
FM	FLOW METER
GHWP	GLYCOL HOT WATER PUMP
HWP	HOT WATER PUMP
LWT	LEAVING HOT WATER TEMPERATURE
GHST	GLYCOL HOT WATER SUPPLY TEMPERATURE
GHRT	GLYCOL HOT WATER RETURN TEMPERATURE
VFD	VARIABLE FREQUENCY DRIVE
TS	TEMPERATURE SENSOR
WS	WHISKER SWITCH
ST	STACK TEMPERATURE SENSOR
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
GHWR	GLYCOL HOT WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
MCP	MASTER CONTROL PANEL
BCP	BOILER CONTROL PANEL
HX	HEAT EXCHANGER
BAC	BACnet BUILDING AUTOMATION NETWORK

PRIMARY LOOP NOTES:

1. NATURAL GAS SENSORS IN MECHANICAL EQUIPMENT ROOM ARE PROVIDED BY THE MECHANICAL CONTRACTOR. INTEGRATE GAS ALARM PANEL ANNUNCIATION WITH THE BMS SYSTEM.
2. USE 2-WAY VALVES FOR THROTTLING OF TERMINAL UNITS.
3. PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER TO PROVIDE VARIABLE FLOW CONTROL SIGNAL TO OPERATING PRIMARY HOT WATER PUMPS AND DIFFERENTIAL PRESSURE VALVE. PROVIDE 2-WAY BYPASS VALVE SIZED IN THE AGGREGATE FOR THE MINIMUM FLOW REQUIRED TO SATISFY THE CRITICAL MINIMUM FLOW (40-45% VFD SPEED). PRIMARY LOOP CRITICAL MINIMUM FLOW SHALL ALSO BE DETERMINED IN CONSIDERATION OF BOILER MINIMUM FLOW. TCC TO COORDINATE WITH THE WATER BALANCER.
4. FOR COMPLETE VALVE AND INSTRUMENTATION REQUIREMENTS SEE CONTRACT SPECIFICATION.
5. TCC TO PROVIDE THE NECESSARY INTERLOCK WIRING BETWEEN COMB. DAMPERS, WHISKER SWITCH AND CONDENSING BOILER CONTROL PANEL(S) COORD. WITH OEM.
6. TCC TO COORDINATE FIELD INSTALLATION REQUIREMENTS OF OEM FURNISHED DEVICES WITH THE MANUFACTURER. TCC TO PROVIDE INSTALLATION AS REQUIRED. MASTER BOILER CONTROLLER BY OEM SHALL PROVIDE UNIVERSAL DIGITAL CONTROLLERS, SEQUENCES, ETC.
7. VARIABLE FREQUENCY DRIVES (VFD) SHALL BE USED TO MONITOR AND RECORD KW AND KWH DATA.
8. IN AREAS WHERE GAS PRESSURE IS 1/2 PSIG OR LESS IN THE SERVING UTILITY'S STREET PIPING NETWORK, TEMPERATURE CONTROLS CONTRACTOR (TCC) SHALL INTEGRATE THE HEADER GAS SUB-METER (FURNISHED AND INSTALLED BY P&D CONTRACTOR). ONLY THE HEADER FEEDING THE BOILERS AND RTUs (NOT EACH INDIVIDUAL BOILER OR RTU) REQUIRES GAS FLOW MONITORING.
9. OEM SHALL PROVIDE FLAME SAFEGUARD CONTROLS, FUEL/AIR RATIO CONTROLLER, UNIVERSAL DIGITAL CONTROLLERS (I.E. HOT WATER SUPPLY TEMP RESET). SENSORS UTILIZED BY OEM CONTROL SYSTEM CAN ALSO BE UTILIZED FOR BMS/DDC SYSTEM BY MAPPING THROUGH GATEWAY. OTHER ALTERNATE IS FOR TCC TO PROVIDE THEIR OWN MONITORING SENSORS. OEM CONTROLS LEAD/LAG OF BOILERS. TCC CONTROLS ONLY MONITOR BOILER FUNCTIONING AND CONTROL VFD PUMPS.
10. AIR SEPARATOR, EXPANSION TANK, MAKEUP WATER LINE NOT SHOWN, REFER TO MECHANICAL PIPING DRAWINGS.
11. LOCAL BOILER CONTROL PANEL BY OEM SHALL INCLUDE FLAME SAFEGUARD SYSTEM, FUEL/AIR CONTROLLER, COMBUSTION AIR PROVING, ETC. PER SPEC. 15565.
12. TCC SHALL INTEGRATE THE HEADER GAS PRESSURE TRANSMITTERS (FURNISHED BY THE TCC) THAT SERVE ALL OF THE BOILERS AND DOMESTIC HOT WATER HEATER GAS PRESSURE TRANSMITTER.
13. TCC SHALL PROVIDE STACK TEMPERATURE SENSORS IF THE BOILER FLAME SAFEGUARD CONTROLLER FLAME FAILURE POINT CAN NOT BE MAPPED TO BACnet.
14. IF NOT OTHERWISE NOTED, POINTS ARE TO BE PROVIDED TCC.
15. POINT TO BE MAPPED TO LON FROM OEM PANEL OR PROVIDED BY TCC VIA TCC FURNISHED SENSOR.
16. POINT TO BE PROVIDED BY TCC VIA OEM FURNISHED SENSOR.

TYPICAL SYSTEM CONTROL DIAGRAM GLYCOL HOT WATER CONDENSING BOILER PRIMARY LOOP 1

NOT TO SCALE



SECONDARY LOOP NOTES:

1. FOR COMPLETE VALVE AND INSTRUMENTATION REQUIREMENTS SEE CONTRACT SPECIFICATION.
2. TEMPERATURE CONTROL CONTRACTOR PROVIDED POINTS USED FOR MONITORING AND/OR CONTROL.
3. PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER TO PROVIDE VARIABLE FLOW CONTROL SIGNAL TO OPERATING SECONDARY WATER PUMPS. PROVIDE DIFFERENTIAL PRESSURE CONTROL VALVE TO SATISFY REQUIRED MINIMUM CRITICAL PUMP FLOW (40-45% VFD SPEED).
4. ENERGY MONITORING FOR EACH SECONDARY HOT WATER SUPPLY PUMP SHALL BE THROUGH THEIR RESPECTIVE VARIABLE FREQUENCY DRIVES AND SHALL BE INTEGRATED INTO THE BMS/DDC SYSTEM.
5. DIFFERENTIAL PRESSURE SHALL BE MEASURED AT OR NEAR THE MOST REMOTE FTR OR THE FTR REQUIRING THE GREATEST DIFFERENTIAL PRESSURE.

TYPICAL SYSTEM CONTROL DIAGRAM HOT WATER SECONDARY LOOP PIPING 2

NOT TO SCALE

"TYPICAL PRIMARY/SECONDARY HOT WATER CONDENSING BOILER PLANT"		Input/Output (Note 1) Sensed				Input/Output (Note 1) Calculated			Software/Firmware Features (Note 2,3) Alarms and Advisories (with Instructions)					Software/Firmware Features (Note 2,3) Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Outside Air Temp (By OEM)	X														X		Input	
2	GHW Differential Water Pressure	X									SP+10%	SP-10%				X		Input	
3	Common Header GHWS Temp	X														X		Input	6
4	Common Header GHWR Temp	X									131°F	SP-5°F				X		Input	6
5	Common Header HW Flow	X					gpm	Gal.								X		Input	
6	Each Boiler Supply Temp (By OEM)	X														X		Input	
7	Each Boiler Isolation Valve			X												X		Input	
8	Each Stack Temp	X														X		Input	8
8	Each Combustion Damper Status			X												X		Input	
10	Natural Gas Alarm			X						X						X		Input	5
11	Glycol Hot Water Pump Enable			X												X		Input	
12	GHW Pump VFD			X											X	X		Input	4
13	GHW Pump VFD S/S				X											X		Output	8
14	GHW Pump VFD Status			X												X		Input	8
15	GHW Pump VFD Speed		X													X		Output	8
16	GHW Pump VFD Fault			X												X		Input	8
17	GHW Pump VFD Power KW,KWH													X	X	X		Input	8
18	GHW Pump Failure				X				X							X		Output	2,8
18	HW Pump VFD			X											X	X		Input	4
20	HW Pump VFD S/S				X											X		Output	8
21	HW Pump VFD Status			X												X		Input	8
22	HW Pump VFD Speed		X													X		Output	8
23	HW Pump VFD Fault			X												X		Input	8
24	HW Pump VFD Power KW,KWH													X	X	X		Input	8
25	HW Pump Failure				X				X							X		Output	2,8
26	Boiler Controller Including Flame Failure (By OEM)									X					X	X		Input	
27	Master Boiler Controller			X											X	X		Input	
28	Natural Gas Supply Pressure	X										4" w.c.				X		Input	
29	Natural Gas Flow	X					cfh	CCF								X		Input	
30	GHW Primary Loop Bypass Control Valve		X													X		Output	
31	HW Secondary Loop Bypass Control Valve		X													X		Output	
32	Primary Loop HX-1 Control Valve		X													X		Output	
33	Secondary HWS Temp	X														X		Input	
34	Secondary HWR Temp	X														X		Input	

"TYPICAL PRIMARY/SECONDARY HOT WATER		Input/Output (Note 1) Sensed				Input/Output (Note 1) Calculated			Software/Firmware Features (Note 2,3) Alarms and Advisories (with					Software/Firmware Features (Note 2,3) Miscellaneous Features					Notes
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
35	Secondary Differential Water Pressure	X									SP+10%	SP-10%				X		Input	
36	Secondary Header HW Flow	X					gpm	Gal.								X		Input	
37	Primary Differential Water Pressure Setpoint		X													X		Set Point	
38	Secondary Differential Water Pressure Setpoint		X													X		Set Point	
39	Primary Loop Supply Temp Setpoint		X													X		Set Point	
40	Secondary Loop Supply Temp Setpoint		X													X		Set Point	
41	Boiler Enable Setpoint		X													X		Set Point	

Symbol:

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. All alarms shall be part of the BACnet database.

3. TheTCC will provide all trending and alarming via the HMI/SCADA Software.

4. Provide BACNet communication connection to this device mapping all required points into the BACnet database.

5. Alarm contacts are provided by Gas Monitoring and Leak Detection System. Coordinate BMS connections with Mechanical Contractor and vendor for details.

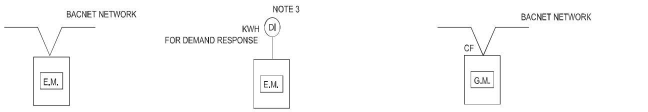
6. When using thermistor sensors use matched-pair elements to eliminate inter-sensor error factor.

7. By TCC if no mapping of flame failure point.

8. Provide points for each pump.

TYPICAL SYSTEM CONTROL POINT LIST HOT WATER CONDENSING BOILER PRIMARY AND SECONDARY LOOP PIPING 3

NOT TO SCALE

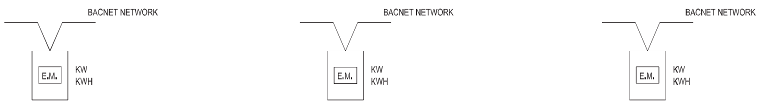


MAIN ELECTRIC METER FURNISHED BY SWITCHBOARD MANUFACTURER INSTALLED BY ELECTRIC CONTRACTOR, INTEGRATED INTO THE NETWORK BY TCC. METER TO BE FURNISHED WITH OUTPUTS TO RECEIVE CONTROL WIRING FOR PULSE OUTPUT FOR KWH

MAIN ELECTRIC METER FURNISHED BY UTILITY INSTALLED BY ELECTRIC CONTRACTOR, INTEGRATED INTO THE NETWORK BY TCC. METER TO BE FURNISHED WITH OUTPUTS TO RECEIVE CONTROL WIRING FOR DEMAND RESPONSE.

LOW PRESSURE SERVICE WITH GAS BOOSTER:

ONE MAIN GAS METER INSTALLED AS PART OF THE FACTORY FURNISHED GAS BOOSTER SYSTEM. GAS BOOSTER PROVIDED AND INSTALLED BY P&D CONTRACTOR.



ADDITIONAL ELECTRIC METERS FURNISHED AND INSTALLED BY TCC FOR ELECTRICAL USAGE MONITORING OF EACH FEEDER SERVING EACH ROOF TOP UNIT, EACH HEAT PUMP DOMESTIC HOT WATER HEATER, EACH CHILLER, EACH AIR-COOLED CONDENSER AND EACH AIR COOLED CONDENSING UNIT, INTEGRATED INTO THE NETWORK BY TCC.

ADDITIONAL ELECTRIC METERS FURNISHED AND INSTALLED BY TCC FOR EACH CONSTANT VOLUME FAN GREATER THAN OR EQUAL TO 5 HP (REFER TO SECTION 15970 ARTICLE 2.9), INTEGRATED INTO THE NETWORK BY TCC.

ADDITIONAL ELECTRIC METERS FURNISHED AND INSTALLED BY DIV 16 FOR MAIN ELECTRIC SERVICE LOCATED IN MAIN SWITCHBOARD (REFER TO SECTION 16420 AND 16425), PULSE OUTPUT INTEGRATED INTO THE NETWORK BY TCC.

ABBREVIATIONS

DI DIGITAL INPUT (PULSE-ACCUMULATOR)
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT
G.M. GAS METER
E.M. ELECTRIC METER

NOTES:

1. TCC SHALL COORDINATE THROUGH THE G.C. AND WITH THE ELECTRICAL CONTRACTOR FOR DETAILS ON CONNECTING TO THE MAIN SWITCHBOARD ELECTRIC METER.
2. TCC SHALL COORDINATE THROUGH THE G.C. AND WITH THE PLUMBING CONTRACTOR FOR DETAILS ON CONNECTING TO ALL GAS SUB METERS.
3. TCC SHALL PROVIDE PULSE-ACCUMULATION STYLE DIGITAL INPUTS (DI) SUITABLE FOR THIS PURPOSE AND SIZED FOR THE PULSE FREQUENCY IN ORDER TO TOTALIZE. TCC SHALL ALSO PROVIDE ANALOG INPUTS (AI) TO RECORD RATE USAGE OF ELECTRICITY (KW) AND RATE USAGE OF GAS (CFH) (AND RATE USAGE OF OIL (GPM) IF APPLICABLE).

TYPICAL ENERGY METERING CONTROL DIAGRAM 1

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"MISCELLANEOUS ENERGY MONITORING & MEASUREMENT"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Main Electric Meter- Bldg Switchboard			X			KW	KWH							X	X		Input	6
2	Main Gas Meter- Low Pressure			X				C.F.							X	X		Input	6
3	Watt Meter- Chillers	X					KW	KWH						X	X	X		Input	4,5
4	Watt Meter-CHW Pumps	X					KW	KWH						X	X	X		Input	4,5
5	Watt Meter - Dom. HW Heat Pump	X					KW	KWH						X	X	X		Input	4,5
6	Watt Meter- CW Pumps	X					KW	KWH						X	X	X		Input	4,5
7	Watt Meter- ACU'S & ACCU'S	X					KW	KWH						X	X	X		Input	4,5
8	Watt Meter- C.V. Pumps > 5HP	X					KW	KWH						X	X	X		Input	4,5
9	Watt Meter- C.V. Fans > 5HP	X					KW	KWH						X	X	X		Input	4,5

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. All alarms shall be part of the BACnet database.

3. The TCC will provide all trending and alarming via the HMI/SCADA Software.

4. Provide BACnet communication connection to this device mapping all required points into the BACnet database.

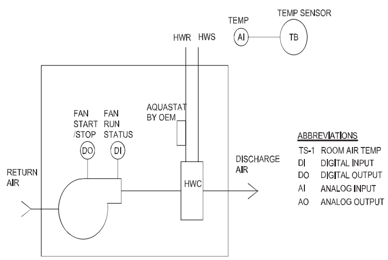
5. The TCC furnishes and installs the watt-meter. TCC to coordinate the installation of the watt-meter with Electrical.

6. This digital pulsed-input represents a quantity of energy flow. TCC to coordinate with the respective contractor for the energy flow per pulse and for the meter connection details. Gas totalizer shall be obtained by integrating the booster control panel into the BACnet Network.

7. The P&D contractor furnishes the gas sub meters. TCC coordinates the installation with the P&D contractor who is responsible for the proper installation of the meter.

8. Do not provide Watt Meter for any Smoke Purge type fans.

ENERGY MONITORING CONTROL POINT LIST 2



ABBREVIATIONS

TS-1 ROOM AIR TEMP
DI DIGITAL INPUT
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT

NOTES:
1. SMOKE DETECTORS AND FAN SHUTDOWN ARE NOT REQUIRED FOR TERMINAL UNIT HEATERS AND CABINET UNIT HEATERS ACTING IN A PURE RECIRCULATION MODE SINCE SUCH UNITS (SERVING ONE SPACE) ARE INCAPABLE OF SPREADING SMOKE BEYOND THE ENCLOSING WALLS, FLOORS AND CEILINGS OF THE ROOM OR SPACE IN WHICH THE SMOKE IS GENERATED (REFERENCE MC 606.2 EXCEPTION).
2.
HOT WATER UNIT HEATER AND CABINET UNIT HEATER AQUASTAT IS BY OEM AND FUNCTIONS AS A LOW
3. LIMIT CONTROL.

ELECTRIC UNIT HEATER AND CABINET UNIT HEATER DISCHARGE AIR TEMPERATURE SENSOR IS BY OEM AND FUNCTIONS AS A HIGH LIMIT CONTROL.

TYPICAL HOT WATER UNIT HEATER AND CABINET UNIT HEATER CONTROL DIAGRAM 3

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"HOT WATER UNIT HEATER AND CABINET UNIT HEATER"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
1	Space Temp	X										45°F				X		Input	
2	Unit Fan Status			X												X		Input	
3	Unit Fan S/S				X											X		Output	
4	Space Temp Setpoint		X													X		Set Point	4
5	Occupancy Mode					X										X		Input	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

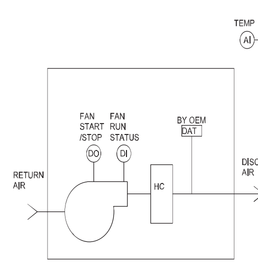
1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. Alarms shall be viewable at the POT when the POT is connected to the digital controller.

3. The TCC will provide all trending.Digital controller shall store all trended data.

4. Provide Occupied and Unoccupied setpoints.

TYPICAL HOT WATER UNIT HEATER AND CABINET UNIT HEATER CONTROL POINT LIST 4



ABBREVIATIONS

TS-1 ROOM AIR TEMP
DI DIGITAL INPUT
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT
HC ELECTRIC HEATING COIL
HWC HOT WATER HEATING COIL
DAT DISCHARGE AIR TEMPERATURE SENSOR
POT PORTABLE OPERATORS TERMINAL

TYPICAL ELECTRIC UNIT HEATER AND CABINET UNIT HEATER CONTROL DIAGRAM 5

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"ELECTRIC UNIT HEATER AND CABINET UNIT HEATER"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)			Trended Value	Misc. Other	Variable Type	Notes
1	Space Temp	X										45°F				X		Input	
2	Unit Fan Status			X												X		Input	
3	Unit Fan S/S				X											X		Output	
4	Space Temp Setpoint		X													X		Set Point	4
5	Occupancy Mode					X										X		Input	

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

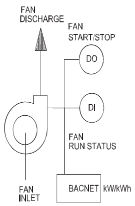
1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. Alarms shall be viewable from the POT when the POT is connected to the digital controller.

3. The TCC will provide all trending. Digital controller shall store all trended data.

4. Provide Occupied and Unoccupied setpoints.

TYPICAL ELECTRIC UNIT HEATER AND CABINET UNIT HEATER CONTROL POINT LIST 6



NOTES:

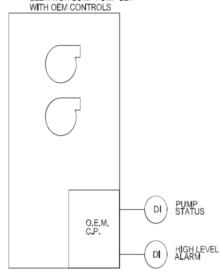
1. SUPPLY VFD MOTOR CONTROL FOR SYSTEMS EQUAL TO OR OVER 5 HP, PROVIDE BACNET CONNECTION FOR MONITORING kW AND kWH.

ABBREVIATIONS

DI DIGITAL INPUT (PULSE-ACCUMULATOR)
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT

FAN SET MONITORING CONTROL DIAGRAM 1

ELEVATOR SUMP PUMP SET WITH OEM CONTROLS



NOTES:

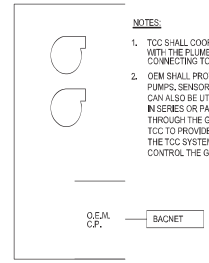
1. TCC SHALL COORDINATE THROUGH THE G.C. AND M.C. WITH THE PLUMBING CONTRACTOR FOR DETAILS ON CONNECTING TO THE MISCELLANEOUS PUMP CONTROLS.
2. OEM SHALL PROVIDE CONTROL OF THE PUMP SET(S) THE TCC SHALL MONITOR AND NOT CONTROL THE PUMPS.

ABBREVIATIONS

DI DIGITAL INPUT (PULSE-ACCUMULATOR)
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT

ELEVATOR SUMP PUMP SET MONITORING CONTROL DIAGRAM 2

GAS BOOSTER SET WITH OEM CONTROLS



NOTES:

1. TCC SHALL COORDINATE THROUGH THE G.C. AND M.C. WITH THE PLUMBING CONTRACTOR FOR DETAILS ON CONNECTING TO THE MISCELLANEOUS PUMP CONTROLS.
2. OEM SHALL PROVIDE CONTROL OF THE GAS BOOSTER PUMPS. SENSORS UTILIZED BY OEM CONTROL SYSTEM CAN ALSO BE UTILIZED FOR BMS/DDC SYSTEM BY WIRING IN SERIES OR PARALLEL AS REQUIRED, OR MAPPING THROUGH THE GATEWAY. OTHER ALTERNATE IS FOR TCC TO PROVIDE THEIR OWN MONITORING SENSORS. THE TCC SYSTEM SHALL ONLY MONITOR AND NOT CONTROL THE GAS BOOSTER PUMPS.

ABBREVIATIONS

DI DIGITAL INPUT (PULSE-ACCUMULATOR)
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT

GAS BOOSTER PUMP SET MONITORING CONTROL DIAGRAM 3

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"FAN MONITORING & MEASUREMENT"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Fan Status			X					X	X						X		Input	4,5
2	Fan Command				X											X		Output	4
3	Space Temperature	X									85	65				X		Input	6
4	Fan Alarm			X					X	X						X		Input	4
5	Fan Power	X					KW								X	X		Input	4,7
6	Fan Energy	X					KWH	KWH							X	X		Input	4,7

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all digital alarm logic. All digital alarms shall be part of the BACNET database.

3. The TCC will provide all trending and analog alarming via the HMI/SCADA Software.

4. TCC shall map points to the BACNET database.

5. Provide current switches as required.

6. Add Temperature Sensor for Temperature Controlled Exaust Fans

7. Supply VFD Motor Control for systems equal to or over 5 hp. Provide BACnet connection for monitoring kW and kWh.

FAN SET MONITORING CONTROL POINT LIST 4

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"MISCELLANEOUS PUMP MONITORING & MEASUREMENT"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Sump Pump Set: Pump Status			X									1,000			X		Input	5
2	Sump Pump Set: High Level Alarm			X						X						X		Input	4

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all digital alarm logic. All digital alarms shall be part of the BACnet database.

3. The TCC will provide all trending and analog alarming via the HMI/SCADA Software.

4. Integrate local O.E.M panel annunciating alarm into BMS/DDC network.

5. Provide current switches as required.

ELEVATOR SUMP PUMP SET MONITORING CONTROL POINT LIST 5

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"GAS BOOSTER PUMP MONITORING & MEASUREMENT"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Gas Booster Pump Set	X													X	X		Input	4
2	Power ON Status			X											X	X		Input	4
3	Inlet Gas Pressure			X								3" w.c.			X	X		Input	4
4	Outlet Gas Pressure			X							15" w.c.	4" w.c.			X	X		Input	4
5	Booster Pump #1 Status			X									1,000		X	X		Input	4
6	Booster Pump #2 Status			X									1,000		X	X		Input	4
7	Heat Exchanger Status			X											X	X		Input	4
8	Common Maintenance Alarm									X					X	X		Input	4
9	Gas Booster Totalized Gas Flow	X					FT^3/Min	FT^3							X	X		Input	4

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

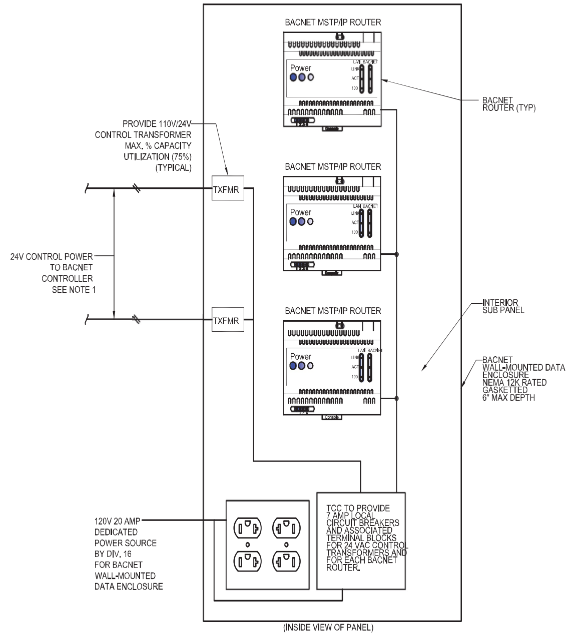
1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all digital alarm logic. All digital alarms shall be part of the BACnet database.

3. The TCC will provide all trending and analog alarming via the HMI/SCADA Software.

4. This BACNET-Based device is furnished by the Plumbing Contractor as part of the Gas Booster Package. The OEM furnishes the local controller with the BACNET-Gateway communication card. TCC shall map points to the BACNET database.

GAS BOOSTER PUMP SET MONITORING CONTROL POINT LIST 6

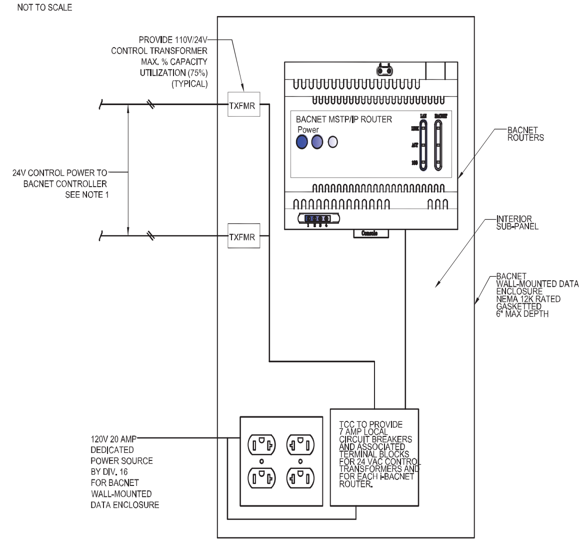


NOTE:

1. BACNET WALL DATA ENCLOSURE FURNISHED BY TCC AND INSTALLED BY DIV. 16 CONTRACTOR
2. LOCATE IN BUILDING. COORDINATE WITH ELECTRICAL CONTRACTOR.

TYPICAL BACNET WALL-MOUNTED DATA ENCLOSURE DETAIL FOR MULTIPLE BACNET MS/TP ROUTER MOUNTING 1

NOT TO SCALE

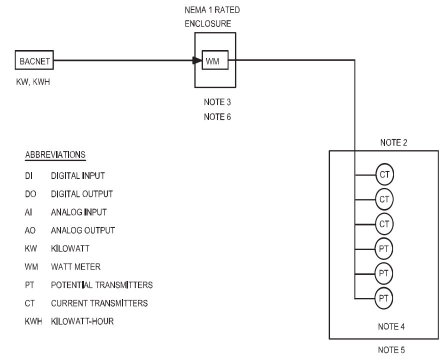


NOTE:

1. BACNET WALL-MOUNTED DATA ENCLOSURE FURNISHED BY TCC AND INSTALLED BY DIV. 16 CONTRACTOR
2. THE TCC SHALL PROVIDE 24VAC TO THOSE MISC. CONTROL DEVICES THAT ARE NOT POWERED DIRECTLY FROM A UNITARY HVAC SYSTEM. TCC TO COORDINATE WITH MECHANICAL CONTRACTOR AND EQUIPMENT VENDORS FOR CONTROL DEVICE POWER.

TYPICAL BACNET WALL-MOUNTED DATA ENCLOSURE DETAIL FOR SINGLE BACNET MS/TP ROUTER MOUNTING 2

NOT TO SCALE



ABBREVIATIONS

DI DIGITAL INPUT
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT
KW KILOWATT
WM WATT METER
PT POTENTIAL TRANSMITTERS
CT CURRENT TRANSMITTERS
KWH KILOWATT-HOUR

NOTES:

1. TCC SHALL FURNISH AND INSTALL BACNET-BASED ENERGY MONITORING DEVICE FOR EACH INTERIOR AND EXTERIOR LIGHTING PANEL AND RECEPTACLE PANEL SHOWN ON THE ELECTRICAL DRAWINGS.
2. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR THE ENTRY OF THE TCC CONDUIT INTO ALL PANELS AND CONNECTION OF THE CT-PT'S.
3. INSTALL ENERGY MONITORING DEVICE IN A SEPARATE ENCLOSURE ADJACENT TO ALL PANELS CONNECTED TO THE PANELS WITH CONDUIT.
4. TCC SHALL COORDINATE ACTUAL CT-PT CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND PANEL CONFIGURATION.
5. SEE ELECTRICAL CONTRACT DRAWINGS FOR QUANTITY OF LIGHTING PANELS AND RECEPTACLE PANELS.
6. TCC SHALL INSTALL ALL PANEL KW/KWH METERS SUCH THAT KW/KWH METER IS STILL POWERED WHEN LOAD IS SWITCHED OFF BY PANEL SCHEDULE.

PANELS TO BE MONITORED:

1. LP-GYM, LP-1, LP-2, LP-3, LP-ELEVATOR RM
2. RP-1, RP-2, RP-3
3. DIMMER, EMR

LIGHTING/RECEPTACLE ENERGY MONITORING CONTROL DIAGRAM 3

NOT TO SCALE

		Input/Output (Note 1)							Software/Firmware Features (Note 2,3)										Notes
"LIGHTING EMERGENCY MONITORING & MEASUREMENT"		Sensed				Calculated			Alarms and Advisories (with Instructions)					Miscellaneous Features					
Reference No.	Point Name	Analog Input	Analog Output	Digital Input	Digital Output	String Value	Rate of Variable	Totalize Variable	Digital Alarm	Change-Of-State Alarm	High Limit Alarm	Low Limit Alarm	Runtime Limit (Hrs)	Broadcasted Point	"Direct BACnet Communication"	Trended Value	Misc. Other	Network Variable Type	Notes
1	Watt Meter	X					KW	KWH						X	X	X		Input	4,5

X = Contractor to provide quantity as required to include all instances of the indicated feature. Include multiple points within each mechanical system as necessary. Coordinate with equipment vendor.

Notes:

1. The points listed herein are the minimum points required for the control and monitoring of this equipment. This point list is typical for each mechanical/electrical system of this type. If the sequence of operation requires additional or differing information it must be provided by the respective provider of the controls for this type of equipment as coordinated by the General and Mechanical Contractors.

2. The TCC shall provide all alarm logic. All alarms shall be part of the BACNET database.

3. TheTCC shall provide all trending and alarming via the HMI/SCADA Software.

4. Provide BACNET communication connection to this device mapping all required points into the BACNET database.

5. The TCC furnishes and installs the watt-meter. TCC to coordinate the installation of the watt-meter with Electrical.

6. See the Electrical Contract drawings for quantity of lighting panels.

LIGHTING/RECEPTACLE ENERGY MONITORING CONTROL POINT LIST 4

NOT TO SCALE

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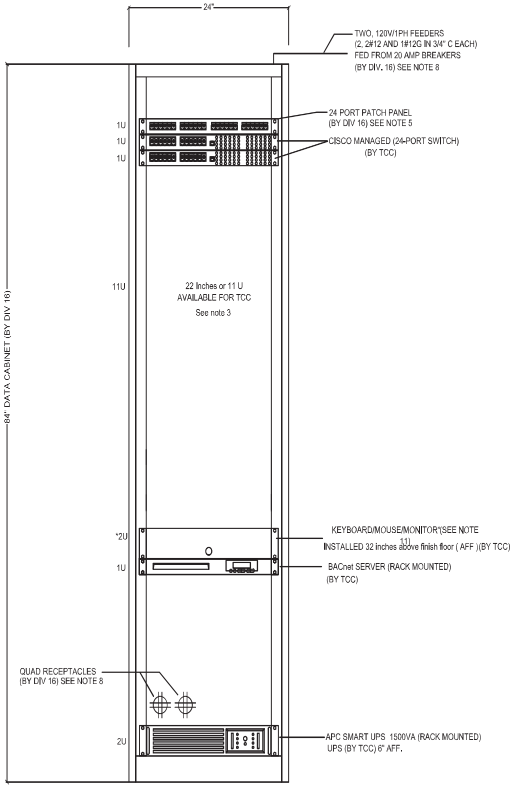


(OVERALL DIMENSIONS: 84"(H) x 24"W x 36"(D)

NOTES:

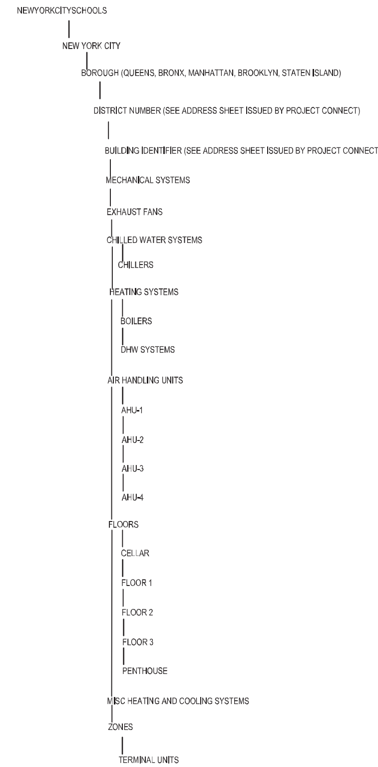
1. FOR MORE DETAILS ON COMPONENTS SEE SPEC. SECTIONS AS REFERENCED.
2. 1U = 2 INCHES VERTICAL.
3. SPACE E AVAILABLE FOR CONTRACTOR'S USE. BACK PANEL FOR INSTALLING ROUTERS, ADDITIONAL SWITCHES (1.0) AND CONTROL TRANSFORMERS (IF ANY) SHALL BE SO INSTALLED (ON BACK RAILS) THAT COMPONENTS AS INSTALLED DO NOT INHIBIT CABINET DOOR CLOSING. COORDINATE SELECTION, FURNISHING AND INSTALLATION OF COMPONENTS WITH FMSI.
4. PANEL CONSTRUCTION AND COMPONENT LAYOUT AND INSTALLATION DETAILS SHALL BE SUBMITTED BY THE CONTRACTOR TO FMSI FOR APPROVAL.
5. PATCH PANEL SHALL BE REQUIRED FOR ROUTERS INSTALLED OUTSIDE THE BACnet CABINET (i.e. IN INTERMEDIATE TELECOM CLOSETS, OR SEPARATELY FROM THE BACnet CABINET, BUT IN MAIN TELECOM ROOM).
6. POWER SUPPLY FROM UPS IS DISTRIBUTED THROUGH OUTLETS WHICH ARE A PART OF THE UPS. INCOMING 1 PH. 120VAC CIRCUIT FOR THE UPS IS EXPECTED TO BE FROM EMERGENCY GENERATOR DISTRIBUTION SYSTEM.
7. POWER SUPPLY THAT DOES NOT COME THROUGH UPS IS USED (IN THE FIELD FOR MISC. USES) DIRECTLY FROM THE QUAD RECEPTACLE.
8. INCOMING 120VAC (1 PH., N, G) CIRCUIT FEEDER SHALL TERMINATE IN OUTLET BOXES MOUNTED QUAD RECEPTACLES TO BE INSTALLED ON THE INSIDE ON ONE OF THE SIDES OF THE CABINET NEAR THE BOTTOM OF THE CABINET. THE INCOMING FEEDER WIRES SHALL ENTER THROUGH KNOCK-OUTS IN THE TOP SHEET OF THE CABINET AND SUITABLY INSTALLED AND SUPPORTED INSIDE THE CABINET. THE CONDUIT INSTALLATION FOR THESE FEEDERS SHALL BE COORDINATED ACCORDINGLY. (CONDUITS TO BE INSTALLED OUTSIDE THE MOUNTING RAILS SO AS NOT TO INTERFERE WITH THE RACK MOUNTED EQUIPMENT)
9. "BY DIV. 15 / DIV. 16 / TCC" IMPLIES FURNISHED AND INSTALLED BY RESPECTIVE ENTITIES (i.e. GC / TCC). INSTALLATION INCLUDES ALL NECESSARY INSTALLATION HARDWARE.
10. THE HEAT DISSIPATED (ESTIMATED VALUES AS INDICATED) IS TO BE VENTED OUT OF THE CABINET NATURALLY THROUGH VENTS ON THE TWO SIDES (NO FANS / MECHANICAL VENTILATION IS CONSIDERED NECESSARY). CABINET MANUFACTURER TO CONFIRM THIS FEATURE.
11. THE KEYBOARD, MOUSE AND 20" MONITOR ARE EXPECTED TO BE ASSEMBLED ON A RACK-MOUNTED TRAY. WHILE THE PART # IS INDICATED, IF NECESSARY MANUFACTURER MAY OFFER ALTERNATIVE PART #. TCC TO CONFIRM WHILE APPROVING THE CABINET SUBMITTAL (INCLUDING DIMENSIONS - 1U OR 2U).
12. THE CABINET SHALL HAVE LOCKABLE, CLEAR PLEXI GLASS DOOR IN THE FRONT AND REAR. THE TWO SIDES AND TOP SHALL HAVE SHEET METAL. BOTTOM SHALL BE OPEN.

PARTIAL BILL OF MATERIALS FOR BACNET DATA CABINET

TYP. MANUFACTURER (O.A.E.)	DESCRIPTION	QTY.	TYP. PART #	DIMENSIONS (WxDxH) In	WEIGHT	DISSIPATED HEAT	ELECTRIC POWER	EQUIVALENT "U's" IN HEIGHT
Cisco	Cisco Catalyst Managed Switch	2	3860 or Equal	17.5x11.8x1.73	8.5 Lbs	250 BTU / h	120V, 1AMP	1U
Dell	BACNET Server	1	R330	17.4x25x1.73	44 Lbs	1,195 BTU / h	120V, 3AMP	1U
Crystal Image Technologies	Keyboard/Mouse/Monitor	1	RM-116-2U	17.3x25.6x1.73	32 Lbs	165 BTU / h	120V, 1AMP	2U (SEE NOTE 11)
Schneider Elect. (APC)	APC Smart UPS (1500VA)	1	SMX1500RM2U	17x19.4x3.5	54.6 Lbs	4095 BTU / h	120V, 12AMP	2U
STARTECH.COM from CDW	24 Port Rack Mounted, Cat 6 Patch Panel	1	C6PANL 4524	19(L)x2.2(W)X1.7(H)	20.8OZ	—	—	1U
COLUMN TOTAL					140 Lbs Approx.	5705 BTU/h SEE NOTE 10	17AMP	

TYPICAL BACNET DATA CABINET DETAIL IN MAIN TELECOM ROOM 1

NOT TO SCALE



NOTES:

1. ALL WORK PROVIDED BY THE TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL COMPLY WITH THE NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY (SCA) CONTRACT DRAWINGS AND SPECIFICATIONS AS FOLLOWS:
   SECTION 15970 - TEMPERATURE CONTROL SYSTEM-BACNET BMS/DDC WITH BACNET NETWORK.
   SECTION 15971 - TEMPERATURE CONTROL SYSTEM-BACNET BMS/DDC WITH LOCAL BACNET NETWORK.
   SECTION 15985 - SEQUENCE OF OPERATIONS
2. THE TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL BE RESPONSIBLE FOR THE NETWORK TREE LAYOUT

THE NETWORK NAVIGATION TREE IS SHOWN FOR GUIDELINE PURPOSES AND SHOULD BE EDITED TO REFLECT THE PROJECT MECHANICAL EQUIPMENT SCHEDULES AND CONTRACT DOCUMENTATION.

THE TEMPERATURE CONTROLS CONTRACTOR TO SUBMIT A SYSTEM HIERARCHY DIAGRAM FOR APPROVAL PRIOR TO STARTING SYSTEM COMMISSIONING

NETWORK NAVIGATION TREE 2

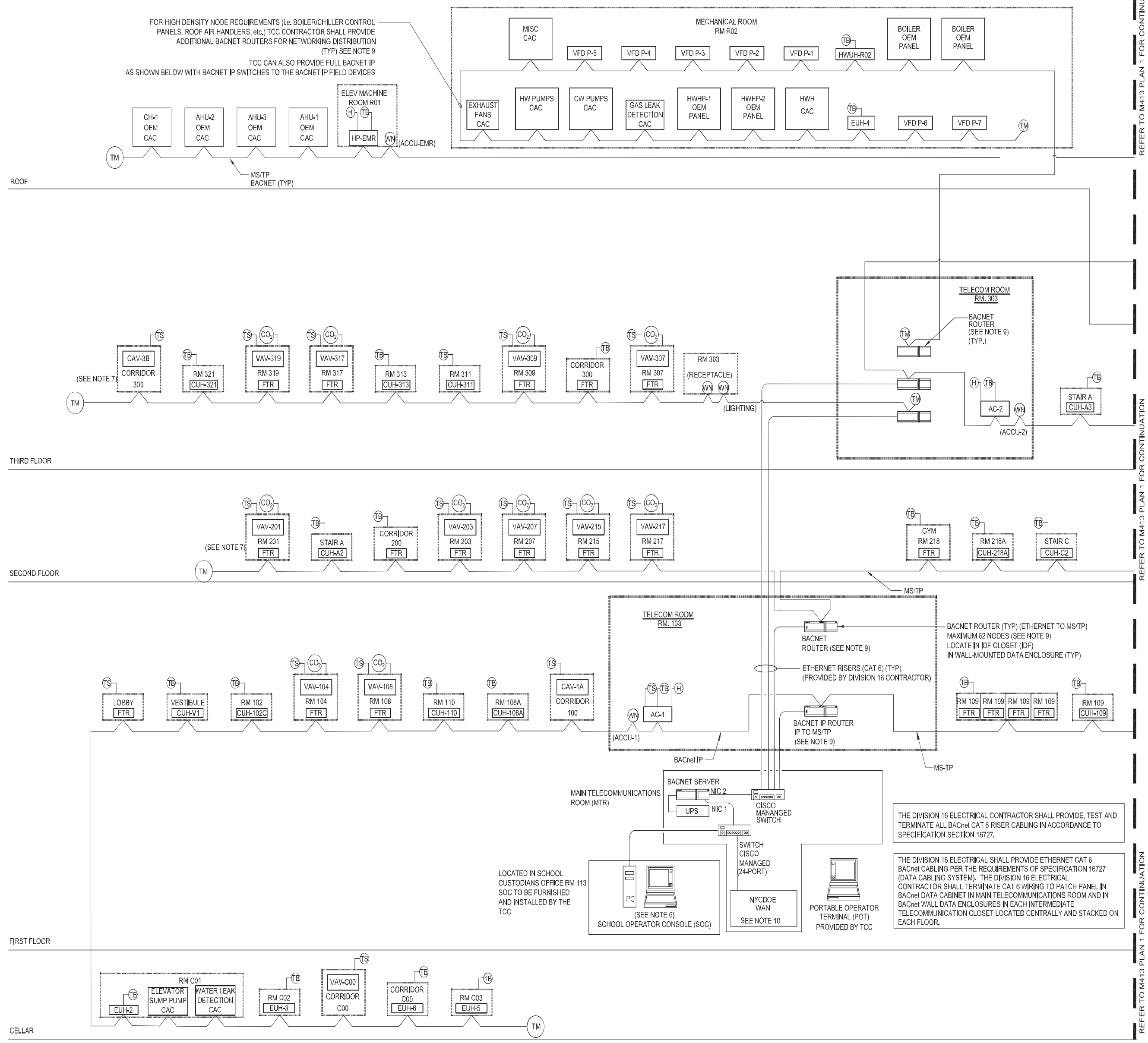
NOT TO SCALE

SYMBOLS

VAV	VARIABLE AIR VOLUME BOX
CAC	TYPICAL (ID#) BACnet FIELD PANEL-SUPERVISORY CONTROL PANEL R- INDICATES (ROOFTOP UNIT)
H	HUMIDITY SENSORS (SEE NOTE 11)
TS	SPACE TEMPERATURE SENSOR
CO_2	CARBON DIOXIDE SENSOR (SEE NOTE 7)
	LOCAL BACNET NETWORK
	MS\TP LOCAL BACNET NETWORK
	SCOPE OF WORK BOUNDARY
	BOUNDARY OF MAIN TELECOMMUNICATIONS ROOM
	ETHERNET (CAT 6) PROVIDED BY DIV. 16 SECTION 16727
BMS	BUILDING MANAGEMENT SYSTEM
BS	BACK-UP DATABASE & HMI SOFTWARE STORAGE
CAC	CUSTOM APPLICATION CONTROLLER (CAC)
CHCS	CENTRAL HOST CONTROL STATION
FMSI	FACILITY MANAGEMENT SYSTEMS INTEGRATOR
HMI	HUMAN MACHINE INTERFACE
IP	INTERNET PROTOCOL
ITC	INTERMEDIATE TELECOMMUNICATIONS CLOSET
MS	MAIN DATABASE & HMI SOFTWARE STORAGE
MTR	MAIN TELECOMMUNICATIONS ROOM
PC	PERSONAL COMPUTER
SOC	SCHOOL OPERATING CONSOLE
TCC	TEMPERATURE CONTROL CONTRACTOR
TCP	TRANSMISSION CONTROL PROTOCOL
TP	TWISTED PAIR
TYP	TYPICAL
UPS	UNINTERRUPTIBLE POWER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE (WITH BACNET CARD)
WAN	WIDE AREA NETWORK

NOTES:

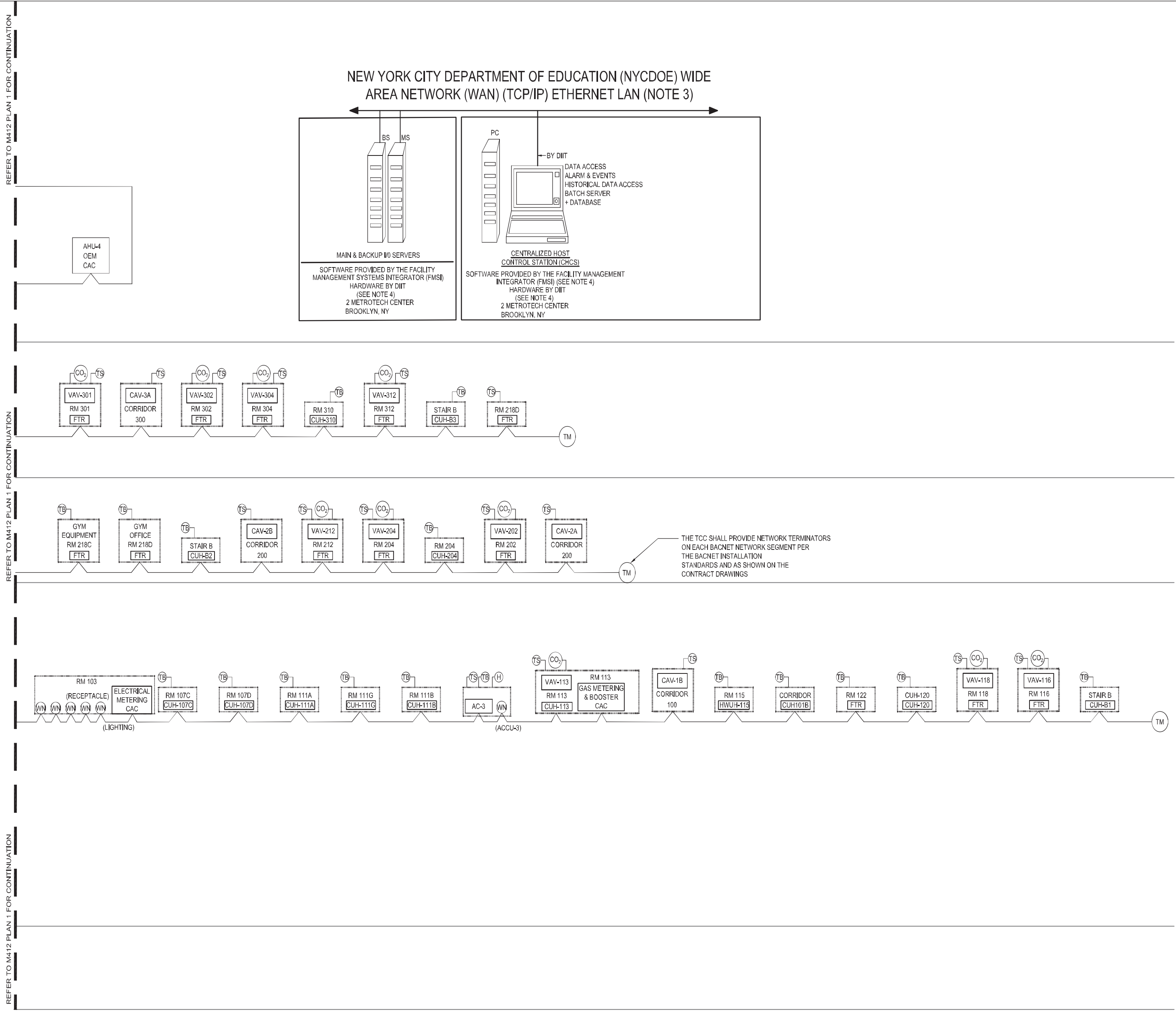
1. ALL WORK PROVIDED BY THE TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL COMPLY WITH THE NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY (SCA) CONTRACT DRAWINGS AND SPECIFICATIONS AS FOLLOWS:
   SECTION 15985 - SEQUENCE OF OPERATIONS
   SECTION 15970 - TEMPERATURE CONTROL SYSTEM-BACNET BMS/DDC WITH SCHOOL OPERATING CONSOLE.
2. ALL WORK PROVIDED BY THE FACILITY MANAGEMENT SYSTEMS INTEGRATOR (FMSI) SHALL COMPLY WITH THE NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY (SCA) SPECIFICATIONS AS FOLLOWS:
   SECTION 15985 - SEQUENCE OF OPERATIONS - (APPLICABLE SECTIONS)
   SECTION 15970 - TEMPERATURE CONTROL SYSTEM-BACNET BMS/DDC WITH SCHOOL OPERATING CONSOLE (APPLICABLE SECTIONS)
   SECTION 15973 - FACILITY MANAGEMENT SYSTEMS INTEGRATION.
3. NEW AND EXISTING SCHOOLS UNDERGOING MAJOR MODERNIZATION SHALL BE INTEGRATED BY THE FMSI TO THE NEW YORK CITY DEPARTMENT OF EDUCATION (NYCDOE) CENTRALIZED HOST CONTROL STATION USING THE NYCDOE ETHERNET WIDE AREA NETWORK (WAN) OVER TRANSMISSION CONTROL PROTOCOL (TCP) OVER INTERNET PROTOCOL (IP) WITH VIRTUAL PRIVATE NETWORK (VPN). THE CENTRALIZED HOST CONTROL STATION IS TO BE LOCATED AT 2 METROTECH CENTER LOCATED AT BROOKLYN, NEW YORK. THE MAIN SERVER AND BACKUP SERVER ARE ALSO TO BE LOCATED AT 2 METROTECH BROOKLYN, NEW YORK.
4. THE FACILITY MANAGEMENT SYSTEMS INTEGRATOR (FMSI) SHALL PROVIDE ALL ASSOCIATED SOFTWARE FOR THE CENTRALIZED HOST CONTROL STATION. THE CENTRALIZED HOST CONTROL IS TO PROVIDE THE FOLLOWING: GLOBAL WEB ACCESS FOR EACH INDIVIDUAL SCHOOL PROVIDED WITH A BACnet CONTROL NETWORK ACCESS, ALARM AND EVENTS, AND HISTORICAL DATA ACCESS MAIN SERVER AND BACKUP SERVER FOR THE ENTIRE NEW YORK CITY DEPARTMENT OF EDUCATION.
5. THE TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL BE RESPONSIBLE FOR THE INSTALLATION OF THE BACNET CONTROL NETWORK IN EACH INDIVIDUAL SCHOOL AND SHALL ALSO PROVIDE A PORTABLE LAPTOP COMPUTER (POT) AS SPECIFIED ON A SCHOOL BY SCHOOL BASIS.
6. THE TEMPERATURE CONTROLS CONTRACTOR (TCC) SHALL PROVIDE FOR THE BUILDING MANAGEMENT SYSTEM (BMS): SCHOOL OPERATOR CONSOLE (SOC) FRONT - END HARDWARE, THE FRONT - END SOFTWARE, SYSTEM GRAPHICS (GUI), BACNET SERVER, UPS AND CISCO MANAGED SWITCHES AS SPECIFIED ON A SCHOOL BY SCHOOL BASIS.
7. THE TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL PROVIDE CARBON DIOXIDE SPACE SENSORS IN ADDITION TO HUMIDITY TRANSMITTERS AND TEMPERATURE SENSORS IN ASSEMBLY SPACES SUBJECT TO INTERMITTENT OCCUPANCY i.e. AUDITORIUMS, CAFETERIAS, GYMNASIUMS, ETC. SEE SEQUENCE OF OPERATIONS REQUIREMENTS SECTION 15985. PRIMARY CONTROL DEVICES ARE TO BE WIRED DIRECTLY TO THE CONTROLLER. SECONDARY CONTROL DEVICES (I.E. CO2, OAT, OAH, OAE) MAY BE CONNECTED EITHER WIRED DIRECTLY TO THE CONTROLLER OR VIA THE BACnet NETWORK. CLASSROOMS SHALL BE PROVIDED WITH CARBON DIOXIDE SENSORS FOR DEMAND CONTROL VENTILATION.
8. THE TCC SHALL PROVIDE BACNET SERVERS AS NEEDED OR APPROVED EQUAL, PER THE PROJECT REQUIREMENTS. THE TCC SHALL ALSO PROVIDE BACnet ROUTERS AND SWITCHES, OR APPROVED EQUAL IN A FULL SIZED DATA CABINET, LOCATED IN THE MAIN TELECOMMUNICATIONS ROOM. THE DATA CABINET IS TO BE PROVIDED BY THE DIVISION 16 ELECTRICAL CONTRACTOR COMPLETE WITH PATCH PANEL, AND SHALL UTILIZE NATURAL VENTILATION TO ACCOMMODATE THE BACnet EQUIPMENT AND DEVICES. THE TCC SHALL MOUNT THE BACnet DEVICES SUCH AS THE BACnet SERVER, BACnet ROUTER, BACnet IP SWITCH ETC. IN THE BACnet DATA CABINET.
9. THE TCC SHALL PROVIDE ADDITIONAL ROUTERS OR BACNET IP SWITCHES AS REQUIRED FOR EACH INDIVIDUAL MS-TP BACNET OR BACNET IP SEGMENT WITH MAXIMUM 62 NODES OR BASED ON CONTROL DATA THROUGHPUT REQUIREMENTS. SEE SPECIFICATIONS FOR BANDWIDTH & SYSTEM PERFORMANCE CRITERIA. SEC. 15970.
10. CONNECTION TO NYCDOE WIDE AREA INTRANET NETWORK (WAN) SHALL BE PER DIIT REQUIREMENTS BY THE FMSI.
11. PROVIDE HARDWIRED RETURN AIR DUCT HUMIDITY SENSORS TO MONITOR OCCUPIED SPACE HUMIDITY LEVELS PER THE AUTHORITY'S SPECIFICATIONS. PROVIDE SPACE HUMIDITY SENSORS TO MAINTAIN UNOCCUPIED SPACE HUMIDITY LEVELS PER THE AUTHORITY'S SPECIFICATIONS.
12. THE TCC SHALL PROVIDE ALL HORIZONTAL MS/TP BACNET AND LOW VOLTAGE WIRING FROM THE ITC BACNET WALL DATA ENCLOSURES TO BACNET FIELD TERMINAL DEVICES. AS AN ALTERNATE THE TCC MAY GET CONTROL POWER FROM TRANSFORMERS LOCATED AT LINE POWERED TERMINAL UNITS.
13. ALL REMOTE FIELD MOUNTED ROUTERS PROVIDED BY THE TCC, SHALL BE INSTALLED IN BACNET WALL-MOUNTED DATA ENCLOSURES (NEMA 12K) AND SHALL HAVE A MAXIMUM DEPTH OF 6". THE BACNET WALL DATA ENCLOSURES SHALL BE LOCATED IN EACH INTERMEDIATE TELECOMMUNICATION CLOSET. THE BACNET WALL-MOUNTED DATA ENCLOSURES SHALL BE FURNISHED BY THE TCC AND INSTALLED BY THE DIVISION 16 CONTRACTOR.
14. THE BACNET WALL-MOUNTED DATA ENCLOSURES SHALL BE PROVIDED WITH INTERIOR BACK PLATE FRAME FOR THE MOUNTING OF: QUAD ELECTRICAL OUTLET, DISCONNECT CIRCUIT BREAKER, AND 110 VOLT TO 24 VOLT STEP DOWN TRANSFORMERS. (AS REQUIRED) THE ABOVE EQUIPMENT SHALL BE FURNISHED AND PRE-WIRED BY THE TCC IN THE BACNET WALL DATA ENCLOSURES. THE DIVISION 16 CONTRACTOR SHALL INSTALL THE BACNET WALL DATA ENCLOSURES WITH THE ABOVE EQUIPMENT PRE-MOUNTED BY THE TCC AND SHALL PROVIDE A DEDICATED 110 VOLT POWER SOURCE TO THE DISCONNECT CIRCUIT BREAKER.



TYPICAL SCHOOL BACNET SYSTEM CONTROL ARCHITECTURE 1

NOT TO SCALE

143



TYPICAL SCHOOL BACNET SYSTEM CONTROL ARCHITECTURE 1

NOT TO SCALE

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

TABLE OF CONTENTS

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.

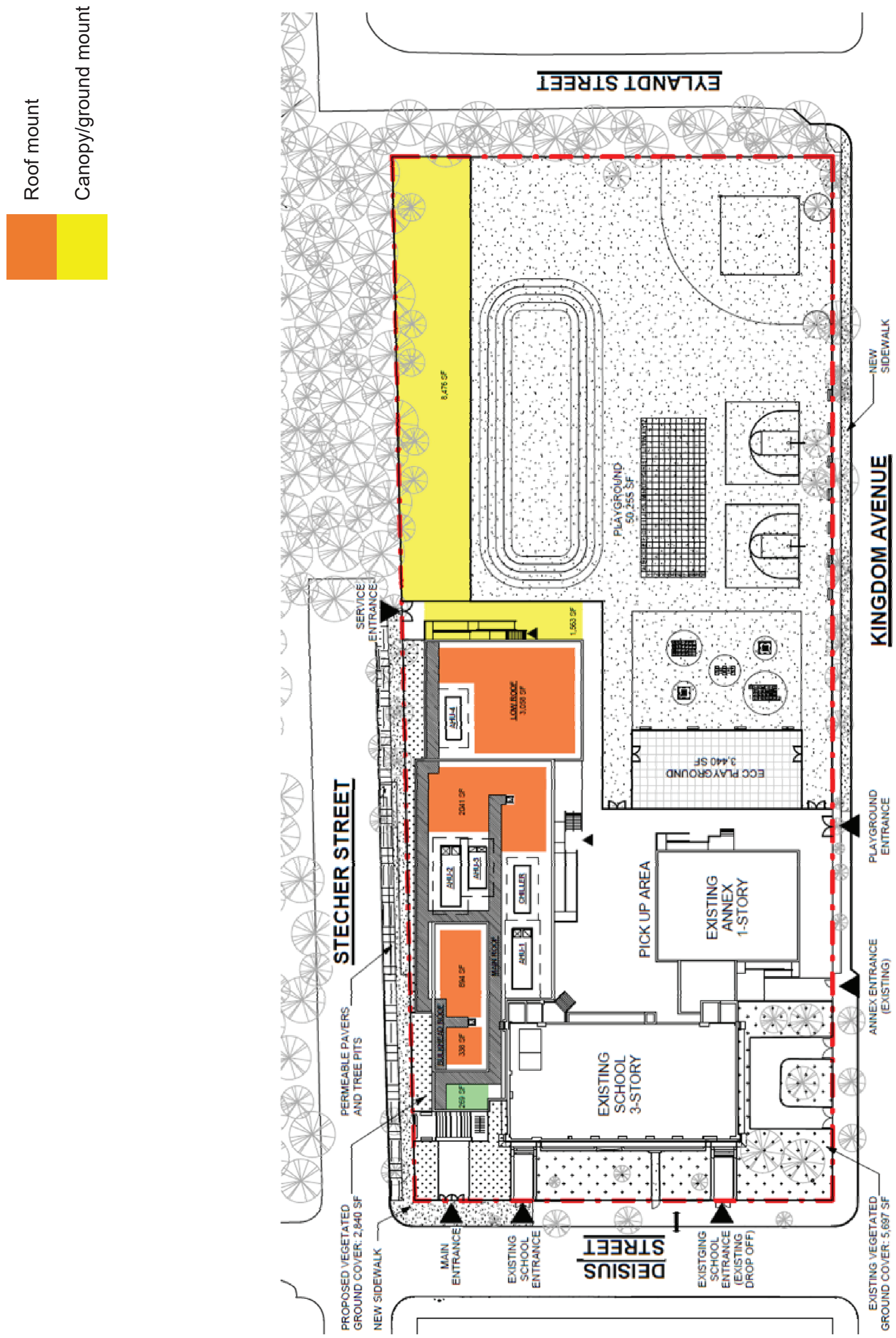
Parameter	**Savings**
Annual Carbon Footprint Reduction (MTCO2e)	47

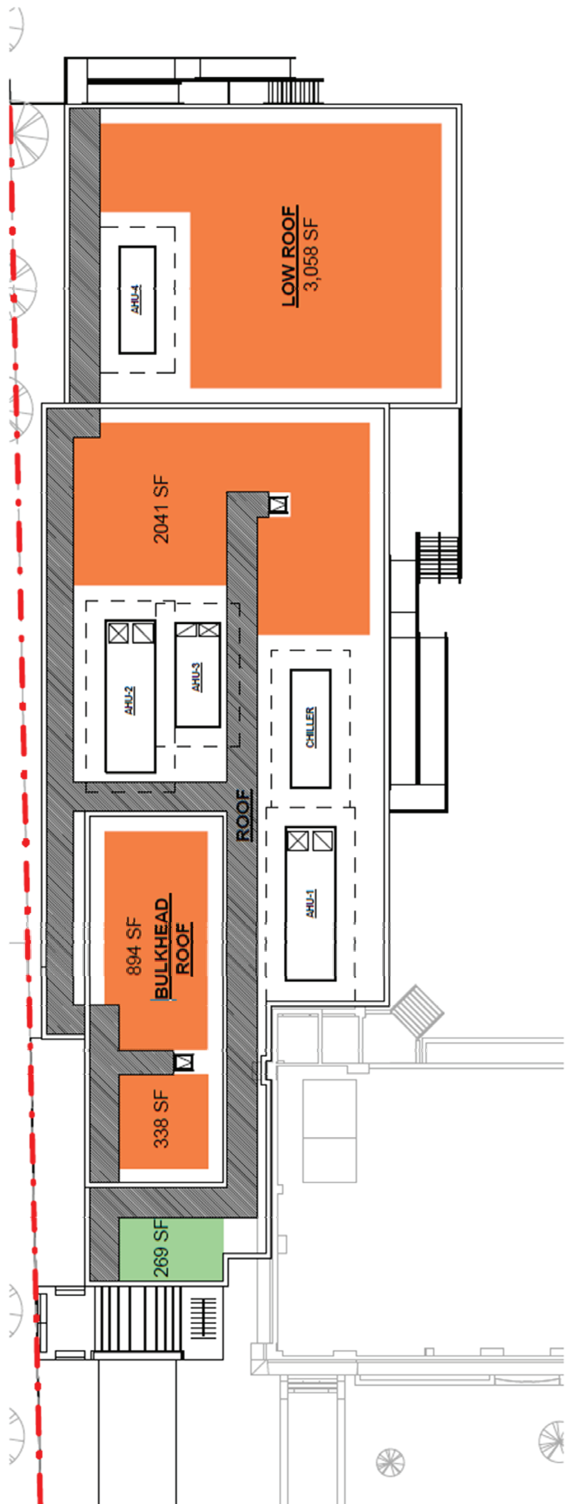
Project teams are to multiply projected annual energy usage (kWh/yr) by the DCAS factor of .000288962 to determine the annual carbon footprint reduction.

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.

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

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%

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

188,736 kWh/Year*

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

Month	Solar Radiation (kWh / m² / 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

TABLE OF CONTENTS

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.

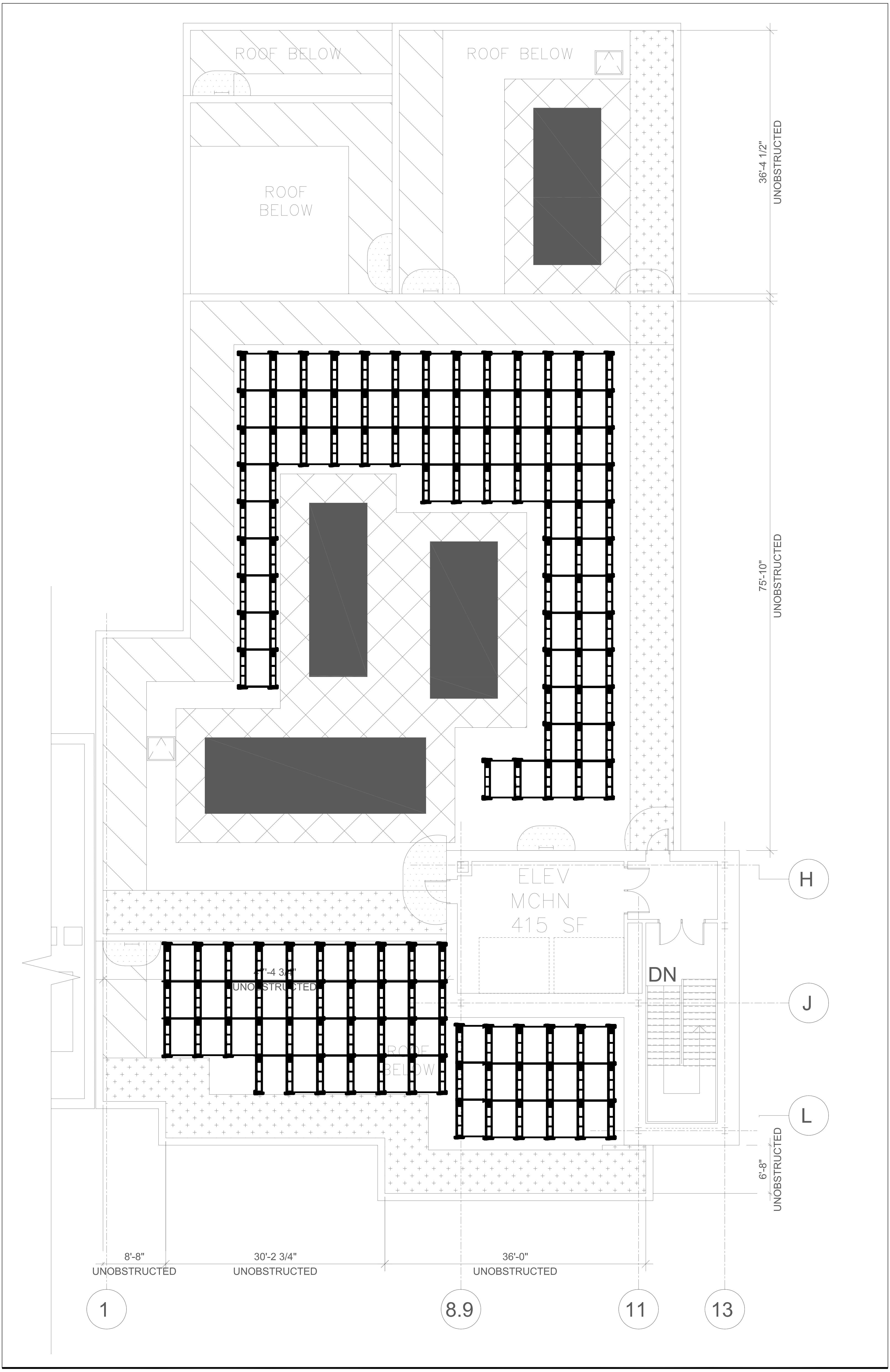
Energy benefits include a potential for surplus production of energy that is used to meet electricity demand, high efficiency system, a reliable source of energy, and less strain on the city's power grid thereby avoiding blackouts.

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 / m² / 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

NYC Green Schools Rating System

RENEWABLE ENERGY PRODUCTION

CREDIT FORM

Credit E6.2A

School Construction Authority

RESPONSIBLE PARTY:

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

Project:		Submission Phase:	100% CD Report Submission
Address:		Architect:	
LLW #:		Preparer:	s
Design #:	0	Form Revision Date:	6/10/2021

INSTRUCTIONS:
Step 1) Provide annual building energy cost from energy model.
Step 2) Insert details on renewable energy system provided.
Step 3) Check compliance.

Step 1: Insert annual building energy cost

Annual Energy Cost $ 57,501

Reference Table 1: Renewable Energy

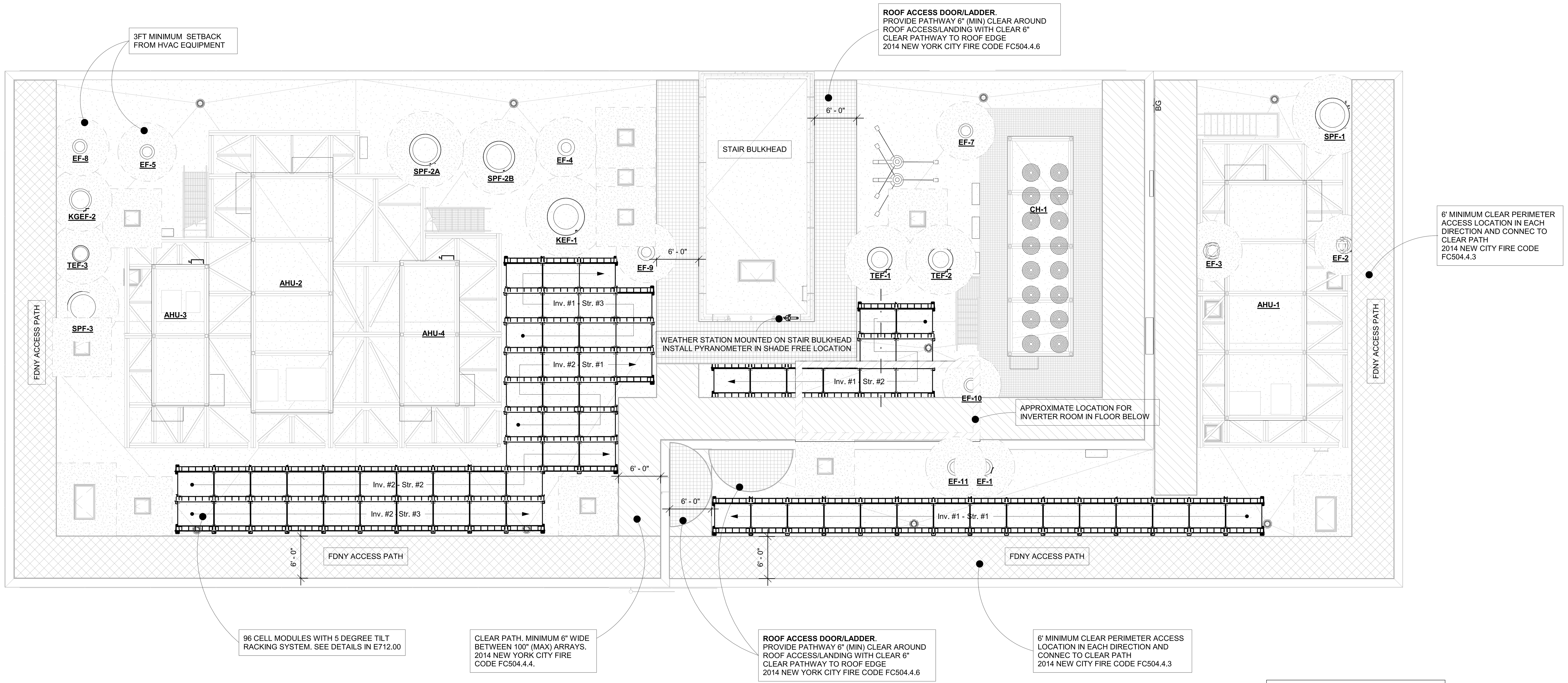
Percentage Renewable Energy Pursued	Energy Cost Savings	Size of Array (kW)	Points
1%	575.01	3.27	1
5%	2875.05	16.34	2
10%	5750.10	32.68	3
15%	8625.15	49.02	4

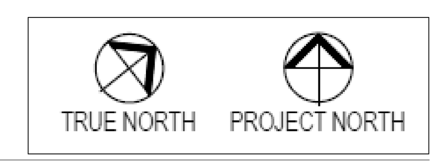
Step 2: Insert details on renewable energy system provided

Size of PV array provided 41 kW

Points achieved 3

Revision I - September 2019
Revision II - February 26, 2021





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 180º 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

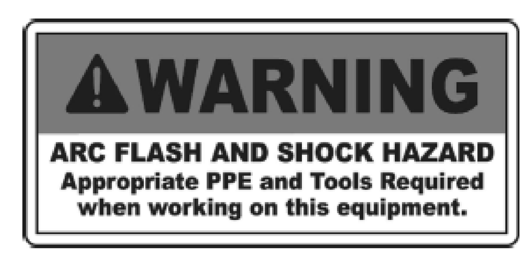
1. THE CONTRACTOR SHALL FURNISH AND INSTALL GROUNDING NECESSARY IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

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)

SCA NYC School Construction Authority

Architecture & Engineering
Dominick DeAngelis, AIA, Vice President
Aileen del Prado, P.E. LEED AP BD+C, Senior Director, Design Consultant Management
Maria 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, MEPFP ENGINEERS: NYC SCHOOL CONSTRUCTION AUTHORITY A&E IN-HOUSE DESIGN STUDIO 30-30 THOMSON AVENUE, LONG ISLAND CITY, NY 11101-3045

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

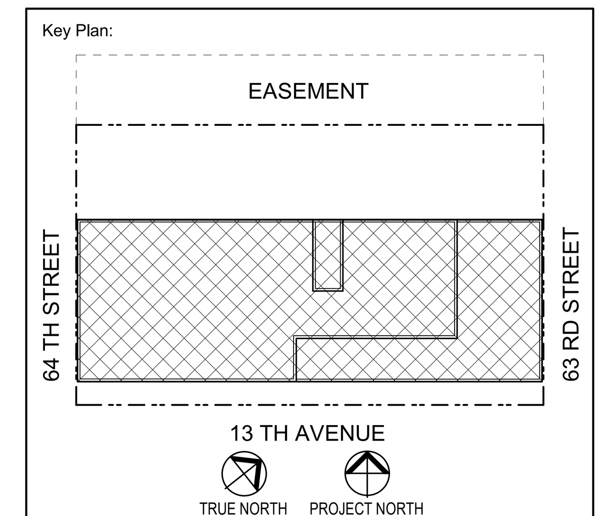
FOOD SERVICE: ROMANO GATLAND 1 HUNTINGTON QUADRANGLE SUITE 2C03, MELVILLE, NY 11747

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 0 341

C:\Revit\EL108380_3D_CENTRAL_030241.rvt
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E6.3R – GREEN POWER & CARBON OFFSETS

NYC Green Schools Rating System

GREEN POWER AND CARBON OFFSETS

CREDIT CALCULATOR

Credit E6.3R

School Construction Authority

RESPONSIBLE PARTY:

INITIAL SUBMISSION PHASE:

SD	DD	60%	100%	Design	CA

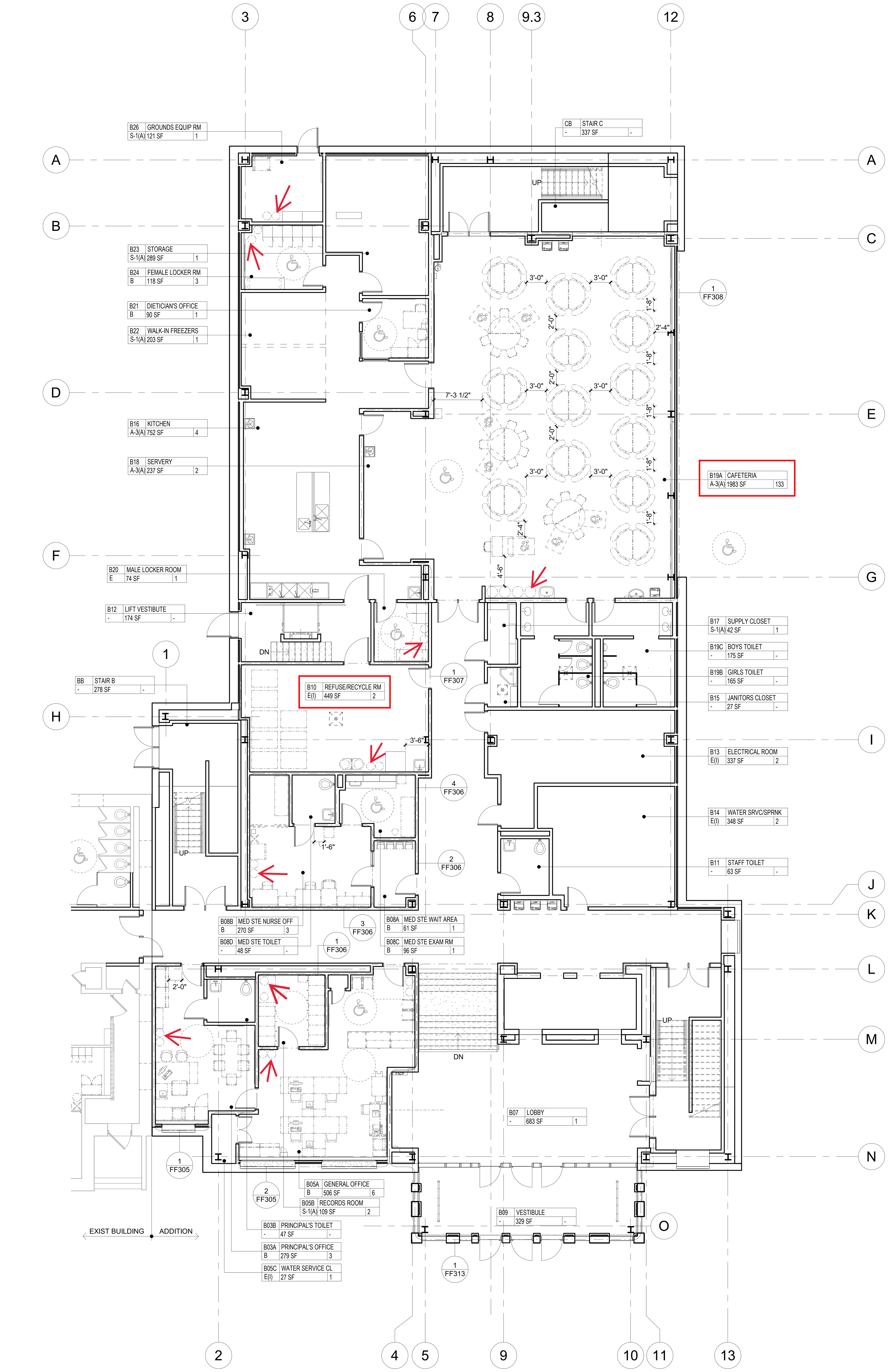
Project:	PS 123A	Submission Phase:	Schematic Design
Address:	345 Example St	Architect:	Architect
LLW #:	123456	Preparer:	
Design #:	123456	Form Revision Date:	

INSTRUCTIONS:
Step 1) Modeled Energy Use
Modeled Energy Use: Enter building energy consumption and enter percentage offset.

Step 1: Calculation based on energy model

Design case total electricity usage	354,145	kWh
Percentage of building energy offset (50% or 100%)	50	%
Term of agreement	5	years
Total energy to be addressed by green power, and/or offsets	885,363	kWh

M1.1P – STORAGE & COLLECTION OF RECYCLABLES



1 FURNITURE & FURNISHINGS PLAN - BASEMENT
1/8" = 1'-0"

Board of Trustees

SCA
Construction Authority

Architecture & Engineering

Consultants:

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% DD SUBMISSION
	4/1/2021	60% CD SUBMISSION

Key Plan:

Block No. 11694 Lot No. 27

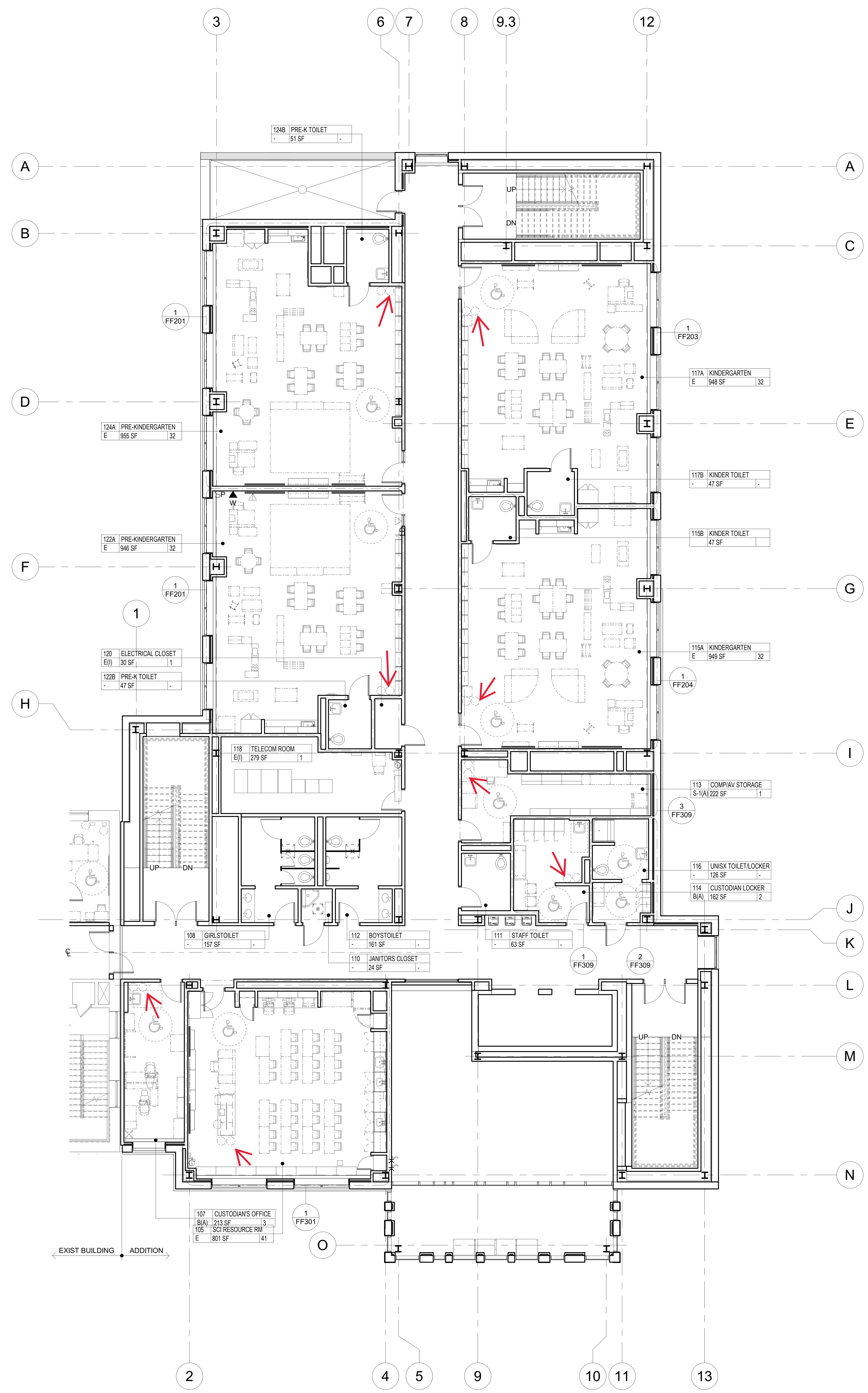
SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
LLW No: Facility Code: Date: 7/22/2021

Address:

Drawing No.: FF100.00

Sheets in Contract Set: of XXX

Sheets in DOB Set: of XXX



1 FURNITURE & FURNISHINGS PLAN - FIRST FLOOR
1/8" = 1'-0"

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Construction Authority

Architecture & Engineering

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

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No.	Date	Revision
	2/23/2021	30% DD SUBMISSION
	4/1/2021	60% 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

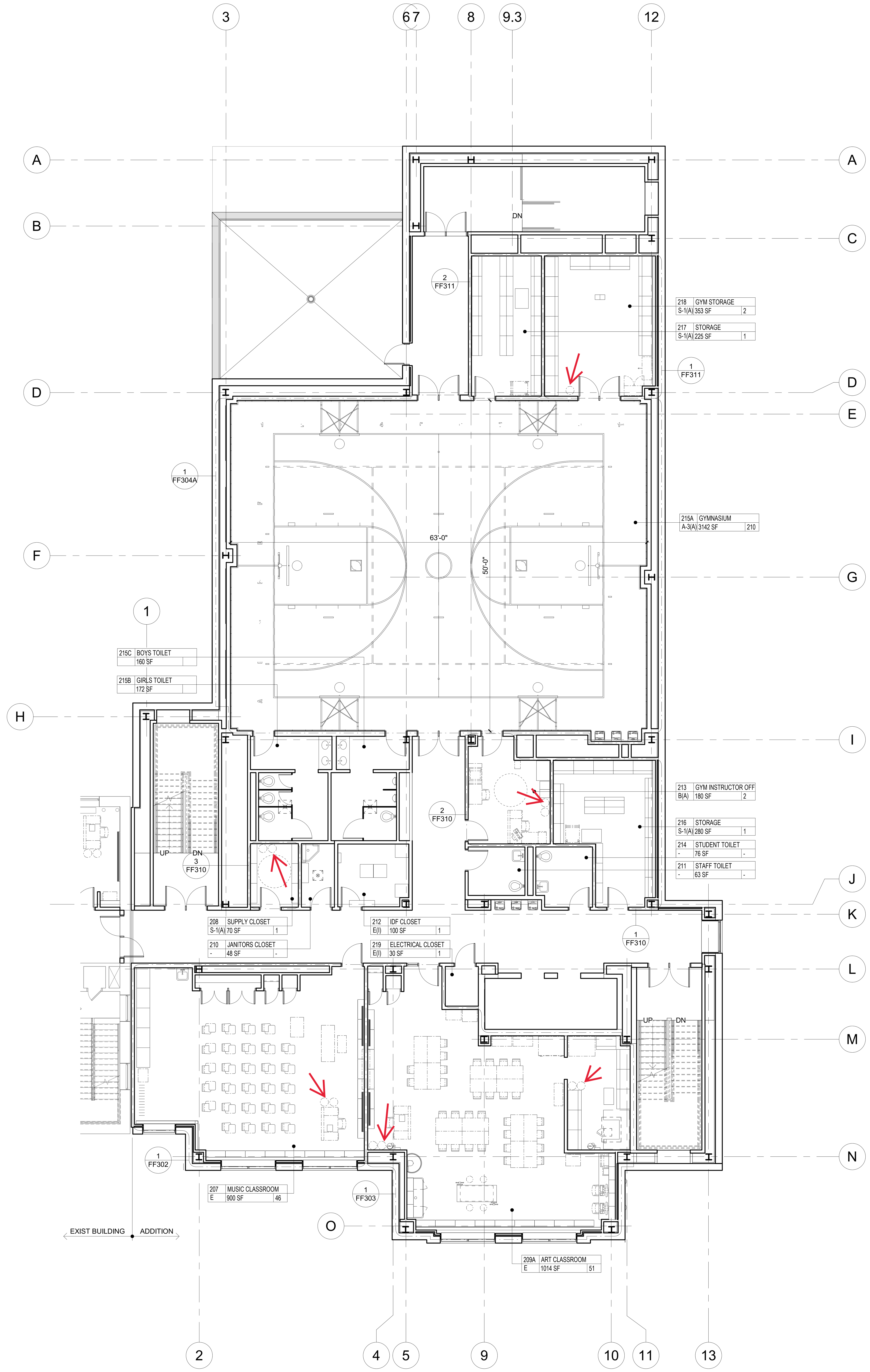
Project:
P.S. 96 - QUEENS
ADDITION AND EXISTING BUILDING RENOVATION WORK
Address:

Drawing Title:
FURNITURE & FURNISHINGS PLAN - FIRST FLOOR

Drawing No.:
FF101.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX



1 FURNITURE & FURNISHINGS PLAN - SECOND FLOOR
1/8" = 1'-0"

Board of Trustees

SCA Construction Authority

Architecture & Engineering

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

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	2/23/2021	30% DD SUBMISSION
	4/1/2021	60% CD SUBMISSION

Plan:

SCA Design Manager:
Project Architect/Engineer: RA
Discipline Lead:
Designer: ROLANDO KENNY, RA
Drawn by:
Checked by:
LLW No.: Facility Code: Date: 7/22/2021

Project:

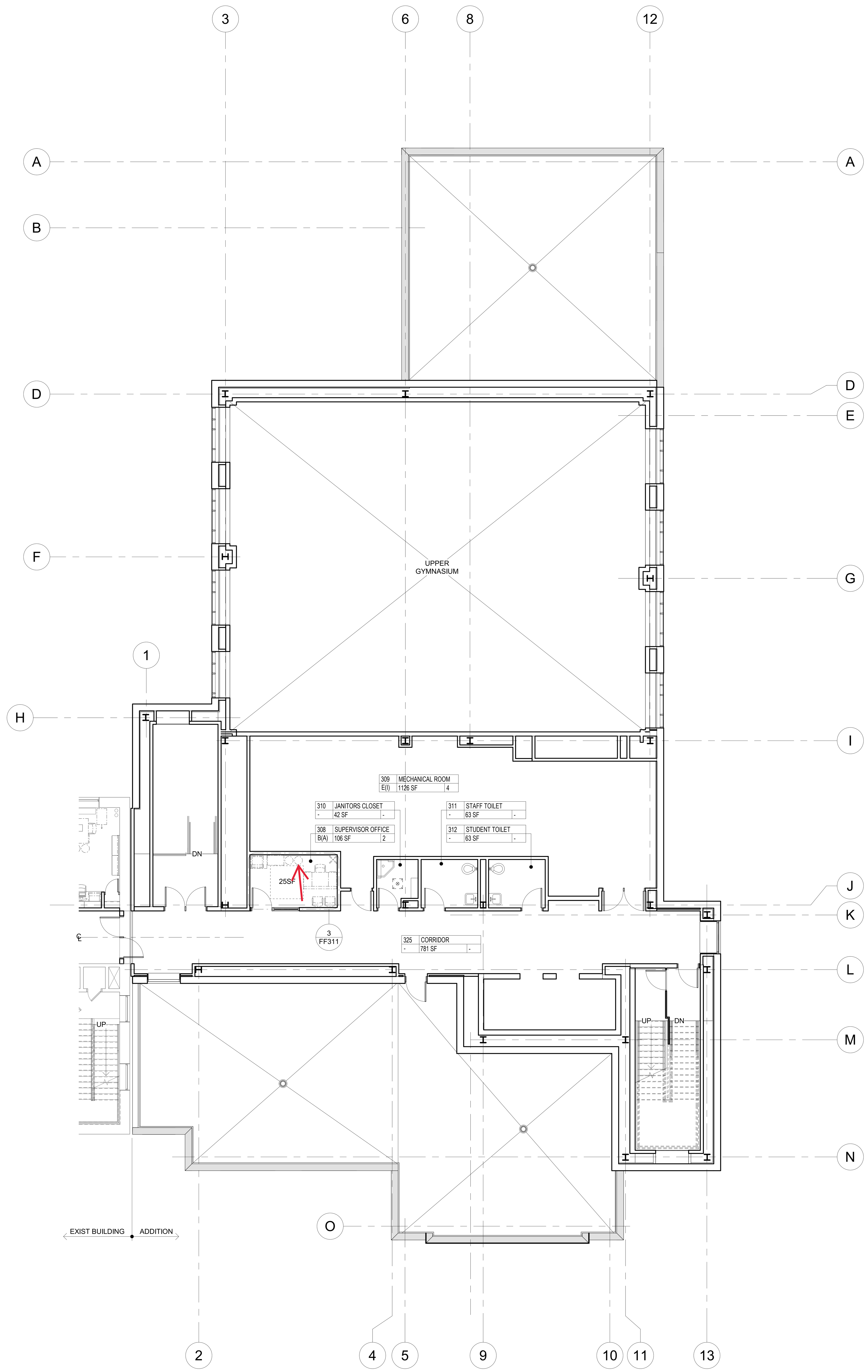
Address:

Drawing Title:
FURNITURE & FURNISHINGS PLAN - SECOND FLOOR

Drawing No.:
FF102.00

Sheets in Contract Set:

Sheets in DOB Set:
XXX



1 FURNITURE & FURNISHINGS PLAN - THIRD FLOOR
1/8" = 1'-0"

SCA
Construction Authority

Architecture & Engineering

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

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SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
LLW No.: Facility Code: Date: 7/22/2021

Address:

FURNITURE & FURNISHINGS PLAN - THIRD FLOOR

Draw

.00

Sheets in Contract Set:

Sheets in DOB Set:

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:

Table of Contents

Figures

Tables

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 $\mu g/m3$. 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.

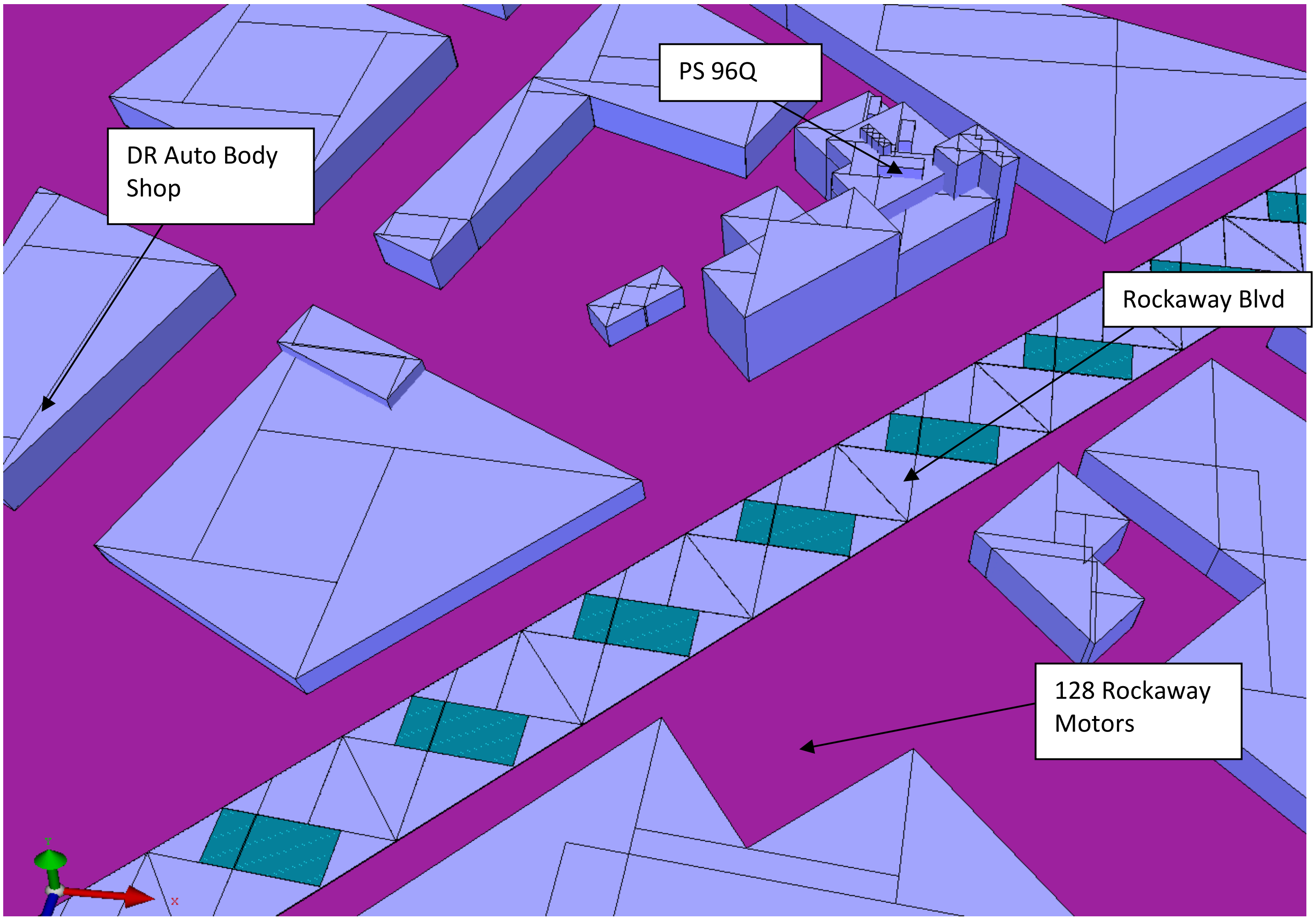


Figure 2: PS96Q and neighboring structures in the CFD model

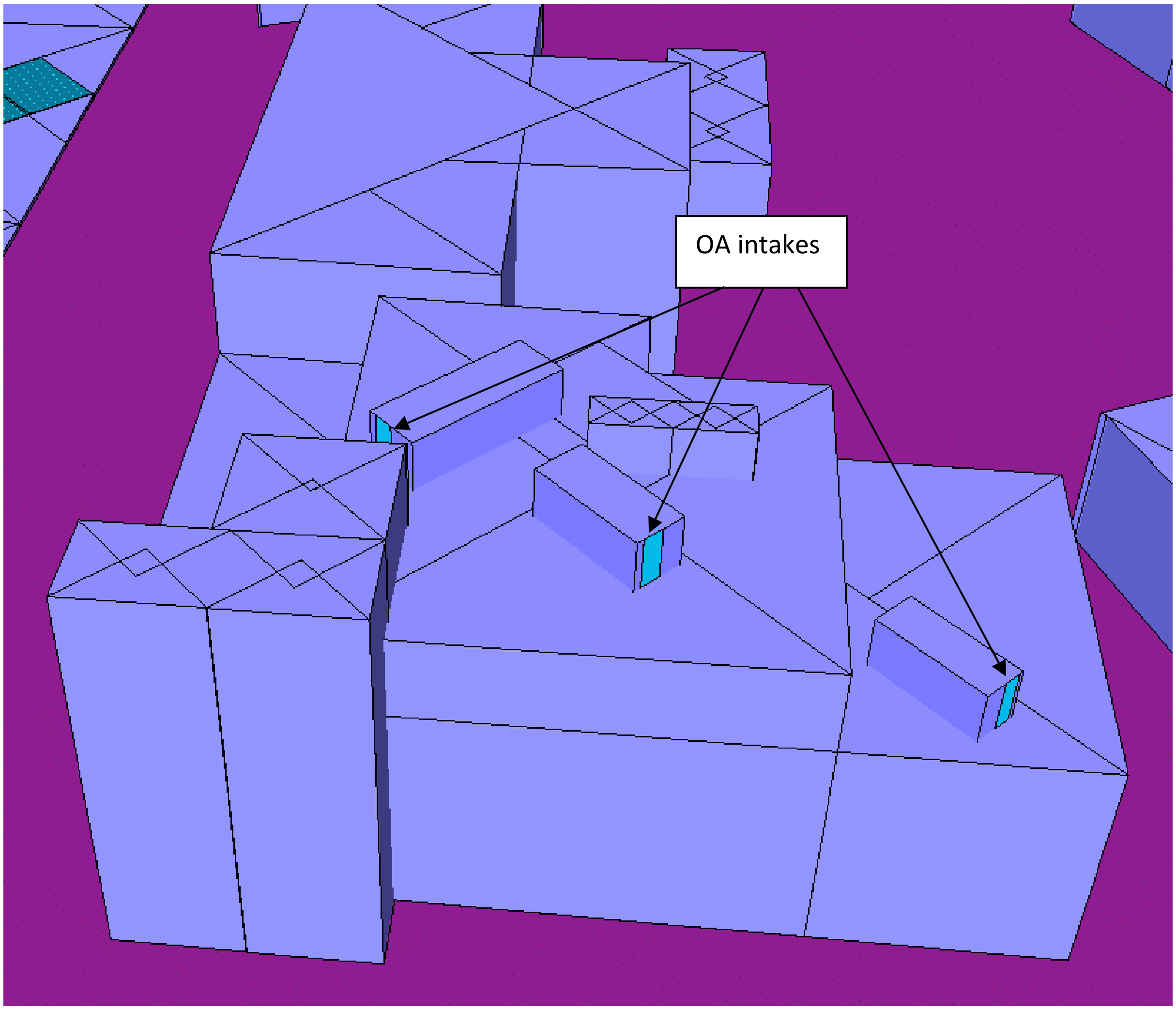


Figure 3: Close-up of the school and outside air intake sites

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.

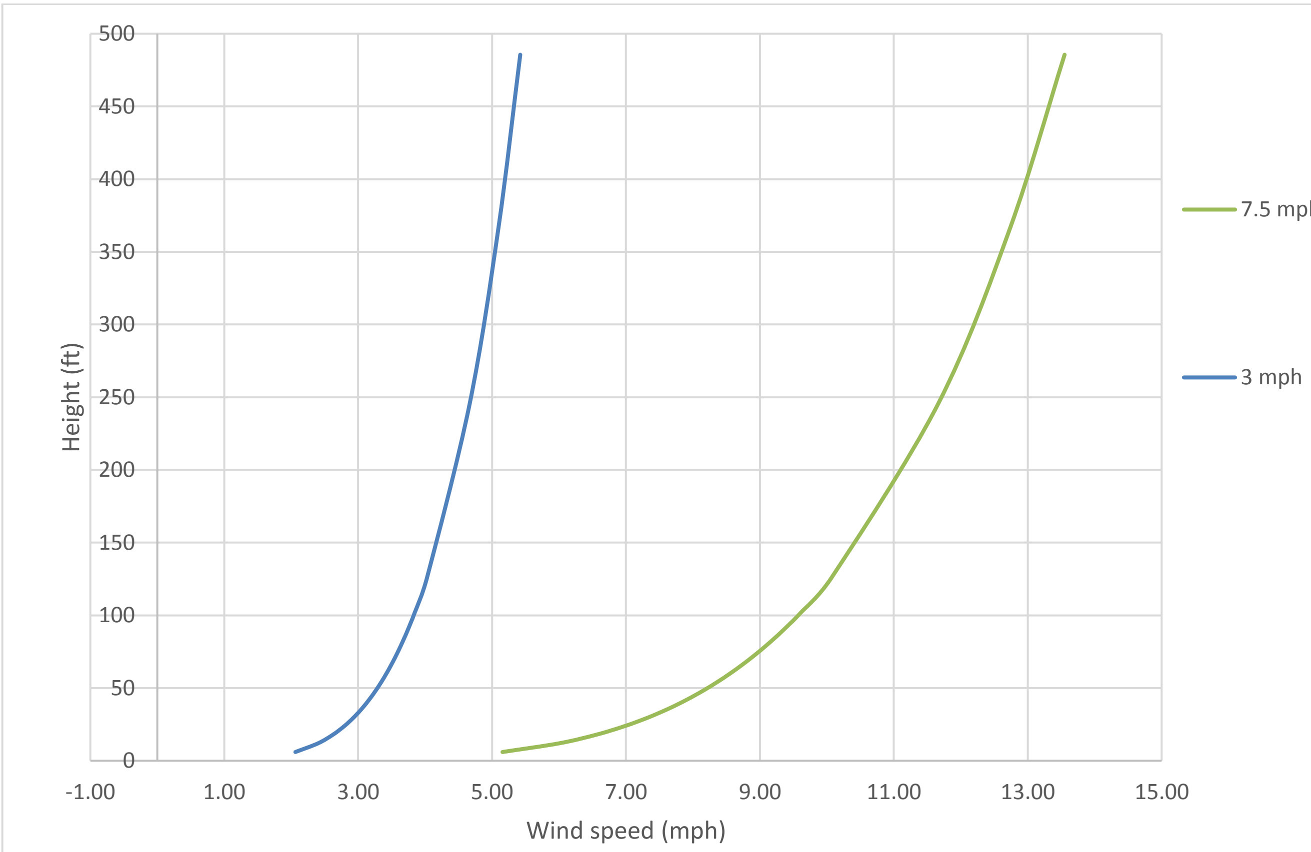


Figure 4: Wind Speed profile for areas exposed to wind flowing over water per chapter 24, ASHRAE Fundamentals 2017. Referenced wind speed is measured 33 feet above the ground: 3mph and 7.5mph

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 $\mu g/m^3$	50 $\mu g/m^3$	150 $\mu g/m^3$
PM2.5	10.4 $\mu g/m^3$	15 $\mu g/m^3$	35 $\mu g/m^3$
VOC	16.5 $\mu g/m^3$	500 $\mu g/m^3$	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 $\mu g/m^3$	50 $\mu g/m^3$	150 $\mu g/m^3$
PM2.5	10.4 $\mu g/m^3$	15 $\mu g/m^3$	35 $\mu g/m^3$
VOC	381.3 $\mu g/m^3$	500 $\mu g/m^3$	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.

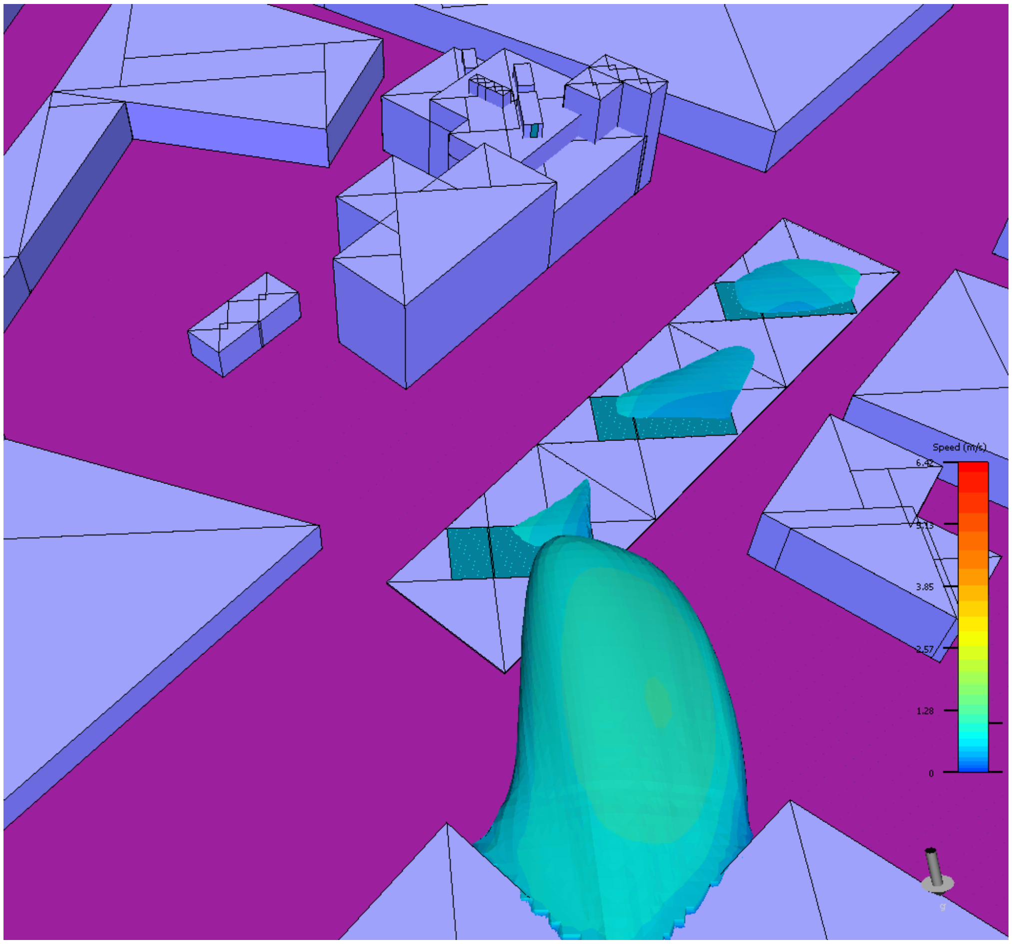


Figure 5: Plot of Benzene at 0.01 ppm concentration colored by speed, Highest Risk case

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.

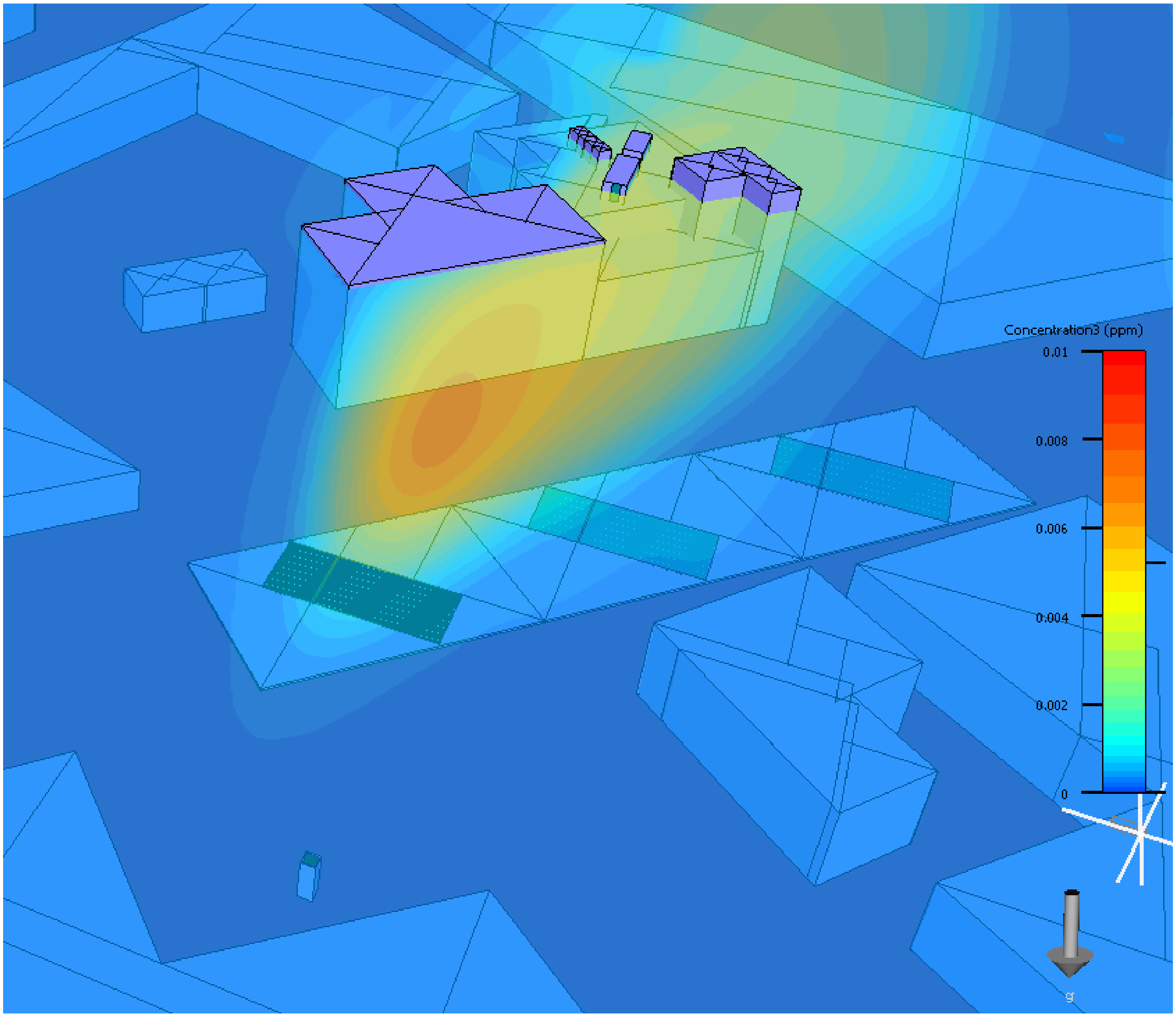


Figure 6: Plot of Benzene Concentration – Horizontal section, Highest Risk case

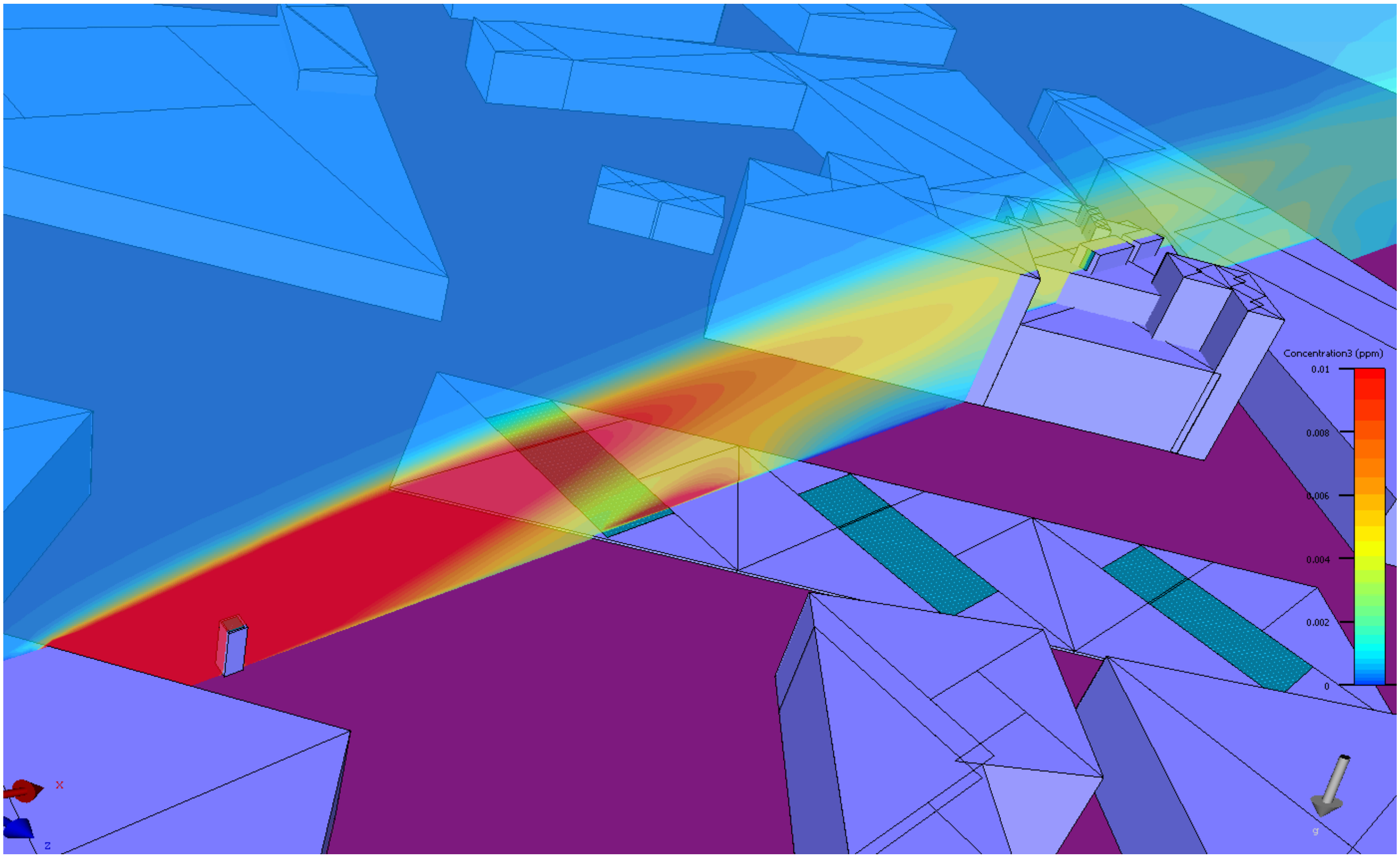


Figure 7: Plot of Benzene Concentration – Vertical section, Highest Risk case

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

	Concentration of Benzene (ppm)		
Weather	**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

	Concentration of VOC ($\mu g/m^3$)		
Weather	**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
1255 Broad Street, Suite 201
Clifton, New Jersey 07013
T: +1 (973) 883 8500
F: +1 (973) 883 8501
aecom.com

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.

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, olig	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)			

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**

INHALABLE PARTICULATES ($PM_{2.5}$)

(Manhattan Sites)

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 *)

Station	Site No.	Total Obs.	Maximum Values, µg/m³ 1st	2nd	3rd	98th Percentile, µg/m³ 2018	2017	2016	3-yr Avg.	Quarterly Averages, 2018 1st	2nd	3rd	4th	Annual Mean, µg/m³ 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	0.086	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	58	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	0.005	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.

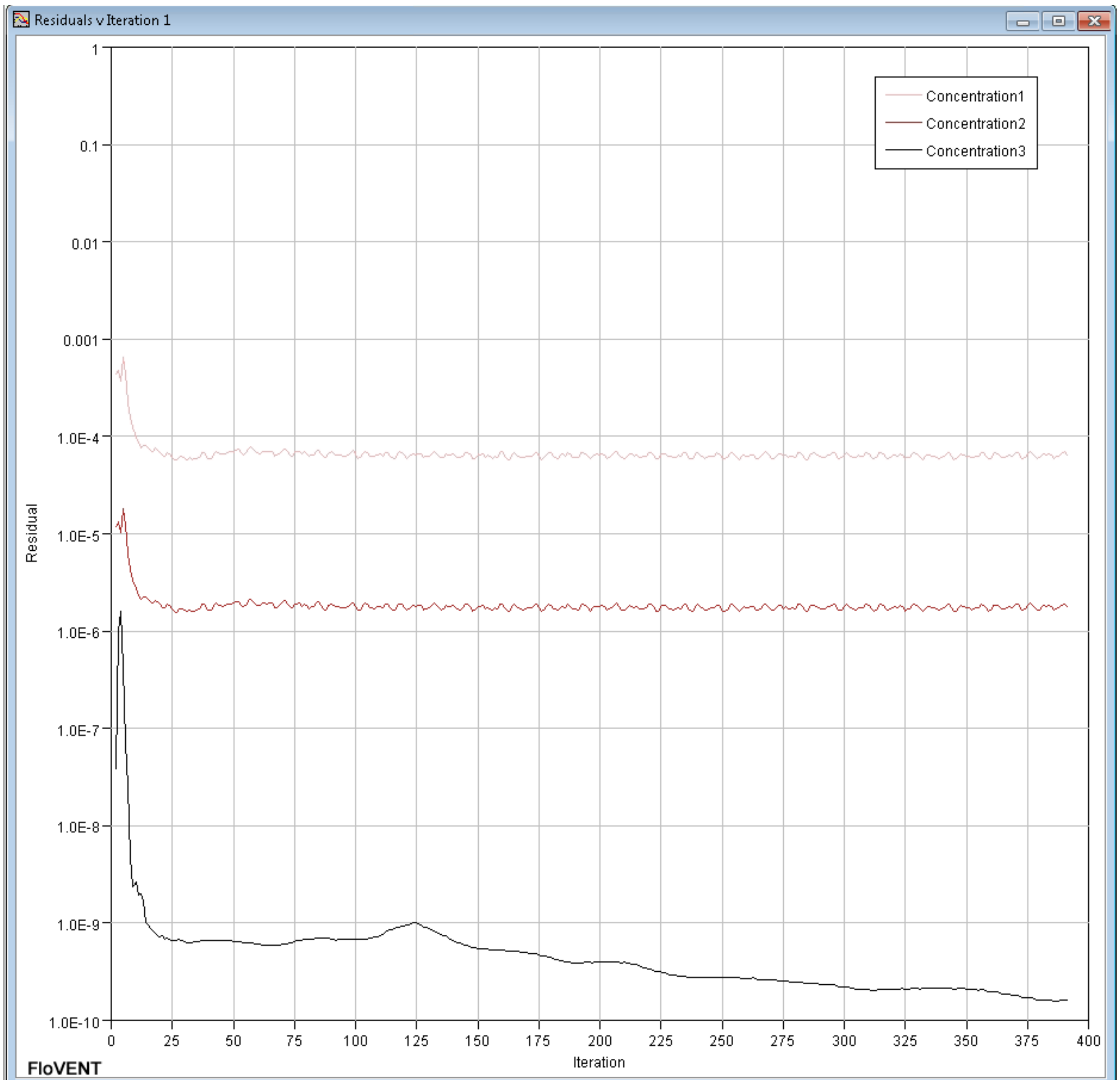


Figure 8: Plot of Residuals of pollutant concentration vs Iteration, High Risk Conditions

NYC Green Schools Rating System

School Construction Authority

MINIMUM INDOOR AIR QUALITY PERFORMANCE
CREDIT FORM
Credits Q1.1P

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

Go to SCA website for active form

Project:		**Submission Phase:**	Turnover
Address:		**Architect:**	
LLW #		**Preparer:**	SCA A&E
Design #		**Revision Date:**	

INSTRUCTIONS
Step 1) Confirm submission of required ventilation calculations
Step 2) Insert summary of minimum indoor air quality performance with one line for each system. Fill in either multiple zone systems of 100% outdoor air systems, as applicable.

Required Ventilation Calculations

	Y	N
Ventilation calculations verify compliance with Table 6-2 of ASHRAE 62.1-2010 entitled "Minimum Ventilation Rates in Breathing Zone"	X	
Control drawings show the type and location of monitoring devices	X	

Summary

System Name, Number	All Zones included in the VRP calc?	System floor area (sq ft)	Fully occupied system population (people)	Outdoor Air Intake (required by 62.1) Vot (cfm)	Fully occupied system design outdoor Air Intake Flow Provided (cfm)	Fully occupied system design outdoor air intake flow provided meets or exceeds Vot?	Fully occupied zone outdoor airflow provided meets or exceeds Voz for all zones
Multiple Zone Variable Air Volume Systems							
AHU-1 (MZVAV)	Yes	42,424	685	10,201	16,000	Yes	Yes
AHU-2 (MZVAV)	Yes	30,699	712	10,782	14,000	Yes	Yes
100% Outdoor Air Systems (Dedicated Outdoor Air System [DOES] and Single Zone Variable Air Volume Systems [SZVAV])							
AHU-3 (SZVAV)	Yes	7,591	202	2,089	4,950	Yes	Yes
AHU-4 (SZVAV)	Yes	7,040	305	1,909	4,000	Yes	Yes

AHU-1 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT²) (Az)	NYC BC TABLE 1004.1.1 SPACE FUNCTION	SQ.FT PER OCCUPANT	# OF OCCU. PER P.O.R. CALCULATED # OF OCCU. (Pz)	NYC MC TABLE 403.3 OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	OA CALC. PER NYC MC 403.3 (Eqn 4-1) BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	EHX. CALC. PER NYC MC 403.5 ZONE EXHAUST CFM	DESIGN VALUES SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
5TH FLOOR															
500 CORRIDOR	1,126	n/a	n/a		CORRIDOR	0	0.06		68		500	300			NOTE 1
501 SCIENCE ROOM	822	CLASSROOM	20	41	CLASSROOM	10	0.12		509		1,100	660	850		-
503 STAFF TOILET	58	TOILET	20	1 FIXTURE	TOILET ROOM	10	0.12	70 / FIXTURE		70				75	-
505 MUSIC CLASSROOM	622	CLASSROOM	20	31	CLASSROOM	10	0.12		385		900	540	700		-
505A INSTRUMENT STORAGE	67	STORAGE			STORAGE	0	0.12		8					50	
507 ELECTRICAL IDF ROOM	109														-
509 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
511 JANITOR'S CLOSET	42	n/a	n/a											75	
513 GIRLS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
SB5 STAIR B	294	n/a	n/a		STAIR										
SC5 STAIR C	292	n/a	n/a		STAIR										
502 TEACHERS' WORK RM / LOUNGE	440	BUSINESS	100	4	OFFICE	5	0.06		46		650	390	500		-
502A TOILET	59	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
504 EXERCISE ROOM	1,237	EXERCISE	50	24	EXERCISE	20	0.06		554		1,550	930	1,200		-
506 ELECTRICAL CLOSET	95													50	-
508 E.D. STORAGE	61	STORAGE			STORAGE	0	0.12		7					50	
510 GENDER NEUTRAL TOILET	58	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
512A HEALTH INSTRUCTOR'S OFFICE	117	BUSINESS	100	1	OFFICE	5	0.06		12		250	150	200		-
4TH FLOOR															
400 CORRIDOR	1,612	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
401 SPEECH RESOURCE RM	350	CLASSROOM	20	17	CLASSROOM	10	0.12		212		450	270	425		-
403 PARENT COMMUNITY ROOM	361	BUSINESS	100	3	OFFICE	5	0.06		37		450	270	425		-
405 GUID. SUITE	441	BUSINESS	100	5	OFFICE	5	0.06		51		500	300	375		-
405D STORAGE CLOSET	72	STORAGE			STORAGE	0	0.12		9					50	
407 READING RESOURCE RM	333	CLASSROOM	20	16	CLASSROOM	10	0.12		200		400	240	350		-
409 ELECTRICAL IDF ROOM	106														-
411 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
413 JANITOR'S CLOSET	42	n/a	n/a											75	
SB4 STAIR B	294	n/a	n/a		STAIR										
SC4 STAIR C	292	n/a	n/a		STAIR										
402 GRADE 5 CLASSROOM	717	CLASSROOM	20	35	CLASSROOM	10	0.12		436		850	510	775		-
404 GRADE 5 CLASSROOM	716	CLASSROOM	20	35	CLASSROOM	10	0.12		436		850	510	775		-
406 ELECTRICAL CLOSET	96												50		-
408 GRADE 5 CLASSROOM	667	CLASSROOM	20	33	CLASSROOM	10	0.12		410		800	480	725		-
3TH FLOOR															
300 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
301 D75 OCCU. THERAPY	451	CLASSROOM	20	22	CLASSROOM	10	0.12		274		550	330	450		-
303 D75 SPECIAL ED SPEECH RM	205	CLASSROOM	20	10	CLASSROOM	10	0.12		125		250	150	200		-
305 STAFF LUNCH ROOM	499	BUSINESS	100	33	OFFICE	5	0.06		195		600	360	550		-
307 D75 SPECIAL ED SPEECH RM	200	CLASSROOM	20	10	CLASSROOM	10	0.12		124		250	150	200		
309 ELECTRICAL MDF ROOM	311														-
311 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
313 JANITOR'S CLOSET	42	n/a	n/a											75	
SB3 STAIR B	294	n/a	n/a		STAIR										
SC3 STAIR C	292	n/a	n/a		STAIR										
302 GRADE 2 CLASSROOM	732	CLASSROOM	20	36	CLASSROOM	10	0.12		448		850	510	775		-
304 GRADE 2 CLASSROOM	732	CLASSROOM	20	36	CLASSROOM	10	0.12		448		850	510	775		-
306 ELECTRICAL CLOSET	92												50		-
308 GRADE 2 CLASSROOM	690	CLASSROOM	20	34	CLASSROOM	10	0.12		423		800	480	750		-
2ND FLOOR															
200 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
201 D75 MAIN / SUPER OFFICE	380	BUSINESS	100	3	OFFICE	5	0.06		38		450	270	350		-
201A E.D. STORAGE	50	STORAGE			STORAGE	0	0.12		6					50	
203 D75 CLASSROOM RM (CW-10-10)	466	CLASSROOM	20	23	CLASSROOM	10	0.12		286		550	330	425		-
203A CLASSROOM TOILET	42	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	
205 MULTI-PURPOSE RM	599	CLASSROOM	20	29	CLASSROOM	10	0.12		362		700	420	630		-
207 ELECTRICAL IDF ROOM	110														-
209 BOYS' TOILET	237	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
211 JANITOR'S CLOSET	40	n/a	n/a											75	
SB2 STAIR B	294	n/a	n/a		STAIR										
SC3 STAIR C	292	n/a	n/a		STAIR										
202 D75 CHANGING ROOM	90	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
204 D75 CLASSROOM	617	CLASSROOM	20	30	CLASSROOM	10	0.12		374		750	450	600		-
204A D75 CLASSROOM TOILET	66	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
206 D75 CLASSROOM	639	CLASSROOM	20	31	CLASSROOM	10	0.12		387		750	450	600		-
206A D75 CLASSROOM TOILET	66	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
208 ELECTRICAL CLOSET	90												50		-
210 D75 CLASSROOM	624	CLASSROOM	20	31	CLASSROOM	10	0.12		385		750	450	600		-
210A D75 CLASSROOM TOILET	62	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-

AHU-1 OUTDOOR AIR REQUIREMENT CONTINUED

ROOM NAME / ROOM NUMBER	AREA (FT²) (Az)	NYC BC TABLE 1004.1.1 SPACE FUNCTION	SQ.FT PER OCCUPANT	# OF OCCU. PER P.O.R. CALCULATED # OF OCCU. (Pz)	NYC MC TABLE 403.3 OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	OA CALC. PER NYC MC 403.3 (Eqn 4-1) BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	EHX. CALC. PER NYC MC 403.5 ZONE EXHAUST CFM	DESIGN VALUES SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
1ST FLOOR															
100A CORRIDOR	779	n/a	n/a		CORRIDOR	0	0.06		47		300	180			NOTE 1
100E CORRIDOR	320	n/a	n/a		CORRIDOR	0	0.06		19		300	180			-
101 KINDERGARTEN CLASSROOM	930	CLASSROOM	20	30	CLASSROOM	10	0.12		412		1,150	690	1,000		-
101A KINDER. CLASSRM. TOILET	47	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
103 KINDERGARTEN CLASSROOM	944	CLASSROOM	20	31	CLASSROOM	10	0.12		423		1,150	690	1,000		-
103A KINDER. CLASSRM. TOILET	47	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
105 STAFF TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
VC VESTIBULE	88	n/a	n/a		CORRIDOR	0	0.06		5		200	120			
SB1 STAIR B	282	n/a	n/a		STAIR										
SC1 STAIR C	261	n/a	n/a		STAIR										
102 JANITOR'S CLOSET	34	n/a	n/a											75	
104 KINDERGARTEN CLASSROOM	947	CLASSROOM	20	31	CLASSROOM	10	0.12		424		1,150	690	1,000		-
104A KINDER. CLASSROOM TOILET	43	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
106 ELECTRICAL CLOSET	84													50	
CELLAR FLOOR															
C00 CORRIDOR	932	n/a	n/a		CORRIDOR	0	0.06		56		900	540			NOTE 1
C01 WATER METER ROOM	547	n/a	300	1							300			400	
C03 JANITOR'S CLOSET	34	n/a	n/a											75	
C05 LOCKER RM SUITE	415	LOCKER	50	4	LOCKER			0.25			400	240		450	
C07 GEN. STOR. RECEIVING RM	252	STORAGE			STORAGE	0	0.12		30		375	225	350		
C13 GENERAL STORAGE	482	STORAGE			STORAGE	0	0.12		58		375	225			
C09 AV SECURE STORAGE	150	STORAGE			STORAGE	0	0.12		18		150	90	150		
C11 ELECTRICAL IDF ROOM	108													-	-
C15 SHOWER/CHANGING RM	234	LOCKER	50	1 FIXTURE	LOCKER			0.25		70				300	
C17 BICYCLE STORAGE	129	STORAGE			STORAGE	0	0.12		15					150	
SBC STAIR B	282	n/a	n/a		STAIR										
SCC STAIR C	261	n/a	n/a		STAIR										
C02 TOILET	56	n/a	n/a							75				75	
C04 CUSTODIAN'S OFFICE	316	BUSINESS	100	3	OFFICE	5	0.06		34		350	210	320		-
C06 CUST. WORKSHOP/STOR.	401	BUSINESS	100	3	OFFICE	5	0.06		24		400	240		400	
C08 REFUSE RECYCLING RM	540	STORAGE			STORAGE	0	0.12		65					400	
C10 ELECTRICAL ROOM	505													-	NOTE 2
C12 KITCHEN STORAGE	61	STORAGE			STORAGE	0	0.12		7					100	
C10A UPS ROOM															NOTE 2
									CRITICAL ZONE OA/SA FACTION						0.6
									TOTAL =		26,050	15,450	18,175	5,425	
									VAV DIVERSITY 0.85 =>		22,143				
									AHU-1 DESIGN		23,000	16,000			

NOTES:
#1: CORRIDOR SUPPLY AIR FROM AHU-1&2 JOINTLY PROVIDES MAKE UP AIR TO ALL TOILET EXHAUST AND CLOSET EXHAUSTS.
#2: STORAGE ROOM AIR PROVIDED VIA CORRIDOR TRANSFER AIR.

NOTE: ROOM SQ.FT. MAY HAVE SLIGHTLY REDUCED ON ARCH. PLANS DUE TO CLOSETS AND PIPE CHASES ADDED INSIDE CLASSROOMS. THERE WILL BE COORDINATED IN THE NEXT SUBMISSION.

Acting President & CEO

NYC School Construction Authority

Architecture & Engineering

Consultants:

Issued For Construction

NOTE: Drawing may be printed at reduced scale

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

Key Plan:

Project:

Drawing Title:
HVAC VENTILATION
SCHEDULES SHEET 1

Drawing No.:
M009.00

Sheets in Contract Set:
292 OF 455

Sheets in DOB Set:
194 OF 282

AHU-2 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT²)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
ROOF I FLOOR															
600 CORRIDOR	592	n/a	n/a		CORRIDOR	0	0.06		36		500	300			NOTE 1
603 FILTER STORAGE ROOM	238	STORAGE			STORAGE	0	0.12		29					150	
604 ROOF ELECTRICAL ROOM	295	-			-	-	-		-					300	
4TH FLOOR															
400 CORRIDOR	1,612	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
410 GRADE 4 CLASSROOM	690	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	510	775		-
412 GRADE 4 CLASSROOM	674	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	510	775		-
414 GRADE 4 CLASSROOM	671	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	510	775		-
SA5 STAIR A	274	n/a	n/a		STAIR										
415 GIRLS' TOILET	271	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
417 STAFF TOILET	58	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
419 CSD SP. ED. CLASSROOM	429	CLASSROOM	20	21	CLASSROOM	10	0.12		261		500	300	450		-
421 GRADE 3 CLASSROOM	673	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	510	775		-
423 ED. STORAGE	28	STORAGE			STORAGE	0	0.12		3					50	
425 GRADE 3 CLASSROOM	681	CLASSROOM	20	34	CLASSROOM	10	0.12		422		850	510	775		-
427 GRADE 3 CLASSROOM	646	CLASSROOM	20	32	CLASSROOM	10	0.12		398		850	510	775		-
3TH FLOOR															
300 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
310 GRADE 1 CLASSROOM	692	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	510	750		-
312 GRADE 1 CLASSROOM	691	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	510	750		-
314 GRADE 1 CLASSROOM	727	CLASSROOM	20	36	CLASSROOM	10	0.12		447		850	510	750		-
SA3 STAIR A	294	n/a	n/a		STAIR										
315 GIRLS' TOILET	271	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
317 STAFF TOILET	57	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
319 ART CLASSROOM	997	CLASSROOM	20	47	CLASSROOM	10	0.12	0.7	590	698	1,200	720	600		-
319A ART STORAGE WITH KILN FAN	143	KILN												700	
321 CSD SP. ED. CLASSROOM	486	CLASSROOM	20	24	CLASSROOM	10	0.12		298		600	360	500		-
323 ED. STORAGE	48	STORAGE			STORAGE	0	0.12		6					50	
325 LIBRARY	832	LIBRARY	50	16	LIBRARY	10	0.12		260		1,000	600	850		-
2ND FLOOR															
200 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	240			NOTE 1
212 D75 CLASSROOM	439	CLASSROOM	20	21	CLASSROOM	10	0.12		263		550	330	425		-
212A D75 CLASSROOM TOILET	63	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
214 D75 CLASSROOM	478	CLASSROOM	20	23	CLASSROOM	10	0.12		287		550	330	425		-
214A D75 CLASSROOM TOILET	64	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
216 D75 CLASSROOM (CW10-10)	484	CLASSROOM	20	24	CLASSROOM	10	0.12		298		550	330	425		-
216A D75 CLASSROOM TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
218 D75 GUIDANCE SUITE	129	BUSINESS	100	6	OFFICE	5	0.06		38		100	60	100		-
218A&B D75 GUIDANCE OFFICE	316	BUSINESS	100	2	OFFICE	5	0.06	70/FIXTURE	29	70	400	240	350		-
SA2 STAIR A	394	n/a	n/a		STAIR										
213 GIRLS' TOILET	267	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
215 D75 STORAGE	383	STORAGE			STORAGE	0	0.12		46					100	
217 STAFF TOILET	59	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
219 D75 CLASSROOM (CW10-11)	640	CLASSROOM	20	32	CLASSROOM	10	0.12		397		800	480	700		-
219A D75 CLASSROOM TOILET	64	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
221 D75 RESOURCE ROOM	250	CLASSROOM	20	12	CLASSROOM	10	0.12		150		300	180	250		-
223 D75 E.D. STORAGE	168	STORAGE			STORAGE	0	0.12		20					50	-
225 D75 RESOURCE ROOM	249	CLASSROOM	20	12	CLASSROOM	10	0.12		150		300	180	250		-
227 D75 RESOURCE ROOM	279	CLASSROOM	20	13	CLASSROOM	10	0.12		163		350	210	300		-
229 D75 PHYSICAL THERAPY	575	CLASSROOM	20	28	CLASSROOM	10	0.12		349		700	420	625		-
1ST FLOOR															
100D CORRIDOR	782	n/a	n/a		CORRIDOR	0	0.06		47		400	240			NOTE 1
106 ELECTRICAL CLOSET	83													50	-
108 PRE-K CLASSROOM	909	CLASSROOM	20	30	CLASSROOM	10	0.12		409		1,100	660	950		-
108A PRE-K CLASSROOM TOILET	46	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
110 PRE-K CLASSROOM	913	CLASSROOM	20	30	CLASSROOM	10	0.12		410		1,100	660	950		-
110A PRE-K CLASSROOM TOILET	46	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
112 PRE-K CLASSROOM	926	CLASSROOM	20	30	CLASSROOM	10	0.12		411		1,100	660	950		-
112A PRE-K CLASSROOM TOILET	45	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
SA1 STAIR A	422	n/a	n/a		STAIR										
107 PRINCIPAL'S OFFICE	310	BUSINESS	100	3	OFFICE	5	0.06		34		350	210	275		-
107A TOILET	57	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
109 GENERAL OFFICE	455	BUSINESS	100	4	OFFICE	5	0.06		47		550	330	475		-
109A RECORD ROOM	116	STORAGE			STORAGE	0	0.12		14					50	
111 ED. STORAGE	31	STORAGE			STORAGE	0	0.12		4					50	
113 MEDICAL SUITE	253	BUSINESS	100	2	OFFICE	5	0.06		25		300	180	350		-
115B EXAM ROOM	104	BUSINESS	100	2	OFFICE	5	0.06		16		150	90			-
113C TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
115 PRE-K CLASSROOM	879	CLASSROOM	20	29	CLASSROOM	10	0.12		395		1,100	660	1000		-
115A PRE-K CLASSROOM TOILET	44	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
117 GROUND EQUIPMENT STORAGE	112	-			-	-	-		-		100			100	-
									CRITICAL ZONE OA/SA FACTION						0.6
										TOTAL =	23,500	14,040	18,100	3,525	
										VAV DIVERSITY 0.85 =>	19,975				
										AHU-2 DESIGN	20,000	14000			

NOTES:
#1: CORRIDOR SUPPLY AIR FROM AHU-1&2 JOINTLY PROVIDES MAKE UP AIR TO ALL TOILET EXHAUST AND CLOSET EXHAUSTS.
#2: STORAGE ROOM AIR PROVIDED VIA CORRIDOR TRANSFER AIR.

NOTE: ROOM SQ.FT. MAY HAVE SLIGHTLY REDUCED ON ARCH. PLANS DUE TO CLOSETS AND PIPE CHASES ADDED INSIDE CLASSROOMS. THERE WILL BE COORDINATED IN THE NEXT SUBMISSION.

AHU-3 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT²)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
CELLAR FLOOR															
C14 CAFETERA	2,869	ASSEMBLY*	12	191	CAFETERIA	7.5	0.18		1949		5,000	3,094	4,800		NOTE 2
C14A BOYS' TOILET	178	TOILET		4 FIXTURE	TOILET ROOM		70 / FIXTURE			280				300	
C14B GIRLS' TOILET	167	TOILET		4 FIXTURE	TOILET ROOM		70 / FIXTURE			280				300	
C19A SERVERY	499	BUSSINESS	200	2	CAFETERIA	7.5	0.18		105		1000	619			-
C19B KITCHEN PREP & COOK. AREA	1,174	KITCHEN	200	5	KITCHEN			0.70		822	1850	1,145		2250	NOTE 1
KITCHEN HOOD														4000	NOTE 1
C19J DIETICIAN'S OFFICE	135	BUSINESS	135	1	OFFICE	5	0.06		13		150	93			
C19G CAN WASH ROOM	106	n/a			n/a									250	-
C19C TOILET	68	TOILET			TOILET ROOM		70 / FIXTURE			70				75	
C19D KITCHEN M. STAFF LOCKER	108	LOCKER		2	LOCKER									100	
C19E KITCHEN F. STAFF LOCKER	127	LOCKER		2	LOCKER									100	
C19F FOOD STORAGE	184	STORAGE			STORAGE	0	0.12		22					50	
C19K ELEVATOR MACHINE RM	102	ELEVATOR												150	
										TOTAL =	8,000	4,950	4,800	3,575	NON-COOKING
													3,050	5,325	COOKING
										AHU-3 DESIGN	8,000	4950			

NOTES:
#1: KITCHEN HOOD AND KITCHEN GENERAL EXHAUST DO NOT OPERATE CONCURRENTLY. WHEN KITCHEN HOOD IS ON, THE KITCHEN EXHAUST IS TURNED OFF.
#2: CAFETERIA RETURN FOR NON-COOKING MODE IS 4,800 CFM AND FOR COOKING MODE IS 3,050 CFM.
#3: KITCHEN GENERAL EXHAUST FAN KEF-2 SERVICES KITCHEN, DIETITIAN OFFICE (VIA TRANSFER AIR), FOOD STORAGE & NON FOOD STORAGE.

AHU-4 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT²)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
5th FLOOR / GYM FLOOR															
512 MULTI-PURPOSE ROOM	4,110	GYMNASIUM	15	274	GYM		0.30		1233		5,000	3333	4400		-
512B CHAIR STORAGE	113	STORAGE			STORAGE		0.12		14					100	-
512C GYM EQUIP. STORAGE	238	STORAGE			STORAGE		0.12		29					200	-
512D STAGE	885	PLATFORM	15	58	STAGES	10	0.06		633		1,000	667	850		-
SA5 STAIR A	832	n/a	n/a		STAIR										
										TOTAL =	6,000	4,000	5,250	300	
										AHU-4 DESIGN	6,000	4,000			

NOTES:
NONE

NYC School Construction Authority

Issued For Construction

NOTE: Drawing may be printed at reduced scale

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

Project:
NEW BUILDING
Address:

Drawing Title:
HVAC VENTILATION SCHEDULES SHEET 2

Drawing No.: M010.00

Sheets in Contract Set: 293 OF 455

Sheets in DOB Set: 195 OF 282

AHU-1 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT^2)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT^2 (Ra)	EXHAUST RATE CFM/FT^2	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
5TH FLOOR															
500 CORRIDOR	1,126	n/a	n/a		CORRIDOR	0	0.06		68		450	293			NOTE 1
501 SCIENCE ROOM	822	CLASSROOM	20	41	CLASSROOM	10	0.12		509		1,100	717	850		-
503 STAFF TOILET	58	TOILET	20	1 FIXTURE	TOILET ROOM	10	0.12	70 / FIXTURE		70				75	-
505 MUSIC CLASSROOM	622	CLASSROOM	20	31	CLASSROOM	10	0.12		385		900	587	700		-
505A INSTRUMENT STORAGE	67	STORAGE			STORAGE	0	0.12		8					50	
507 ELECTRICAL IDF ROOM	109													50	-
509 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
511 JANITOR'S CLOSET	42	n/a	n/a											50	
513 GIRLS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
SB5 STAIR B	294	n/a	n/a		STAIR										
SC5 STAIR C	292	n/a	n/a		STAIR										
502 TEACHERS' WORK RM / LOUNGE	440	BUSINESS	100	4	OFFICE	5	0.06		46		650	424	500		-
502A TOILET	59	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
504 EXERCISE ROOM	1,237	EXERCISE	50	24	EXERCISE	20	0.06		554		1,550	1011	1,200		-
506 ELECTRICAL CLOSET	95													50	-
508 E.D. STORAGE	61	STORAGE			STORAGE	0	0.12		7					50	
510 GENDER NEUTRAL TOILET	58	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
512A HEALTH INSTRUCTOR'S OFFICE	117	BUSINESS	100	1	OFFICE	5	0.06		12		250	163	200		-
4TH FLOOR															
400 CORRIDOR	1,612	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
401 SPEECH RESOURCE RM	350	CLASSROOM	20	17	CLASSROOM	10	0.12		212		450	293	425		-
403 PARENT COMMUNITY ROOM	361	BUSINESS	100	3	OFFICE	5	0.06		37		450	293	425		-
405 GUID. SUITE	441	BUSINESS	100	5	OFFICE	5	0.06		51		500	326	375	50	-
407 READING RESOURCE RM	333	CLASSROOM	20	16	CLASSROOM	10	0.12		200		400	261	350		-
409 ELECTRICAL IDF ROOM	106													50	-
411 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
413 JANITOR'S CLOSET	42	n/a	n/a											50	
SB4 STAIR B	294	n/a	n/a		STAIR										
SC4 STAIR C	292	n/a	n/a		STAIR										
402 GRADE 5 CLASSROOM	717	CLASSROOM	20	35	CLASSROOM	10	0.12		436		850	554	775		-
404 GRADE 5 CLASSROOM	716	CLASSROOM	20	35	CLASSROOM	10	0.12		436		850	554	775		-
406 ELECTRICAL CLOSET	96													50	-
408 GRADE 5 CLASSROOM	667	CLASSROOM	20	33	CLASSROOM	10	0.12		410		800	522	725		-
3TH FLOOR															
300 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
301 D75 OCCU. THERAPY	451	CLASSROOM	20	22	CLASSROOM	10	0.12		274		550	359	450		-
303 D75 SPECIAL ED SPEECH RM	205	CLASSROOM	20	10	CLASSROOM	10	0.12		125		250	163	200		-
305 STAFF LUNCH ROOM	499	BUSINESS	100	33	OFFICE	5	0.06		195		600	391	550		-
307 D75 SPECIAL ED SPEECH RM	200	CLASSROOM	20	10	CLASSROOM	10	0.12		124		250	163	200		
309 ELECTRICAL MDF ROOM	311													100	-
311 BOYS' TOILET	240	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
313 JANITOR'S CLOSET	42	n/a	n/a											50	
SB3 STAIR B	294	n/a	n/a		STAIR										
SC3 STAIR C	292	n/a	n/a		STAIR										
302 GRADE 2 CLASSROOM	732	CLASSROOM	20	36	CLASSROOM	10	0.12		448		850	554	775		-
304 GRADE 2 CLASSROOM	732	CLASSROOM	20	36	CLASSROOM	10	0.12		448		850	554	775		-
306 ELECTRICAL CLOSET	92													50	-
308 GRADE 2 CLASSROOM	690	CLASSROOM	20	34	CLASSROOM	10	0.12		423		800	522	750		-
2ND FLOOR															
200 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
201 D75 MAIN / SUPER OFFICE	380	BUSINESS	100	3	OFFICE	5	0.06		38		450	293	350		-
201A E.D. STORAGE	50	STORAGE			STORAGE	0	0.12		6					50	
203 D75 CLASSROOM RM (CW-10-10)	466	CLASSROOM	20	23	CLASSROOM	10	0.12		286		550	359	425		-
203A CLASSROOM TOILET	42	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	
205 MULTI-PURPOSE RM	599	CLASSROOM	20	29	CLASSROOM	10	0.12		362		700	457	575		-
207 ELECTRICAL IDF ROOM	110													50	-
209 BOYS' TOILET	237	TOILET		4 FIXTURE	TOILET ROOM			70 / FIXTURE		280				300	-
211 JANITOR'S CLOSET	40	n/a	n/a											50	
SB2 STAIR B	294	n/a	n/a		STAIR										
SC3 STAIR C	292	n/a	n/a		STAIR										
202 D75 CHANGING ROOM	90	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
204 D75 CLASSROOM	617	CLASSROOM	20	30	CLASSROOM	10	0.12		374		750	489	600		-
204A D75 CLASSROOM TOILET	66	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
206 D75 CLASSROOM	639	CLASSROOM	20	31	CLASSROOM	10	0.12		387		750	489	600		-
206A D75 CLASSROOM TOILET	66	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
208 ELECTRICAL CLOSET	90													50	-
210 D75 CLASSROOM	624	CLASSROOM	20	31	CLASSROOM	10	0.12		385		750	489	600		-
210A D75 CLASSROOM TOILET	62	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
1ST FLOOR															
100A CORRIDOR	779	n/a	n/a		CORRIDOR	0	0.06		47		400	261			NOTE 1
100E CORRIDOR	320	n/a	n/a		CORRIDOR	0	0.06		19		200	130			-
101 KINDERGARTEN CLASSROOM	930	CLASSROOM	20	30	CLASSROOM	10	0.12		412		1,150	750	1,000		-
101A KINDER. CLASSRM. TOILET	47	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
103 KINDERGARTEN CLASSROOM	944	CLASSROOM	20	31	CLASSROOM	10	0.12		423		1,150	750	1,000		-
103A KINDER. CLASSRM. TOILET	47	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
107 STAFF TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
VC VESTIBULE	88	n/a	n/a		CORRIDOR	0	0.06		5		100	65			
SB1 STAIR B	282	n/a	n/a		STAIR										
SC1 STAIR C	261	n/a	n/a		STAIR										
102 JANITOR'S CLOSET	34	n/a	n/a											50	
104 KINDERGARTEN CLASSROOM	947	CLASSROOM	20	31	CLASSROOM	10	0.12		424		1,150	750	1,000		-
104A KINDER. CLASSROOM TOILET	43	TOILET		1 FIXTURE	TOILET ROOM			70 / FIXTURE		70				75	-
CELLAR FLOOR															
C00 CORRIDOR	932	n/a	n/a		CORRIDOR	0	0.06		56		400	261			NOTE 1
C01 WATER METER ROOM	547	n/a	300	1							300	196		350	
C03 JANITOR'S CLOSET	34	n/a	n/a											50	
C05 LOCKER RM SUITE	415	LOCKER	50	4	LOCKER			0.25			450	293	400		
C07 GEN. STOR. RECEIVING RM	252	STORAGE			STORAGE	0	0.12		30		375	245	350		
C13 GENERAL STORAGE	482	STORAGE			STORAGE	0	0.12		58		375	245			
C09 AV SECURE STORAGE	150	STORAGE			STORAGE	0	0.12		18		150	98	150		

AHU-1 OUTDOOR AIR REQUIREMENT CONTINUED

C09 AV SECURE STORAGE	150	STORAGE			STORAGE	0	0.12		18		150	98	150		
C11 ELECTRICAL IDF ROOM	108													50	-
C15 SHOWER/CHANGING RM	234	LOCKER	50	1 FIXTURE	LOCKER			0.25		70	200	130		300	
C17 BICYCLE STORAGE	129	STORAGE			STORAGE	0	0.12		15		100	65		150	
SBC STAIR B	282	n/a	n/a		STAIR										
SCC STAIR C	261	n/a	n/a		STAIR										
C02 JANITOR'S CLOSET	56	n/a	n/a											50	
C04 CUSTODIAN'S OFFICE	316	BUSINESS	100	3	OFFICE	5	0.06		34		350	228	320		-
C06 CUST. WORKSHOP/STOR.	401	BUSINESS	100	3	OFFICE	5	0.06		24		500	326	460	225	
C08 REFUSE RECYCLING RM	540	STORAGE			STORAGE	0	0.12		65		500	326		550	
C10 ELECTRICAL ROOM	505										400	261		400	-
C12 KITCHEN STORAGE	61	STORAGE			STORAGE	0	0.12		7					100	
										TOTAL =	26750	17446	18830	5525	
										VAV DIVERSITY 0.9 =>	24070				
										AHU-1 DESIGN	23,000	13000			

NOTES:
#1: CORRIDOR SUPPLY AIR FROM AHU-1&2 JOINTLY PROVIDES MAKE UP AIR TO ALL TOILET EXHAUST AND CLOSET EXHAUSTS.
#2: STORAGE ROOM AIR PROVIDED VIA CORRIDOR TRANSFER AIR.

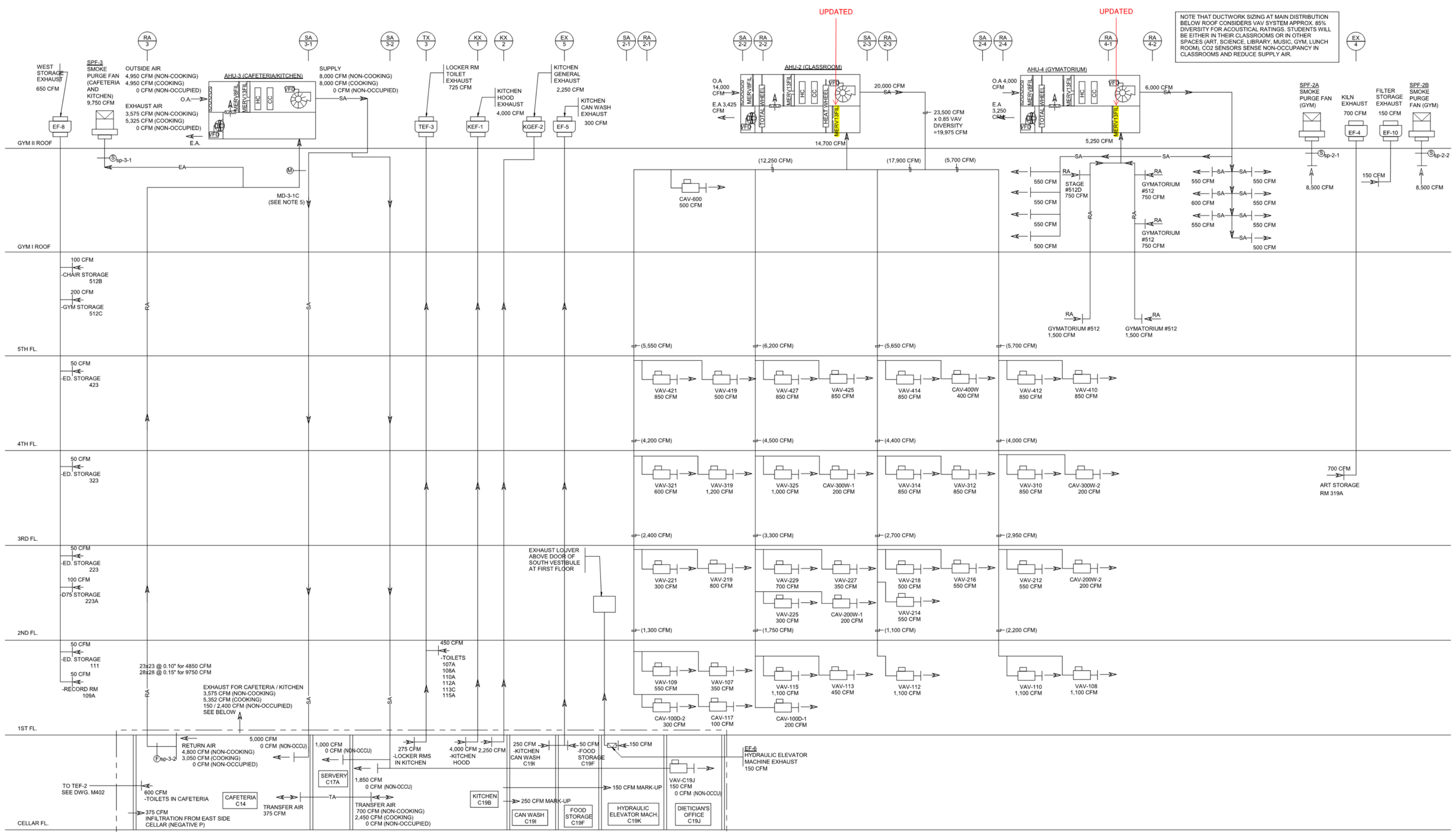
NOTE: ROOM SQ.FT. MAY HAVE SLIGHTLY REDUCED ON ARCH. PLANS DUE TO CLOSETS AND PIPE CHASES ADDED INSIDE CLASSROOMS. THERE WILL BE COORDINATED IN THE NEXT SUBMISSION.

AHU-2 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT^2)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT^2 (Ra)	EXHAUST RATE CFM/FT^2	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
4TH FLOOR															
400 CORRIDOR	1,612	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
410 GRADE 4 CLASSROOM	690	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	554	775		-
412 GRADE 4 CLASSROOM	674	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	554	775		-
414 GRADE 4 CLASSROOM	671	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	554	775		-
SA5 STAIR A	274	n/a	n/a		STAIR										
415 GIRLS' TOILET	271	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
417 STAFF TOILET	58	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
419 CSD SP. ED. CLASSROOM	429	CLASSROOM	20	21	CLASSROOM	10	0.12		261		500	326	450		-
421 GRADE 3 CLASSROOM	673	CLASSROOM	20	33	CLASSROOM	10	0.12		411		850	554	780		-
423 ED. STORAGE	28	STORAGE			STORAGE	0	0.12		3					50	
425 GRADE 3 CLASSROOM	681	CLASSROOM	20	34	CLASSROOM	10	0.12		422		850	554	775		-
427 GRADE 3 CLASSROOM	646	CLASSROOM	20	32	CLASSROOM	10	0.12		398		850	554	775		-
3TH FLOOR															
300 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
310 GRADE 1 CLASSROOM	692	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	554	750		-
312 GRADE 1 CLASSROOM	691	CLASSROOM	20	34	CLASSROOM	10	0.12		423		850	554	750		-
314 GRADE 1 CLASSROOM	727	CLASSROOM	20	36	CLASSROOM	10	0.12		447		850	554	750		-
SA3 STAIR A	294	n/a	n/a		STAIR										
315 GIRLS' TOILET	271	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
317 STAFF TOILET	57	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
319 ART CLASSROOM	997	CLASSROOM	20	47	CLASSROOM	10	0.12	0.7	590	698	1,200	783	600		-
319A ART STORAGE WITH KILN FAN	143	KILN												700	
321 CSD SP. ED. CLASSROOM	486	CLASSROOM	20	24	CLASSROOM	10	0.12		298		600	391	500		-
323 ED. STORAGE	48	STORAGE			STORAGE	0	0.12		6					50	
325 LIBRARY	832	LIBRARY	50	16	LIBRARY	10	0.12		260		1,000	652	850		-
2ND FLOOR															
200 CORRIDOR	1,613	n/a	n/a		CORRIDOR	0	0.06		97		400	261			NOTE 1
212 D75 CLASSROOM	439	CLASSROOM	20	21	CLASSROOM	10	0.12		263		550	359	425		-
212A D75 CLASSROOM TOILET	63	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
214 D75 CLASSROOM	478	CLASSROOM	20	23	CLASSROOM	10	0.12		287		550	359	425		-
214A D75 CLASSROOM TOILET	64	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
216 D75 CLASSROOM (CW10-10)	484	CLASSROOM	20	24	CLASSROOM	10	0.12		298		550	359	425		-
216A D75 CLASSROOM TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
218 D75 GUIDANCE SUITE	129	BUSINESS	100	6	OFFICE	5	0.06		38		225	147	300		-
218A D75 GUIDANCE OFFICE	142	BUSINESS	100	1	OFFICE	5	0.06	70/FIXTURE	14	70	175	114			-
SA2 STAIR A	394	n/a	n/a		STAIR										
213 GIRLS' TOILET	267	TOILET		4 FIXTURE	TOILET ROOM			70/FIXTURE		280				300	-
215 D75 STORAGE	383	STORAGE			STORAGE	0	0.12		46					100	
217 STAFF TOILET	59	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
219 D75 CLASSROOM (CW10-11)	640	CLASSROOM	20	32	CLASSROOM	10	0.12		397		800	522	700		-
219A D75 CLASSROOM TOILET	64	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
221 D75 RESOURCE ROOM	250	CLASSROOM	20	12	CLASSROOM	10	0.12		150		300	196	250		-
223 D75 E.D. STORAGE	168	STORAGE			STORAGE	0	0.12		20					50	-
225 D75 RESOURCE ROOM	249	CLASSROOM	20	12	CLASSROOM	10	0.12		150		300	196	250		-
227 D75 RESOURCE ROOM	279	CLASSROOM	20	13	CLASSROOM	10	0.12		163		350	228	300		-
229 D75 PHYSICAL THERAPY	575	CLASSROOM	20	28	CLASSROOM	10	0.12		349		700	457	625		-
1ST FLOOR															
100D CORRIDOR	782	n/a	n/a		CORRIDOR	0	0.06		47		400	261			NOTE 1
106 ELECTRICAL CLOSET	83													50	-
108 PRE-K CLASSROOM	909	CLASSROOM	20	30	CLASSROOM	10	0.12		409		1,100	717	950		-
108A PRE-K CLASSROOM TOILET	46	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
110 PRE-K CLASSROOM	913	CLASSROOM	20	30	CLASSROOM	10	0.12		410		1,100	717	950		-
110A PRE-K CLASSROOM TOILET	46	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
112 PRE-K CLASSROOM	926	CLASSROOM	20	30	CLASSROOM	10	0.12		411		1,100	717	950		-
112A PRE-K CLASSROOM TOILET	45	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
SA1 STAIR A	422	n/a	n/a		STAIR										
107 PRINCIPAL'S OFFICE	310	BUSINESS	100	3	OFFICE	5	0.06		34		350	228	250		-
107A TOILET	57	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
109 GENERAL OFFICE	455	BUSINESS	100	4	OFFICE	5	0.06		47		550	359	475		-
109A RECORD ROOM	116	STORAGE			STORAGE	0	0.12		14					50	
111 ED. STORAGE	31	STORAGE			STORAGE	0	0.12		4					50	
113 MEDICAL SUITE	253	BUSINESS	100	2	OFFICE	5	0.06		25		300	196	450		-
113B EXAM ROOM	104	BUSINESS	100	2	OFFICE	5	0.06		16		150	98			-
113C TOILET	60	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
115 PRE-K CLASSROOM	879	CLASSROOM	20	29	CLASSROOM	10	0.12		395		1,100	717	950		-
115A PRE-K CLASSROOM TOILET	44	TOILET		1 FIXTURE	TOILET ROOM			70/FIXTURE		70				75	-
										TOTAL =	22,800	14,869	17,980	2,975	
										VAV DIVERSITY 0.9 =>	20,520				
										AHU-2 DESIGN	23,000	13000			

NOTES:
#1: CORRIDOR SUPPLY AIR FROM AHU-1&2 JOINTLY PROVIDES MAKE UP AIR TO ALL TOILET EXHAUST AND CLOSET EXHAUSTS.
#2: STORAGE ROOM AIR PROVIDED VIA CORRIDOR TRANSFER AIR.

NOTE: ROOM SQ.FT. MAY HAVE SLIGHTLY REDUCED ON ARCH. PLANS DUE TO CLOSETS AND PIPE CHASES ADDED INSIDE CLASSROOMS. THERE WILL BE COORDINATED IN THE NEXT SUBMISSION.



NON-COOKING MODE

KEF-1 (HOOD): 0 CFM
KGEF-2 (GENERAL): 2,250 CFM
EF-5 (CAN WASH & FOOD STORAGE): 300 CFM
EF-12 (HYDRAULIC ELEVATOR): 150 CFM
TEF-2&3 (LOCKER/TOILET/STORAGE): 875 CFM

TOTAL EXHAUST CFM: 3,575 CFM

COOKING MODE

KEF-1 (HOOD): 4,000FM
KGEF-2 (GENERAL): 0 CFM
EF-5 (CAN WASH & FOOD STORAGE): 300 CFM
EF-12 (ELEVATOR): 150 CFM
TEF-2&3 (LOCKER/TOILET/STORAGE): 875 CFM

TOTAL EXHAUST CFM: 5,325 CFM

NON-OCCUPIED MODE

KEF-1 (HOOD): 0 CFM
KGEF-2 (GENERAL): 0 / 2,250 CFM (BY TEMPERATURE)
EF-3 (CAN WASH & FOOD STORAGE): 0 CFM
EF-12 (ELEVATOR): 150 CFM
TEF-2 (LOCKER/TOILET): 0 CFM

TOTAL EXHAUST CFM: 150 / 2,400 CFM

NOTE: KGEF-2 IS CONTROLLED BY TEMP SENSOR LOCATED IN KITCHEN

1 AIR RISER DIAGRAM - UNITS ON GYM II ROOF

M401.00 SCALE: NOT TO SCALE

(SEE DWG M402 FOR UNITS ON MAIN ROOF)

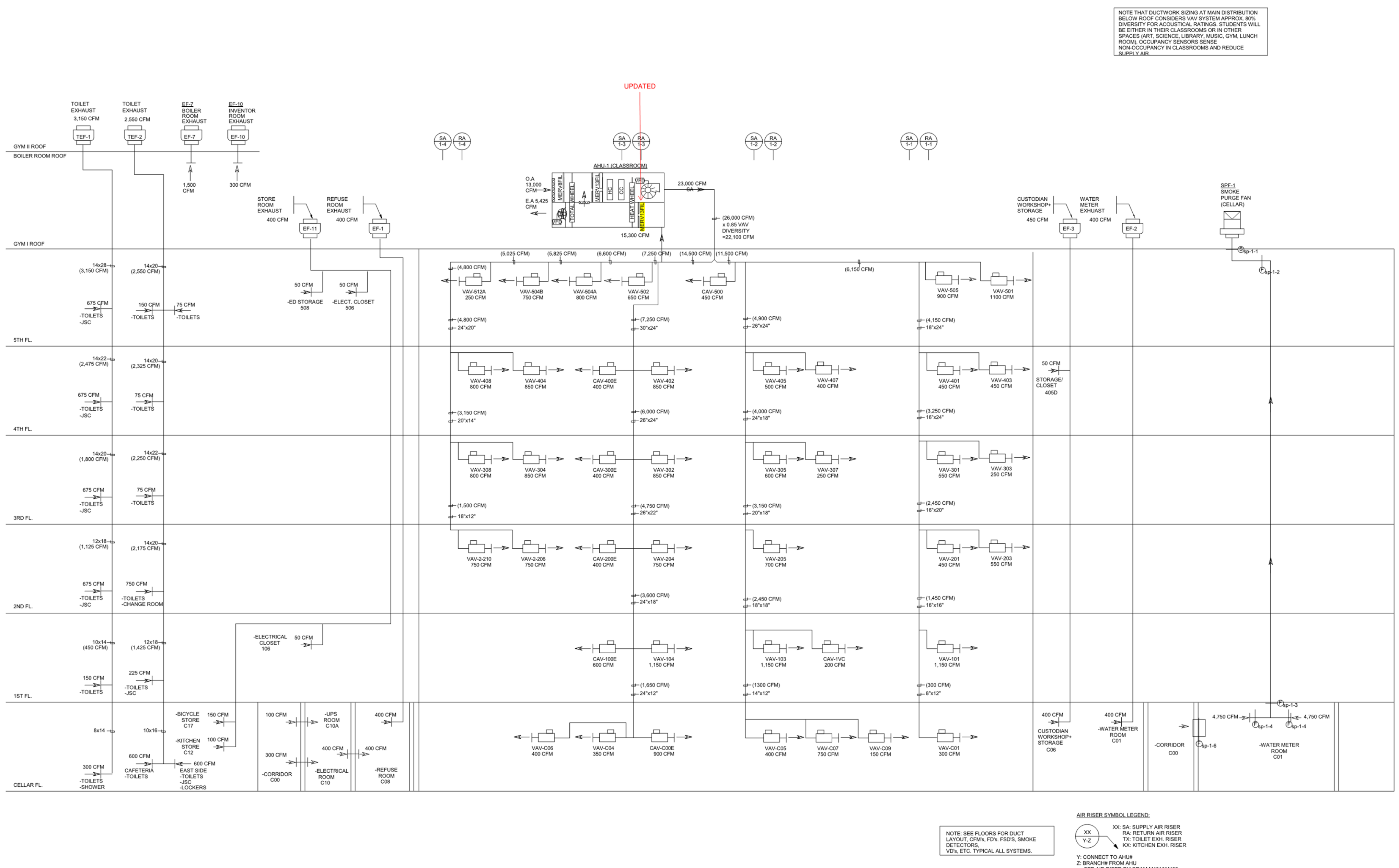
POST FIRE SMOKE PURGE SYSTEMS AND DAMPERS LIST — Ⓕ is Fire Smoke Damper — Ⓢ is Smoke Damper

HVAC SYSTEM	F.S.D. No.	SMOKE PURGE ZONE	FAN LOCATION	DEDICATED PURGE DAMPER, SEE DWG.E709 (NORMALLY CLOSED PURGE DAMPER) DAMPER TO BE OPENED FOR SMOKE PURGE	DUAL USE PURGE DAMPER, SEE DWG. E709 (NORMALLY OPEN PURGE DAMPER) DAMPER TO BE RE-OPENED (AFTER FA CLOSE COMMEND) FOR SMOKE PURGE
SPF-1	Ⓢsp-1-1 Ⓕsp-1-2 thruⒻsp-1-6	CELLAR	LOWER ROOF (ROOF I)	Ⓢsp-1-1 Ⓕsp-1-2 thruⒻsp-1-6	NONE
SPF-2A SPF-2B	Ⓢsp-2-1 Ⓢsp-2-2	MULTI-PURPOSE GYM / AUDITORIUM	GYM ROOF (ROOF II)	Ⓢsp-2-1 Ⓢsp-2-2	NONE
SPF-3	Ⓢsp-3-1 Ⓕsp-3-2	CAFETERIA / KITCHEN	GYM ROOF (ROOF II)	Ⓢsp-3-1	Ⓕsp-3-2

NOTE: FSD/SD DAMPERS USED AT THE BUILDING ENVELOPE SHALL BE CLASS 1 LEAKAGE RATE FOR NYC ECC COMPLIANCE.

NOTE:

1. ALL FANS AND FANS SYSTEMS WHICH HAVE BEEN AUTOMATICALLY SHUTDOWN BY FIRE ALARM CONTROL SYSTEM SHALL BE RESTARTED IN A STAGGERED MANNER THROUGH THE FACP SYSTEM WHEN THE FIRE ALARM CONTROL IS RESET. THE FAN OR FAN SYSTEM RE-START SHALL BE SUBJECT TO THE OPERATIONAL MODE AT THE TIME OF RESET.
2. ALL FIRE/SMOKE DAMPERS THAT ARE NOT PART OF THE POST-FIRE SMOKE PURGE SYSTEM SHALL CLOSE UPON THE ACTIVATION OF FIRE OR SMOKE ALARM CONDITION AND REMAIN CLOSED DURING THE SMOKE PURGE OPERATION. SEE FLOOR PLANS FOR LOCATIONS OF FSD'S.
3. ALL FIRE/SMOKE DAMPERS ASSOCIATED WITH THE POST-FIRE SMOKE PURGE SYSTEM SHALL BE CONTROLLED FROM FIRE ALARM PANEL DURING THE SMOKE PURGE OPERATION.
4. ALL FIRE/SMOKE DAMPERS ASSOCIATED WITH THE POST-FIRE SMOKE PURGE SYSTEM SHALL BE NORMALLY OPEN OR NORMALLY CLOSE BASED ON THE TABLE DURING NORMAL OPERATION AND CONTROLLED FROM FIRE ALARM PANEL DURING THE SMOKE PURGE OPERATION.
5. OPERATING SMOKE PURGE FAN SPF-3 SHALL SHUT DOWN AHU-3 TO ISOLATE OUT AHU-3 DURING PURGE. MECHANICAL CONTRACTOR SHALL INTERLOCK MOTORIZED DAMPER MD-3-1C TO CLOSE WHENEVER AHU-3 IS SHUT DOWN.
6. OPERATING SMOKE PURGE FAN SPF-1 SHALL SHUT DOWN AHU-2 TO ISOLATE OUT AHU-2 DURING PURGE. MECHANICAL CONTRACTOR SHALL INTERLOCK MOTORIZED DAMPER MD-1-15C, MD-1-16C, & MD-1-17C (SEE M101 & M402) TO CLOSE WHENEVER AHU-2 IS SHUT DOWN.



2 AIR RISER DIAGRAM - UNITS ON GYM II / BOILER ROOF AND MAIN ROOF (SEE DWG M401 FOR UNITS ON GYM II ROOF)
M402.00 SCALE: NOT TO SCALE

AHU-4 OUTDOOR AIR REQUIREMENT

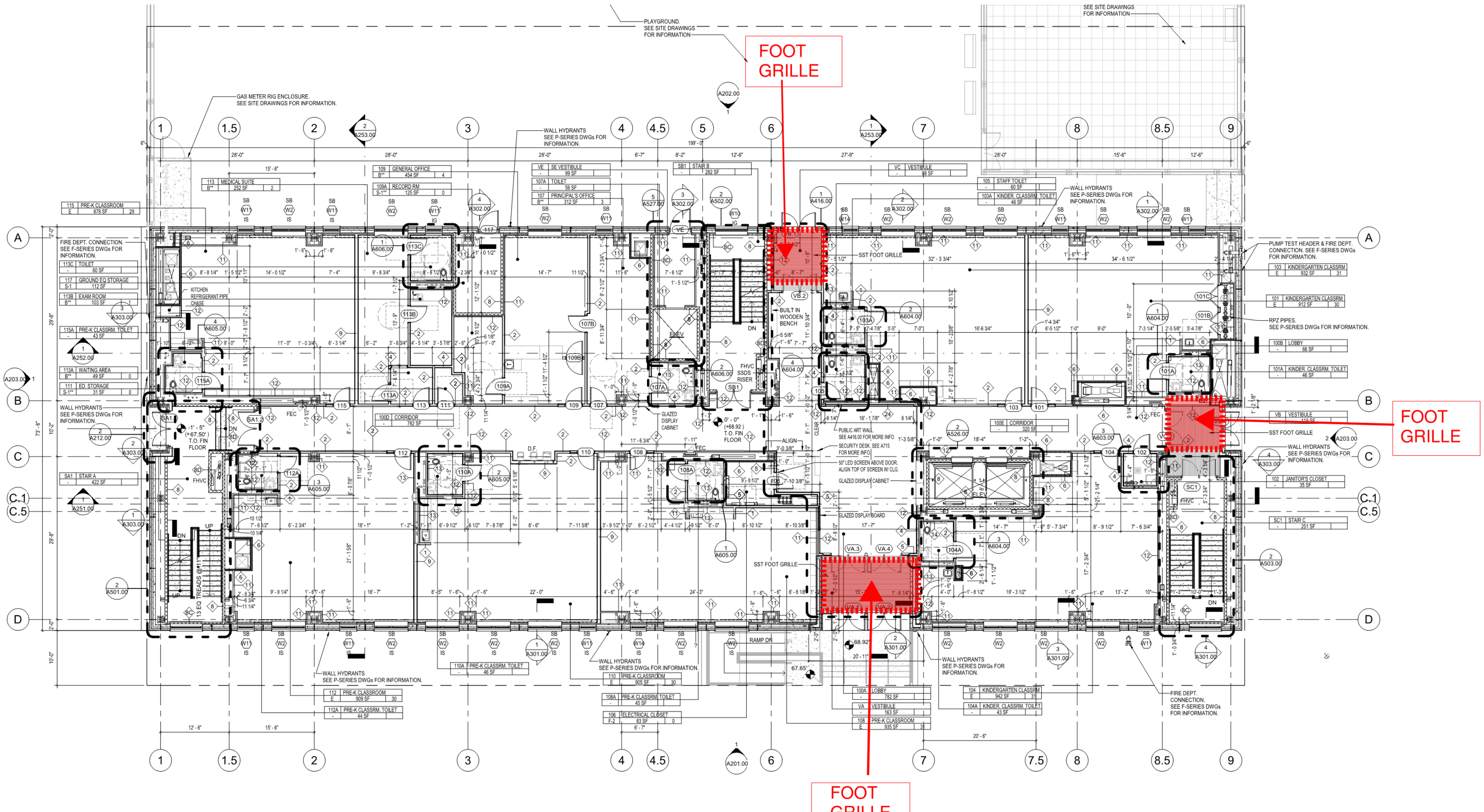
ROOM NAME / ROOM NUMBER	AREA (FT²)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
5th FLOOR / GYM FLOOR															
512 MULTI-PURPOSE ROOM	4,110	GYMNASIUM	15	274	GYM		0.30		1233		5,000	2500	4400		NOTE 1
512B CHAIR STORAGE	113	STORAGE			STORAGE	0	0.12		14					100	-
512C GYM EQUIP. STORAGE	238	STORAGE			STORAGE	0	0.12		29					200	-
512D STAGE	885	PLATFORM	15	58	STAGES	10	0.06		633		1,000	500	850		-
SA5 STAIR A	832	n/a	n/a		STAIR										
NOTES: #1: KITCHEN HOOD AND KITCHEN EXHAUST DO NOT OPERATE CONCURRENTLY. WHEN KITCHEN HOOD IS ON, THE KITCHEN EXHAUST IS TURNED OFF. #2: KITCHEN GENERAL EXHAUST FAN KEF-2 SERVICES KITCHEN, DIETITIAN OFFICE (VIA TRANSFER AIR), FOOD STORAGE & NON FOOD STORAGE.										TOTAL =	6,000	3,000		300	
										VAV DIVERSITY 0.9 =>	5,400				
										AHU-3 DESIGN	6,000	3,000			

AHU-3 OUTDOOR AIR REQUIREMENT

ROOM NAME / ROOM NUMBER	AREA (FT²)	NYC BC TABLE 1004.1.1		# OF OCCU. PER P.O.R.	NYC MC TABLE 403.3				OA CALC. PER NYC MC 403.3 (Eqn 4-1)	EHX. CALC. PER NYC MC 403.5	DESIGN VALUES				
	(Az)	SPACE FUNCTION	SQ.FT PER OCCUPANT	CALCULATED # OF OCCU. (Pz)	OCCUPANCY CLASS	BREATHING ZONE PA/PERSON (Rp)	BREATHING ZONE OA/FT² (Ra)	EXHAUST RATE CFM/FT²	BREATHING ZONE OA FLOW CFM (vbz = RpPz+RaAz)	ZONE EXHAUST CFM	SUPPLY AIR CFM	OUTSIDE AIR CFM	RETURN AIR CFM	EXHAUST AIR CFM	NOTES (AT BOTT.)
CELLAR FLOOR															
C14 CAFETERA	2,869	ASSEMBLY*	12	191	CAFETERIA	7.5	0.18		1949		5,000	2,750	3,000		NOTE 1
C14A BOYS' TOILET	178	TOILET		4 FIXTURE	TOILET ROOM		70 / FIXTURE			280				300	
C14B GIRLS' TOILET	167	TOILET		4 FIXTURE	TOILET ROOM		70 / FIXTURE			280				300	
C19A SERVERY	499	BUSSINESS	200	2	CAFETERIA	7.5	0.18		105		1000	550			-
C19B KITCHEN PREP & COOK. AREA	1,174	KITCHEN	200	5	KITCHEN			0.70		822	1850	1,018		2300	-
KITCHEN HOOD														4000	-
C19J DIETICIAN'S OFFICE	135	BUSINESS	135	1	OFFICE	5	0.06		13		150	83			
C19G CAN WASH ROOM	106	n/a			n/a									250	-
C19C TOILET	68	TOILET			TOILET ROOM		70 / FIXTURE			70				75	
C19D KITCHEN M. STAFF LOCKER	108	LOCKER		2	LOCKER									100	
C19E KITCHEN F. STAFF LOCKER	127	LOCKER		2	LOCKER									100	
C19F FOOD STORAGE	184	STORAGE			STORAGE	0	0.12		22					50	
C19K ELEVATOR MACHINE RM	102	ELEVATOR												150	
NOTES:										TOTAL =	8,000	4,400		7,625	
										VAV DIVERSITY 0.9 =>	7,200				
										AHU-4 DESIGN	8,000	4,400			

Q1.2R – ENHANCED IAQ SOURCE CONTROL

Employ permanent entryway systems **at least ten feet long** in the primary direction of travel to capture dirt and particulates from entering the building at regular entry points that are directly connected to the outdoors. **Qualifying entryways** are those that serve as regular entry points for students or staff.



1 FIRST FLOOR PLAN
A101.00 SCALE: 1/8" = 1'-0"

* NOTE 9

ROOF TOP AIR HANDLING UNIT SCHEDULE - FACTORY PACKAGED

UNIT NO.	LOCATION	AREA SERVED	TYPE	BASIS OF DESIGN MFR MODEL	TOTAL CFM	MIN. O. A. CFM	SUPPLY FAN NO.	SUPPLY FAN CFM (EA)	SUPPLY FAN ESP ("WC)	SUPPLY FAN TSP ("WC)	SUPPLY FAN BHP (EA)	SUPPLY FAN HP (EA)	SUPPLY FAN DRIVE	SUPPLY FAN TYPE
AHU-1	ROOF	CLASSROOMS/OFFICES	ROOFTOP	ANNEX AIR ERP-E-12-EW04-H-C-SW-SS	16,750	9,045	2	8,375	2.5	7.31	0	15	DIRECT VFD	AIRFOIL PLENUM
AHU-2	ROOF	CLASSROOMS/OFFICES	ROOFTOP	ANNEX AIR ERP-E-20-EW04-H-C-SW-SS	15,500	8,215	2	7,750	2.5	7.36	0	20	DIRECT VFD	AIRFOIL PLENUM
AHU-3	ROOF	CAFETERIA/KITCHEN	ROOFTOP	ANNEX AIR AHU-E-07-H-C-SS	7,250	5,510	1	7,250	2.5	5.66	0	10	DIRECT VFD	AIRFOIL PLENUM
AHU-4	ROOF	GYMATORIUM	ROOFTOP	ANNEX AIR ERP-E-07-EW04-H-C-SS	6,500	1,225	1	5,700	2.5	6.21	0	15	DIRECT VFD	AIRFOIL PLENUM

UNIT NO.	CHILLED WATER COIL (30% PROPYLENE GLYCOL) EAT DB	EAT WB	LAT DB	LAT WB	AIR PD WG	SENS (MBH)	TOTAL (MBH)	MAX FACE VEL FPM	GPM	EWT/LWT	MAX. PD FT	MIN ROW/FPI	COILS QTY.
AHU-1	79.3	66.2	54	54	1.0	334	471	691	99.86	45/ 55	12.0	6/12	3
AHU-2	79.6	66.4	55	54	1.0	548	782	719.9	165.79	45/ 55	10.0	6/12	3
AHU-3	86.4	71.3	55	54	1.0	246	406	-	86.07	45/ 55	10.0	6/12	2
AHU-4	80	66.8	55	54	1.0	203	295	577	62.54	45/ 55	10.0	6/12	2

UNIT NO.	HEATING COIL (30% PROPYLENE GLYCOL) COILS QTY.	EAT DB	MAX. LAT DB	MAX. AIR PD WG	MAX. PD FT	WATER GPM	WATER EWT/LWT	CAP (MBH)	MAX FACE VEL	MIN: ROW/FPI
AHU-1	2	11.0	87.00	0.25	10.0	17.24	160/ 120	329	691	1/12
AHU-2	2	11.0	87.00	0.25	10.0	23.69	160/ 120	452	719.9	2/8
AHU-3	2	55.8	87.00	0.25	5.0	12.84	160/ 120	245	-	2/8
AHU-4	2	61.3	87.00	0.25	5.0	10.95	160/ 120	209	577	2/12

UNIT NO.	ENERGY RECOVERY WHEEL (HEATING / COOLING) MAX PD WG	SUMMER SUPPLY EAT (°F) DB/WB	SUMMER SUPPLY LAT (°F) DB/WB	SUMMER EXHAUST EAT (°F) DB/WB	SUMMER EXHAUST LAT (°F) DB/WB	RECOVERY MBH	WINTER SUPPLY EAT (°F) DB/WB	WINTER SUPPLY LAT (°F) DB/WB	WINTER EXHAUST EAT (°F) DB/WB	WINTER EXHAUST LAT (°F) DB/WB	RECOVERY MBH	HP
AHU-1	0.75	89/73	81.9/68.5	78/65	87/71	153	11/11	49.3/10	72/53	22/22	229	0.25
AHU-2	0.75	89/73	83.6/69.8	78/65	87/71	188.8	11/11	39.9/33.6	72/53	23/22	386	0.25
AHU-3	0.75	-	-	-	-	-	11/11	51.9/41.4	72/53	22/22	183	-
AHU-4	-	89/73	81.6/68.3	78/65	78/65	-	-	-	-	-	-	0.25

* NOTE 9

ROOF TOP AIR HANDLING UNIT SCHEDULE - FACTORY PACKAGED (CONT'D)

UNIT NO.	HEAT WHEEL (COOLING) SUPPLY EAT (°F) DB/WB	SUPPLY LAT (°F) DB/WB	RETURN EAT (°F) DB/WB	RETURN LAT (°F) DB/WB	HP	EXHAUST FAN NO.	CFM (EA)	MAX CFM (TOTAL)	ESP (EA)	BHP (EA)	HP (EA)	DRIVE	TYPE
AHU-1	55/54	65/58	78/65	66/61	0.5	2	5,788	11,576	2.4	0	7.5	DIRECT VFD	AIRFOIL PLENUM
AHU-2	55/54	65/58	70/53	54/57	0.5	2	6,208	12,416	2.29	0	10	DIRECT VFD	AIRFOIL PLENUM
AHU-3	-	-	-	-	-	1	3,625	7,250	1.58	0	3	DIRECT VFD	AIRFOIL PLENUM
AHU-4	-	-	-	-	-	2	6,600	13,200	1.99	0	7.5	DIRECT VFD	AIRFOIL PLENUM

UNIT NO.	STARTERS SUPPLY	STARTERS EXHAUST	ELECTRICAL DATA VOLT	HZ	PH	FLA	MCA	MOC	AIR FILTERS SUPPLY PRE-FILTER AVG. PD IWG	SUPPLY FINAL FILTER AVG. PD IWG	RETURN FLAT PRE-FILTER AVG. PD IWG
AHU-1	VFD	VFD	208	60	3	138	173	175	MERV 8 0.5	MERV 13 MIN. 0.85	MERV 8 0.5
AHU-2	VFD	VFD	208	60	3	179	223	225	MERV 8 0.5	MERV 13 MIN. 0.85	MERV 8 0.5
AHU-3	VFD	VFD	208	60	3	62	78	90	MERV 8 0.5	MERV 13 MIN. 0.85	MERV 8 0.5
AHU-4	VFD	VFD	208	60	3	78	98	110	MERV 8 0.5	MERV 13 MIN. 0.85	-

UNIT NO.	VIBRATION ISOLATION TYPE	STATIC DEFLECTION INCH (MIN)	SERIAL NO.	DIMENSIONS L"XW"XH"	OPER. WGHT. (LBS)	REMARKS
AHU-1	ESTRAINED SPRING	2"	-	354 X 104 X 110	11,400	NOTES 1-8
AHU-2	ESTRAINED SPRING	2"	-	369 X 126 X 129	14,800	NOTES 1-8
AHU-3	ESTRAINED SPRING	2"	-	231X 94 X 86	5,500	NOTES 1-8
AHU-4	ESTRAINED SPRING	2"	-	279 X 94 X 86	6,800	NOTES 1-8

NOTES:
1. PROVIDE FACTORY PRE-INSTALLED AND WIRED EBTRON AIR MONITOR TO CONTROL OUTSIDE AIR INTAKE AS BASED ON SIGNALS FROM CARBON DIOXIDE SPACE AND OUTSIDE CONTROLLERS. PROVIDE SUPPLY AND RETURN DUCT SMOKE DETECTORS.
2. PROVIDE VIBRATION ISOLATION RAILS AND SUPPLEMENTARY STEEL SUPPORTED BY RESTRAINED POINT VIBRATION ISOLATION SPRINGS, ANCHORED TO STEEL DUNNAGE.
3. PROVIDE ONE POINT OF ELECTRICAL CONNECTION-UNIT MOUNTED DISCONNECT SWITCH, VARIABLE SPEED DRIVES FOR SUPPLY, RETURN FANS, ENERGY RECOVERY WHEEL AND HEAT WHEEL, TRANSFORMERS, NC/NO, HOAP PILOT LIGHT SWITCHES. PROVIDE NEMA 4 OUTLET FACTORY WIRED. PROVIDE GFI OUTLETS AND INTERNAL LIGHTS WIRED BY MANUFACTURER. PROVIDE MANUFACTURER MOUNTED WEATHERPROOF EXTERIOR LIGHTS AND WIRING (MIN. 1 LIGHT PER SIDE) WITH FIELD PROVIDED SWITCH FOR CONTROL. REFER TO ELECTRICAL.
4. ALL MOTORS SHALL BE PREMIUM EFFICIENCY.
5. PROVIDE TRAPPED COOLING COIL CONDENSATE DRAIN AND PIPE TO NEAREST ROOF DRAIN. DRAIN PIPING SHALL BE ROUTED LESS THAN 12" ABOVE ROOF.
6. PROVIDE FACTORY INSTALLED OEM BACNET CONTROLS AND AS SPECIFIED UNDER 15852, 15935, 15970 AND 15985.
7. PRODUCT SUBSTITUTION TO CONFORM TO SPECIFIED L X W X H AND WEIGHT AND SUPPLY AND RETURN OPENING LOCATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR ELECTRICAL, STRUCTURAL DUNNAGE REDESIGN AND ROOF SLAB FRAMED OPENING DUE TO SUBSTITUTION
8. PROVIDE ECONOMIZER MODE RATED FOR 100% OF SUPPLY AIR QUANTITY AS OUTDOOR AIR FOR COOLING. ECONOMIZER DAMPERS SHALL BE CAPABLE OF BEING SEQUENCED WITH MECHANICAL COOLING.
9. PROVIDE SERVICE USE EQUIPMENT PERMIT
10. COILS SHALL BE CONNECTED TO HEADER WITH ALL VALVING INTERNAL TO UNIT PER SPEC 15852 AND 15935. PROVIDE ACCESS DOORS AND PANELS.

* NOTE 7

FAN SCHEDULE

UNIT NO.		TX-1	KEF-1	KX-1	EXH-1	EXH-2	EXH-3	EXH-4	EXH-5	EXH-6	EXH-PFSP	EXH-PFSP (MAKEUP)	EXH-7
SERVICE		TOILETS EXHAUST	KILN GENERAL EXHAUST	KITCHEN HOOD EXHAUST	GENERAL KITCHEN EXHAUST	CAN WASH EXHAUST	REFUSE ROOM EXHAUST	BUILDING GENERAL EXHAUST	BATTERY ROOM EXHAUST	GYM STORAGE EXHAUST	CELLAR	CELLAR	GYM EQUIPMENT ROOM EXHAUST
LOCATION		ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	ROOF	BULKHEAD ROOF	ROOF	BULKHEAD ROOF	CELLAR	ROOF
FAN DATA	TYPE	DOWNBLAST	UTILITY	UTILITY	UPBLAST	DOWNBLAST	DOWNBLAST	DOWNBLAST	DOWNBLAST	DOWNBLAST	UPBLAST	INLINE	DOWNBLAST
	CFM	3440	1250	4000	1700	250	250	2065	100	30	1600	1700	30
	S.P. (IWG)	1.934	1	3.0	1.5	0.75	0.75	1.624	0.75	0.682	0.5	1.5	0.682
	RPM	1658	2352	1713	1482	1725	1725	1159	1484	1416	842	1770	1416
	DRIVE	BELT	BELT	BELT	BELT	DIRECT	DIRECT	BELT	DIRECT	DIRECT	BELT	DIRECT	DIRECT
	MFR	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK
	MODEL NO.	GB-180HP-30	USF-12	USF-18-B1	CUBE-161HP	G-097-A	G-097-A	GB-200HP-15	CSP-A930-VG	GB-098-VG	CUBE-160	QEID-15-65	GB-098-VG
MOTOR	BHP / HP	2.04/ 3	0.36/ 1.5	2.95/5	0.79/1	0.13/0.25	0.13/0.25	1.1/1.5	0.05/0.65	0.1/0.25	0.27/0.5	0.84/1	0.1/0.25
	RPM	1725	1725	-	-	1725	1725	1725	1484	1416	1725	1770	1416
	VOLTS / PH / HZ	208/ 3/ 60	208/ 3/ 60	208/ 3/ 60	208/ 3/ 60	115/ 1/ 60	115/ 1/ 60	208/ 3/ 60	115/ 1/ 60	115/ 1/ 60	208/ 3/ 60	208/ 3/ 60	115/ 1/ 60
STARTER	TYPE: CMUF / VSD	VFD	VFD	VFD	VFD	SPEED CONTROL THERMAL SWITCH	SPEED CONTROL THERMAL SWITCH	VFD	SPEED CONTROL THERMAL SWITCH	SPEED CONTROL THERMAL SWITCH	VFD	VFD	SPEED CONTROL THERMAL SWITCH
INTERLOCK	AHU	AHU-1 AUH-2	AHU-2	AHU-3	AHU-3	AHU-3	AHU-2	AHU-1 AUH-2	AHU-2	AHU-4	-	-	AHU-4
SERIAL NO.		-	-	-	-	-	-	-	-	-	-	-	-
WEIGHT		225 LBS	500 LBS	303 LBS	98 LBS	49 LBS	49 LBS	200 LBS	50 LBS	100 LBS	125 LBS	250 LBS	100 LBS
REMARKS		SEE NOTES 1-3, 5-7	SEE NOTES 1-8	SEE NOTES 1-3, 5-7, 9	SEE NOTES 1-7	SEE NOTES 1-7	SEE NOTES 1-7	SEE NOTES 1-3, 5-7	SEE NOTES 1-7	SEE NOTES 1-7	SEE NOTES 1-3, 6-7,10	SEE NOTES 1-3, 6-7,10	SEE NOTES 1-7

NOTES:
1. ALL MOTORS SHALL BE PREMIUM EFFICIENCY TYPE.
2. ROOF EXHAUSTERS SHALL BE PROVIDED WITH 24" HIGH DOUBLE WALL INSULATED PREFAB ROOF CURB WITH 12" EXTENSION & ACCESS DOORS.
3. ROOF EXHAUSTERS SHALL BE PROVIDED WITH REMOTE START-STOP & PILOT LIGHT, MOTORIZED DAMPER, CONDUITS, CONTROL AND INTERLOCK WIRING TO FAN STARTER. PROVIDE MOTORIZED BACKDRAFT DAMPER.
4. FRACTIONAL HP , 120 V/1/60 FANS SHALL BE PROVIDED WITH SPEED POTENTIOMETERS WITH REMOTE START-STOP, AND DISCONNECT SWITCH AT THE FAN, WIRED UNDER THE ELECTRICAL TRADES.
5. PROVIDE BACNET DDC CONTROLLERS & COMMUNICATION TO BUILDING BMS SYSTEM.
6. WHERE PLANS INDICATE STARTERS MOUNTED OUTDOORS: STARTERS, DISCONNECT SWITCHES, AND VFDS SHALL BE NEMA 4 CONSTRUCTION.
7. PROVIDE SERVICE EQUIPMENT USE PERMIT
8. PROVIDE HIGH TEMPERATURE PROCESS PACKAGE OR APPROVED EQUAL FOR KILN EXHAUST.
9. KITCHEN HOOD EXHAUST SHALL BE A MINIMUM OF 40" ABOVE THE ROOF SURFACE. FAN SHALL BE HINGED AND SUPPLIED WITH FLEXIBLE WEATHERPROOF ELECTRICAL CABLE TO ALLOW FOR CLEANING. PROVIDE VENTED CURB. FAN SHALL BE PROVIDED WITH DRAIN OUTLET. PROVIDE STAINLESS STEEL GREASE RESERVOIR.
10. FAN TO BE CONTROLLED BY FIREMAN'S SWITCH. INTERLOCK WITH GV-PFSP, COORDINATE WITH ELECTRICAL CONTRACTOR. PROVIDE END SWITCH ON MOTORIZED DAMPER. REFER TO FIRE ALARM DRAWINGS

HOT WATER DUCT HEATER SCHEDULE

UNIT NO.	REC-111/111B
SERVICE	KITCHEN & SERVERY
LOCATION	RM 162
CFM	2700
AIR EAT/LAT (°F)	65/75
MBH	28.3
WATER: EWT/LWT (°F)	140/120
GPM	2.9
MAX COIL PD (FT H20)	1 FT
COIL ROWS/FPI	1/6
MIN. FACE VELOCITY	500
CONNECTION SIZES (IN)	(2) 3/4"
MAX. PD. (IN. W.G.)	0.1
DIMENSIONS (LxWxH)	27X5X27
MANUFACTURER	GREENHECK
TYPE/MODEL	HW58S01B06
REMARKS	REFER TO SPECIFICATION FOR ADDITIONAL REQUIREMENTS

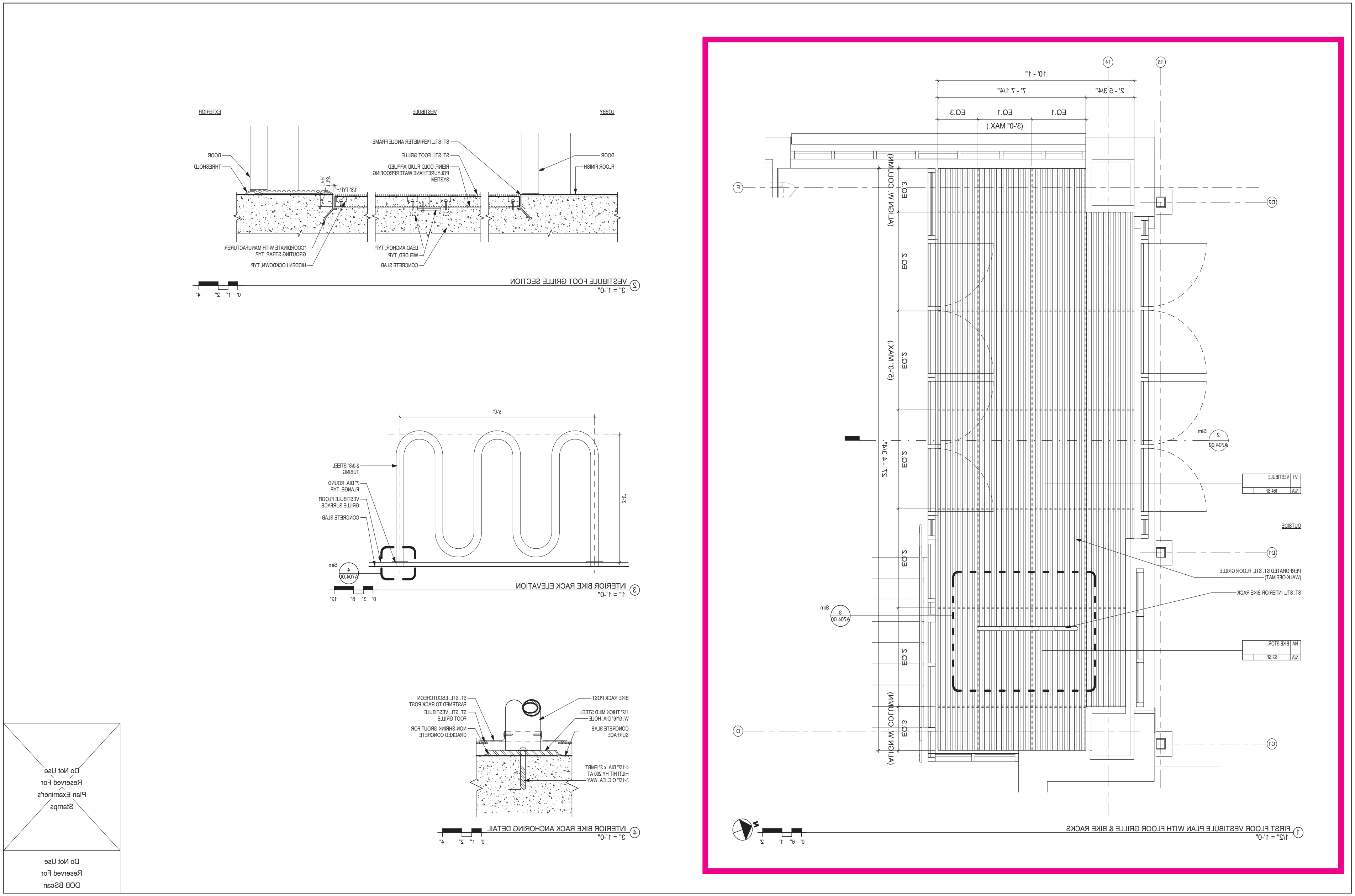
BOILER SCHEDULE

UNIT NO.			B-1	B-2
LOCATION			ROOF MECH. ROOM	ROOF MECH. ROOM
SERVICE			HOT WATER HEATING	HOT WATER HEATING
TYPE			DIRECT FIRED CONDENSING	DIRECT FIRED CONDENSING
BOILER	CAPACITY	NET AHRI RATING (MBH) WITH 30% PROPYLENE GLYCOL	1949.2	1949.2
		INPUT (MBH)	2500	2500
		OUTPUT (MBH)	1949.2	1949.2
	DESIGN WORK PRES. (PSIG)		75 MAX	75 MAX
	MANUFACTURER		CLEAVER BROOKS	CLEAVER BROOKS
	MODEL		CLEAR FIRE-CE CFC-E-2500	CLEAR FIRE-CE CFC-E-2500
	SERIAL NO.		-	-
BURNER	FUEL	INPUT (MBH)	2500	2500
		OUTPUT (MBH)	1949.2	1949.2
		TYPE OF GAS	NATURAL GAS	NATURAL GAS
	PILOT TYPE		NATURAL GAS	NATURAL GAS
	MANUFACTURER		CLEAVERBROOKS	CLEAVERBROOKS
	MODEL		CLEAR FIRE-CE CFC-E-2500	CLEAR FIRE-CE CFC-E-2500
	SERIAL NO.		-	-
MIN. FLOW RATE, (MAX FIRE) GPM (30% GLYCOL)			94.0 @ 40°F ΔT	94.0 @ 40°F ΔT
EWT/LWT			120/160	120/160
FLUE VENT SIZE O.D.			10" DIA. INNER: AL-29-4C SS; OUTER: 304/430SS	10" DIA. INNER: AL-29-4C SS; OUTER: 304/430SS
BOILER CONNECTION	MAIN GAS		1-1/2"	1-1/2"
	WATER RETURN		4"	4"
	WATER SUPPLY		4"	4"
	COMBUSTION AIR INLET		10" DIA.	10" DIA.
	FLUE VENT SIZE		10" DIA.	10" DIA.
ELECT.	VOLTS		115	115
	PHASE		1	1
	AMPS (BURNER) / MOCP		13 / 20	13 / 20
DIMENSIONS			36"L X 56"W X 95"H	36"L X 56"W X 95"H
OPERATING WEIGHT, LBS			2,857	2,857
MEA #	BOILER		-	-
	BURNER		-	-
GAS	GAS TRAIN SIZE (INCH)		1-1/2"	1-1/2"
	MIN/MAX PRESS. IN. W.G.		4" MIN - 14" MAX WC	4" MIN - 14" MAX WC
% COMBUSTION EFFICIENCY			94.5%	94.5%
% THERMAL EFFICIENCY			94.9%	94.9%
REMARKS			SEE NOTES	SEE NOTES

NOTES:
1. PROVIDE BACNET BOILER CONTROL MODULES, INTEGRATED DIGITAL CONTROLS & CONTROL PANEL TO CONTROL OPERATION OF CIRCULATOR PUMPS, SYSTEM SENSOR, OUTPUT SENSOR, TWO LOW WATER CUT-OFFS, FLOW SWITCH.
2. PROVIDE FACTORY MOTORIZED ISOLATION VALVE AND MODULATING DAMPER, FOR EACH BOILER.
3. PROVIDE LOW NOX EMISSION BURNER, AND VENTLESS GAS TRAIN.
4. PROVIDE ADJUSTABLE FEET, STACK THERMOMETER, DRAIN VALVE, AUXILIARY LOW WATER CUT OFF, FLOW SWITCH, AND OUTDOOR TEMPERATURE SENSOR.
5. PROVIDE ELECTRICAL DISCONNECT, EMERGENCY STOP SWITCH, LEAD LAG KIT, SYSTEM PUMP CONTROL MODULE FOR TEMPERATURE AND PRESSURE, AND ALARMS LIGHTS AND HORN PACKAGE
6. INSTALLING CONTRACTOR SHALL BE MFR CERTIFIED AND SHALL PROVIDE PRE-START UP AND STARTUP PROCEDURES PER MFR'S INSTRUCTIONS.
7. BOILER TURN DOWN RATIO: 5:1 PER BOILER
8. REFER TO SPECIFICATION 15565 FOR ADDITIONAL REQUIREMENTS
9. PROVIDE ACID NEUTRALIZER KIT AND PIPING, TO NEARBY FLOOR DRAIN, FOR EACH BOILER.

WHERE MANUFACTURERS' NAMES AND PRODUCT NUMBERS ARE INDICATED ON THE DRAWINGS IT SHALL BE CONSTRUED TO MEAN THE ESTABLISHING OF QUALITY AND PERFORMANCE STANDARDS OF SUCH ITEMS. ALL PRODUCTS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE THEY SHALL BE DEEMED EQUAL. SUBSTITUTION SHALL FOLLOW PROCEDURE IN SPECIFICATION SECTION S01630

2. REFER TO SPECIFICATION FOR ADDITIONAL REQUIRED INFORMATION


VESTIBULE FOOT GRILLE SECTION
3" = 1'-0"
INTERIOR BIKE RACK ELEVATION
1" = 1'-0"
INTERIOR BIKE RACK ANCHORING DETAIL
3" = 1'-0"
FIRST FLOOR VESTIBULE PLAN WITH FLOOR GRILLE & BIKE RACKS
1/2" = 1'-0"
Do Not Use
Reserved For
Plan Examiner's
Stamps
Do Not Use
Reserved For
DOB BScan

Q1.3 – ENHANCED IAQ VENTILATION & MONITORING

GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

KEY NOTES

(1) PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

(2) INDOOR AC/HEAT PUMP TO BE MOUNTED ON MANUFACTURER PROVIDED WALL MOUNTING BRACKET .PROVIDE CONDENSATE PUMP. REFER TO SPECIFCATION 15783. PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITOR CLOSET

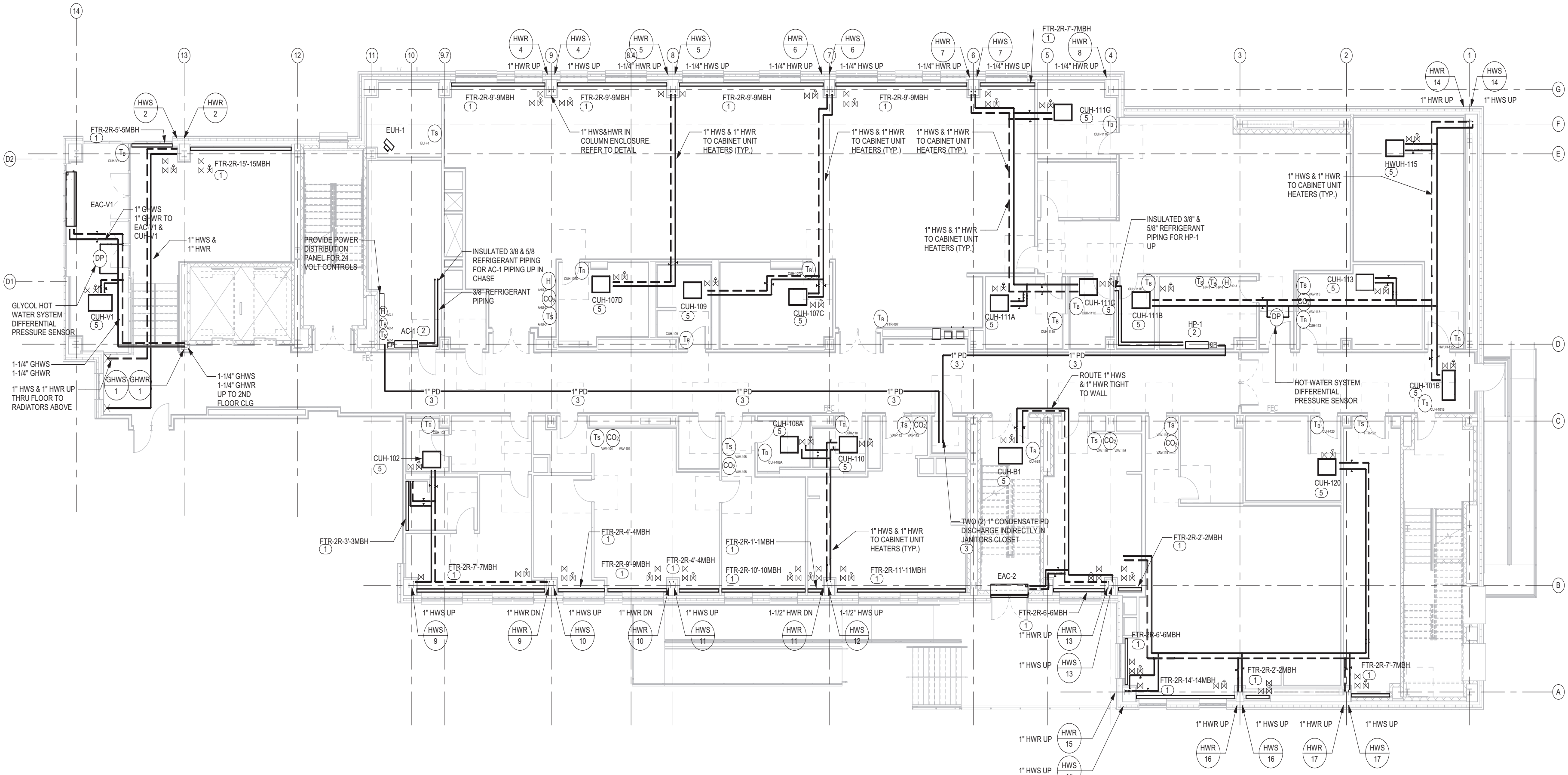
(3) PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITORS CLOSET

(4) EQUIPMENT BY FOOD SERVICE CONTRACTOR. PROVIDE INSULATED REFRIGERANT PIPING PER MANUFACTURERE SIZING FROM EXTERIOR CONENSING UNIT TO INTERIOR UNIT. PROVIDE 1" INSULATAED CONDENSATE DRAIN TO FLOOR DRAIN OUTSIDE WALK IN FREEZER/REFRIGERATOR. PROVIDE ALL POWER AND CONTROL WIRING. PIPING AND EQUIPMENT SHOWN FOR REFERENCE ONLY. REFER TO FOOD SERVICE DRAWINGS.

KEY NOTES CONT.

(5) PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305

(6) PROVIDE NEW GAS LEAK DETECTION PANEL. PROVIDE CUSTODIAN;S ALARM PANEL AS PER SPEC 15596 IN CUSTOIDAN'S OFFICE. PROVIDE ALL WIRING, CONDUIT, SUPPORTS, ETC REQUIRED FOR COMPLETE INSTALLATION (APPROX. 100 LF). REFER TO DETAIL ON M502



(1) HVAC - PIPING - FIRST FLOOR
1/8" = 1'-0"

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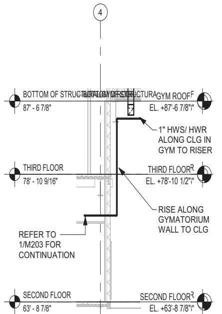
GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

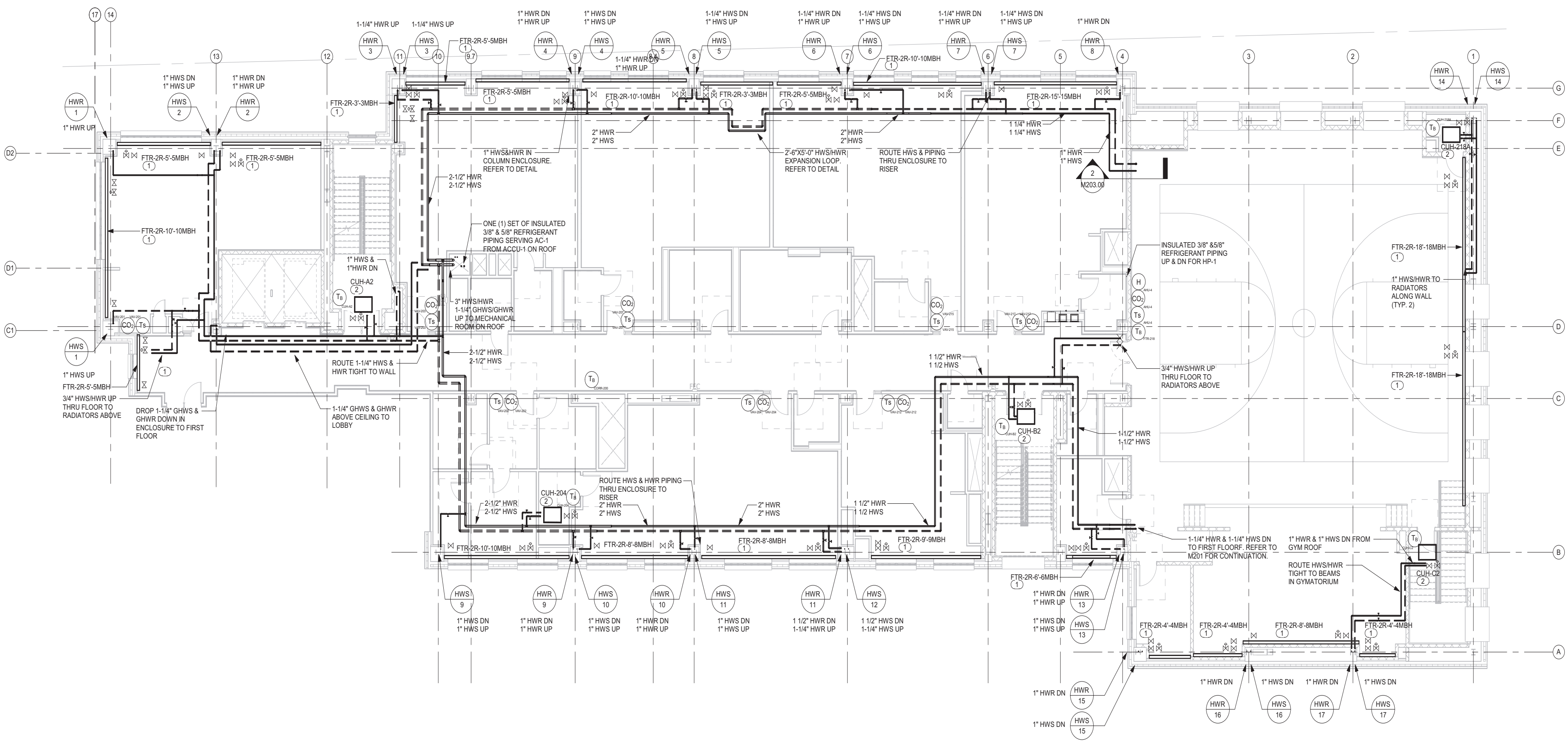
KEY NOTES

(1) PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

(2) PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305



2 HOT WATER ROUTING IN GYM
1/8" = 1'-0"



1 HVAC - PIPING - SECOND FLOOR
1/8" = 1'-0"

GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

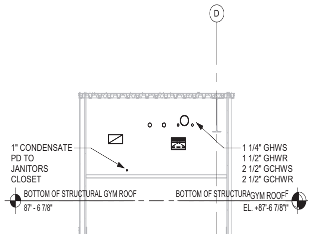
KEY NOTES

1 PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

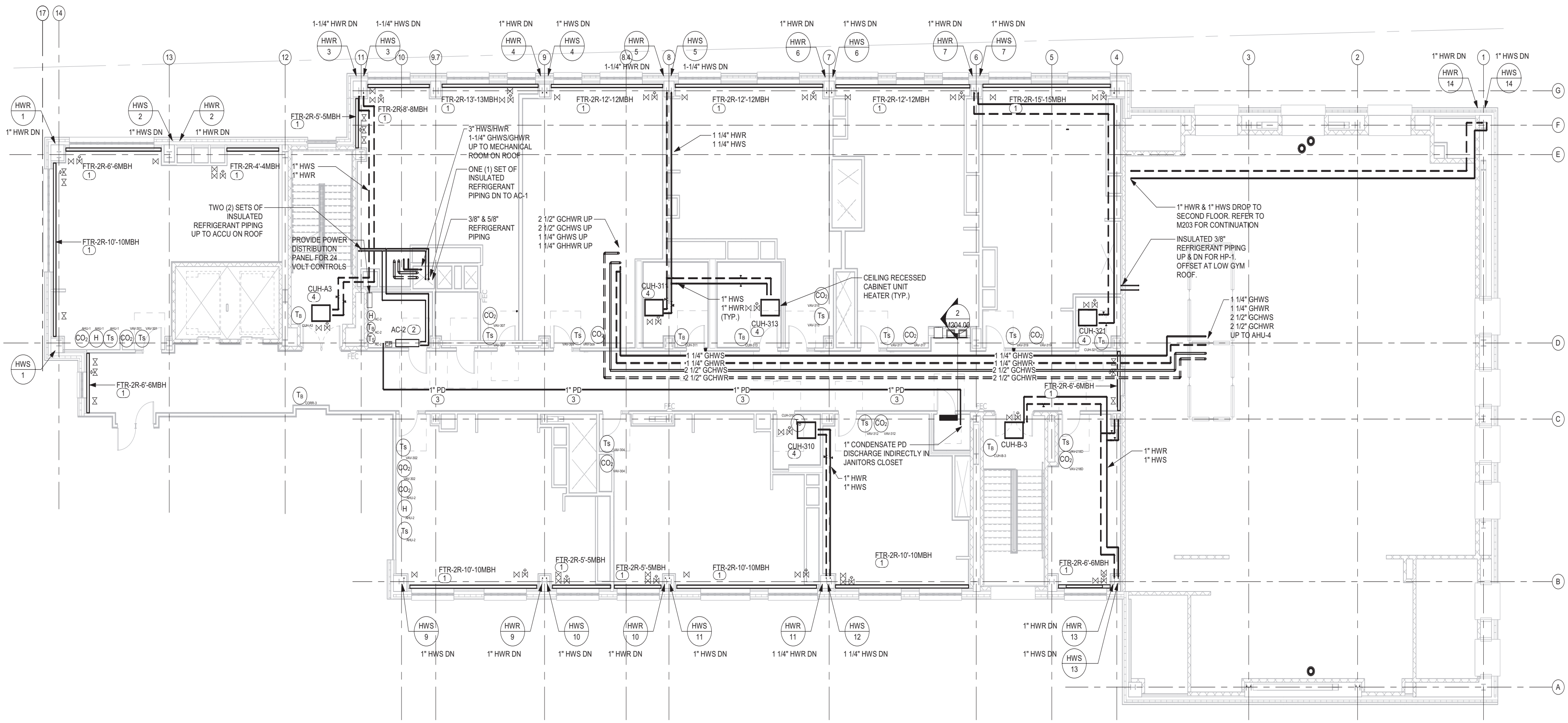
2 INDOOR AC/HEAT PUMP TO BE MOUNTED ON MANUFACTURER PROVIDED WALL MOUNTING BRACKET .PROVIDE CONDENSATE PUMP. REFER TO SPECIFCATION 15783. PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITOR CLOSET

3 PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITORS CLOSET

4 PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305



2 THIRD FLOOR CORRIDOR ROUTING
1/4" = 1'-0"



1 HVAC - PIPING - THIRD FLOOR
1/8" = 1'-0"

Q5.1R – THERMAL COMFORT

NYC Green Schools Rating System

SCA School Construction Authority

THERMAL COMFORT

CREDIT FORM
Credit Q5.1R

RESPONSIBLE PARTY:

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

Go to SCA website for active form

Project:	PS 5R	**Submission Phase:**	Schematic Design
Address:		**Architect:**	
LLW #		**Preparer:**	
Design #	N/A	**Revision Date:**	

INSTRUCTIONS:
Step 1) Thermal Comfort Design: mark box if HVAC system meets ASHRAE requirements
Step 2) Thermal Comfort Control

Step 2a) Individual Occupant Spaces (offices, classrooms, other instructional rooms [ie science lab, art classroom], exercise rooms, libraries): Complete the table below for all individual occupant spaces with individual controls. Spaces with identical occupancy types and thermal controls may be grouped together for efficiency. For credit compliance, at least 50% of individual occupant spaces must have controls.

Step 2b) Shared Multioccupant Spaces (cafeterias, gyms, gymnatorium, auditoriums): Complete the table below for all shared multioccupant spaces. For credit compliance, 100% of shared multioccupant spaces must have controls.

Step 1: Thermal Comfort Design

General:

HVAC Systems and building envelope meets ASHRAE 55-2010, Thermal Comfort Conditions for Human Occupancy, with errata	X
For Gymnasiums and Other Spaces with high metabolic rates, ASRAE 55-2010, Normative Appendix A has been accounted for	X
For kitchens ASHRAE 55 2010 or ISO 7730-2005 have been accounted for	X

Step 2a: Thermal Comfort Control: Individual Occupant Spaces

Individual Occupant Space Type	Thermal Control Type	Number of Spaces with Individual Controls
Offices	Individual Controls	4
Classrooms	Individual Controls	14
Other instructional room (science, art, etc)	Individual Controls	3
Exercise rooms	-	
Libraries	Individual Controls	1

Total number of individual occupant spaces in project	22
Total number of individual occupant spaces with controls	22
Percentage of individual occupant spaces with controls	**100%**

Step 2b: Thermal Comfort Control: Shared Multioccupant Spaces

Shared Occupant Space Type	Thermal Control Type	Number of Spaces with Controls
Cafeteria	Individual Controls	1
Gymnasium	-	
Gymnatorium	Individual Controls	1
Auditorium	-	

Total number of shared multioccupant spaces	2
Total number of shared multioccupant spaces with controls	2
Percentage of shared multioccupant spaces with controls	**100%**

Inputs

Select method: PMV method

Operative temperature	78	°F	
Air speed	40	fpm	With local control
Relative humidity	50	%	Relative humidity
Metabolic rate	1.2	met	Standing, relaxed: 1.2
Clothing level	0.5	clo	Typical summer indoor clothing: 0.5 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

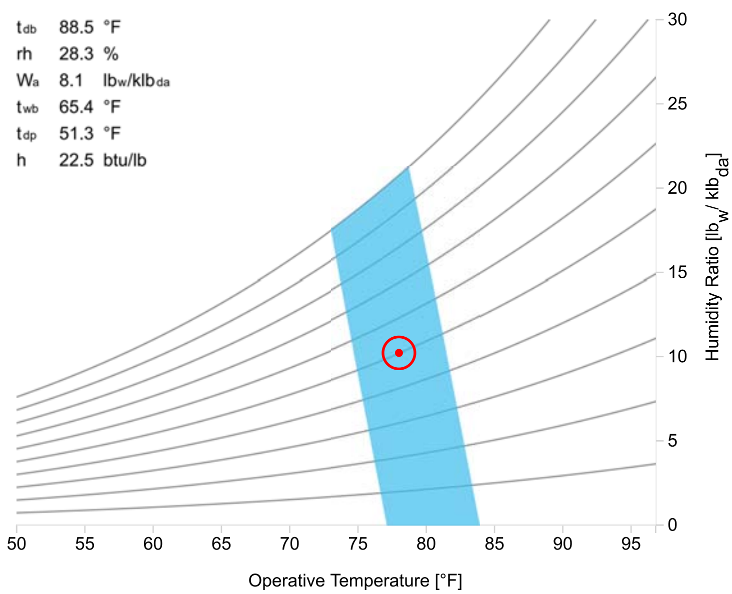
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55-

PMV with elevated air speed = -0.01
Sensation = Neutral
Dry-bulb temperature at still air = 76.4 °F

PPD with elevated air speed = 5 %
SET = 77.0 °F
Cooling effect = 1.6 °F

Psychrometric (operative temperature)



NOTE: In this psychrometric chart the abscissa is the operative temperature and for each point dry-bulb temperature equals mean radiant temperature (DBT = MRT). The comfort zone represents the combination of conditions with the same DBT and MRT for which the PMV is between -0.5 and +0.5, according to the standard.
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

Inputs

Select method:			PMV method
Operative temperature	72	°F	
Air speed	40	fpm	
Relative humidity	50	%	Relative humidity
Metabolic rate	1.2	met	Standing, relaxed: 1.2
Clothing level	1	clo	Typical winter indoor clothing: 1.0 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

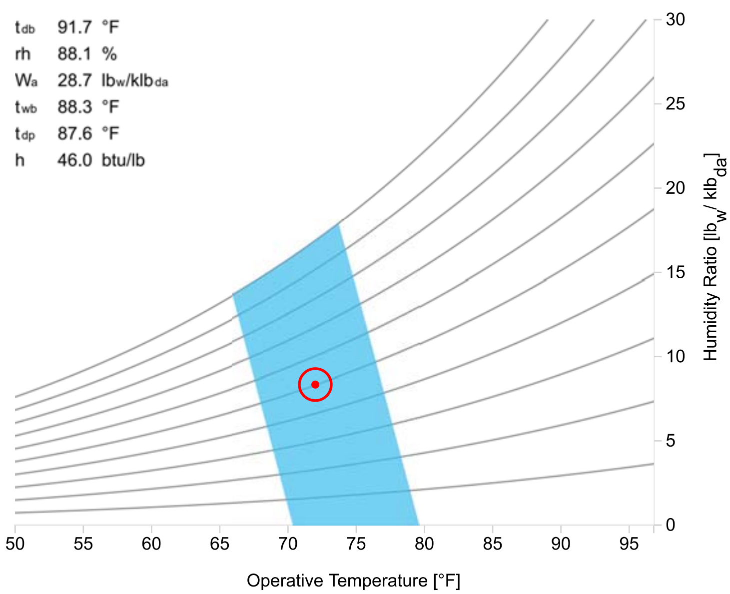
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55

PMV with elevated air speed = -0.03
Sensation = Neutral
Dry-bulb temperature at still air = 70.5 °F

PPD with elevated air speed = 5 %
SET = 78.1 °F
Cooling effect = 1.5 °F

Psychrometric (operative temperature)



NOTE: In this psychrometric chart the abscissa is the operative temperature and for each point dry-bulb temperature equals mean radiant temperature (DBT = MRT). The comfort zone represents the combination of conditions with the same DBT and MRT for which the PMV is between -0.5 and +0.5, according to the standard.
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

To cite this webpage:
Tyler Hoyt, Stefano Schiavon, Federico Tartarini, Toby Cheung, Kyle Steinfeld, Alberto Piccioli, and Dustin Moon, 2019, CBE Thermal Comfort Tool. Center for the Built Environment, University of California Berkeley.
Note: We recommend using Chrome, Firefox, Opera or Safari.
Contact Us: For any enquiries contact us via email at cbecomforttool@gmail.com
Report Issue | Request New Feature

Inputs

Select method: PMV method

Operative temperature	72	°F	
Air speed	40	fpm	
Relative humidity	50	%	Relative humidity
Metabolic rate	1	met	Reading, seated: 1.0
Clothing level	1	clo	Typical winter indoor clothing: 1.0 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

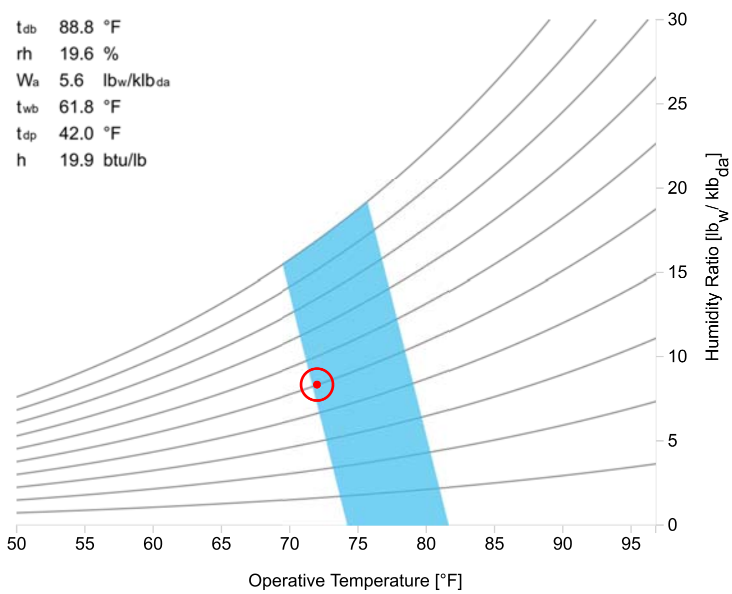
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55

PMV with elevated air speed = -0.45
Sensation = Neutral
Dry-bulb temperature at still air = 70.9 °F

PPD with elevated air speed = 9 %
SET = 75.3 °F
Cooling effect = 1.1 °F

Psychrometric (operative temperature)



NOTE: In this psychrometric chart the abscissa is the operative temperature and for each point dry-bulb temperature equals mean radiant temperature (DBT = MRT). The comfort zone represents the combination of conditions with the same DBT and MRT for which the PMV is between -0.5 and +0.5, according to the standard.
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

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Note: We recommend using Chrome, Firefox, Opera or Safari.
Contact Us: For any enquiries contact us via email at cbecomforttool@gmail.com

Report Issue | Request New Feature

Inputs

Select method:			PMV method
Operative temperature	78	°F	
Air speed	40	fpm	No local control
Relative humidity	50	%	Relative humidity
Metabolic rate	1	met	Reading, seated: 1.0
Clothing level	0.5	clo	Typical summer indoor clothing: 0.5 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

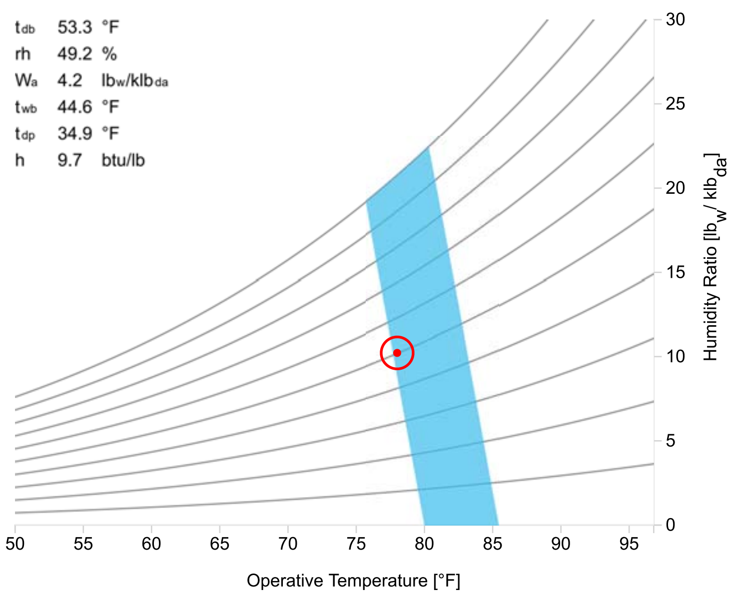
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55

PMV with elevated air speed = -0.44
Sensation = Neutral
Dry-bulb temperature at still air = 76.8 °F

PPD with elevated air speed = 9 %
SET = 75.0 °F
Cooling effect = 1.2 °F

Psychrometric (operative temperature)



NOTE: In this psychrometric chart the abscissa is the operative temperature and for each point dry-bulb temperature equals mean radiant temperature (DBT = MRT). The comfort zone represents the combination of conditions with the same DBT and MRT for which the PMV is between -0.5 and +0.5, according to the standard.
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

Inputs

Select method: PMV method

Operative temperature	78	°F	
Air speed	40	fpm	
Relative humidity	50	%	Relative humidity
Metabolic rate	1.7	met	Walking about: 1.7
Clothing level	0.36	clo	Walking shorts, short-sleeve shirt: 0.36 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

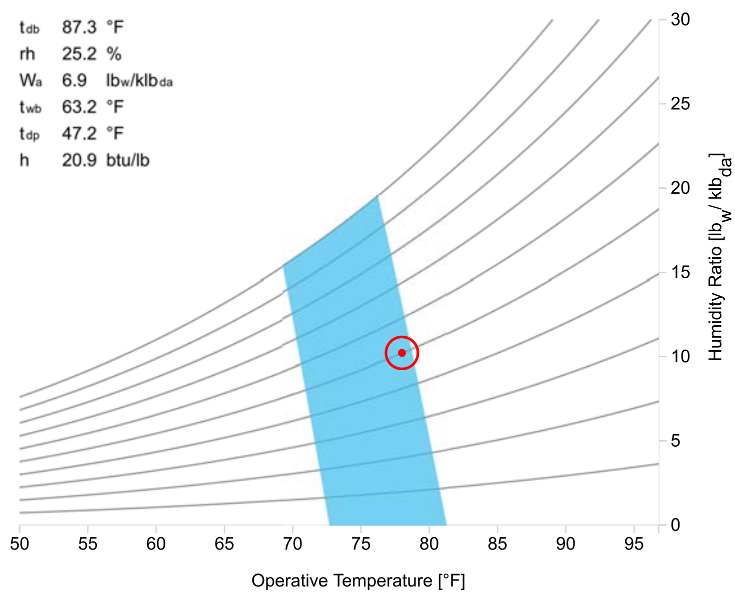
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55

PMV with elevated air speed = 0.42
Sensation = Neutral
Dry-bulb temperature at still air = 75.6 °F

PPD with elevated air speed = 9 %
SET = 79.4 °F
Cooling effect = 2.4 °F

Psychrometric (operative temperature)



NOTE: In this psychrometric chart the abscissa is the operative temperature and for each point dry-bulb temperature equals mean radiant temperature (DBT = MRT). The comfort zone represents the combination of conditions with the same DBT and MRT for which the PMV is between -0.5 and +0.5, according to the standard.
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

Inputs

Select method:			PMV method
Operative temperature	72	°F	
Air speed	40	fpm	
Relative humidity	50	%	Relative humidity
Metabolic rate	1.7	met	Walking about: 1.7
Clothing level	0.36	clo	Walking shorts, short-sleeve shirt: 0.36 clo

Create custom ensemble

Dynamic predictive clothing

Solar gain on occupants

Reset | Set pressure | SI/IP | ? Help

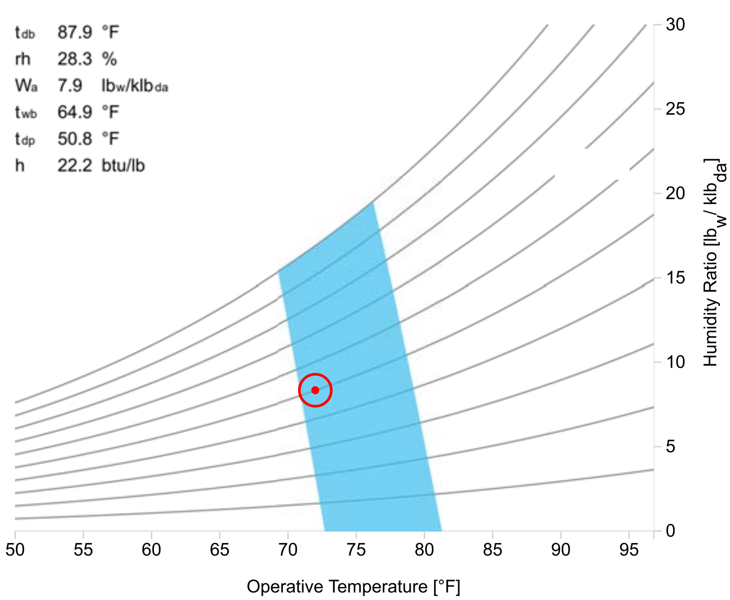
Local discomfort | Globe temp

✔ Complies with ASHRAE Standard 55

PMV with elevated air speed = -0.36
Sensation = Neutral
Dry-bulb temperature at still air = 69.8 °F

PPD with elevated air speed = 8 %
SET = 73.5 °F
Cooling effect = 2.2 °F

Psychrometric (operative temperature)



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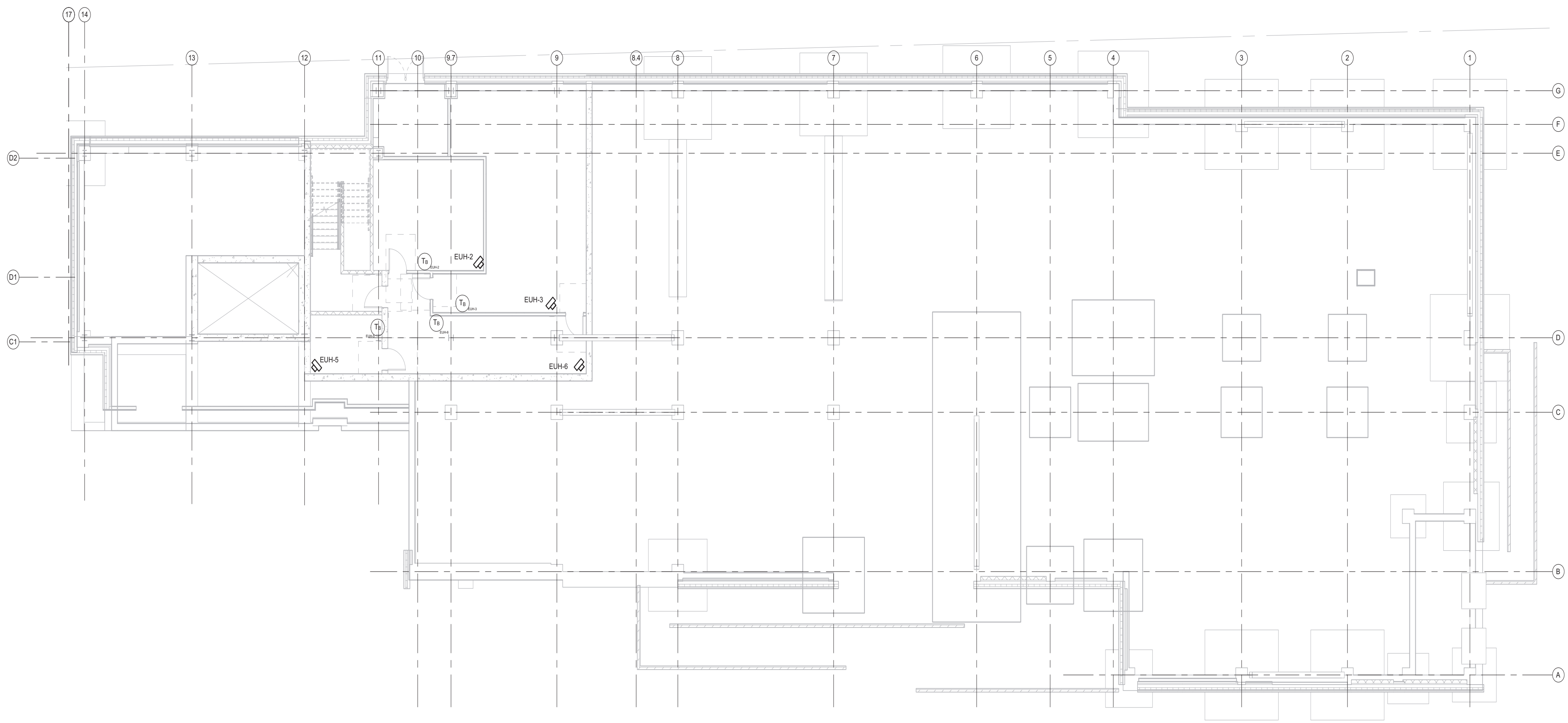
Limits of Applicability: This standard is only applicable to healthy men and women. This standard does not apply to occupant: a) whose clothing insulation exceed 1.5 clo; b) whose clothing is highly impermeable; or c) who are sleeping, reclining in contact with bedding, or able to adjust blankets or bedding.

GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS



1 HVAC - PIPING - CELLAR
1/8" = 1'-0"

188

GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

KEY NOTES

(1) PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

(2) INDOOR AC/HEAT PUMP TO BE MOUNTED ON MANUFACTURER PROVIDED WALL MOUNTING BRACKET .PROVIDE CONDENSATE PUMP. REFER TO SPECIFCATION 15783. PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITOR CLOSET

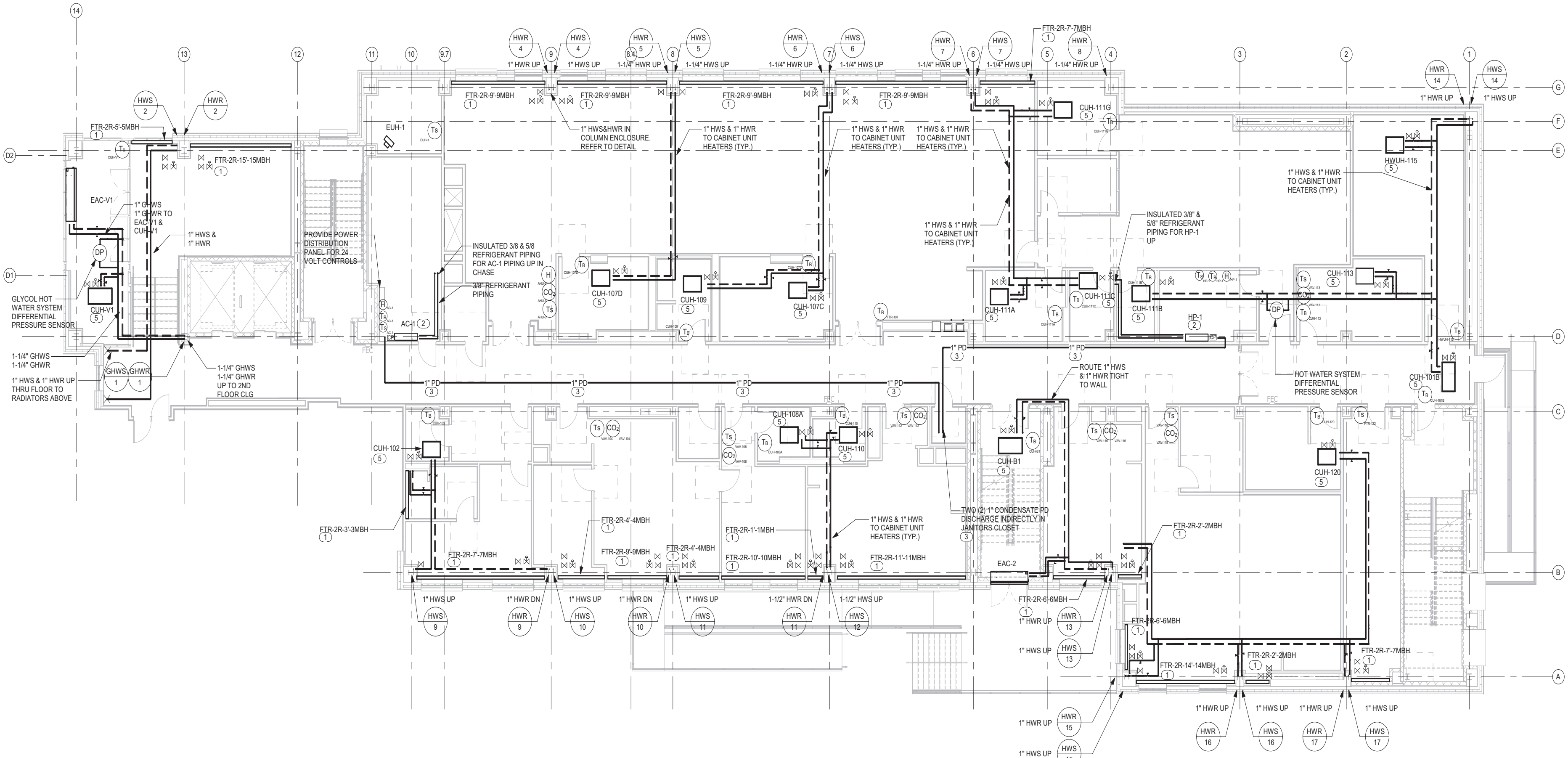
(3) PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITORS CLOSET

(4) EQUIPMENT BY FOOD SERVICE CONTRACTOR. PROVIDE INSULATED REFRIGERANT PIPING PER MANUFACTURERE SIZING FROM EXTERIOR CONENSING UNIT TO INTERIOR UNIT. PROVIDE 1" INSULATAED CONDENSATE DRAIN TO FLOOR DRAIN OUTSIDE WALK IN FREEZER/REFRIGERATOR. PROVIDE ALL POWER AND CONTROL WIRING. PIPING AND EQUIPMENT SHOWN FOR REFERENCE ONLY. REFER TO FOOD SERVICE DRAWINGS.

KEY NOTES CONT.

(5) PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305

(6) PROVIDE NEW GAS LEAK DETECTION PANEL. PROVIDE CUSTODIAN;S ALARM PANEL AS PER SPEC 15596 IN CUSTOIDAN'S OFFICE. PROVIDE ALL WIRING, CONDUIT, SUPPORTS, ETC REQUIRED FOR COMPLETE INSTALLATION (APPROX. 100 LF). REFER TO DETAIL ON M502



(1) HVAC - PIPING - FIRST FLOOR
1/8" = 1'-0"

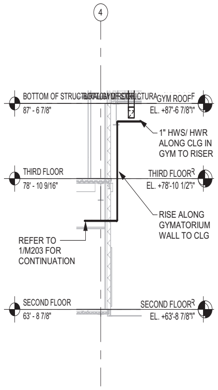
GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

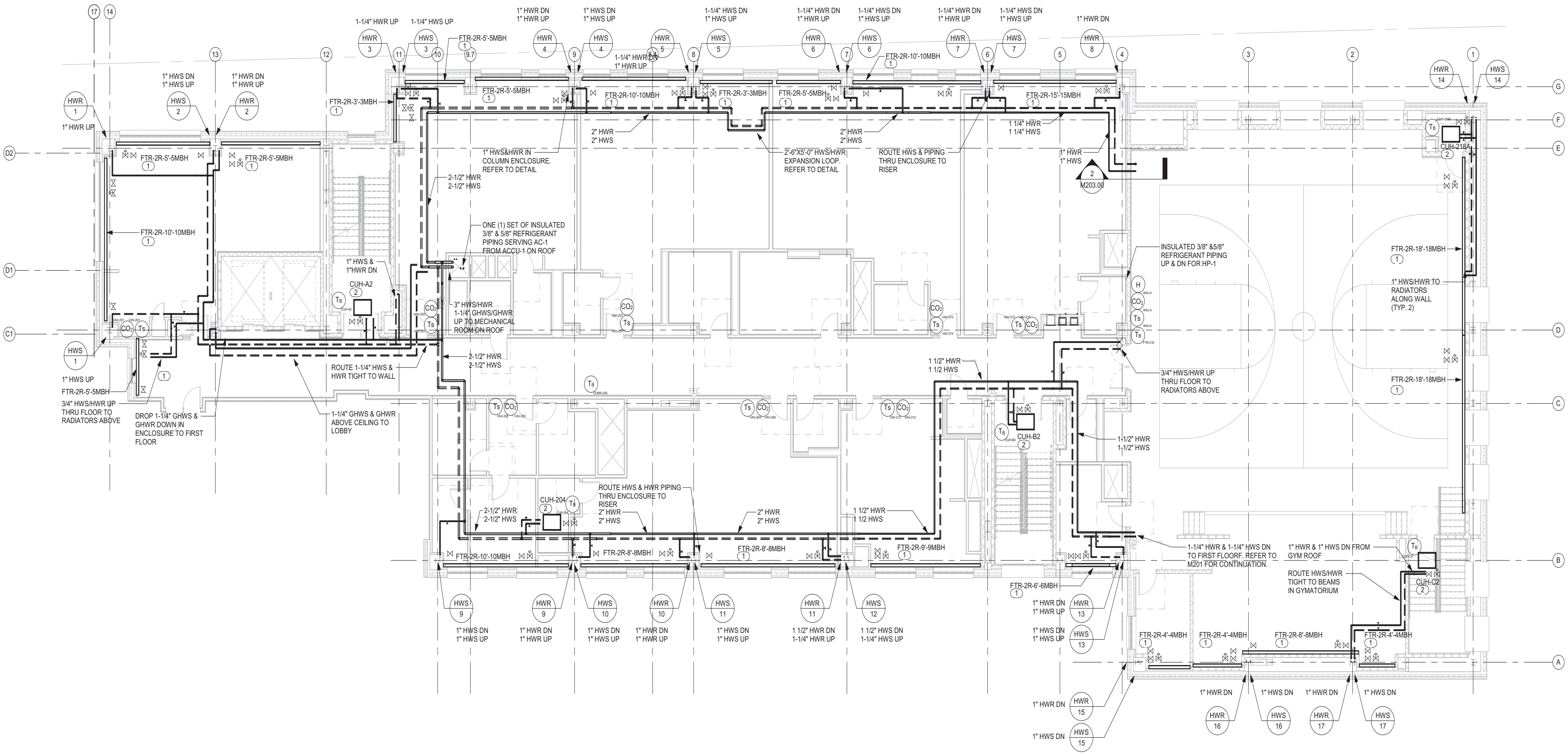
KEY NOTES

(1) PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

(2) PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305



2 HOT WATER ROUTING IN GYM
1/8" = 1'-0"



1 HVAC - PIPING - SECOND FLOOR
1/8" = 1'-0"

GENERAL NOTES

1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR FIN TUBE RADIATOR, CABINET UNIT HEATER, AND OTHER EQUIPMENT, PIPING ARRANGEMENT, AND VALVING REQUIREMENTS. PROVIDE ACCESS DOORS PER SPECIFICATION.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. PROVIDE 1" HWS& HWR TO CABINET UNIT HEATERS. DROPS TO EACH FTR SHALL BE 3/4" HWS/HWR.
5. HOT WATER PIPING SHALL BE ENCLOSED AT COLUMNS. REFER TO ARCHITECTURAL DRAWINGS AND DETAILS
6. HVAC CONTRACTOR SHALL PROVIDE WELL/TAPS REQUIRED FOR HVAC CONTROLS

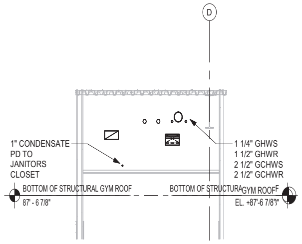
KEY NOTES

(1) PROVIDE CONTINUOUS WALL TO WALL FIN TUBE RADIATOR ENCLOSUSESS WITH END CAPS. PROVIDE SHUT OFF VALVE AND AIR VENT AT HIGH POINT ON WATER SUPPLY AND COMBINATION SHUT OFF & BALANCING VALVE AND MODULATING DDC CONTROL VALVE ON RETURN RISER. PROVIDE ACCESS DOORS ON SUPPLY AND RETURN SIDE OF FIN TUBE RADIATOR ENCLOSUSURE TO GRANT ACCESS TO VALVES. COORDINATE ENCLOSUSURE AND ACCESS DOORS WITH ARCHITECTURAL FURNITURE LAYOUT.

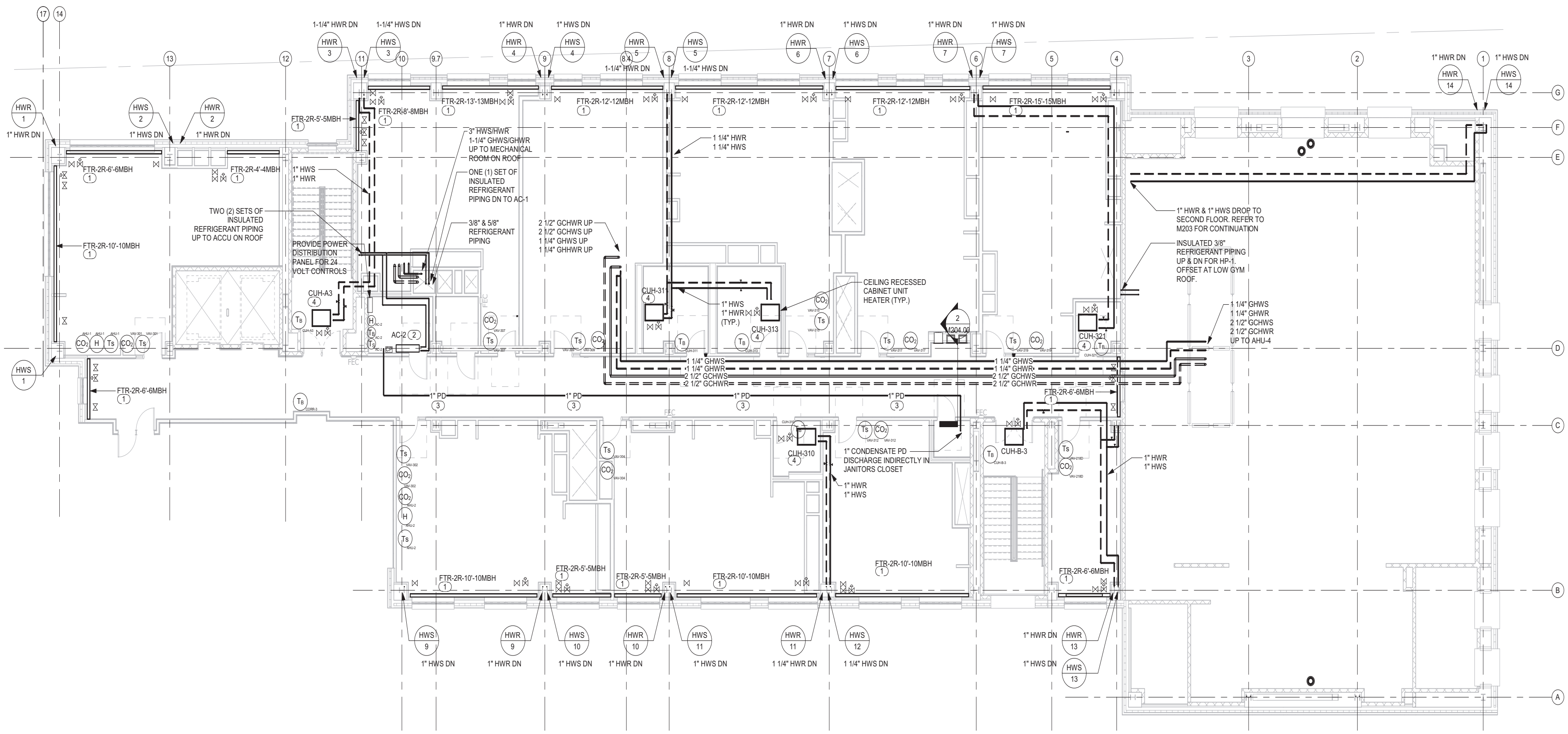
(2) INDOOR AC/HEAT PUMP TO BE MOUNTED ON MANUFACTURER PROVIDED WALL MOUNTING BRACKET .PROVIDE CONDENSATE PUMP. REFER TO SPECIFCATION 15783. PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITOR CLOSET

(3) PROVIDE 1" INSULATED COPPER CONDENSATE PIPING TO JANITORS CLOSET

(4) PROVIDE SHUT OFF VALVE, BALANCING VALVE, AQUASTAT, AND AIR VENT ON HOT WATER PIPING AS INDICATED ON DETAIL. COORDIANTE AND PROVIDE GENERA CONSTRUCTION ACCESS DOORS FOR VALVES PER 08305



2 THIRD FLOOR CORRIDOR ROUTING
1/4" = 1'-0"



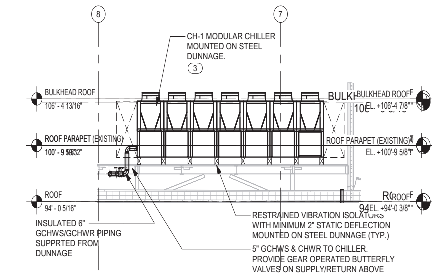
1 HVAC - PIPING - THIRD FLOOR
1/8" = 1'-0"

GENERAL NOTES

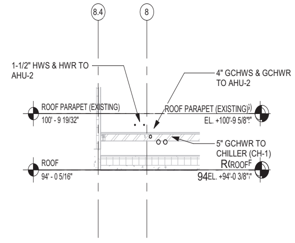
1. REFER TO DRAWING M001.00 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS LISTS
2. REFER TO DETAILS SHEET FOR DUCT/PIPE PEMETRATION DETAILS, HVAC EQUIPMENT SUPPORT, PIPING HOOK UP, REQUIRED VALVES, PRESSURE/TEMPERATURE GAUGES, STRAINERS, ETC.
3. INSULATE ALL PIPING AND VALVING. HORIZONTAL PIPE INSULATION THICKNESS SHALL BE DOUBLE AS SPECIFIED IN SPECIFICATION 15512.
4. HVAC CONTRACTOR TO PROVIDE WELLS/TAPS REQUIRED FOR HVAC CONTROLS.
5. PROVIDE 4" HIGH CONCRETE PADS FOR EACH EQUIPMENT. PAD DIMENSTIONS SHALL EXTEND 6" ALL AROUND THE EQUIPMENT.

KEY NOTES

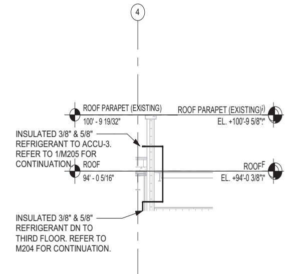
1. PROVIDE ACCU UNIT MOUNTED ON MIN. 24" HIGH PRE-FAB CURB. PROVIDE ROOF PORTAL FOR INSULATED REFRIGERANT PIPES DN TO AC UNIT. CHARGE SYSTEM PER MANUAFACTURER'S INSTRUCTIONS. FURNISH AND INSTALL CONTROL WIRING PER MANUFACTURER'S INSTRUCTIONS BETWEEN INDORR EVAPORATOR UNIT AND OUTDOOR CONDENSING UNIT. FOR ELECTRICAL POWER REFER TO ELECTRICAL DRAWINGS.
2. PROVIDE INSULATED REFRIGERANT PIPING BETWEEN EXTERIOR ACCU AND INDORR AC UNIT. PROVIDE ALUMNIUM OR STAINLESS STEEL JACKET HELD WITH Z-LOCK FOR EXPOSED REFRIGERANT PIPING.
3. PROVIDE MODULAR CHILLER ON STEEL DUNNAGE. PROVIDE MIN. 2" STATIC DEFLECTION RESTRAINED SPRING ISOLATORS. PROVIDE GEAR OPERATED BUTTERFULY SUPPLY VALVE/RETURN VALVES. PROVIDE MANUAL DRAIN ON SUPPLY PIPING ABOVE DUNNAGE. ROUTE DRAIN PIPING TO NEARBY ROOF DRAIN.
4. PROVIDE NEW CONDENSING UNIT ON FACTORY PROVIDED WALL MOUNTED BRACKET ANCHORED EXTENSTION TO WALL. INSTALL NEW INSULATED REFRIGERANT PIPES. CHARGE REFRIGERANT PER MANUFACTURER'S INSTRUCTIONS. FURNISH & INSTALL CONTROL WIRING PER MANUFACTURER'S INSTRUCTIONS BETWEEN INDOOR EVAPORATOR UNIT AND OUTDOOR CONDENSING UNIT. FOR ELECTRICAL POWER REFER TO ELECTRICAL DRAWINGS.
5. INDOOR AC/HEAT PUMP TO BE MOUNTED ON MANUFACTURER PROVIDED WALL MOUNTING BRACKET. PROVIDE CONDENSATE PUMP. REFER TO SPECIFICATION 15783. PROVIDE 1" INSULATED COPPER CONDENSATE PPIPING TO NEARBY ROOF DRAIN.



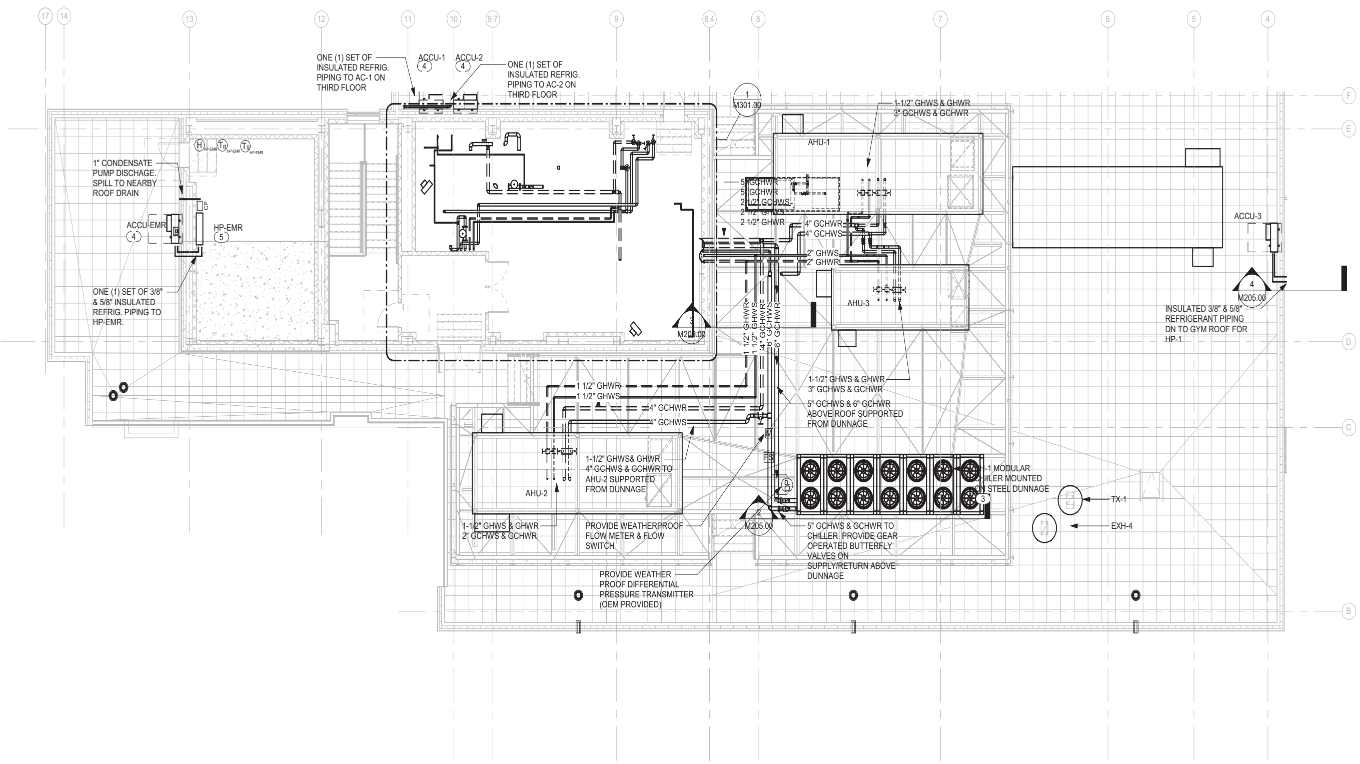
2 CHILLER (CH-1) SECTION
1/8" = 1'-0"



3 HVAC PIPING SECTIONAL VIEW
1/8" = 1'-0"



4 HVAC PIPING FOR ACCU-3 ON MAIN ROOF
1/8" = 1'-0"



1 HVAC - PIPING - ROOF
1/8" = 1'-0"

Q6.1R – INTERIOR LIGHTING CONTROL

SCA School Construction Authority

NYC Green Schools Rating System

INTERIOR LIGHTING CONTROL

CREDIT FORM

Credit Q6.1R

RESPONSIBLE PARTY:

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

Go to SCA website for active form

Project:	PS 123A
Address:	345 Example St
LLW #	123456
Design #	123456

INSTRUCTIONS:
Step 1a) Individual Occupant Lighting Controls
Complete the table below for all individual occupant spaces. Spaces with identical occupancy types and lighting controls may be grouped together for efficiency. For credit compliance, at least 90% of individual occupant spaces must have individual lighting controls.
Step 1b) Lighting Control: Shared Multi-occupant spaces
Complete the table below for all shared multi-occupant spaces. Spaces with identical occupancy types and lighting controls may be grouped together for efficiency. For credit compliance, 100% of shared multi-occupant spaces must have controls.

Lighting Control Type Note: *Dimmer switch qualifies as a multi-level lighting control.*

Step 1a: Individual occupant lighting controls

Space or Group ID	Number of Spaces or workstation with Individual Controls	Number of Spaces or workstation without Individual Controls
Individual Office with Multi-Level Lighting Controls	6	
Individual Office without Multi-Level Lighting Controls		0
	Total number of individual occupant spaces in project	6
	Total number of individual occupant spaces with controls	6
	Percentage of individual occupant spaces with controls	**100%**

Step 1b: Lighting Control: Shared Multi-Occupant Spaces *(select Learning Space Type to enable Occupant Space Type selection)*

Learning Space Type	Occupant Space Type	Number of Rooms	Adjustable Control Systems?	Manual Controls located in space?
Multi-Zone Spaces (Select from the drop-down menu)				
Large Offices	General	1	Yes	Yes
Insert other Multi-Zone Spaces (Select from the drop-down menu)				
Cafeteria	General	1	Yes	Yes
Gymnasium	General	1	Yes	Yes

Single-Zone Spaces				
Classrooms	General	6	Yes	Yes
Chemistry Laboratory	General	1	Yes	Yes
Art Room	General	1	Yes	Yes
Workshops	General	1	Yes	Yes
Music Room	General	1	Yes	Yes
Dance/Exercise Studios	General	1	Yes	Yes

Total number of shared multi occupant spaces in project	14
Total number of multi-shared occupant spaces with controls	14
Percentage of individual occupant spaces with controls	**100%**

	Y	N	N/A
All learning spaces have in place multi-zone (multi-level or multi-scene) control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel).	X		
Any projection or presentation walls with separate lighting must be separately controlled.			X
Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires.	X		

If "Y" is selected, indicate applicable spaces:

NYC Green Schools Rating System

School Construction Authority

Project:
Address:
LLW #:
Design #:

Submission Phase:
Architect:
Preparer:
Revision Date:

Space Type/ID	Lighting Details
Kindergarten Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Pre-K Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
3-K Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Corridor	Recessed 2x4 panel lighting fixtures with occupancy sensors
Lobby	Linear (Linear and downlights) recessed fixtures with occupancy sensors
Vestibule	Recessed linear with occupancy sensors
Individual Toilet	Recessed 2x4 troffer lighting fixtures with vacancy sensor and manual control with settings at off and on
Medical Office	Recessed 2x4 troffer lighting fixtures with vacancy sensor and manual control with settings at off and on
Medical Exam	Recessed 2x4 troffer lighting fixtures with vacancy sensor, and manual control with settings at off and on
Cafeteria	Recessed 2x4 troffer lighting fixtures with vacancy sensor and lockable manual control with settings at off and on
Administrative Office	Recessed 2x4 troffer lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off and on
Principal's Office	Recessed 2x4 panel lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off and on
Kitchen	Recessed 2x2 gasketed troffer lighting fixtures with time-based schedule and manual controls with settings at off and on
Kitchen Office	Recessed 2x2 gasketed troffer lighting fixtures with vacancy sensor and manual control with settings at off and on
1-2nd Grade Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
3rd Grade Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Guidance Office	Recessed 2x4 troffer lighting fixtures with vacancy sensor and manual control with settings at off and on
Custodian's Suite	Recessed 2x4 troffer lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Library/Media Room	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Art/Music Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel

4-5 Grade Classroom	Linear, Pendant, Direct/Indirect lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off, on, and midlevel
Staff Lounge	Recessed 2x4 troffer lighting fixtures with vacancy sensor, daylight sensor, and manual control with settings at off and on
Gymatorium	Recessed 2x4 troffer lighting fixtures with manual and automatic controls
Gymatorium Stage	Linear, Pendant, Direct lighting fixtures with time-based schedule and manual controls with settings at off and on
Instr. Office	Recessed 2x4 troffer lighting fixtures with vacancy sensor and manual control with settings at off and on
Utility	Linear, Pendant, Direct lighting fixtures with time-based schedule and manual controls with settings at off and on
Storage	Linear, Pendant, Direct lighting fixtures with vacancy sensor and manual control combination
Multi/Student Toilets	Linear, Pendant, Direct lighting fixtures with time-based schedule and manual/key controls with settings at off and on
Single User Toilets	Recessed 2x4 troffer lighting fixtures with occupancy sensor and manual control combination

A lighting control plan must be provided for each floor of the project.

Supplemental documentation needed to demonstrate lighting control operation, such as a lighting fixture schedule or lighting control legend, shall also be provided.

GENERAL NOTES:
1. FOR NOTES, SYMBOLS AND ABBREVIATIONS SEE DWG. E001.00 AND E002.00

2. EXIT LIGHTS TO BE CIRCUITED TO PANEL LP-3\10.

3. ALL LIGHT FIXTURES TO BE BRANCH CONNECTED TO PANEL LP-3, UNLESS OTHERWISE NOTED.

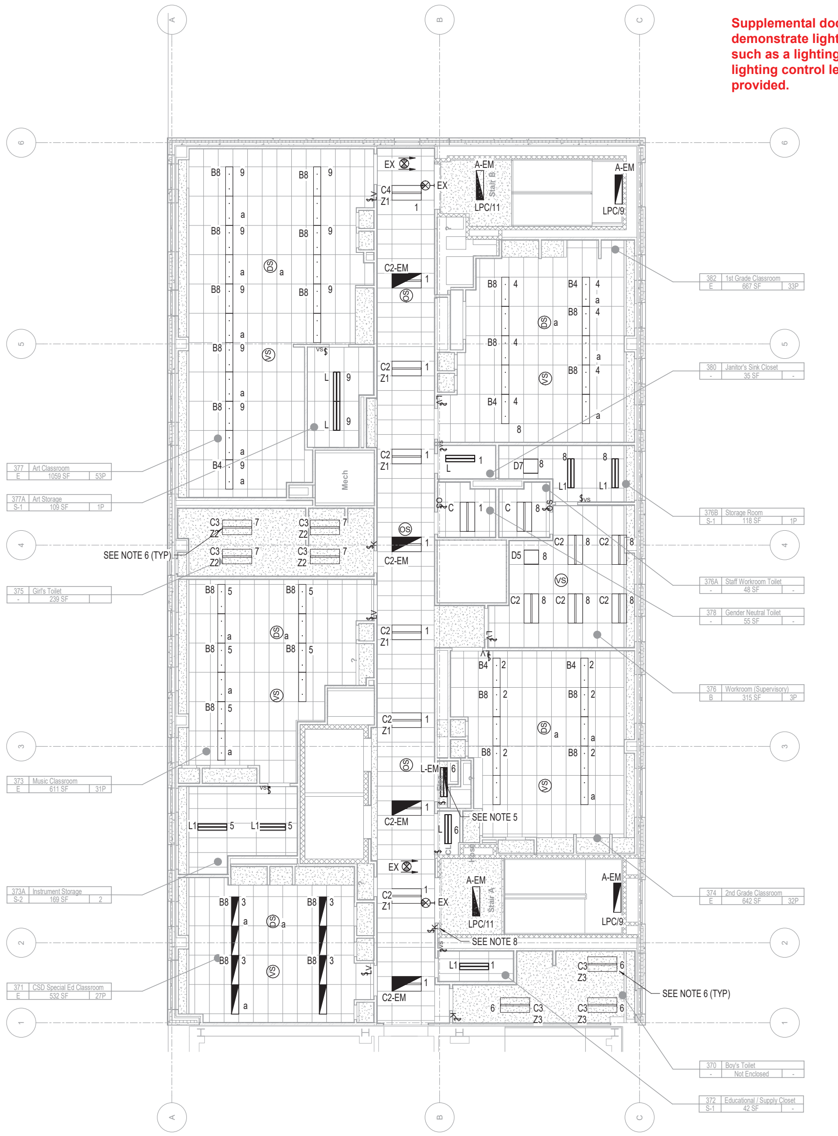
4. REFER TO DRAWING E606 FOR LIGHT CONTROL SEQUENCE & FIXTURE SCHEDULE.

5. PANELBOARD 'PP-3', 'LP-3' & 'LCP-3' ARE LOCATED IN THIS ELECTRICAL CLOSET.

6. LIGHTING FIXTURES IN MULTI USER RESTROOMS HAVE BUILT IN OCCUPANCY SENSORS.

7. ZONE 'ZX' LIGHTING FIXTURES TO BE CONTROLLED BY PROGRAMMABLE LIGHTING CONTROL PANEL 'LCP-3' WITH INTEGRAL CLOCK. LIGHTING CONTROL PANEL 'LCP-3' TO BE CIRCUITED FROM PANEL LP-3\12.

8. DENOTED KEY SWITCH DEDICATED FOR EMERGENCY LIGHTS IN CORRIDOR.



1 THIRD FLOOR LIGHTING PLAN

E104.00 SCALE: 1/8" = 1'-0"

NYC School Construction Authority

Drawing may be printed at reduced scale

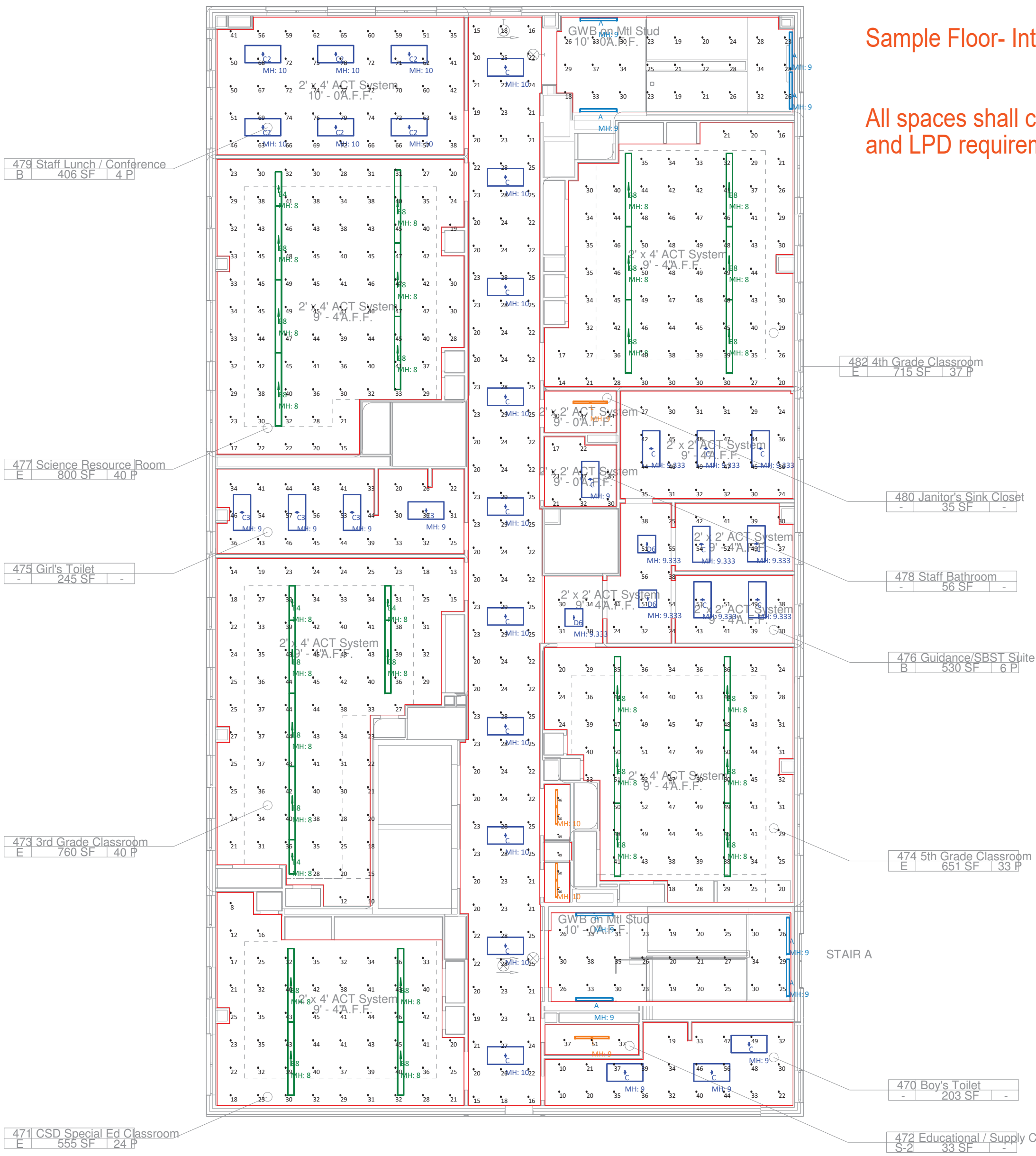
No.	Date	Revision

SCA Design Manager:

LLW No.: Facility Code: Date:

Proje..

Q6.2 – INTERIOR LIGHTING QUALITY



Sample Floor- Interior Photometrics

All spaces shall comply with the illumination and LPD requirements of SCA DR 7.2.1.

Project:

Address:

4TH FLOOR LIGHTING CALCULATION

Calculation Summary

Project: NYCSCA FOURTH FLOOR

Label	CalcType	Avg	Max	Min	Avg/Min	Max/Min	Units
470 @ WP	Illuminance	33.61	56	10	3.36	5.60	Fc
471 @ WP	Illuminance	33.13	46	8	2.5	3.0	Fc
472 @ WP	Illuminance	41.67	51	37	1.13	2.2	Fc
473 @ WP	Illuminance	30.99	45	10	3.10	1.12	Fc
474 @ WP	Illuminance	39.39	52	18	2.19	2.89	Fc
475 @ WP	Illuminance	39.15	57	20	1.96	2.85	Fc
476 @ WP	Illuminance	39.05	56	24	1.63	2.33	Fc
477 @ WP	Illuminance	36.31	49	15	2.42	3.27	Fc
478 @ WP	Illuminance	27.13	37	17	1.60	2.18	Fc
479 @ WP	Illuminance	62.33	79	35	1.78	2.26	Fc
480 @ WP	Illuminance	40.33	47	30	1.34	1.57	Fc
482 @ WP	Illuminance	37.05	50	14	2.65	3.57	Fc
CLOSET @ WP	Illuminance	48.33	50	46	1.05	1.09	Fc
CORRIDOR @ WP	Illuminance	23.08	29	15	1.54	1.93	Fc
STAIR A @ WP	Illuminance	26.81	38	19	1.41	2.00	Fc
STAIR B @ WP	Illuminance	26.37	37	18	1.47	2.06	Fc

LPD Area Summary

Label	Area	Total Watts	LPD
470_LPD	179.25	97.2	0.542
471 LPD	507.1	150.4	0.297
472 LPD	32.44	42.3	1.304
473 LPD	722.6	190.4	0.263
474 LPD	605.03	225.6	0.373
475 LPD	238.94	129.6	0.542
476_LPD	86.69	33.6	0.388
476A LPD	86.64	32.4	0.374
476B LPD	75.53	32.4	0.429
476C LPD	230.49	97.2	0.422
477 LPD	772.97	228	0.295
478 LPD	55.29	32.4	0.586
479 LPD	388.07	194.4	0.501
480 LPD	35.17	33	0.938
482 LPD	640.67	190.4	0.297
CLOSET LPD	17.15	33	1.924
CORRIDOR LPD	987.55	490.2	0.496
ELEC LPD	12.42	33	2.657
STAIR A LPD	258.16	61.4	0.238
STAIR B LPD	221.39	61.4	0.277

Average LPD = .48

NYC Green Schools Rating System

School Construction Authority

Project: **Submission Phase:**

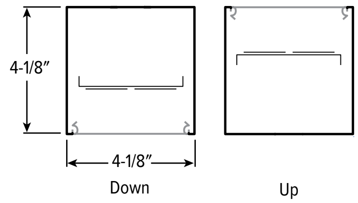
LLW #: **Preparer:**

Design #: **Revision Date:**

Space	Luminaire Qty (#)	Total Power (W)	Area (ft²)	Power Density (W/ft²)	Average Reflectance (%)	
					80/50/20	90/60/25
C001 Corridor	7	282.1	786.7	0.40		X
C002 Corridor	4	110.3	175.0	0.60		X
C101 Water/Pump Room	7	142.2	557.5	0.30		X
C102 Staff T	1	40.3	63.8	0.60		X
C103 JC	1	20.3	40.5	0.50		X
C104 Lockers	1	40.3	58.4	0.70		X
C104A M locker	1	40.3	89.7	0.40		X
C104B W Locker	4	161.2	178.8	0.90		X
C105 Kitchen	28	968.8	1226.8	0.80		X
C105A Dietician's Office	1	27.0	71.5	0.40		X
C105B Food Storage	3	148.2	186.0	0.80		X
C105C Non-Food Storage	3	148.2	187.7	0.80		X
C105D Can Wash	2	69.2	65.7	1.10		X
C106 Staff T	1	40.3	58.6	0.70		X
C107 Elec Service	4	81.3	330.4	0.20		X
C108 Custodian's Office	5	135.0	254.2	0.53		X
C109 Refuse Room	10	346.0	479.4	0.70		X
C110 Dining	46	1242.0	4799.0	0.30		X
C110B Boys	2	80.6	177.8	0.50		X
C110C Girls	2	80.6	213.6	0.40		X
C110D Servery	12	415.2	477.0	0.90		X
C111 Elev Controls	2	55.2	69.8	0.80		X
Stair D	4	112.8	216.5	0.50		X
100 CORRIDOR	48	1113.5	2353.6	0.50		X
133 RPZ	2	55.2	115.0	0.50		X
135 JC	1	20.3	52.2	0.40		X
136 Med Suite Office	4	108.0	250.2	0.40		X
136A Med Suite Waiting	1	40.6	76.1	0.50		X
136B Med Suite Exam	3	95.9	123.1	0.80		X
136C Student Toilet	1	40.3	57.6	0.70		X
137 General Office	6	243.6	540.9	0.50		X
137A Records Room	2	54.0	92.7	0.60		X

137B Principals Office	5	135.0	333.1	0.40		X
137C Principals Toilet	1	40.3	50.6	0.80		X
139 Toilet Shower	2	80.6	131.9	0.60		X
140 Guidance	3	81.0	158.4	0.50		X
140A Guidance Office	2	54.0	100.4	0.50		X
140B Guidance Office	2	81.2	104.5	0.80		X
140C Guidance Conf	2	81.2	165.2	0.50		X
140D Guidance Stor	1	40.3	71.5	0.60		X
141 CR_CSD SP ED	9	386.1	465.9	0.80		X
142 Staff T	1	40.3	63.1	0.60		X
143 PRE-K	11	471.9	905.7	0.50		X
143A Toilet	1	40.3	44.3	0.90		X
144 Music	9	386.1	709.9	0.50		X
145 Elec	1	34.8	63.9	0.50		X
146 Pre-K	10	429.0	895.1	0.50		X
146A Toilet	1	40.3	43.9	0.90		X
147 CR_PRE-K	11	471.9	919.4	0.50		X
147A Toilet	1	40.3	40.8	1.00		X
148 Gender Neutral	1	40.3	41.5	1.00		X
150 Pre-K	11	471.9	867.1	0.50		X
150A Toilet	1	40.3	44.6	0.90		X
Vestibule North	6	82.9	254.3	0.30		X
Vestibule South	6	82.9	192.1	0.40		X
1ST 247	8	240.0	674.2	0.40		X
1ST 250	8	240.0	690.8	0.30		X
Boys 236	2	80.6	185.0	0.40		X
CL 246	1	27.6	57.0	0.50		X
Corridor 200	23	926.9	1919.1	0.50		X
CSD SP ED 249	6	180.0	454.6	0.40		X
Elec. 245	1	34.8	64.0	0.50		X
Girls 234	2	80.6	193.1	0.40		X
JC 235	1	20.3	41.6	0.50		X
Kinder 239	11	314.7	903.5	0.30		X
Kinder 241	10	300.0	902.5	0.30		X
Kinder 242	12	360.0	932.3	0.40		X
Kinder 243	10	284.7	903.7	0.30		X
Kinder 244	11	314.7	937.0	0.30		X
Kinder 248	12	344.7	914.7	0.40		X
Staff T 237A	1	40.3	58.9	0.70		X
Staff T 240	1	40.3	66.6	0.60		X
Staff Work 237	5	135.0	398.2	0.30		X
Telecom 238	7	142.2	356.9	0.40		X
Toilet 239A	1	40.3	40.4	1.00		X
Toilet 241A	1	40.3	41.0	1.00		X
Toilet 242A	1	40.3	40.8	1.00		X
Toilet 243A	1	40.3	40.5	1.00		X
TOILET 244A	1	40.3	40.5	1.00		X
Toilet 248A	1	40.3	40.7	1.00		X

2ND 337	5	214.5	733.4	0.30		X
2ND 340	10	429.0	686.8	0.60		X
3RD 342	8	343.2	677.6	0.50		X
3RD 343	11	471.9	715.4	0.70		X
4TH 344	8	343.2	685.2	0.50		X
4TH 347	9	386.1	681.9	0.60		X
4TH 349	9	386.1	697.5	0.60		X
5TH 346	9	386.1	677.3	0.60		X
5TH 348	9	386.1	669.8	0.60		X
5TH 353	10	429.0	689.7	0.60		X
Boys 336	2	80.6	187.5	0.40		X
CL 345	1	20.3	40.5	0.50		X
Corridor 300	23	926.9	1941.2	0.50		X
CSD SP ED 355	6	257.4	468.2	0.50		X
Elec 351	1	34.8	63.9	0.54		X
Girls 334	2	80.6	195.7	0.40		X
JC 335	1	20.3	42.7	0.50		X
Staff Lunch 338	7	189.0	470.3	0.40		X
Staff T 339	1	40.3	59.9	0.70		X
Staff T 341	1	40.3	60.1	0.70		X
BOYS 436	2	62.7	195.5	0.30		X
CORRIDOR 400	26	1047.8	2609.0	0.40		X
GIRLS 434	2	62.7	246.1	0.30		X
GYM	14	1400.0	3728.9	0.40		X
GYM STORAGE	2	54.0	141.6	0.40		X
HEALTH INSTRUCTOR 437A	2	54.0	171.2	0.30		X
MER	26	717.1	1974.2	0.40		X
STAFF TOILET 438	1	31.3	73.0	0.40		X
Total	663	23456.2	51574.7	0.45		



CATALOG #:

TYPE:

PROJECT:

FEATURES

- Available with BIOS® SkyBlue® technology to support proper daytime circadian stimulus
- Create elegant spaces with a seamless, continuous row of illumination
- Flat and proud lenses give designers a variety of looks
- Moveable mounting hardware easily slides along the length of the fixture providing variable mounting points
- Maximize energy savings with efficacies as high as 117 lm/W
- Linear extrusion contains snap-in light rails for ease of installation and maintenance
- Versatile MX4 system includes recessed, surface, suspended and in-wall mounting, see hew.com
- Corner configurations available, see Product Builder at hew.com/product-builder
- Diffuse acrylic lens provides uniform illumination for visual comfort
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – Extruded aluminum with die-cast end plates.
- SHIELDING – Extruded, flat, diffuse acrylic lens.
- FINISH – Textured matte white polyester TGIC powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High quality mid-power LED boards. L70 >60,000 hours per IES TM-21. 25°C maximum ambient operating temperature.
- MOUNTING – Suspended. 1/16″ diameter adjustable steel leveling aircraft cable and mounting hardware necessary for grid and hardpan ceiling applications provided.
- LISTINGS –
  - cETLus conforms to UL STD 1598.
  - Certified to CAN/CSA STD C22.2 No. 250.0.
  - Suitable for damp locations.
  - DesignLights Consortium qualified product. Not all versions of this product may be DLC qualified, see the DLC Qualified Products List at www.designlights.org/QPL.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

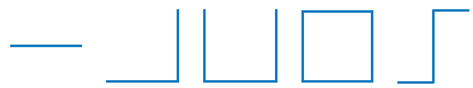
Available with BIOS® consult factory

ORDERING EXAMPLE: MX4D - 12′00 - L8/835 - F - AC/D48 - OPTIONS - DIM - UNV

SERIES
MX4D Down
MX4U Up

LENGTH
Lengths specified in feet and inches using 4″ increments, 2′ minimum.
Example: **12′00** = 12′-0″

Product Builder
Easily build shapes & simplify ordering with the Williams Linear Product Builder at hew.com/product-builder [1]



LUMENS [2]
L8 800lm
L12 1200lm
L15 1500lm

CRI
8 80
9 90 [4]

CCT
27 2700K
30 3000K
35 3500K
40 4000K
50 5000K

SHIELDING
F Flat, diffuse acrylic
P Proud, diffuse acrylic with 5/16″ drop [5]

MOUNTING (EXAMPLE: AC/D48) [3]

Prefix	Type	Length
AC/	**D** 1″ grid & hardpan **N** 9/16″ grid **S** Slot grid	**24** 24″ **48** 48″ **96** 96″
MSF_	Microstem, 1/4″ IPS, specify length in inches [6]	

OPTIONS [7]

EM/7W	7-watt emergency battery [9]
EM/7WRM	Remote mount 7-watt emergency battery [10]
EM/10W	10-watt emergency battery [11]
EM/10WRM	Remote mount 10-watt emergency battery [12]
OCC__	Factory-installed occupancy sensor [13]: **OCCWS FS-355-L6**
V90	Vertical 90° corner, suspended [14]
ASY	Asymmetric distribution [15]

CONTROL [8]

DIM	Dimming driver
DRV	Non-dimming driver
VDO/DSR	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and sensor-ready driver
VRF/DSR	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and sensor-ready driver

VOLTAGE
120 120V
277 277V
UNV 120-277V
347 347V [16]

NOTES
1 See page 5 for CORNER DETAILS.
2 Lumens per foot output based on 3500K CCT and F shielding. Actual lumens may vary ± 5%. See page 2 for FIXTURE PERFORMANCE DATA.
3 See page 3 for MOUNTING DETAILS.
4 Extended lead times may apply. Consult factory for availability.
5 MX4D only. See page 4 for SHIELDING DETAILS. Not available with corner configurations or transition options.
6 MX4D only.
7 See page 4 for FINISH OPTIONS. Custom colors available upon request. See Technical Info for Power Entry details.
8 See page 3 for ADDITIONAL CONTROL OPTIONS.
9 MX4U, L8 and L12 only. Not available with fixtures less than 4′.
10 L15 or fixtures less than 4′ only.
11 L8 and L12 only. Not available with fixtures less than 4′.
12 L15 or fixtures less than 4′ only.
13 Recommended for use in downlight orientation only. Utilizes 4″ of housing at end of fixture. See page 4 for FIXTURE DETAILS. 120V or 277V only.
14 Connects MX4D to vertically mounted MX4RW; F shielding only. MX4D only. See page 4 for FIXTURE DETAILS.
15 Available with F shielding only. Creates uneven lens illumination. See page 4 for CROSS SECTIONS.
16 Not available with EM drivers.

FIXTURE PERFORMANCE DATA

	DOWN (PER FOOT)			UP (PER FOOT)		
	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)
L8	824	7.3	113	851	7.3	117
L12	1175	10.8	108	1187	10.8	110
L15	1439	13.5	107	1439	13.5	107

- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25ºC ambient temperature.
- Wattage shown is average for 120V through 277V input.
- Results based on F shielding, 3500K, 80 CRI, actual lumens may vary +/-5%.
- Use multiplier table to calculate additional options.

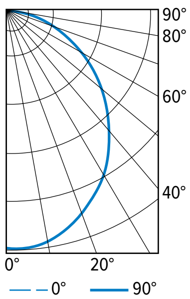
MULTIPLIER TABLE

	COLOR TEMPERATURE	
	CCT	CONVERSION FACTOR
80 CRI	2700K	0.97
	3000K	0.99
	3500K	1.00
	4000K	1.03
	5000K	1.06
90 CRI	2700K	0.80
	3000K	0.82
	3500K	0.83
	4000K	0.86
	5000K	0.89

ASY OPTION	
WATTAGE	EFFICACY (lm/W)
1.03	0.97

PHOTOMETRY

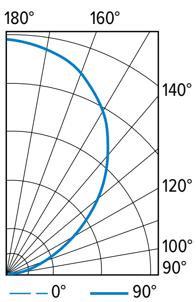
MX4D-4’00-L8/835-F-DIM Total Luminaire Output: 3296 lumens; 29.2 Watts I Efficacy: 113 lm/W I 80 CRI; 3500K CCT



CANDLEPOWER DISTRIBUTION				
VERTICAL ANGLE	HORIZONTAL ANGLE 0º	45º	90º	ZONAL LUMENS
0	894	894	894	
5	913	887	878	123
15	882	846	832	348
25	789	764	746	512
35	684	651	639	597
45	555	530	510	597
55	415	395	371	513
65	270	254	243	368
75	127	122	121	192
85	20	25	23	45
90	0	0	0	

LUMEN SUMMARY		
ZONE	LUMENS	% FIXTURE
0 - 30	983	30
0 - 40	1580	48
0 - 60	2690	82
0 - 90	3296	100
0 - 180	3296	100

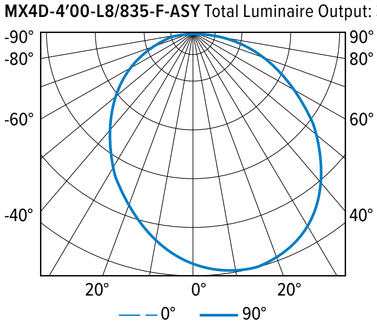
MX4U-4’00-L8/835-F-DIM Total Luminaire Output: 3404 lumens; 29.2 Watts I Efficacy: 117 lm/W I 80 CRI; 3500K CCT



CANDLEPOWER DISTRIBUTION				
VERTICAL ANGLE	HORIZONTAL ANGLE 0º	45º	90º	ZONAL LUMENS
90	0	0	0	
95	20	19	17	29
105	161	123	103	138
115	382	285	242	298
125	643	516	431	477
135	933	818	688	624
145	1189	1112	1006	681
155	1389	1315	1261	603
165	1498	1456	1419	410
175	1557	1519	1501	144
180	1540	1540	1540	

LUMEN SUMMARY		
ZONE	LUMENS	% FIXTURE
90 - 120	465	14
90 - 130	941	28
90 - 150	2247	66
90 - 180	3404	100
0 - 180	3404	100

MX4D-4’00-L8/835-F-ASY Total Luminaire Output: 3197 lumens; 29.2 Watts I Efficacy: 109 lm/W I 80 CRI; 3500K CCT



CANDLEPOWER DISTRIBUTION						
VERTICAL ANGLE	HORIZONTAL ANGLE 0º	45º	90º	135º	180º	ZONAL LUMENS
0	1153	1153	1153	1153	1153	
5	1149	1175	1188	1175	1149	109
15	1101	1185	1221	1185	1101	311
25	1011	1135	1187	1135	1011	468
35	881	1024	1083	1024	881	556
45	726	868	922	868	726	566
55	560	684	730	684	560	507
65	384	481	516	481	384	387
75	203	275	300	275	203	227
85	50	86	100	86	50	67
90	2	13	19	13	2	

LUMEN SUMMARY		
ZONE	LUMENS	% FIXTURE
0 - 30	887	28
0 - 40	1443	45
0 -60	2516	79
0 - 90	3197	100
0 - 180	3197	100

ADDITIONAL CONTROL OPTIONS

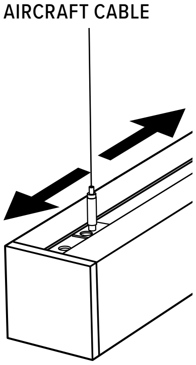
Note: Lumen restrictions apply, consult product builder at hew.com/product-builder.

CATALOG NUMBER	DESCRIPTION
DRV	Driver prewired for non-dimming applications
DIM	Dimming driver prewired for 0-10V low voltage applications
DIM1	1% dimming driver prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V or 277V only)
DSR	Sensor-ready driver
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LTE LINE	Lutron Hi-lume 1% 2-wire dimming driver forward phase line voltage controls (120V only)
LDE1	Lutron Hi-lume 1% EcoSystem dimming LED driver
LDE5	Lutron 5-Series 5% EcoSystem dimming LED driver
VDO/DSR	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC) and sensor-ready driver
VRF/DSR	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF) and sensor-ready driver
VDO/DBI/LDE1	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), Lutron Hi-lume 1% EcoSystem dimming LED driver, and digital link interface
VDO/DBI/LDE5	Lutron Vive integral fixture control, RF with daylight and occupancy sensor (DFCSJ-OEM-OCC), Lutron 5-Series 5% EcoSystem dimming LED driver, and digital link interface
VRF/DBI/LDE1	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), Lutron Hi-lume 1% EcoSystem dimming LED driver, and digital link interface
VRF/DBI/LDE5	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), Lutron 5-Series 5% EcoSystem dimming LED driver, and digital link interface
ELDO SOLOB	EldoLED Solodrive, 0.1% dimming driver for 0-10V controls
ELDO SOLOB DALI	EldoLED Solodrive, 0.1% dimming driver for DALI controls
ELDO ECO1	EldoLED Ecodrive, 1% dimming driver for 0-10V controls
ELDO ECO1 DALI	EldoLED Ecodrive, 1% dimming driver for DALI controls

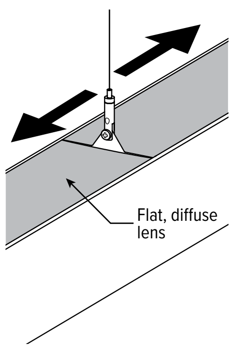
MOUNTING DETAILS

Aircraft cable row mount accessories can be repositioned along the length of the channel, providing flexible mounting locations to suit any application.

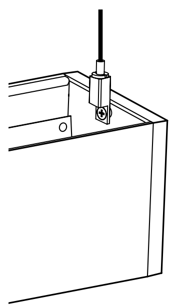
AIRCRAFT CABLE



MX4D Direct Hanger

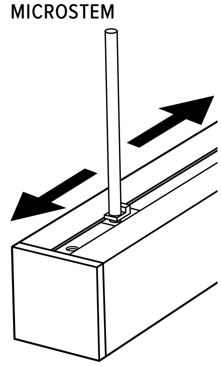


MX4U Mid-fixture Hanger



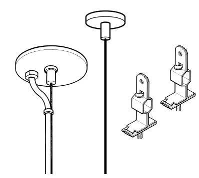
MX4U Standalone hanger

MICROSTEM

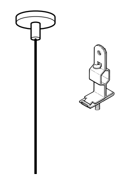


MX4D

STANDARD HARDWARE



Power End/Stand-Alone



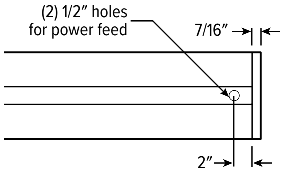
Row Mount Support

Notes:

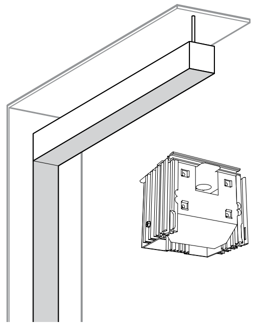
- Fixtures are provided with adjustable length aircraft cables and mounting hardware, must specify.
- Electrical supply is brought into the feeder (or stand-alone) fixture, either as part of a row or as an individual mount unit. Power feed locations are 2″ from end (downlight) or at end of fixture (uplight).
- One 5″ canopy included for each feeder fixture. One 2″ canopy included for each additional fixture required in a row.

FIXTURE DETAILS

MX4D BACK VIEW



V90 CORNER ACCESSORY

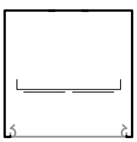


Includes tamper resistent lens bracket for lower end of vertical fixture.

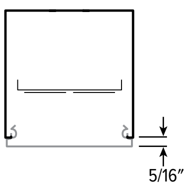
OCCUPANCY SENSOR

SHIELDING DETAILS

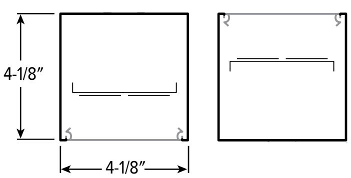
FLAT



PROUD

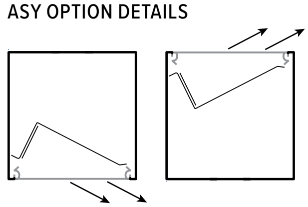


CROSS SECTIONS



Down Up

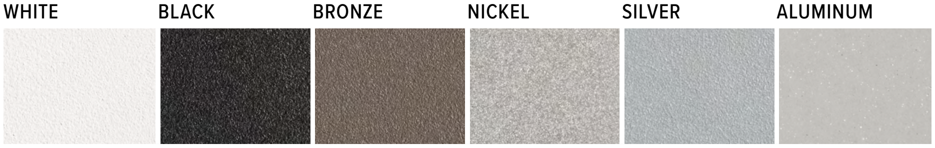
ASY OPTION DETAILS



Down Up

FINISH OPTIONS

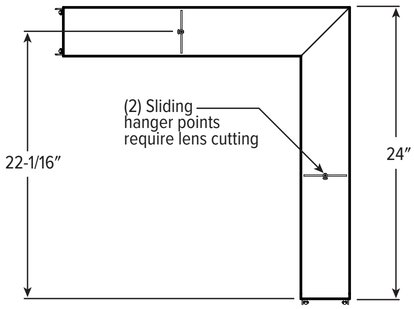
WHITE BLACK BRONZE NICKEL SILVER ALUMINUM



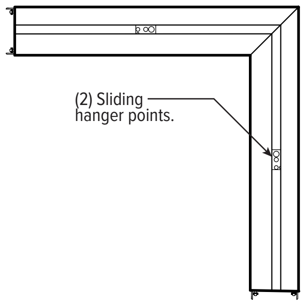
For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1″ square.

CORNER DETAILS

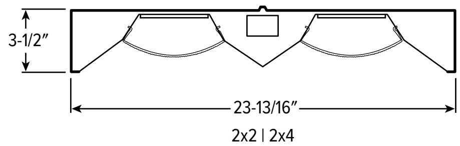
MX490U BACK VIEW



MX490D BACK VIEW



Note: Corner orientation determined in field.
Feeder corner end cap shipped separately.



CATALOG #:

TYPE:

PROJECT:

FEATURES

- Attractive and efficient architectural fixture delivers comfortable, uniform illumination
- Seamlessly integrate LED to any existing HET project
- Maximize energy savings with efficacies as high as 135 lm/W
- Fully room-side accessible without the use of tools
- Frosted acrylic diffusers combined with highly reflective matte white paint provide high optical efficiencies and visual comfort
- One-piece diffusers eliminate the need for separate overlays
- Slim fixture depth for use shallow plenum applications
- Companion HES products preserve continuity, see hew.com
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – 22-gauge die-formed C.R.S.
- SHIELDING – Frosted, ribbed acrylic.
- FINISH – Highly reflective non-glare matte white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High quality mid-power LED boards. Rated for 50,000 hours at 70% lumen maintenance (L70).
- MOUNTING – Designed for NEMA Type "G" 1" grid ceiling standard. For NEMA Type "NFG" and "SG" 9/16" grid installations, specify EQCLIPS option. For flange installations use the Drywall Kit (DFK), ordered separately, see Technical Info.
- LISTINGS –
  - cETLus conforms to UL STD 1598 and UL STD 8750. Certified to CAN/CSA STD C22.2 No. 250.0. Suitable for damp locations.
  - DesignLights Consortium Premium qualified product. Not all versions of this product may be DLC Premium qualified, see the DLC Qualified Products List at www.designlights.org/QPL.
  - City of Chicago Environmental Air approved when specified with CP option.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

ORDERING EXAMPLE: HETG - S24 - L76/835 - A - OPTIONS - DIM - UNV

ORDERING INFO

SERIES	CEILING TYPE	FIXTURE STYLE	WIDTH	LENGTH	LUMENS [1]	CRI	CCT
HET	**G** NEMA Type "G"	**S** Static, no air capability	**1** 1′ [2]	**2** 2′	**1x4**	**8** 80	**30** 3000K
			2 2′	**4** 4′	**L38** 3,800lm	**9** 90 [3]	**35** 3500K
					L69 6,900lm		**40** 4000K
					2x2		**50** 5000K
					L38 3,800lm		
					L69 6,900lm		
					2x4		
					L50 5,000lm		
					L76 7,600lm		
					L130 13,000lm		

SHIELDING	OPTIONS [4]		CONTROL [5]	VOLTAGE
A Frosted, ribbed acrylic diffusers	**EM/10W**	10-watt emergency battery	**DRV** Non-dimming driver	**120** 120V
	EQCLIPS	Earthquake clips [6]	**DIM** Dimming driver	**277** 277V
	(L__)	Additional lower lumen packages available. **Example:** 6,500 nominal lumens = HETG-S24-L76/840-A-**(L65)**. [7]		**UNV** 120-277V
	CP	Chicago plenum (CCEA)		**347** 347V [8]

NOTES

1. Lumen output based on 3500 CCT. Actual lumens may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen packages available, see options.
2. Available in 4′ length only.
3. Extended lead times may apply. Consult factory for availability.
4. See Technical Info for Power Entry details.
5. See page 3 for ADDITIONAL CONTROL OPTIONS.
6. 4 per fixture. Optional for 1" grid installations. Required for 9/16" grid mounting.
7. Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
8. Not available with EM drivers.

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)
1x4	L38	3868	30.7	126.0
	L69	6983	54.4	128.3
2x2	L38	3825	30.7	124.6
	L69	6905	54.4	126.9
2x4	L50	5114	37.7	135.8
	L76	7696	59.8	128.6
	L130	13128	98.7	133.0

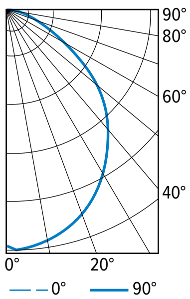
MULTIPLIER TABLE

	COLOR TEMPERATURE	
	CCT	CONVERSION FACTOR
80 CRI	3000K	0.99
	3500K	1.00
	4000K	1.03
	5000K	1.06
90 CRI	3000K	0.82
	3500K	0.83
	4000K	0.86
	5000K	0.89

- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25ºC ambient temperature.
- Wattage shown is average for 120V through 277V input.
- Results based on 3500K, 80 CRI, actual lumens may vary +/-5%
- Use multiplier table to calculate additional options.

PHOTOMETRY

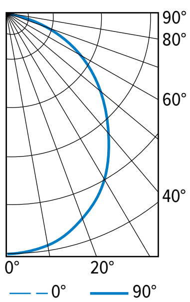
HETG-S14-L69/835 Total Luminaire Output: 6905 lumens; 54.4 Watts | Efficacy: 126.9 lm/W | 80 CRI; 3500K CCT



	VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
		0º	45º	90º	
CANDLEPOWER DISTRIBUTION	0	2602	2602	2602	
	5	2589	2588	2589	246
	15	2476	2483	2502	701
	25	2250	2275	2302	1048
	35	1932	1982	2032	1239
	45	1561	1637	1698	1260
	55	1165	1261	1291	1111
	65	769	842	797	804
	75	386	410	348	417
	85	79	51	29	79
	90	5	4	4	

	ZONE	LUMENS	% FIXTURE
LUMEN SUMMARY	0 - 30	1994	29
	0 - 40	3233	47
	0 - 60	5605	81
	0 - 90	6905	100
	0 - 180	6905	100

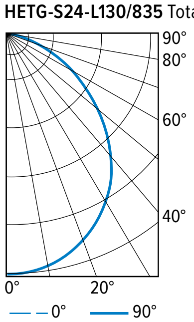
HETG-S22-L69/835 Total Luminaire Output: 6984 lumens; 54.4 Watts | Efficacy: 128.4 lm/W | 80 CRI; 3500K CCT



	VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
		0º	45º	90º	
CANDLEPOWER DISTRIBUTION	0	2827	2827	2827	
	5	2816	2819	2813	267
	15	2693	2706	2722	764
	25	2424	2494	2521	1144
	35	2049	2164	2237	1344
	45	1580	1743	1843	1325
	55	1065	1244	1368	1094
	65	617	753	714	700
	75	274	300	191	296
	85	45	27	11	50
	90	0	0	0	

	ZONE	LUMENS	% FIXTURE
LUMEN SUMMARY	0 - 30	2175	31
	0 - 40	3519	50
	0 - 60	5937	85
	0 - 90	6984	100
	0 - 180	6984	100

HETG-S24-L130/835 Total Luminaire Output: 13128 lumens; 98.7 Watts | Efficacy: 133.0 lm/W | 80 CRI; 3500K CCT



	VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
		0º	45º	90º	
CANDLEPOWER DISTRIBUTION	0	5229	5229	5229	
	5	5201	5179	5180	493
	15	4985	5002	4995	1408
	25	4546	4623	4638	2118
	35	3920	4000	4094	2508
	45	3021	3233	3364	2474
	55	2058	2389	2505	2081
	65	1180	1505	1278	1369
	75	514	599	385	579
	85	86	53	39	97
	90	0	0	0	

	ZONE	LUMENS	% FIXTURE
LUMEN SUMMARY	0 - 30	4019	31
	0 - 40	6527	50
	0 - 60	11082	84
	0 - 90	13128	100
	0 - 180	13128	100

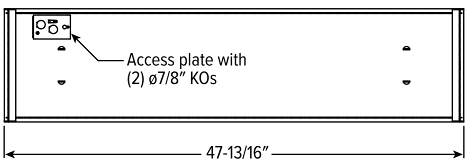
ADDITIONAL CONTROL OPTIONS

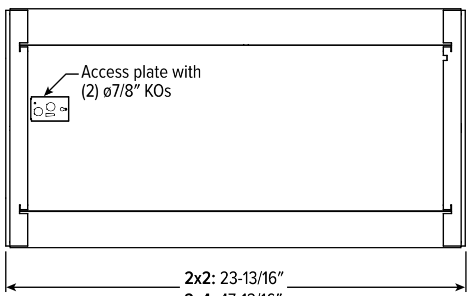
Note: Lumen restrictions apply, consult product builder at hew.com/product-builder.

CATALOG NUMBER	DESCRIPTION
DRV	Driver prewired for non-dimming applications
DIM	Dimming driver prewired for 0-10V low voltage applications
DIM1	1% dimming driver prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V or 277V only)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LTE LINE	Lutron Hi-lume 1% 2-wire dimming driver forward phase line voltage controls (120V only)
LDE1	Lutron Hi-lume 1% EcoSystem dimming LED driver
LDE5	Lutron 5-Series 5% EcoSystem dimming LED driver
ELDO SOLOB	EldoLED Solodrive, 0.1% dimming driver for 0-10V controls
ELDO SOLOB DALI	EldoLED Solodrive, 0.1% dimming driver for DALI controls
ELDO ECO1	EldoLED Ecodrive, 1% dimming driver for 0-10V controls
ELDO ECO1 DALI	EldoLED Ecodrive, 1% dimming driver for DALI controls

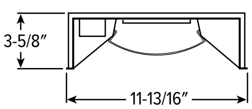
FIXTURE DETAILS

BACK VIEWS

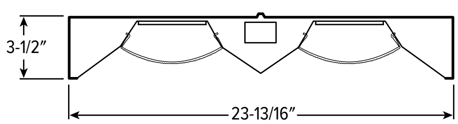




CROSS SECTIONS



1x4

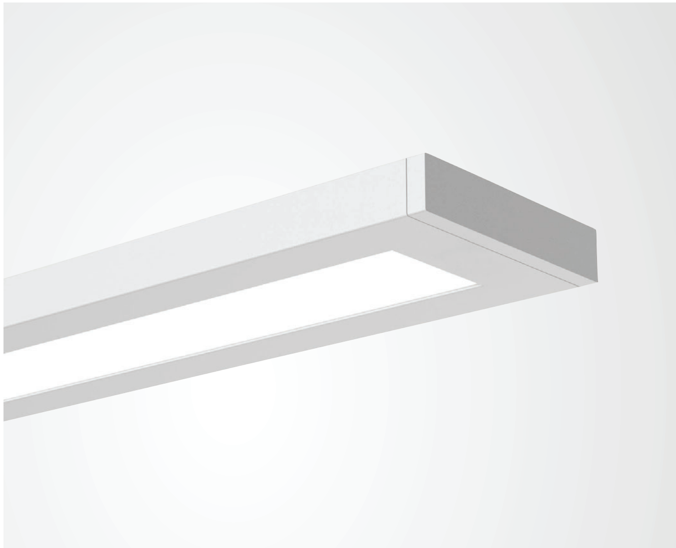


2x2 | 2x4

SPECIFICATIONS

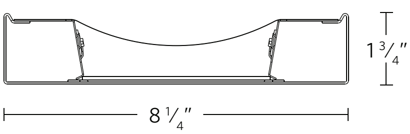
Type:

Project:



DIMENSIONS

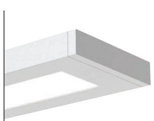
☐ **BRM9L**



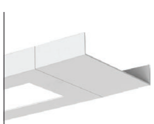
HIGHLIGHTS

- Total System Integration features 5-year limited warranty by Acuity Brands covering all components and construction
- 4', 8' and 12' sections
- Up to 137lm/w
- Multiple outputs available
- Softshine®-engineered comfort optics
- Enhanced batwing distribution through optical film
- Flicker-free dimming to dark (0.1%) powered by eldoLED® driver
- Integrated nLight® for system networking wired and wireless (optional)
- Integrated sensor for daylight dimming and/or occupancy detection (optional)
- Flat or sculptured end caps
- White, black, aluminum or custom color
- QuickShip option available

DETAILS



Flat end cap



Sculptured end cap

LUMEN PACKAGES

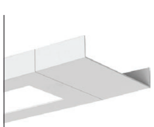
Based on 80CRI @ 3500K @70/30. Additional outputs and color temperatures available.

Indirect/'Direct LED Output	ID500LMF	ID900LMF	ID1400LMF
Total Delivered Lumens Per Foot	473	865	1418
Input Watts Per Foot	3.4	6.4	11.1
Lumens Per Watt	139	135	127

*Please pull the appropriate IES file for the hard data number for your luminaire selection

COMPANION LUMINAIRE(S)

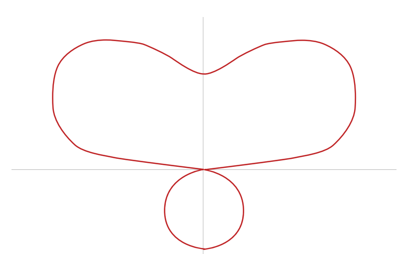
BRW9L
Bruno Wall LED



BRM9L S Bruno Surface

DISTRIBUTION

70% Up | 30% Down



CUSTOMIZATION

Ask us about the following possibilities: Section lengths in 2' increments, additional mounting options, custom colors and other modifications.

Type:

Project:

A+ Capable options indicated by this color background.

MODEL NUMBER

Example: BRM9L LLP 16FT MSL8 80CRI 35K ID1300LMF 20/80 DARK ZT 120 SCT F1/24F C110

Luminaire

BRM9L	

Linear Length Plan

LLP	Linear longest possible
LSL	Longest same length
LCB	Linear center balanced

Total Run Length

__FT	

Indicate luminaire row length in 4' increments. Ex: 12FT

Maximum Section Length

MSL4	4' section(s)
MSL8	8' section(s)
MSL12	12' section(s)

LED Color Rendering

80CRI	80+ CRI
90CRI	90+ CRI

LED Color Temperature

27K	2700K
30K	3000K
35K	3500K
40K	4000K
50K	5000K

Indirect/Direct LED Ouput

ID500LMF	Nominal lumens per foot
ID800LMF	Nominal lumens per foot
ID1200LMF	Nominal lumens per foot
ID1500LMF	Nominal lumens per foot
ID2000LMF	Nominal lumens per foot

ID _ _ _ LMF available in 100 increments between ID500LMF and ID2000LMF

Indirect/Direct Intensity Ratio

70/30	Std. 70% up; 30% down
60/40	60% up; 40% down
50/50	50% up; 50% down
40/60	40% up; 60% down
30/70	30% up; 70% down
20/80	20% up; 80% down
10/90	10% up; 90% down
0/100	0% up; 100% down

**Nominal distribution. Refer to photometric tests for exact distribution.*

Minimum Dimming Level

DARK	Constant current, dimming to < 1%
MIN1	Constant current, dimming to 1%

Control Input

ZT*	0-10V
NLIGHT**	nLight enabled
DALI***	DALI enabled
NLTAIR2	nLight AIR enabled

**0-10V will use linear dimming curve*
***Will use Logarithmic dimming curve*
****Not available with sensors*
****Will use Logarithmic dimming curve*

Voltage

120	120V
277	277V
347*	347V
MVOLT	120V-277V

**J-box mount step down transformer (1) per section*
**Not available with NLIGHT or F2 mount. Consult factory*

Wiring Option

SCT	Single circuit

Emergency Options

(Blank)	None
1EC	(1) emergency circuit module
2EC	(2) emergency circuit module
__EC	___ emergency circuit modules
_E10WLCP	_10 Watt battery pack, constant power with self diagnostics. CEC Certified

**Emergency type is installed in last 4' of luminaire sections. Separate feed required.*
***E10WLCP battery pack are not available with CSA*
****4FT MSL4 Individual fixture with EC Consult factory*

Primary Sensor

(blank)	No factory-installed, integrated sensor
PDT_**	Dual technology occupancy sensor. PIR & microphonics sensor
ADC_**	Daylight Dimming Sensor
APD_***	Dual technology occupancy sensor and daylight dimming sensor
API_*	Passive infrared occupancy sensor and daylight dimming sensor

**Available with NLTAIR2 only*
***Not available with NLTAIR2*
****APD available with ZT, NLIGHT and NLTAIR2*

Secondary Sensor

(blank)	No factory-installed, integrated sensor
SPDT_**	Dual technology occupancy sensor. PIR & microphonics sensor
SADC_**	Daylight Dimming Sensor
SAPD_***	Dual technology occupancy sensor and daylight dimming sensor
SAPI_*	Passive infrared occupancy sensor and daylight dimming sensor

**Available with NLTAIR2 only*
***Not available with NLTAIR2*
****SAPD available with ZT, NLIGHT and NLTAIR2*

Mounting Type/

F1/	T-bar ceiling (universal mounting bracket)
F1A/	T-bar ceiling (UMB with integrated J-box)
F2/	Hard ceiling (horizontal J-box)
F3/	Rigid Stem

**F1 & F1A Mount uses standard 3 1/2" canopy on feed and 2" canopy on support*
***F2 Mount uses standard 5" canopy on feed and 2" canopy on support*
****F3 Not available with NLIGHT F3 Mount uses standard 5" canopy on both feed & support*
*****All feed cords, cord managers, canopies and stems are standard white. They are not painted to match fixture color*

Overall Suspension

12F	12" fixed
18F	18" fixed
24F	24" fixed
24A	24" adjustable
36A	36" adjustable
36F*	36" Fixed
48A	48" adjustable
48F*	48" Fixed
72A	72" adjustable
96A	96" adjustable
144A	144" adjustable
192A	192" adjustable
240A	240" adjustable

**For stem F3 Mount only*
***Measured from ceiling to bottom of luminaire.*

Color

C110	Painted aluminum (low gloss)
C210	White white (fine textured)
C202	Black (fine textured)
C099	Custom color
RALTBD*	Ral Paint finishes

*RALTBD for pricing only. replace with applicable RAL call out when ready to order. See the RAL BROCHURE for available options

Options

BLK***	Black cord, cord manager and canopy
CSA****	Manufactured to Canadian standards
CP	Chicago Plenum (available with F1A only)
DU*	Dust cover
ELH**	Emergency through wiring w/separate neutrals-single EM feed at opposite end of normal
ELS2**	Emergency through wiring w/separate neutrals-single EM feed at same end of normal
GLR	Fast blow
GMF	Slow blow
IND***	Individual luminaire (factory installed end caps and power cord; hanging hardware in box)
MCS*	Matching canopy at support for aesthetics
MCSJ	Matching canopy for J-box mounting at non-power feed support locations
OJB*	Offset J-box at feed
SCEP	Sculptured end caps
SLP****	Sloped ceiling

**Not available with 0/100 distribution*
***Not available with CSA*
****Not available with nLight*
*****When chosen with EC entire section must be EC. EX: MSL8 section would need to be 2EC for entire section.*

** MCS & OJB cannot be chosen together*
**** Not available with F1A or SCEP or SLP or fixed cables (12F, 18F & 24F) & F3 stem mount*
*****Not available with F3 Stem mount*

Type:

Project:

SPECIFICATIONS

Housing
Nominal 8 1/4" x 1 3/4" rectangular housing is formed from cold-rolled steel.

End Caps
Die-cast end caps are mechanically attached with no exposed fasteners. Flat end caps standard. For sculptured end caps, choose option SCEP.

Color
Color for housing and end caps is white, black or painted aluminum. Consult factory for custom colors.

Luminaire Length
4', 8' or 12' lengths in a single section. Using internal joiners, 4' and 8' sections can be joined to form longer rows. For total luminaire length, add 5/8" for each flat end cap and 4" for each sculptured end cap. Using internal joiners, 4' and 8' sections can be joined to form longer rows.

Source
Multiple LED lumen packages and five available color temperature options (2700K, 3000K, 3500K, 4000K and 5000K) — all within 2.5 MacAdam ellipses.

Optics
Softshine® optical system consists of high performance lens, diffusers and metal reflectors.

Dimming Driver
e eldoLED driver provides "natural dimming" with smooth, continuous and flicker-free operation to 0.1% dim levels. Acuity luminaires incorporating eldoLED LED drivers perform within the recommended operating areas for flicker as a function of frequency and modulation (%) outlined in IEEE Standard 1789-2015 (IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers), in typical operating conditions at representative dimming levels. Syncing for controls: 2mA max.

THD: < 20%. Insignificant inrush current at 120 and 277VAC. FCC Class A and B tested for EMI and RFI When Control Input of 0-10V is specified driver will be set for linear dimming curve, if NLIGHT is specified driver will be set for logarithmic dimming curve.

EldoLED Driver for MIN1 and DARK only

nLight Air Wireless
The integrated API smart sensor is part of each luminaire in the nLight AIR network, which can be grouped to control multiple luminaires. The granularity of control with the digital PIR occupancy detection and daylight sensing makes a great solution for any application.

Optionally you can order nLight AIR less sensors for compatibility with an nLight Air wireless system.

Controls and System Networking Options
For wired networking via Cat-5e, choose an integrated nLight® module. For daylight dimming and/or dual technology occupancy detection. See Integrated Sensor Layout Page for more details.

Electrical
LED light engine — consisting of modular LED boards and eldoLED® dimming driver — is rated for 60,000 hours (L_{80}) at 25° C ambient temperature. Specify 120V or 277V. Pre-wired with 16AWG fixture wire. For special circuiting or wire gauge, consult factory. Plug-in electrical connectors included.

Environment
Suitable for damp location.

Validation
CSA/CUS listed. CSA tested to UL 1598 standards. LM-79 tested. Individual sections meet FCC Part 15 requirements. Lighting Facts partner.

Packaging
100% post-consumer recycled cardboard box and inserts. Biodegradable, protective luminaire bag. Recycled kraft paper tape.

Warranty
5-year limited warranty. Complete warranty terms located at www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25°C.

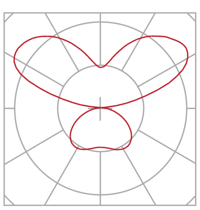
A+ Capable Luminaire
This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background*

To learn more about A+,
visit www.acuitybrands.com/aplus.

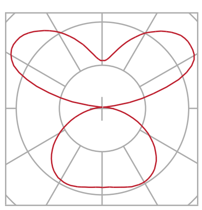
*See ordering tree for details

FIXTURE PERFORMANCE DATA



ID1000LMF 70/30 80CRI 35K
70% up/30% down
3916 delivered lumens per 4' section

132 lm/W



ID1000LMF 60/40 80CRI 35K
60% up/40% down
3740 delivered lumens per 4' section

126 lm/W

How to Calculate Delivered Lumens in Emergency Mode
Use the formula below to determine the delivered lumens in emergency mode
Delivered Lumens = 1.25 x P x LPW
P = Ouput power of emergency driver. P = 10W for E10WLCP option.
LPW = Lumen per watt rating of the luminaire. This information is available on the ABL luminaire spec sheet. LPW = Lumen per watt rating of the luminaire. LPW information available in Performance Data section.

EXPECTED LIFE L80@60,000 HOURS

CCT SCALING CHART

Direct		
CCT	**CRI**	**MULTIPLIER**
27K	80CRI	0.96
30K	80CRI	0.99
35K	80CRI	1
40K	80CRI	1
50K	80CRI	1.05
27K	90CRI	0.81
30K	90CRI	0.83
35K	90CRI	0.85
40K	90CRI	0.86
50K	90CRI	0.92

Type:

Project:

INTELLIGENT LUMINAIRE CHART

Choose nomenclature from these columns

Driver Configurations

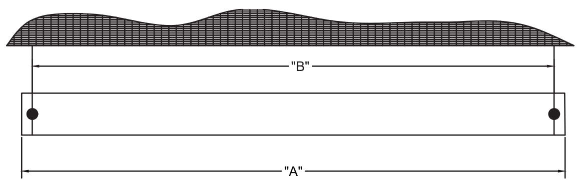
Minimum Dimming Level		Control Input		Driver	Dimming Range	Notes
DARK	+	ZT	=	eldoLED SoloDrive	100% to .1%	Linear Dimming, supplied with leads for 0-10V control
DARK	+	NLIGHT	=	eldoLED SoloDrive	100% to .1%	Logarithmic Dimming, NEPS 60 IO EZ LC included with lumaire
DARK	+	DALI	=	eldoLED SoloDrive	100% to .1%	Logarithmic Dimming, DALI controls and power supply by others
DARK	+	NLTAIR2	=	eldoLED SoloDrive	100% to .1%	Logarithmic Dimming, internal DALI power supply included with lumaire
DARK	+	NLT	=	eldoLED DualDrive	100% to .1%	Logarithmic Dimming, nIO EZDL CCT with lumaire
MIN1	+	ZT	=	eldoLED EcoDrive	100% to 1%	Linear Dimming, supplied with leads for 0-10V control
MIN1	+	NLIGHT	=	eldoLED EcoDrive	100% to 1%	Logarithmic Dimming, NEPS 60 IO EZ LC included with lumaire
MIN1	+	DALI	=	eldoLED SoloDrive	100% to 1%	Logarithmic Dimming, DALI controls and power supply by others
MIN1	+	NLTAIR2	=	eldoLED EcoDrive	100% to 1%	Logarithmic Dimming, internal DALI power supply included with lumaire

Control + Sensor Configurations

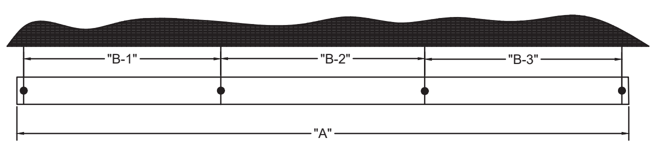
Minimum Dimming Level		Control Input		Driver	Notes
ZT	+	ADC	=	SensorSwitch MSD EZ ADC	0-10V control Daylight Sensor
ZT	+	PDT	=	SensorSwitch MSD PDT 7 EZ	0-10V control Occupancy sensor
ZT	+	APD	=	SensorSwitch MSD PDT 7 EZ ADC	0-10V control Daylight with Occupancy sensor
NLIGHT	+	ADC	=	SensorSwitch NES ADCX	nLight control Daylight Sensor
NLIGHT	+	PDT	=	SensorSwitch NES PDT 7	nLight control Occupancy sensor
NLIGHT	+	APD	=	SensorSwitch NES PDT 7 ADCX	nLight control Daylight with Occupancy Sensor
NLT	+	ADC	=	SensorSwitch NES ADCX	nLight control Daylight Sensor with Tunable White
NLT	+	PDT	=	SensorSwitch NES PDT 7	nLight control Occupancy sensor with Tunable White
NLT	+	APD	=	SensorSwitch NES PDT 7 ADCX	nLight control Daylight with Occupancy Sensor with Tunable White
NLTAIR2	+	RIO	=	SensorSwitch RIO EZDL 90D G2	nLight Air fixture embedded network interface
NLTAIR2	+	API	=	SensorSwitch RES7 G2	nLight Air PIR Daylight sensor
NLTAIR2	+	APD	=	SensorSwitch RES7 PDT G2	nLight Air Dul Tech PIR/Microphonics Daylight sensor

WEIGHTS & SUPPORT SPACING

Suspension spacing equals section length. Default location shown. Consult factory for stem mounting suspension spacing and alternate locations.



INDIVIDUAL FIXTURES (MOUNTING)					
ORDERED LENGTH	"A" O.A.L.	"B"	STANDARD END CAP	OPTIONAL FROM SCULPTED END CAP	APPROX. WEIGHT
4FT	4'- 1 5/8"	3'- 11 1/2"	5/8"	4"	22 LBS.
8FT	8'- 1 1/4"	7'- 11 1/8"	5/8"	4"	38 LBS.
12FT	12'- 1 1/4"	11'- 11 1/8"	5/8"	4"	54 LBS.



RUN LAYOUT (MOUNTING)							
ORDERED LENGTH	"A" O.A.L.	"B-1"	"B-2"	"B-3"	STANDARD END CAP	OPTIONAL FROM SCULPTED END CAP	APPROX. WEIGHT
8' SECTION 4' SECTION	12'- 1 5/8"	7'- 11 1/8"	4'- 3/8"	N/A	5/8"	4"	60 LBS.
8' SECTION 8' SECTION	16'- 1 1/4"	7'- 11 1/8"	8'-0"	N/A	5/8"	4"	76 LBS.
8' SECTION 8' SECTION 4' SECTION	20'- 1 5/8"	7'- 11 1/8"	8'-0"	4'- 3/8"	5/8"	4"	98 LBS.

LINEAR PLAN:

PEERLESS offers the ability to provide a continuous run plan to suit your requirements by optionally offering three different methods of configuration.

LSL- Linear Same Length:
In this configuration, each segment is the same length and is standardized based on the longest length available and is the only option provided. Because it is dependent on one segment length there are mathematical limitations on what overall row lengths can be achieved. Example: 20 FT row would be achieved with 5, 4 FT long segments equaling 20 FT (nominal).

LSL	4FT	4FT	4FT	4FT	4FT

LLP- Linear Longest Possible
In this configuration, the longest length available is optimized, resulting in the fewest segments and mounting locations. Caution, should be used where balanced appearance is a concern. Example: 20 FT run would have 1, 12 FT segment and 1, 8 FT segment at the end of the run.

LLP	12 FT	8 FT

LCB- Linear Center Balanced:
This configuration incorporates the longest center segment(s) along with any additional lengths required to fill the run length, added to the run ends. Example: 20 FT run would have 2, 4 FT segments (one at each end) and 1, 12 FT segment in the center.

LCB	4 FT	12 FT	4FT

Type:

Project:

MOST COMMON MOUNTING TYPES AND OPTIONS

Options available for this specific luminaire are checked in the boxes below.

Mounting Type

F1/ For use with most T-Bar and screw slot grid ceilings. Designed for on-grid and off-grid applications.

F2/ For use with recessed or surface mount horizontal J-box applications.

F3/ Stem mounting for use with recessed or surface mount horizontal J-box applications. *Check with local jurisdiction regarding rigid stem code requirements.*

F1A/ For use with most T-Bar and screw slot grid ceilings. Designed for on-grid and off-grid applications. *Comes complete with vertical J-box with built-in wire way. See also CP.*

For more detailed mounting drawings and information, see peerlesslighting.acuitybrands.com/resources

Mounting Options

MCS Matching canopy at support for aesthetics.

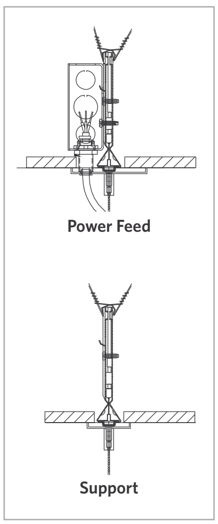
MCSJ Matching canopy for J-box mounting at non-power feed support locations.

OJB Offset J-box at feed.

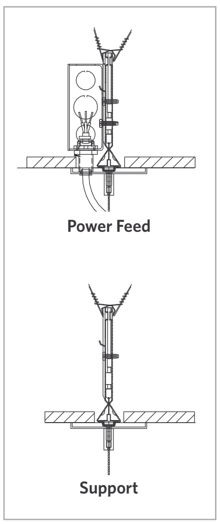
SLP OJB Sloped ceiling couplers and offset J-box option at feed.

✓ Indicates mounting options available with this luminaire.

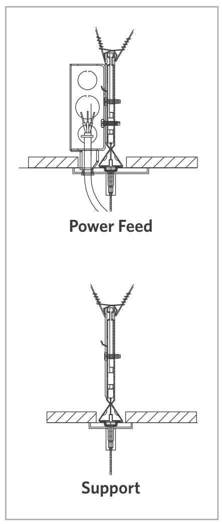
✓ F1/



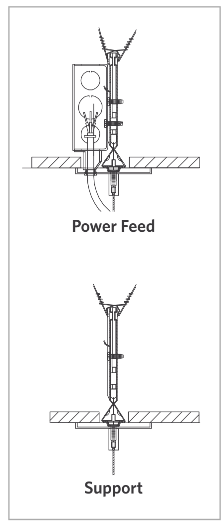
✓ F1/MCS



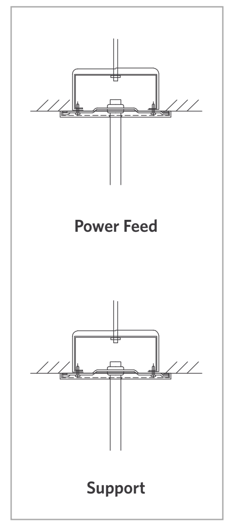
✓ F1A/



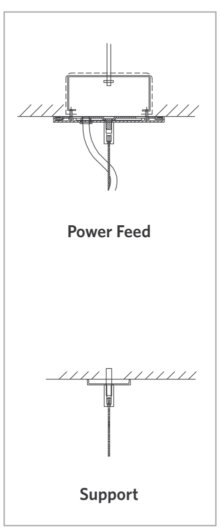
✓ F1A/MCS



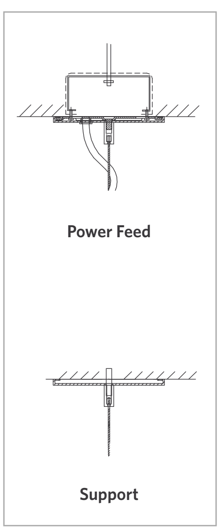
✓ F3/



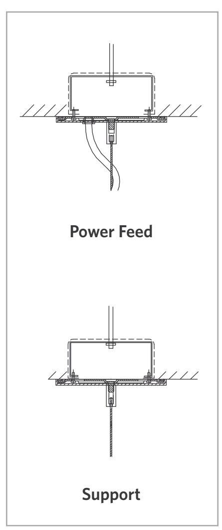
✓ F2/



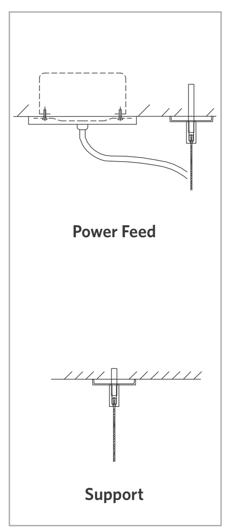
✓ F2/MCS



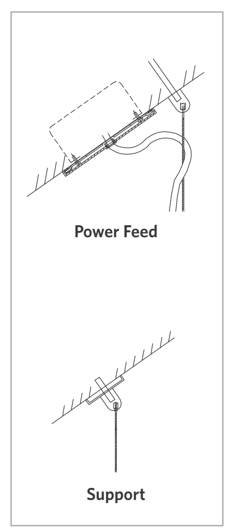
✓ F2/MCSJ



✓ F2/OJB



✓ F2/SLP OJB



For more information about sensor and networking options, download the controls guide at PeerlessLighting.com/ControlsGuide

INTEGRATED SENSOR OPTIONS

Control Input	Integrated Sensor	Daylight Dimming	Occupancy Detection	nLight Wired Networking	nLight Wireless Networking	Component used in fixture
NLIGHT [1]	ADC	X		X		https://www.acuitybrands.com/products/detail/147312/nLight/nES-ADCX/Dimming-Photocell-Embedded-Low-Volt/-/media/products/nLight/147312/document/nES_ADCX-Form_pdf.pdf
NLIGHT [1]	PDT		X	X		https://www.acuitybrands.com/products/detail/147187/nLight/nES-7-Family/Micro-360176-Embedded-Low-Volt-PIR/-/media/products/nLight/147187/document/nes_7-Form_pdf.pdf
NLIGHT [1]	APD	X	X	X		https://www.acuitybrands.com/products/detail/147187/nLight/nES-7-Family/Micro-360176-Embedded-Low-Volt-PIR/-/media/products/nLight/147187/document/nes_7-Form_pdf.pdf
NLIGHT [2]	E10WLCP			X		PS1055LCP
ZT	ADC	X				https://www.acuitybrands.com/products/detail/147312/nLight/nES-ADCX/Dimming-Photocell-Embedded-Low-Volt/-/media/products/nLight/147312/document/nES_ADCX-Form_pdf.pdf
ZT	PDT		X			https://www.acuitybrands.com/products/detail/147187/nLight/nES-7-Family/Micro-360176-Embedded-Low-Volt-PIR/-/media/products/nLight/147187/document/nes_7-Form_pdf.pdf
ZT	APD	X	X			https://www.acuitybrands.com/products/detail/147187/nLight/nES-7-Family/Micro-360176-Embedded-Low-Volt-PIR/-/media/products/nLight/147187/document/nes_7-Form_pdf.pdf
NLTAIR2	API	X	X		X	RES7 EXT900 ACWH 180D G2
NLTAIR2	APD	X	X		X	RES7 PDT EXT900 ACWH 180D G2
NLTAIR2	no sensor					RIO EZDL EXT900 ACWH 180D G2

nES ADCX

nES PDT 7

MSD EZ ADC

MSD PDT7

RES7 PDT

Daylight harvesting deactivated by default and field programmed per sequence of operations.

Luminaires specified with nLight system networking ship with one RJ-45 connector integrated into the luminaire, 10' of Cat-5e cable and a splitter to control the entire luminaire row (depending on wattage/voltage limitations). For multiple zones, please contact TechSupport@PeerlessLighting.com.

1. All nLight wired devices with sensors use the NEPS 60IO EZLC N100.

2 . nLight with an emergency pack (E10WLCP) the driver and nLight to be wired to regular power.

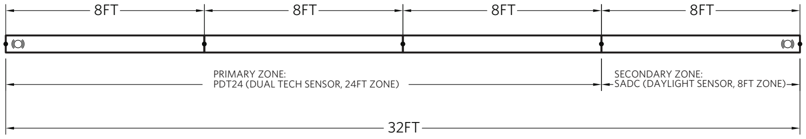
Type:

Project:

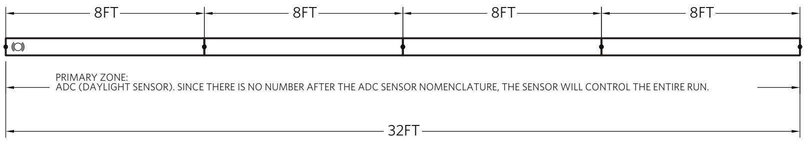
INTEGRATED SENSOR LAYOUT

CORRECT:

32FT MSL8 RUN WITH 2 SENSORS WITH PRIMARY ZONE 24FT AND SECONDARY ZONE 8FT -- PDT24 SADC8

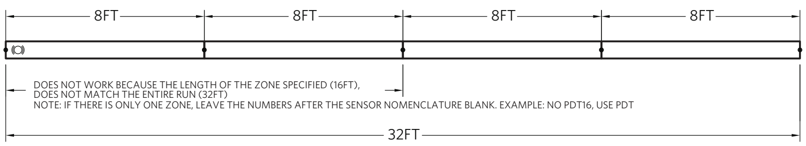


32FT MSL8 RUN WITH 1 SENSOR ALL ONE ZONE -- ADC

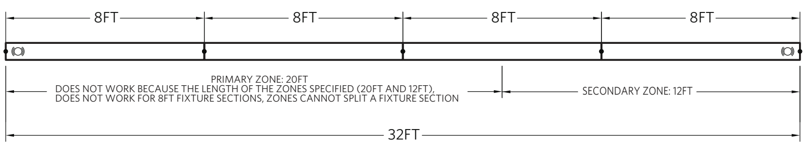


INCORRECT:

32FT MSL8 RUN WITH 1 SENSOR ALL ONE ZONE -- PDT16



32FT MSL8 RUN WITH 2 SENSORS WITH PRIMARY ZONE 20FT AND SECONDARY ZONE 12FT -- PDT20 SADC12



Notes:
- Only one sensor per zone
- At the most, the entire run can only have 2 sensors (thus 2 sensors zones at the most)
- Sensor zone can not split fixture sections
- No overlapping zones
- NLIGHT - Nio goes where the nlight power packs are - power packs are one per zone
- One nLight or NLTAIR2 device per zone or per sensor, for multiple zones without sensors contact factory

Type:

Project:

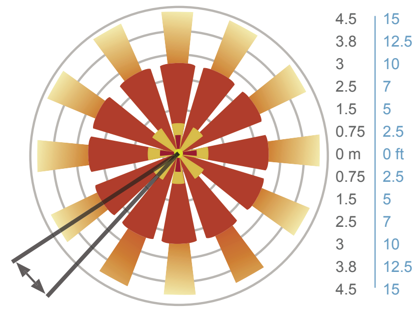
OCCUPANCY DETECTION COVERAGE

At the 7.5 ft (2.9 m) hanging height of a typical pendant mount fixture the sensor provides 10 ft (3.05 m) radial detection of small motion. At a 9 ft (2.74 m) hanging height the radius is 12 ft (3.66 m) for small motion.

Adequate for walking motion detection from mounting heights between 7.5 ft (2.29 m) and 20 ft (6.10 m).

Initial detection will occur earlier when walking across sensor's field of view than when walking directly at sensor.

Initial detection of walking motion into long coverage segment will occur at distances of 2x the mounting height up to 15 ft (4.57 m) and 1.75x up to 20 ft (6.10 m). Lens assembly rotates 15° to enable adjustment in order to line up long segments.



COMPATIBLE nLIGHT COMPONENTS WITH INTEGRATED CONTROLS

MSD PDT7

nPODMA 2P DX WH

nPODMA 4P DX WH

nPODMA 2L WH

nPOD Unitouch WH

rPODBA

SensorSwitch.com/DataSheets/nPODM.pdf

SensorSwitch.com/DataSheets/nPODM-xL.pdf

SensorSwitch.com/DataSheets/nPOD-GFX.pdf

http://www.acuitybrands.com/products/detail/593897/Sensor-Switch/RPODB-Switch/nLight-AIR-Wireless-Wall-Switch/specification-sheets

eldoLED COMPATIBILITY For compatible dimmers & switches please see the EldoLED compatibility document

PeerlessLighting.com/eldoLED-compatibility

Project		Catalog #		Type	
Prepared by		Notes		Date	

2' x 4' LED Luminaire
Premium Recessed Commercial LED Luminaire
For Use in Insulated Ceilings

Typical Applications

Commercial office spaces • Schools • Hospitals • Retail merchandising areas

Interactive Menu

Product Certification

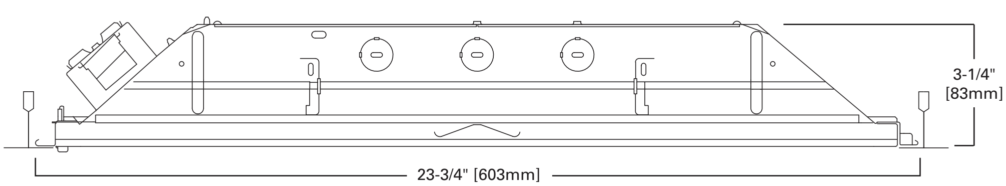
Product Features

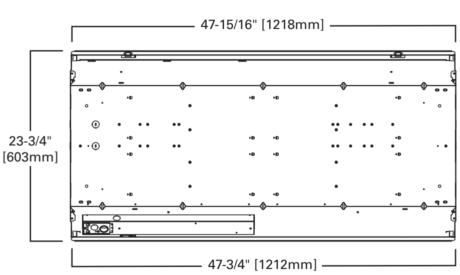
damp location
Connected Systems
Bluetooth®
LINEAR DISCONNECT
Safe and convenient means of disconnecting power
MWS® MODULAR WIRING SYSTEM
CLICK HERE

Top Product Features

- Improved asethetic over traditional prismatic lensed troffer
- 2 x 4 and 2 x 2 product configurations
- Excellent performance with up to 142 lm/W
- Two unique versions - Standard or High Performance (HP)
- 0 to 10V driver (standard), optional step dim, 1%, DALI, and DLVP

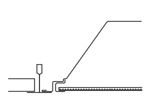
Dimensional and Mounting Details



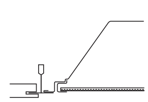


Ceiling Compatibilty

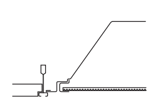
G
Grid/Lay-in
Standard



G
Concealed T



G
Slot Grid



Ceiling Type	Trim Type
Exposed Grid	G
Concealed T	G
Slot Grid	G

(Verify compatibility/ consult factory.)

Order Information

SAMPLE ORDER NUMBER: **24FR-LD4-40-UNV-L835-CD1-U**

Rating	Width/Length	Series [1]	Door Frame	LED Type	LED Lumens Output [2]	Shielding	Voltage [4]
[Blank]=Standard **ATW-SW4**=Chicago Rated	**24**=2' x 4'	**FR**=Premium Commercial Luminaire	**Standard**=Flat White Steel Door (Leave Blank)	**LD4**=LED 4.0	**Stock** **40**=4000 **65**=6500 **MTO** **30**=3000 **50**=5000 **69**=6900 **72**=7200 **80**=8000 [3]	**[Blank]**=Curved Frosted Acrylic Lens (standard) **HP**=High Performance, Curved Frosted Acrylic Lens	**347V**=347 Volt **UNV**=Universal Voltage 120-277 **48V**=48 Volt Low-voltage (Class 2) [C] **120V**=120 Volt [5] **277V**=277 Volt [5]
		Notes (1) DesignLights Consortium® Qualified and classified for both DLC Standard and DLC Premium, refer to www.designlights.org for details.			**Notes** (2) Nominal lumen output. (3) Only available with HP shield option		**Notes** (4) Products also available in non-US voltages and frequencies for international markets. (5) Must specify voltage as 120V or 277V when ordering GTR2 option. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility.

Emergency Options	CRI/CCT	Flex	Driver Type	Number of Drivers
EL7W=7-watt, 120V-277V emergency battery pack installed [6] **EL14W**=14-watt 120V-277V emergency battery pack installed [6] **ELV7W**=Low-voltage system, 7-watt emergency battery pack [C] **ELV14W**=Low-voltage system, 14-watt emergency battery pack [C] **GTR2**=Bodine Generator Transfer Relay [7], [8] **ETRD**=Emergency Transfer Relay with dimming control [7]	**L827**=2700K **L830**=3000K **L835**=3500K **L840**=4000K **L850**=5000K	**A3/8-4/18GDIM** =3/8" Flex with 0-10V Dimming Leads Multiple other configurations available. See below for details. **A3/8-5/18GDIM**=Flex with 0-10V Dimming leads and Blue for alternate wiring. See below for details.	**CD**=0-10V Dimming Driver (10%-100% Dimming) **HCD**=0-10V Dimming Driver (1% - 100% Dimming) **SR**=Sensor-ready Dimming Driver (1%-100% Dimming) **5LTD**=Fifth Light DALI Driver (10%-100% Dimming) [9], [E] **5LTHD**=Fifth Light Dimming Driver (1%-100% Dimming) [9], [10], [E] **LV**=Low-voltage System Dimming Driver (0%-100% Dimming [C] **SD**=Step-Dim Driver (50% or 100% Dimming) **LH**=Lutron HiLume (LDE1 series) 1%-100% EcoSystem Driver with Soft-on Fade to Black dimming [F] **L5**=Lutron 5 Series (LDE5-Series) 5%-100% EcoSystem Driver [F]	**1**=1 Driver **2**=2 Drivers [11]
Notes (6) External test switch / indicator / laser test. For approximate delivered lumens multiply the lumens per watt of the desired fixture by the wattage of the emergency battery pack (100 lm/W x 7=700 lumens). IES-format photometry for luminaire under emergency operation available. (7) Used to bypass local control during outage. Must be used in conjunction with UL 1008 device (provided by others). GTR2 option includes 2 relays on fixtures with dimming drivers. ETRD option only requires one relay when used on a dimming fixture. (8) Must specify voltage as 120V or 277V when ordering GTR2 option. Integrated options must be used in conjunction with the associated system and may not be compatible with other options or accessories. Please refer to the following: (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility.		**Flexible Metal Conduit Options** Flex options available for 0-10V dimming control, DALI dimming control, emergency and night light functions. 72-inch factory-installed and pre-wired to driver, fitted to luminaire housing access plate with 90° enclosed FMC connector. Not all options may be combined and installation ratings vary by type. **A3/8-4/18GDIM series notes:** Factory installed dimming option 3/8" flexible metal conduit with 2-#18 power and ground wires and 2-#18 UL-listed jacketed 0-10V +/- control wires. Meets UL 66, 83, 1479, 1569, 1581, 2556. NEC® 250.118, 300.22(C), 392, 396, 330, 501, 502, 503, 504, 505, 518, 520, 530, 645, 72; Federal Specification A-A-59544 (formerly J-C-30B); all applicable OSHA and HUD Requirements. UL Classified 1-, 2-, and 3-hour through penetration with applicable fire stop product (not included). May be surface mounted, fished and/or embedded in plaster. Cable tray and approved raceway rated, install per NEC®; Environmental Air-Handling Space Installation per NEC® 300.22(C).	**Notes** (9) Must be used in conjunction with a DALI control system. For complete DALI soluitions by Fifth Light, visit www.cooperlighting.com (10) Two drivers required for 6500 and higher lumens. Integrated options must be used in conjunction with the associated system and may not be compatible with other options or accessories. Please refer to the following: (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility. (E) Consult Fifth Light system pages for additional details and compatibility. (F) Consult Marketplace Options - Lutron system pages for additional details and compatibility. Compatible only with driver series shown, and may require two or more drivers. Requires field commissioning to operate or dim. Contact Lutron at www.lutron.com.	(11) Used to bypass local control during outage. Must be used in conjunction with UL 1008 device (provided by others). GTR2 option includes 2 relays on fixtures with dimming drivers. ETRD option only requires one relay when used on a dimming fixture. Must specify voltage as 120V or 277V when ordering these devices.

Options	Integrated Sensing Systems	Packaging	Accessories
PMW=Paint Matte White	**[Blank]**=No Sensor **WAA**=WaveLinx Wireless Integrated Sensor [12], [A] **WLA**=Low-voltage Integrated Sensor [13], [C] **SVPD1**=0-10V Stand-alone Integrated Sensor [14], [D]	**U**=Unit Pack **PAL**=Job Pack, out of carton **PALC**=Job Pack, in carton	**EQ-CLIP-U**=T-BAR Safety Earthquake Clips [15] **DF-24W-U**=2' x 4' Drywall Frame Kit **SK-24-WS**=2' x 4' Shallow Surface Mount Kit **SK-24-WT**=2' x 4' Tall Surface Mount Kit **ISHH-01**=Programming Remote for Integrated Sensor [D] **ISHH-02**=Personal Control Remote for Integrated Sensor [D]
	Notes (12) WAA sensor to be used with CD or W2A driver. (13) WLA sensor to be used with LV driver. (14) SVPD1 sensor to be used with CD driver. Integrated options must be used in conjunction with the associated system and may not be compatible with other options or accessories. Please refer to the following: (A) Consult WaveLinx system pages for additional details and compatibility. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility. (D) Consult SVPD series system pages for additional details and compatibility.		**Notes** (15) An EQ Grid Clip is recommended for all 9/16" ceiling systems. Four required per fixture. (D) For use with SVPD sensor only. Consult SVPD series system pages for additional details and compatibility.

Product Specifications

Construction
- Rigid housing is die formed of code gauge prime cold rolled steel and features full length die-formed stiffeners and unibody endplate for added strength
- Side flanges are hemmed
- Innovative design provides superior lens brightness uniformity and visual comfort
- Unibody endplates are securely attached with interlocking tabs and screws
- Four auxiliary fixture end suspension points provided
- Gridlock feature for safety and convenience

Controls
- 0-10V dimming to 10% standard
- Optional 1% dimming is available
- WaveLinx wireless sensor compatible for connected and IoT capability
- SVPD sensor compatible for standalone functionality
- Low-voltage sensor and driver compatible for WaveLinx Low-Voltage and DLVP applications
- DALI 2.0, Lutron, and step-dimming available

Connected Systems
CLICK HERE

Electrical
- Long-Life LED system coupled with electrical driver to deliver optimal performance
- LED's available in 2700, 3000K, 3500K, 4000K or 5000K with min. 80 CRI
- Rated life based on TM21 is greater than L82 at 60,000 hours
- Electronic drivers are available for 120-277V applications
- A 0-10V dimming driver is standard

Emergency Battery Pack Option
- Optional 120V-277V integral emergency battery pack is available in 7-watts or 14-watts to meet critical life-safety lighting requirements
- The 90-minute batteries provide constant power to the LED system, ensuring code-compliance
- A test switch/indicator button can be tested safely from the ground using a laser pointer, while the patented EZ Key prevents accidental discharge of the battery during construction
- Emergency/generator transfer options available – see ordering information for details

Finish
- Multistage, iron phosphate pretreatment ensures maximum bonding and rust inhibition
- Housing and driver cover finished with new 90% reflective white enamel for superior performance

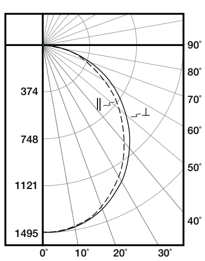
Hinging / Latching
- Cam steel latches with baked white enamel finish
- Safety-lock T-hinges allow hinging and latching from either side

Frame/Optical Shielding
- Curved, Frost lens within steel hinged door frame
- Lens offers a balance of aesthetics and light stability

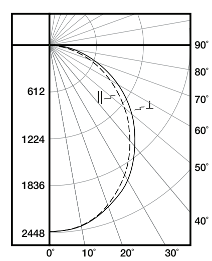
Compliance
- Indoor luminaires are cULus listed for 25ºC ambient environments
- Fixtures are suitable for direct insulation contact and are damp location listed
- RoHS compliant
- LED components comply with IESNA LM-79 and LM-80 standards
- DesignLights Consortium® Qualified and classified for both DLC Standard and DLC Premium, refer to www.designlights.org for details
- Can be used for State of California Title 24 high efficacy luminaire

Photometric Data

View IES files



24FR-LD4-40-UNV-L835-CD1-U
Electronic Driver
Linear LED 4000K
Spacing criterion: (II) 1.19 x mounting height, (⊥) 1.23 x mounting height
Lumens: 3991
Input Watts: 30.6W
Efficacy: 130.4 lm/W
Test Report: 24FR-LD4-40-UNV-L835-CD1-U.IES



24FR-LD4-65-UNV-L835-CD1-U
Electronic Driver
Linear LED 3500K
Spacing criterion: (II) 1.19 x mounting height, (⊥) 1.23 x mounting height
Lumens: 6543
Input Watts:59.1W
Efficacy: 110.7 lm/W
Test Report: 24FR-LD4-65-UNV-L835-CD1-U

Energy and Performance Data

Wattage

Catalog Number	Shielding Type	Nominal Lumens	Wattage	Efficancy lm/W @ 3500K)
24FR-30-UNV-L8XX-CD1-U	Standard	3023	22.9	135.3
24FR-40-UNV-L8XX-CD1-U	Standard	4096	30.6	130.6
24FR-50-UNV-L8XX-CD1-U	Standard	5034	40.9	123.4
24FR-65-UNV-L8XX-CD1-U	Standard	6703	59.1	110.7
24FR-69-UNV-L8XX-CD1-U	Standard	6900	67.1	105.2
24FR-72-UNV-L8XX-CD1-U	Standard	7237	68.8	104.6
24FR-30-HP-UNV-L8XX-CD1-U	High Performance	3067	21.5	139.0
24FR-40-HP-UNV-L8XX-CD1-U	High Performance	4542	29.7	136.1
24FR-50-HP-UNV-L8XX-CD1-U	High Performance	5090	38.5	131.8
24FR-65-HP-UNV-L8XX-CD1-U	High Performance	6530	53.2	123.6
24FR-69-HP-UNV-L8XX-CD1-U	High Performance	6986	57.6	121.3
24FR-72-HP-UNV-L8XX-CD1-U	High Performance	7265	63.9	118.5
24FR-80-HP-UNV-L8XX-CD1-U	High Performance	8028	68.5	117.0

Notes: All models also available in 2700K, 3000K, 3500K, 4000K, and 5000K. Lumens based on 3500K. Use lumen multiplier for other performance values.

CCT Table

Approximate Color Temperature Multiplier	
2700K	.93
3000K	.98
3500K	1.0
4000K	1.02
5000K	1.02

Shipping Data

Catalog No.	Wt.	Pallet
24FR-LD4	20 lbs.	24

Q6.3R – VISUAL PERFORMANCE

Room	Notes (including responses to previous BCC review comments)	Fixture	A	A1	A2	B	B1	B2	C	C1	C2	CS	CE1	D	D1	D2	F24	F36	GR	J	J1	K	M	ME2	MSP2	MN	N2_2	N2_3	N2_4	N2_22	N2_23	N2_24	N2_26	N2_4	N2_6	NW_16	Q	RB3	S	S1	S3	T	T1	TR	TR2	VJ	X1/X2/X3	Wall OS	Ceiling OS	DS	Vacancy VS	Design LPD (W/ft^2)	Proposed LPD SCHEDULE	SCA Guideline Proposed LPD (W/ft^2) (only used when lighting fixtures not provided or partially provided in design)	NYCECC 2020 Table 9.6.1 Space Type	GSG Baseline LPD - ASHRAE 90.1-2010 (W/ft^2)	NYCECC 2020 Appendix CA Baseline LPD (W/ft^2)	NYCECC LPD Schedule
		LED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N											
		Fixture Qty (F) / Linear Feet of Fixture (LF)	LF	LF	LF	F	F	F	F	F	F	F	F	F	F	F	Y	F	F	F	F	F	F	F	F	F	LF	LF	LF	LF	LF	LF	LF	LF	LF		F	F	F	F	LF	F	F	F	F	F	F											
		Wattage	6	8	8	47	29	35	35	35	35	69	35	32	32	32	68	66	25	41	45	52	20	102	20	25	9.7	9.2	9.2	9.7	9.2	9.2	4.6	9.2	4.6		1.5	6.7	45	45	7	17	17	10	10	42	5											
		Area																																																								
C Stair A		468																																					2													0.19	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
C21 Vestibule		127							1																																										1	0.27	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
C14 Cafeteria	Each RB3 fixture is 3 cells long in lighting layout, per lighting fixture schedule notes. Each 3 cells was therefore counted as 1 fixture.	3,030																																				76		1							4				4	0.19	CAFÉ-LT-YR	0.53	Cafeteria	0.65	0.53	CAFÉ-LT-YR
C14A Girls Toilet		192														4																																				0.67	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
C14B Boys Toilet		206														4																																				0.62	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
C12 Storage		78													1																																				1	0.41	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C10 Electrical Room	C10 Electrical Room includes J-Fixture in adjacent closet	519																		5																															1	0.39	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
C08 Refuse Recycling		493																			7																														1	0.64	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C06 Cust Workshop Storage		427																		6																															1	0.58	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C04 Custodians Office	Fixture rechecked and confirmed	463					7																																												1	0.44	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
C02 Janitors Closet		47													1																																		1			0.69	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
C Stair C		442																																					2													0.20	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
C00 Corridor E	Cellar corridor is split into C00 Corridor E and C03 Corridor	1,045							8	0																	6	12			18	4	12	16													4		4			0.84	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
C01 Water Meter Room		609																		6																															1	0.40	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
C03A Female Cust Lockers	Room number changed to C05A. Zone does not include 1 Fixture D which is reflected in C03 Corridor	220												2																																					1	0.29	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
C03B Male Cust Lockers	Room number changed to C05B	198												3						1																															2	0.69	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
C03 Corridor	Cellar corridor is split into C00 Corridor E and C03 Corridor	81												2																																		1				0.79	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
C05A Gen Stor Receiving		289																		4																															1	0.57	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C05B General Storage		528																		6																															2	0.47	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C07 AV Secure Stor		163																			2																														1	0.55	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C09 IDF Room		105																		1																															1	0.39	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
C11 Shower Changing Rm		296													4																																	1	1			0.43	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
C13 Bicycle Storage		153																			2																														1	0.59	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C Stair B		320																																					2													0.28	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
C19 EMR		82																		2																															1	1.00	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
C15 Staff Toilet		121									1																																									0.29	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
C17B Kitchen Prep		1,103					2															19																													1	0.95	KITCHEN-LT-YR	0.80	Kitchen	0.99	0.92	KITCHEN-LT-YR
C17HJ Walk-in Coolers		325																																																		0.40	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C17A Servery		526																				9																														0.89	KITCHEN-LT-YR	0.80	Kitchen	0.99	0.92	KITCHEN-LT-YR
C17G Can Wash Rm		146																				2																													1	0.71	KITCHEN-LT-YR	0.80	Kitchen	0.99	0.92	KITCHEN-LT-YR
C17F Food Storage		263																			2																														1	0.34	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
C17E Kitchen Staff Lockers		169						2																																											2	0.41	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
C17D Kitchen Staff Lockers		99						2																																											2	0.70	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
C17C Dieticians Office		168													1																																	1				0.19	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
SA1 Stair A		468																																					4													0.38	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
112 Pre K Classroom		1,052	40												1																																	1		1	1	0.26	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
110 Pre K Classroom		1,085	48												1																																	1		1	1	0.29	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
108 Pre K Classroom		966	48												1																																	1		1	1	0.33	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
106 Elect Closet		117																		1																																0.35	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
VA Vestibule		177																										6							6								4				2					0.91	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
104 Kinder Classroom		1,041	60												1																																	1		1	1	0.38	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
102 Janitors Closet		50																		1																															1	0.82	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
SC1 Stair C		375																																					4								1					0.49	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
VB Vestibule		158																									4	6															4									1.03	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
100E Corridor		408							2																		4	3	8		6		12														1					0.80	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
100A Lobby		780																										30	64						12	1							6						2			1.31	CORR-LT-YR	0.80	Lobby	0.90	0.90	CORR-LT-YR
100D Corridor		816							8																			3	4			4	6																2			0.50	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
VD Vestibule		136																									4	6															4									1.19	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
101 Kinder Classroom		1,010	44												1																																	1		1	1	0.29	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
103 Kinder Classroom		1,024	40												1																																	1		1	1	0.27	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
105 IDF Room		117	4																																																	0.21	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
107 Staff Toilet		70													1																																	1				0.46	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
VC Vestibule		117																										12															2									1.23	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
SB1 Stair B		299																																					4													0.60	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
VE SE Vestibule		82													2																																				1	0.78	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
109A Record Room		160													1																																	1				0.20	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
109 General Office		465					8																																											1	1	0.50	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
111 Principals Office	Configuration of zone does not match design, total fixture count is the same	418					10	1																																										1	1	0.78	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
119 Ground EQ Stor		158																		2																															1	0.52	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
113 ED Storage		62						1												1																															1	1.23	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
115B Exam Room		116										1																																		1		1				0.96	OFFICE-LT-YR	0.80	Exam/Treatment Room	1.66	1.16	OFFICE-LT-YR
115 Medical Suite		359										1			1																															3		1		1	1	0.63	OFFICE-LT-YR	0.80	Exam/Treatment Room	1.66	1.16	OFFICE-LT-YR
115A Waiting Area		69																																												1						0.61	CAFÉ-LT-YR	0.44	Lounge/Breakroom	0.73	0.44	CAFÉ-LT-YR
117 Pre K Classroom		1,029	44												1																																	1		1	1	0.29	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
SA2 Stair A		468																																					4													0.38	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
218 D75 Classroom		542																																												7		1		1	2	0.54	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
216 D75 Classroom		560		28											1																																	1		1	1	0.46	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
214 D75 Classroom		581		28											1																																	1		1	1	0.44	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
212 D75 Classroom		634		28											1																																	1		1	1	0.40	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
210 D75 Classroom		745		44											1																																	1		1	1	0.52	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
208 Elec Closet		105																		1																																0.39	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
206 D75 Classroom		786		40											1																																			1	2	0.45	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
204 D75 Classroom		755		44											1																																			1	2	0.51	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
202 D75 Changing Rm		103												1																																		1				0.31	CLASS-LT-YR	0.45	Locker Room	0.75	0.45	CLASS-LT-YR
SC2 Stair C		442																																					4													0.41	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
200E Corridor		856							5																		4	15	16	4	15		12														4		2			0.88	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
200W Corridor		858							9																			6		4		8															2		3			0.57	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
201 D75 Main Office		522					8														1																													1	2	0.53	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
203 D75 Multipurpose Rm		571		28											1																																	1		1	1	0.45	OFFICE-LT-YR	0.70	Conference	1.23	0.93	OFFICE-LT-YR
205 D75 Special Ed Rm		302		24																																												1		1	1	0.64	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
207 D75 Special Ed Rm		362		24																																												1		1	1	0.53	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
209 IDF Room		105																		2																												1				0.78	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
211 Boys Toilet		290														3																																	3			0.33	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
213 Janitors Closet		45																		1																															1	0.92	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
215 Girls Toilet		334														3																																	3			0.29	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
SB2 Stair B		320																																					4													0.56	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
217 D75 Storage		361													5																																			1	1	0.44	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
221 D75 Classroom	Configuration of zones does not match design, total fixture count is the same	876		60											1																																	1		1	1	0.58	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
219 Staff Toilet		74													1																																	1				0.43	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
223 D75 Guidance Office	Configuration of zones does not match design, total fixture count is the same	165		8																																														1	1	0.39	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
225 D75 Guidance Office	Configuration of zones does not match design, total fixture count is the same	165													2																																				1	0.39	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
227 D75 Resource Rm		310		24																																																0.62	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
229 D75 Resource Rm		320		20																																														1	1	0.50	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
231 D75 Physical Therapy		713		36																																														1	1	0.40	OFFICE-LT-YR	0.80	Exam/Treatment Room	1.66	1.16	OFFICE-LT-YR
SA3 Stair A		468																																					4													0.38	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
314 Grade 1 Classroom		755	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
312 Grade 1 Classroom		817	32																																															1	1	0.24	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
310 Grade 1 Classroom		754	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
308 Grade 2 Classroom		765	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
306 Elec Closet		109																		1																												1				0.38	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
304 Grade 2 Classroom		738	32																																															1	1	0.26	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
302 Grade 2 Classroom		855	36																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
SC3 Stair C		442																																					4													0.41	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
300E Corridor		856							4																		4	15	8	4	15	8	12														4		3			0.84	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
300W Corridor		858							8																		6			4	3	4															2		2			0.53	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
301 Staff Lunch		567				5																																												1	1	0.41	CAFÉ-LT-YR	0.44	Lounge/Breakroom	0.73	0.44	CAFÉ-LT-YR
303 D75 Occu Therapy	Configuration of zones does not match design, total fixture count is the same	435		16		6																																												1	1	0.94	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
305 D75 Resource Rm	Configuration of zones does not match design, total fixture count is the same	280		12		1																																												1	1	0.51	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
307 D75 Storage	Configuration of zones does not match design, total fixture count is the same	219																		1																															1	0.19	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
309 MDF Room	Configuration of zones does not match design, total fixture count is the same	367																		2																															1	0.22	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
311 Boys Toilet		290														3																																	3			0.33	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
315 Girls Toilet		334														3																																	3			0.29	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
313 Janitors Closet		45																		1																															1	0.92	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
SB3 Stair B		320																																					4													0.56	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
319A Art Storage		208													2																																				1	0.31	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
317 Staff Toilet		86													1																																	1				0.37	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
319 Art Classroom		1,190	56																																															1	1	0.28	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
323 CSD Sp Ed Classroom		629	24																																															1	1	0.23	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
321 Ed Storage		62																		1																												1				0.67	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
325 Library		840																						5	5																									1	1	0.72	CLASS-LT-YR	0.80	Library (General)	1.24	0.94	CLASS-LT-TIM-YR
SA4 Stair A		468																																					4													0.38	CORR-LT-YR	0.40	Stair	0.69	0.50	CORR-LT-YR
414 Grade 4 Classroom		762	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
412 Grade 4 Classroom		811	32																																															1	1	0.24	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
410 Grade 4 Classroom		770	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
408 Grade 5 Classroom		749	32																																															1	1	0.26	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
406 Elec Closet		109																		1																												1				0.38	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
404 Grade 5 Classroom		798	36																																															1	1	0.27	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
402 Grade 5 Classroom		795	40																																															1	1	0.30	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
SC4 Stair C		442																																					4													0.41	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
400E Corridor		856							5																		4	15	8	4	15	8	12														4		2			0.88	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
400W Corridor		858							9																			6		4	6																3		2			0.56	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
401 Speech Resource Rm		423	20																																															1	1	0.28	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
403 Parent Comm Rm		338					8																																											1	1	0.69	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
407C Guid Suite Conf Rm	Configuration of zones does not match design, total fixture count is the same	217				1														1																										3				1	2	0.98	OFFICE-LT-YR	0.70	Conference	1.23	0.93	OFFICE-LT-YR
407B Guidance Office	Configuration of zones does not match design, total fixture count is the same	87																																												1					1	0.48	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
407A SBST Office	Configuration of zones does not match design, total fixture count is the same	86																																												1					1	0.49	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
405 Education Storage	Configuration of zones does not match design, total fixture count is the same	51																																												2					1	1.66	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
407 Corridor		145																																												2			1			0.58	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
409 Reading Resource Rm		416	28																																															1	1	0.40	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
411 IDF Room		106																		1																															1	0.39	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
413 Boys Toilet		290														3																																	3			0.33	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
415 Janitors Closet		45																		1																															1	0.92	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
417 Girls Toilet		334														3																																	3			0.29	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
SB4 Stair B		320																																					4													0.56	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
421 CSD Sp Ed Classroom		512	28																																															1	1	0.33	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
419 Staff Toilet		86													1																																				1	0.37	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
423 Grade 3 Classroom		776	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
425 Grade 3 Classroom		779	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
427 Grade 3 Classroom		761	32																																															1	1	0.25	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
SA5 Stair A		468																																					3													0.29	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
512D Stage		1,000																		10																					16											0.53	MP-LT-YR	0.75	Gymnasium	1.20	0.75	MP-LT-TIM-YR
512C Gym Equip Stor		370																			3																															0.36	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
512B Chair Storage		195																			2																														1	0.46	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
512A Multipurpose Rm		2,191																8																			2			1							1					0.27	MP-LT-YR	0.75	Gymnasium	1.20	0.75	MP-LT-TIM-YR
512B Multipurpose Rm		2,128																8																			2			1							2					0.28	MP-LT-YR	0.75	Gymnasium	1.20	0.75	MP-LT-TIM-YR
500 Corridor		1,444							10		1																4	18	8	4	12	8	12														5		4			0.67	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
508 Ed Storage		88													1																																				1	0.36	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
510 Gender Neutral Toilet		65													1																																	1				0.49	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
512A Health Instruct Office		194					2																																											1	1	0.30	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
506 Elec Closet		112																		1																																0.37	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
504 Exercise Room		1,135															18																						1											1	1	1.12	AUX-GYM-LT-YR	0.75	Fitness Area	1.20	0.75	AUX-GYM-LT-TIM-YR
502 Teachers Workrm Lounge		627					9																																											1	1	0.42	OFFICE-LT-YR	0.60	Office	1.10	0.85	OFFICE-LT-YR
SC5 Stair C		442																																					4													0.41	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
501 Science Rm		859	44																																									5						1	1	0.37	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
503 Staff Toilet		72													1																																	1				0.44	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
505 Music Classroom		827	40																		1																											1		1	1	0.34	CLASS-LT-YR	0.50	Classroom	1.24	0.74	CLASS-LT-YR
507 IDF Room		106																		1																															1	0.39	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
509 Boys Toilet		290														3																																	3			0.33	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
513 Girls Toilet		334														3																																	3			0.29	RESTRM-LT-PV-YR	0.70	Restrooms	0.98	0.75	RESTRM-LT-PV-YR
511 Janitors Closet		45																		1																																0.92	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
SB5 Stair B		320																																					2													0.28	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
6 Storage A		468																																																		0.40	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
6 Storage B		370																																																		0.40	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
6 Storage C		195																																																		0.40	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
603 Filter Storage		279																		2																															1	0.29	STORAGE-LT-YR	0.40	Storage	0.63	0.43	STORAGE-LT-YR
SB6 Stair B		320																																					6													0.84	CORR-LT-YR	0.40	stair	0.69	0.50	CORR-LT-YR
601 Boiler Room		1,561																		12																																0.32	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
602 EMR		523																		4																																0.31	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
600 Corridor		651																		6																																0.38	CORR-LT-YR	0.58	Corridor	0.66	0.58	CORR-LT-YR
604 PV Inverter Rm		343																		3																																0.36	MECH-LT-YR	0.39	Electrical/Mechanical	0.95	0.39	MECH-LT-YR
TOTAL		85,094	1,064	464	0	13	54	6	69	0	2	2	0	8	42	32		16	0	90	20	30		5	5	0	40	153	116	28	90	44	78	16	18	1	4	76	70	3	16	0	20	5	0	21	39	33	53	57	110	0.442					0.99	0.66	

LIGHTING POWER DENSITY CALCULATIONS

NOTE: ORANGE CELLS INDICATE ZONES WHERE SCA PROPOSED WATTAGE IS ASSUMED, SINCE THE LIGHTING FIXTURE INFORMATION IS NOT YET ON DRAWINGS FOR THESE ZONES. YELLOW CELLS INDICATE LIGHTING FIXTURE WATTAGE TO BE CONFIRMED.

Drawing may be printed at reduced scale

No.	Date	Revision

2

LLW No.: Facility Code: Date:

Pr

NEW BUILDING

Address:

Drawing Title:

ENERGY ANALYSIS SHEET #2

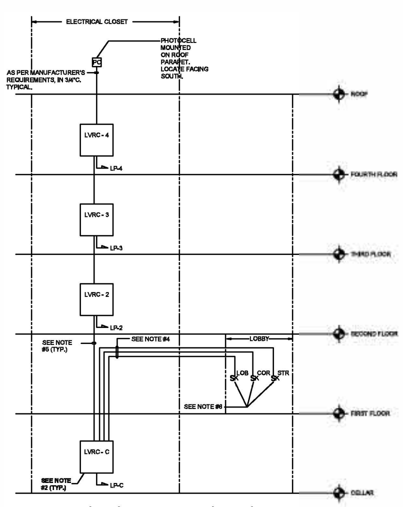
9 455

Sheets in DOB Set:

9 282

LIGHTING FIXTURE SCHEDULE - EN							
TYPE	LOCATION	DESCRIPTION	MANUFACTURERS & CATALOGUE NUMBERS	TYPE OF SOURCE/ LAMP	FIXTURE INPUT VOLT	FIXTURE INPUT WATT	REMARKS
A	CLASSROOMS	DIRECT/INDIRECT 4' PENDANT LUMINAIRE (70% UPLIGHT/30% DOWNLIGHT)	FINELITE HP-4ID-4-H-S-835-WSO-F-120-FA-SC	LED 3500K 4787lm	120 V	43 W	0-10V DIMMING WHERE REQUIRED
B	OFFICE, CAFETERIA	RECESSED 2X4 LENSED TROFFER	FINELITE HPR-LED-F-DCO-S-835-120V	LED 3500K 3772lm	120 V	27 W	PROVIDE BATTERY BACKUP OPTION
D1	CORRIDOR	RECESSED FLAT PANEL 2X4. 0-10V DIMMING DRIVER.	EATON CORELITE DRI-WD-1-L35-UNV-24-STD	LED 3500K 3000lm	120 V	23 W	
D2	TOILET/LOCKER	RECESSED FLAT PANEL 2X4. 0-10V DIMMING DRIVER BI-LEVEL DRIVER	EATON CORELITE DRI-WD-1-L35-UNV-24-STD	LED 3500K 3000lm	120 V	23 W	PROVIDE BATTERY BACKUP OPTION
F1	KITCHEN	RECESSED 2X2	EATON FAIL-SAFE SGI-G-2-LD4-2-STD-35-CRSW-UNV-EDD-1-NSF	LED 2.0	120 V	35 W	
F2	KITCHEN	RECESSED 2X2	COOPER FAILSAFE SGI-G-4-LD3-2-LO-35-CA125-FA-120-ED1C-WL	LED 2.0	120 V	49 W	
G	STAIRS	WALL MOUNTED 4' SURFACE LUMINAIRE, VANDAL RESISTANT, TAMPERPROOF SCREWS SURFACE-MOUNTED LED WITH INTEGRAL SENSOR	ACUITY LITHONIA WL4-30L-120-EZ1-LP835-EL14L	LED	120 V	28 W	
H1	UTILITY/STORAGE	NARROW LED STRIP LIGHT	ACUITY LITHONIA CLX-L48-3000LM-SEF-FDL-MVOLT-GZ10-35K-80CRI-ZACVH	LED 3500K 3000lm	120 V	20 W	
H2	UTILITY/STORAGE	NARROW LED STRIP LIGHT	ACUITY LITHONIA CLX-L48-4000LM-SEF-FDL-MVOLT-GZ10-30K-80CRI-ZACVH	LED 3000K 4000lm	120 V	28 W	
H3	UTILITY/STORAGE	NARROW LED STRIP LIGHT	ACUITY LITHONIA CLX-L48-5000LM-SEF-FDL-MVOLT-GZ10-30K-80CRI-ZACVH	LED 3000K 5000lm	120 V	35 W	
J	ELEVATOR PIT	WALL MOUNT 2' LINEAR VAPORTIGHT	HUBBEL LXEM2-35ML-RFA-EDU	LED 3500K 4490lm	120 V	39 W	[illegible] NEMA 4X RATED. PROVIDE ALL FIXTURES WITH REMOTE BATTERY BACKUP [illegible]
M	LOBBY	PENDANT GLOBE	EUREKA LIGHITNG	LED 3500K	120 V	10 W	
N	GYMATORIUM	SURFACE MOUNTED HIGH BAY FIXTURE	ACUITY LITHONIA IBL-12L-WD-SD125-LP840-WGX	12850lm 4000K LED	120 V	125 W	
S	EXTERIOR RAMP	2" SQUARE STEP LIGHT	STEP 11 RECT INT L LST 1A 700mA WHT30K MVOLT SGB	LED	120 V	10 W	
T	EXTERIOR	WALL MOUNTED EXTERIOR WEDGE LED WITH WIDE OPTIC	ACUITY WDGE2 LED P1 35K 80CRI VW	LED	120 V	10 W	
T1	GYMATORIUM	LED YOKE-MOUNTED NON-VARIABLE WHITE LIGHT SPOTLIGHT WITH 25-50° ZOOM LENS AND SAFETY CABLE		3000K LED	120 V	0 W	
V4	LOBBY	4" SQUARE LENSED DOWNLIGHT	ACUITY BRANDS LIGHTING EVO-SQ-35/07-4AR-LSS-120-EZ1-NPS80EZ	LED 3500K 1000lm	120 V	10 W	
W	LOBBY	LINEAR RECESSED LED 4"W		LED	120 V	14 W	WATTAGE PER LINEAR FOOT
W1	MAIN ENTRY CANOPY	EXTERIOR WET LOCATION DOWNLIGHT		LED	120 V	10 W	
X	DISPLAY CASE	NARROW LED STRIP LIGHT	PHILIPS eW PROFILE POWERCORE	LED 3000K 862lm	120 V	20 W	

ALL EXTERIOR LIGHTING TO BE RATED B0, U0, G0



LIGHTING CONTROL RISER DIAGRAM

SCALE: NONE

LIGHTING CONTROL NOTES:

1. FOR EXACT LOCATION OF EQUIPMENT REFER TO PART PLAN DRAWINGS AND FLOOR PLANS.
2. LOW VOLTAGE RELAY CONTROL PANELS SHALL BE AS MANUFACTURED BY COOPER CONTROL KEEPE R CKT OR APPROVED EQUAL. PANEL SHALL HAVE 30A-RATED RELAYS. RELAYS SHALL BE LATCHING OR NORMALLY OPEN TO ENSURE POWER CONTINUITY AT THE LOADS SERVED IN THE EVENT OF A LOSS OF POWER TO THELOW VOLTAGE RELAYCONTROL PANEL POWER CIRCUIT.
3. ALL CONTROLLED CIRCUITS TO BE ROUTED THROUGH INDIVIDUAL RELAY IN RESPECTIVE LVRC PANEL.
4. MULTI-CONDUCTOR, LOW-VOLTAGECONTROL WIRING IN 3/4" CONDUIT. SEE FLOORPLANS FOR CONTROL DEVICE TYPE, QUANTITY, ANDLOCATION.
5. DATA LINE COMMUNICATIONS LINK IN 3/4" CONDUIT AS PER MANUFACTURER'S REQUIREMENTS.
6. KEY-OPERATED, LOW-VOLTAGE CONTROL SWITCHES LOCATED AT LOBBY FOR EM CORRIDOR, EM STAIR, AND EM LOBBY LIGHTING CONTROL.
7. PROVIDE CAT-6 CABLE FROM PANEL TO DATA OUTLET. COORDINATE WITH TELECOM VENDOR AND CONNECT TO LAN.
8. WHERE EMERGENCY LIGHTING FIXTURES ARE CONTROL BY A LINE-VOLTAGE SWITCH, THE CONTRACTOR SHALL PROVIDE AND INSTALL AN EMERGENCY SHUNT RELAY TO BYPASS THE SWITCH DURING NORMAL POWER FAILURE. THE EMERGENCY SHUNT RELAY SHALL BE AN LCD MODEL GR2001 E/S OR APPROVED EQUAL. PROVIDE NORMAL POWER TO EMERGENCY SHUNT RELAY FROM AN UNSWITCHED LEG OF THE LOCAL LIGHTING CIRCUIT. INSTALL THE EMERGENCY SHUNT RELAY AS PER MANUFACTURER'S INSTRUCTIONS.

LIGHTING SYMBOL LIST	
SYMBOL	DESCRIPTION
A, 3, d, c, EM	1' X 4' LIGHTING FIXTURE. SUPERSCRIPT 'A' DENOTES FIXTURE TYPE, SUBSCRIPT 'c' DENOTES SWITCH CONTROL, NUMERAL DENOTES CIRCUIT NUMBER, TYPICAL FOR ALL LIGHTING FIXTURES. 'EM' DENOTES FIXTURE CONNECTED TO EMERGENCY POWER SOURCE, 'd' DENOTES FIXTURE PROVIDED WITH INTEGRAL DAYLIGHTING SENSOR
A	2' X 4' LIGHTING FIXTURE. SUPERSCRIPT 'A' DENOTES FIXTURE TYPE.
A	RECESSED LIGHTING FIXTURE. SUPERSCRIPT 'A' DENOTES FIXTURE TYPE.
A	WALL-MOUNTED LIGHTING FIXTURE. SUPERSCRIPT 'A' DENOTES FIXTURE TYPE.
PC	PHOTOCELL CONTROL
VC	CEILING-MOUNTED VACANCY SENSOR (MANUAL ON). 'W' = WALL-MOUNTED, LINE-VOLTAGE TYPE
OC	CEILING-MOUNTED OCCUPANCY SENSOR (AUTO ON)
OC W	WALL-MOUNTED OCCUPANCY SENSOR (AUTO ON). 'W' = WALL-MOUNTED, LINE-VOLTAGE TYPE.
DL	[illegible]
G X1	WALL-MOUNTED EXIT SIGN. [illegible] FIXTURE TYPE. [illegible] INDICATED ON PLANS. SHADING INDICATES WHERE 'EXIT' LETTERING APPEARS. SUBSCRIPT 'D' INDICATES EXIT FOR DISABLED. [illegible] 'G' DENOTES WITH GUARD.
G X2	CEILING-MOUNTED EXIT SIGN. [illegible] FIXTURE TYPE. DI[illegible] PLANS. SHADING INDICATES WHERE 'EXIT' LETTERING APPEARS. SUBSCRIPT 'D' INDICATES EXIT FOR DISABLED. [illegible] 'G' DENOTES WITH GUARD.
a,b RC EM 3	[illegible] ROOM CONTROLLER MOUNTED ABOVE CEILING FOR DIMMING, SWITCHING, AND CONTROL [illegible]
VC	[illegible]

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President & CEO
Lorraine Grillo

NYC School Construction Authority

Architecture & Engineering

Consultants:
[illegible] ARCHITECTS
[illegible] CONSULTING ENGINEERING, INC.

Preliminary
Not For Construction

NOTE: Drawing may be printed at reduced scale

No.	Date	Revision
	[illegible]	100% CONSTRUCTION DOCUMENTS
	[illegible]	[illegible] CONSTRUCTION DOCUMENTS
	[illegible]	DESIGN DEVELOPMENT

Key Plan:
HERING AVE
NEILL AVE
EXISTING
ADDITION
YATES AVE
BLOCK: 4275 LOT: 1

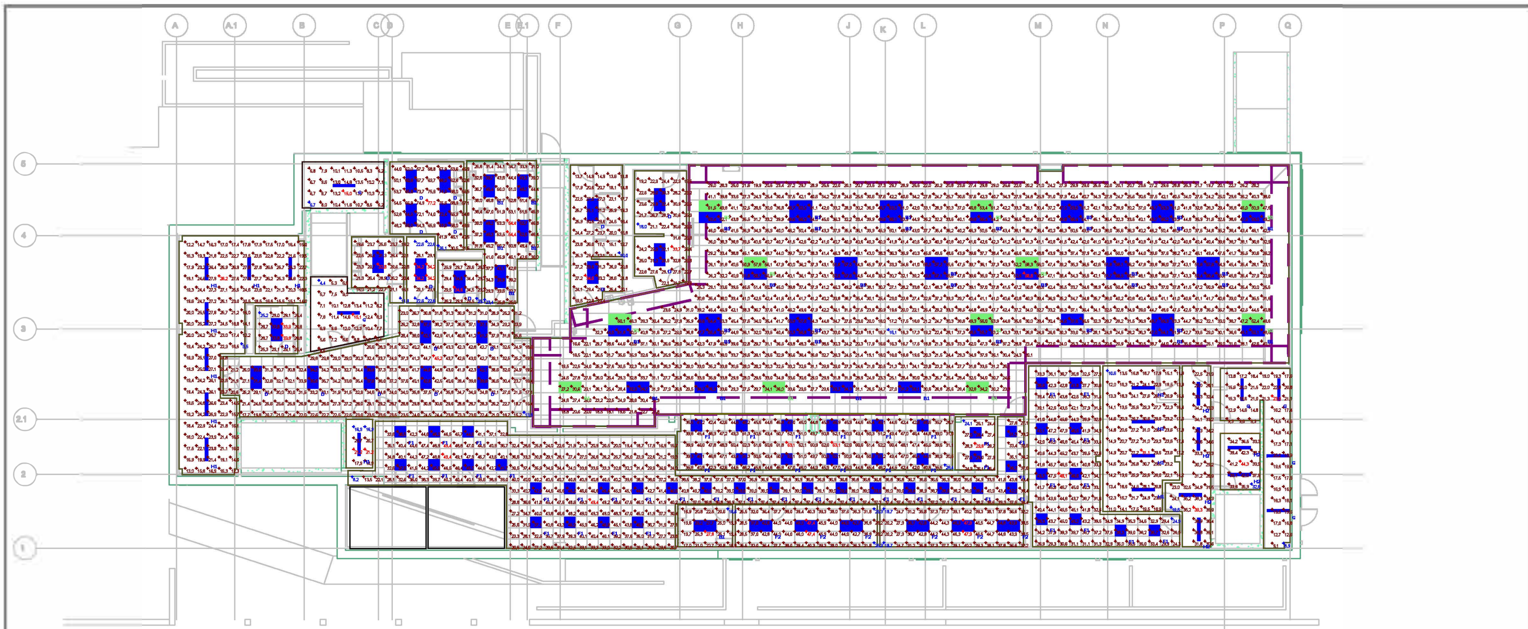
SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
Design No. or LLW No.:
Facility Code:
Date:

Reserved For
DOB NOW Job#

Project:
Address:
Drawing Title:
ENERGY COMPLIANCE LIGHTING SYMBOL LIST, NOTES, AND SCHEDULE

Sheets in Contract Set:
OF
Sheets in DOB Set:
OF

1/28/2021 11:35:45 AM



Plan View

Schedule																
Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	LLF	Wattage	Efficiency	Distribution	Polar Plot	Notes
	B1		82	FINELITE, INC.	FINELITE-HPP-LED-A-2X4-DCO-6-8-35			320	TYPE B - OFFICE CAFETERIA - HPP-LED-A-2X4-DCO-6-8-35-[illegible]	12	0.8	27	100%			
	B2		7	FINELITE, INC.	FINELITE-HPP-LED-A-2X4-DCO-[illegible]			320	TYPE B - OFFICE CAFETERIA - HPP-LED-A-2X4-[illegible]	17	0.8	40.6	100%			
	D		19	EATON - CORELITE (FORMER COOPER LIGHTING)	DRI-WD-3L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	TYPE D1 - DRI-WD-3L35-UNV-24-T1-STD.ies	17	0.8	43.7	100%			
	F1		83	EATON - FAIL-SAFE (FORMER COOPER LIGHTING)	SGI-G-24-2-LD4-2-STD--CA125-FA		2UT217042A8404A ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 28.75 FEET	1	TYPE F1 - SGI-G-24-2-LD4-2-STD-40-CA125-FA.ies	3028	0.8	24.6	100%			
	G		8	Lithonia Lighting	WL4 30L LP835	WL4 4ft 3000 NOMINAL LUMENS 3500K	LED	1	TYPE G - STAIRS - WL4_30L_LP835.ies	3088	0.8	28.19	100%	[illegible]		
	H1		12	Lithonia Lighting	CLX L48 3000LM SEF FDL MVOLT GZ10 35K 80CRI	CLX LED Linear 48" 3,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3500 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_3000LM_SEF_FDL_MVOLT_GZ10_35K_80CRI.ies	2739	0.8	20.33	100%	[illegible]		
	H2		8	Lithonia Lighting	CLX L48 4000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 4,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_4000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	3807	0.8	27.98	100%	[illegible]		
	F2		8	COOPER LIGHTING SOLUTIONS - FAIL-SAFE (FORMERLY EATON)	SGI-G-24-4-LD4-2-LO-CA125-FA		2UT217042A8404A ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 28.75 FEET	1	TYPE F2 - SGI-G-24-4-LD4-2-LO-40-CA125-FA.ies	4732	0.8	49.6	100%			

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
C002 CORR	+	32.1 fc	39.3 fc	19.5 fc	2.0:1	1.6:1
C102 STAFF TOILET	+	28.3 fc	33.8 fc	26.3 fc	1.3:1	1.2:1
BOYS C110B	+	26.2 fc	33.7 fc	18.0 fc	1.9:1	1.5:1
C001 CORR	+	31.4 fc	45.2 fc	13.9 fc	3.3:1	2.3:1
C101 WATER/PUMP ROOM	+	21.4 fc	28.2 fc	9.5 fc	3.0:1	2.3:1
C103 JC	+	19.2 fc	21.2 fc	16.9 fc	1.3:1	1.1:1
C104 Locker	+	39.6 fc	54.2 fc	22.6 fc	1.6:1	1.8:1
C104 Staff T	+	29.8 fc	34.6 fc	23.7 fc	1.3:1	1.2:1
C104A M Locker	+	23.7 fc	32.8 fc	11.9 fc	2.8:1	2.0:1
C104B W Locker	+	38.8 fc	77.2 fc	26.1 fc	3.0:1	2.3:1
C105 KITCHEN	+	37.0 fc	49.4 fc	8.2 fc	6.0:1	4.5:1
C105A DIETICIAN'S OFFICE	+	21.5 fc	27.8 fc	16.6 fc	1.7:1	1.3:1
C105B FOOD STORAGE	+	38.0 fc	47.4 fc	25.3 fc	1.9:1	1.5:1
C105C NON FOOD STORAGE	+	37.6 fc	47.9 fc	18.7 fc	2.6:1	2.0:1
C105D CAN WASH	+	26.9 fc	29.8 fc	24.1 fc	1.2:1	1.1:1
C107 ELEC SERVICE RM	+	21.2 fc	31.1 fc	10.6 fc	2.9:1	2.0:1
C108 Custodian's Office	+	42.3 fc	54.4 fc	23.4 fc	2.3:1	1.8:1
C109 REFUSE RM	+	38.8 fc	48.1 fc	24.0 fc	2.0:1	1.6:1
C110A STUDENT DINING	+	36.4 fc	58.8 fc	16.1 fc	3.7:1	2.3:1
C110C GIRLS	+	22.8 fc	34.0 fc	13.0 fc	3.4:1	2.3:1
C110D SERVERY	+	46.1 fc	88.1 fc	28.4 fc	1.9:1	1.6:1
C111 ELEV CONTROLS	+	38.0 fc	44.3 fc	32.8 fc	1.4:1	1.2:1
Stair A	+	9.0 fc	15.1 fc	4.4 fc	3.4:1	2.0:1
Stair A	+	9.7 fc	15.0 fc	5.7 fc	2.6:1	1.7:1
STAIR D	+	16.9 fc	23.0 fc	8.9 fc	2.6:1	1.9:1

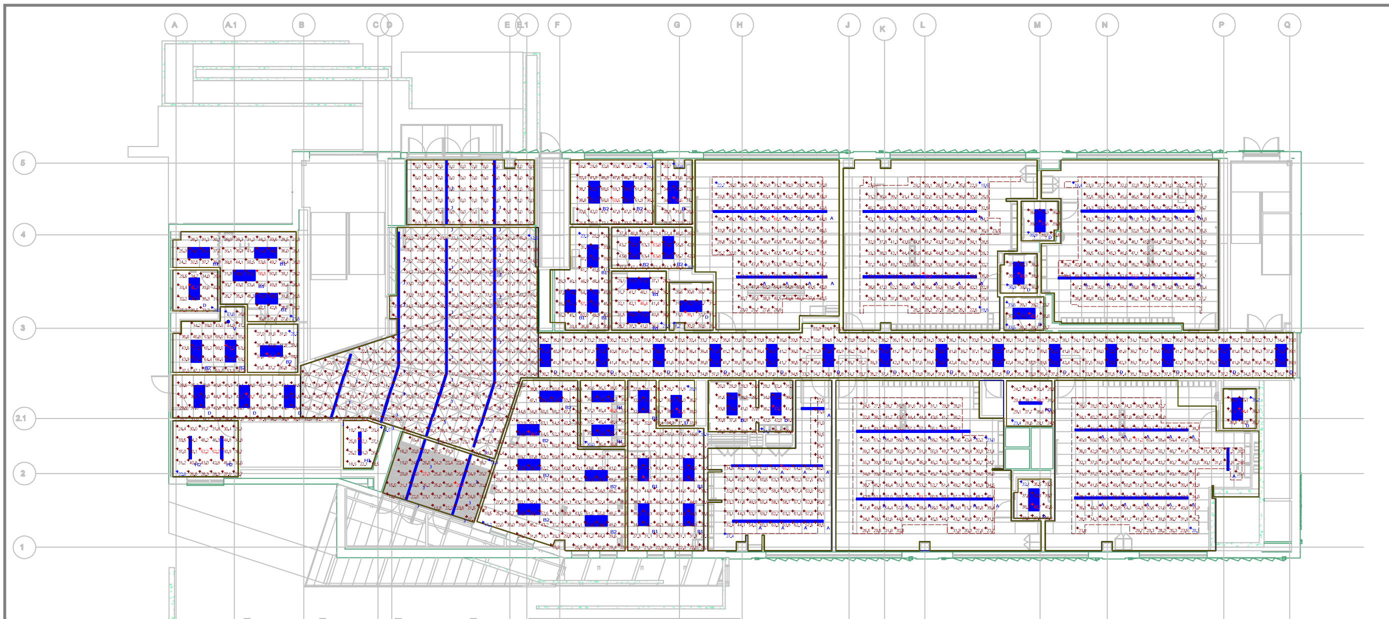
Power Statistics				
Description	# Luminaires	Total Watts	Area	Density
C001 Corridor	7	282.1 W	786.7 ft²	0.4 W/ft²
C002 Corridor	4	110.3 W	175.0 ft²	0.6 W/ft²
C101 Water/Pump Room	7	142.2 W	557.5 ft²	0.3 W/ft²
C102 Staff T	1	40.3 W	63.8 ft²	0.6 W/ft²
C103 JC	1	20.3 W	40.5 ft²	0.5 W/ft²
C104 Lockers	1	40.3 W	58.4 ft²	0.7 W/ft²
C104A M locker	1	40.3 W	89.7 ft²	0.4 W/ft²
C104B W Locker	4	161.2 W	178.8 ft²	0.9 W/ft²
C105 Kitchen	28	968.8 W	1226.8 ft²	0.8 W/ft²
C105A Dietician's Office	1	27.0 W	71.5 ft²	0.4 W/ft²
C105B Food Storage	3	148.2 W	186.0 ft²	0.8 W/ft²
C105C Non-Food Storage	3	148.2 W	187.7 ft²	0.8 W/ft²
C105D Can Wash	2	69.2 W	65.7 ft²	1.1 W/ft²
C106 Staff T	1	40.3 W	58.6 ft²	0.7 W/ft²
C107 Elec Service	4	81.3 W	330.4 ft²	0.2 W/ft²
C108 Custodian's Office	5	135.00 W	254.16 ft²	0.53 W/ft²
C109 Refuse Room	10	346.0 W	479.4 ft²	0.7 W/ft²
C110A Student Dining	46	1242.0 W	4799.0 ft²	0.3 W/ft²
C110B Boys	2	80.6 W	177.8 ft²	0.5 W/ft²
C110C Girls	2	80.6 W	213.6 ft²	0.4 W/ft²
C110D Servery	12	415.2 W	477.0 ft²	0.9 W/ft²
C111 Elev Controls	2	55.2 W	69.8 ft²	0.8 W/ft²
Stair D	4	112.8 W	216.5 ft²	0.5 W/ft²

CELLAR FLOOR LIGHTING CALCULATIONS

Designer
HA/YC
Date
1/6/2021
Scale
Not to Scale
Drawing No.
Summary

1 of 1

Note: Illumination and LPD requirements shall meet SCA DR 7.2.1



Schedule

Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	LLF	Wattage	Efficiency	Distribution	Polar Plot	Notes
	A		61	FINELITE, INC.	FINELITE HP-4-ID-4ft-H--S-835			320	TYPE A - HP-4-ID-4ft-H-S-835-ITL85125.007.ies	15	0.63	42.9	100%			
	B1		16	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-S-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-S-8-35-ITL85145.005.ies	12	0.9	27	100%			
	B2		13	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-H-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-H-8-35-ITL85145.007.ies	17	0.9	40.6	100%			
	D		28	EATON - CORELITE (FORMER COOPER LIGHTING)	DRI-WD-3L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	TYPE D1 - DRI-WD-3L35-UNV-24-T1-STD.ies	17	0.9	40.3	100%			
	G		0	Lithonia Lighting	WL4 30L LP835	WL4 4ft 3000 NOMINAL LUMENS 3500K	LED	1	TYPE G - STAIRS - WL4_30L_LP835.ies	3095	0.9	28.19	100%			
	H1		1	Lithonia Lighting	CLX L48 3000LM SEF FDL MVOLT GZ10 35K 80CRI	CLX LED Linear 48" 3,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3500 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_3000LM_SEF_FDL_MVOLT_GZ10_35K_80CRI.ies	2738	0.9	20.32	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H2		2	Lithonia Lighting	CLX L48 4000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 4,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_4000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	3557	0.9	27.58	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H3		1	Lithonia Lighting	CLX L48 5000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 5,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_5000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	4450	0.9	34.8	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	J		43	Mark Architectural Lighting	SL4L 4 FLP 80CRI 35K 400LMF	Slot 4 LED, 4ft Length, Flushed Lens Position, 80CRI, 3500K LED Boards, 400LMF	LED	1	SL4L_4_FLP_80CRI_35K_400LMF.ies	1259	0.9	13.82	100%	DIRECT, SC-0=1.22, SC-90=1.22	Max: 460cd	
	V		1	Gotham Architectural Lighting	EVO4LW 35/15 AR LSS	EVO 4IN ROUND, LENSED WASH, 3500K, 1500LM, SEMI-SPEC, 80CRI		1	TYPE V4 - EVO4LW_35_15_AR_LSS.ies	1061	0.9	14.7	100%			
	M		0	EUREKA LIGHTING	X230-8-40.LED	MIKA 8	LED 10.3W LED Array (320mA)	1	X230-8-40.LED.ies	1363	0.9	9.938	73%		Max: 109cd	

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
100 CORRIDOR/LOBBY	+	34.5 fc	48.7 fc	12.5 fc	3.9:1	2.8:1
133 RPZ	+	36.4 fc	52.2 fc	22.0 fc	2.4:1	1.7:1
135 JC	+	23.5 fc	32.1 fc	14.0 fc	2.3:1	1.7:1
136 Med Suite Office	+	37.4 fc	56.5 fc	21.6 fc	2.6:1	1.7:1
136A Med Suite Waiting	+	35.4 fc	45.9 fc	25.7 fc	1.8:1	1.4:1
136B Med Suite Exam	+	51.2 fc	71.2 fc	23.6 fc	3.0:1	2.2:1
136C Student Toilet	+	33.1 fc	40.3 fc	26.5 fc	1.5:1	1.2:1
139 Toilet Shower	+	34.1 fc	43.7 fc	24.7 fc	1.8:1	1.4:1
140 Guidance	+	40.9 fc	57.7 fc	23.3 fc	2.5:1	1.8:1
140A Guidance Office	+	36.8 fc	46.4 fc	27.9 fc	1.7:1	1.3:1
140B Guidance Office	+	50.8 fc	63.8 fc	36.1 fc	1.8:1	1.4:1
140C Guidance Conf	+	40.8 fc	59.5 fc	24.5 fc	2.4:1	1.7:1
140D Guidance Stor	+	29.1 fc	38.6 fc	17.9 fc	2.2:1	1.6:1
141 CR_CSD SP ED	+	50.8 fc	65.0 fc	27.4 fc	2.4:1	1.9:1
142 Staff T	+	30.3 fc	38.1 fc	6.2 fc	6.1:1	4.9:1
143 PRE-K	+	44.0 fc	61.2 fc	23.0 fc	2.7:1	1.9:1
143A Toilet	+	37.5 fc	43.7 fc	32.1 fc	1.4:1	1.2:1
144 Music	+	43.7 fc	60.5 fc	22.7 fc	2.7:1	1.9:1
145 Elec	+	30.6 fc	39.2 fc	23.4 fc	1.7:1	1.3:1
146 Pre-K	+	42.5 fc	62.4 fc	19.6 fc	3.2:1	2.2:1
146A Toilet	+	38.7 fc	43.8 fc	35.9 fc	1.2:1	1.1:1
147 CR_PRE-K	+	42.7 fc	61.2 fc	20.1 fc	3.0:1	2.1:1
147A Toilet	+	39.3 fc	44.4 fc	35.2 fc	1.3:1	1.1:1
148 Toilet	+	37.6 fc	43.4 fc	33.5 fc	1.3:1	1.1:1
150 Pre-K	+	45.4 fc	63.0 fc	19.4 fc	3.2:1	2.3:1
150A Toilet	+	38.5 fc	43.6 fc	35.9 fc	1.2:1	1.1:1
GENERAL OFFICE	+	44.4 fc	68.5 fc	17.2 fc	4.0:1	2.6:1
PRINCIPALS OFFICE	+	34.5 fc	46.2 fc	15.9 fc	2.9:1	2.2:1
PRINCIPAL'S TOILET	+	35.6 fc	42.5 fc	29.1 fc	1.5:1	1.2:1
RECORDS ROOM	+	38.1 fc	45.5 fc	30.0 fc	1.5:1	1.3:1
Vestibule North	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A
Vestibule South	+	21.9 fc	27.3 fc	14.4 fc	1.9:1	1.5:1

Power Statistics

Description	# Luminaires	Total Watts	Area	Density
100 CORRIDOR/LOBBY	48	1113.5 W	2353.6 ft²	0.5 W/ft²
133 RPZ	2	55.2 W	115.0 ft²	0.5 W/ft²
135 JC	1	20.3 W	52.2 ft²	0.4 W/ft²
136 Med Suite Office	4	108.0 W	250.2 ft²	0.4 W/ft²
136A Med Suite Waiting	1	40.6 W	76.1 ft²	0.5 W/ft²
136B Med Suite Exam	3	95.9 W	123.1 ft²	0.8 W/ft²
136C Student Toilet	1	40.3 W	57.6 ft²	0.7 W/ft²
137 General Office	6	243.6 W	540.9 ft²	0.5 W/ft²
137A Records Room	2	54.0 W	92.7 ft²	0.6 W/ft²
137B Principals Office	5	135.0 W	333.1 ft²	0.4 W/ft²
137C Principals Toilet	1	40.3 W	50.6 ft²	0.8 W/ft²
139 Toilet Shower	2	80.6 W	131.9 ft²	0.6 W/ft²
140 Guidance	3	81.0 W	158.4 ft²	0.5 W/ft²
140A Guidance Office	2	54.0 W	100.4 ft²	0.5 W/ft²
140B Guidance Office	2	81.2 W	104.5 ft²	0.8 W/ft²
140C Guidance Conf	2	81.2 W	165.2 ft²	0.5 W/ft²
140D Guidance Stor	1	40.3 W	71.5 ft²	0.6 W/ft²
141 CR_CSD SP ED	9	386.1 W	465.9 ft²	0.8 W/ft²
142 Staff T	1	40.3 W	63.1 ft²	0.6 W/ft²
143 PRE-K	11	471.9 W	905.7 ft²	0.5 W/ft²
143A Toilet	1	40.3 W	44.3 ft²	0.9 W/ft²
144 Music	9	386.1 W	709.9 ft²	0.5 W/ft²
145 Elec	1	34.8 W	63.9 ft²	0.5 W/ft²
146 Pre-K	10	429.0 W	895.1 ft²	0.5 W/ft²
146A Toilet	1	40.3 W	43.9 ft²	0.9 W/ft²
147 CR_PRE-K	11	471.9 W	919.4 ft²	0.5 W/ft²
147A Toilet	1	40.3 W	40.8 ft²	1.0 W/ft²
148 Gender Neutral	1	40.3 W	41.5 ft²	1.0 W/ft²
150 Pre-K	11	471.9 W	867.1 ft²	0.5 W/ft²
150A Toilet	1	40.3 W	44.6 ft²	0.9 W/ft²
Vestibule North	6	82.9 W	254.3 ft²	0.3 W/ft²
Vestibule South	6	82.9 W	192.1 ft²	0.4 W/ft²

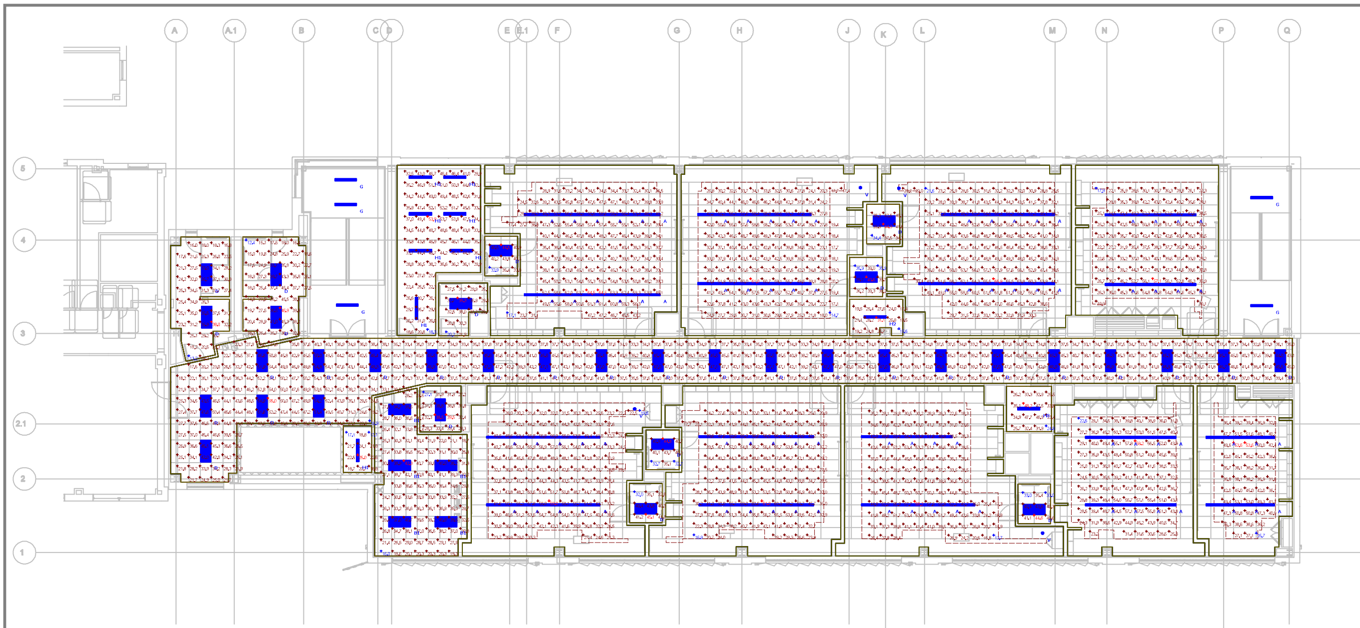
FIRST FLOOR LIGHTING CALCULATIONS

Designer

Date
1/6/2021
Scale
Not to Scale
Drawing No.

Summary

1 of 1



Plan View
Scale - 1" = 8ft

Schedule

Symbol	Label	Image	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage	Efficiency	Distribution	Polar Plot	Notes
	A		84	FINELITE, INC.	FINELITE HP-4-ID-4ft-H--S-835			320	TYPE A - HP-4-ID-4ft-H-S-835-ITL85125.007.ies	15	0.63	30	100%			
	B1		5	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-S-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-S-8-35-ITL85145.005.ies	12	0.9	27	100%			
	B2		0	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-H-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-H-8-35-ITL85145.007.ies	17	0.9	40.6	100%			
	D		35	EATON - CORELITE (FORMER COOPER LIGHTING)	DRI-WD-3L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	TYPE D1 - DRI-WD-3L35-UNV-24-T1-STD.ies	17	0.9	40.3	100%			
	G		5	Lithonia Lighting	WL4 30L LP835	WL4 4ft 3000 NOMINAL LUMENS 3500K	LED	1	TYPE G - STAIRS - WL4_30L_LP835.ies	3095	0.9	28.19	100%	SEMI-DIRECT, SC-0=1.19, SC-90=1.28		
	H1		8	Lithonia Lighting	CLX L48 3000LM SEF FDL MVOLT GZ10 35K 80CRI	CLX LED Linear 48" 3,000 lumens, Standard Efficiency, Less louver. Flat diffuse lens. General distribution, MVOLT, 0-10V dimming, 3500 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_3000LM_SEF_FDL_MVOLT_GZ10_35K_80CRI.ies	2738	0.9	20.32	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H2		1	Lithonia Lighting	CLX L48 4000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 4,000 lumens, Standard Efficiency, Less louver. Flat diffuse lens. General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_4000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	3557	0.9	27.58	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H3		1	Lithonia Lighting	CLX L48 5000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 5,000 lumens, Standard Efficiency, Less louver. Flat diffuse lens. General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_5000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	4450	0.9	34.8	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	V		4	Gotham Architectural Lighting	EVO4LW 35/15 AR LSS	EVO 4IN ROUND, LENSED WASH, 3500K, 1500LM, SEMI-SPEC, 80CRI		1	TYPE V4 - EVO4LW_35_15_AR_LSS.ies	1061	0.9	14.7	100%	DIRECT, SC-0=1.79, SC-90=1		

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
1ST 247	+	41.2 fc	58.2 fc	22.5 fc	2.6:1	1.8:1
1ST 250	+	38.4 fc	57.1 fc	17.9 fc	3.2:1	2.1:1
Boys 236	+	28.4 fc	46.9 fc	12.4 fc	3.8:1	2.3:1
CL 246	+	23.3 fc	31.1 fc	15.6 fc	2.0:1	1.5:1
Corridor 200	+	39.7 fc	55.0 fc	16.9 fc	3.3:1	2.3:1
CSD SP ED 249	+	41.6 fc	53.6 fc	25.7 fc	2.1:1	1.6:1
Elec 245	+	35.0 fc	48.2 fc	24.8 fc	1.9:1	1.4:1
Girls 234	+	27.1 fc	38.0 fc	13.2 fc	2.9:1	2.1:1
JC 235	+	20.7 fc	25.0 fc	17.1 fc	1.5:1	1.2:1
Kinder 239	+	41.1 fc	59.0 fc	19.6 fc	3.0:1	2.1:1
Kinder 241	+	41.2 fc	61.0 fc	16.9 fc	3.6:1	2.4:1
Kinder 242	+	45.1 fc	64.5 fc	17.1 fc	3.8:1	2.6:1
Kinder 243	+	39.1 fc	58.2 fc	13.7 fc	4.2:1	2.9:1
Kinder 244	+	39.4 fc	61.0 fc	14.7 fc	4.1:1	2.7:1
Kinder 248	+	43.6 fc	65.9 fc	21.6 fc	3.1:1	2.0:1
Staff T 237A	+	32.9 fc	39.5 fc	27.1 fc	1.5:1	1.2:1
Staff T 240	+	30.5 fc	38.3 fc	20.2 fc	1.9:1	1.5:1
Staff Work 237	+	31.9 fc	42.3 fc	16.0 fc	2.6:1	2.0:1
Telecom 238	+	38.9 fc	53.9 fc	18.3 fc	2.9:1	2.1:1
Toilet 239A	+	39.1 fc	45.1 fc	32.0 fc	1.4:1	1.2:1
Toilet 241A	+	39.0 fc	44.8 fc	32.7 fc	1.4:1	1.2:1
Toilet 242A	+	39.1 fc	44.5 fc	32.9 fc	1.4:1	1.2:1
Toilet 243A	+	39.1 fc	44.6 fc	33.0 fc	1.4:1	1.2:1
TOILET 244A	+	38.4 fc	43.6 fc	35.9 fc	1.2:1	1.1:1
Toilet 248A	+	39.2 fc	44.3 fc	34.4 fc	1.3:1	1.1:1

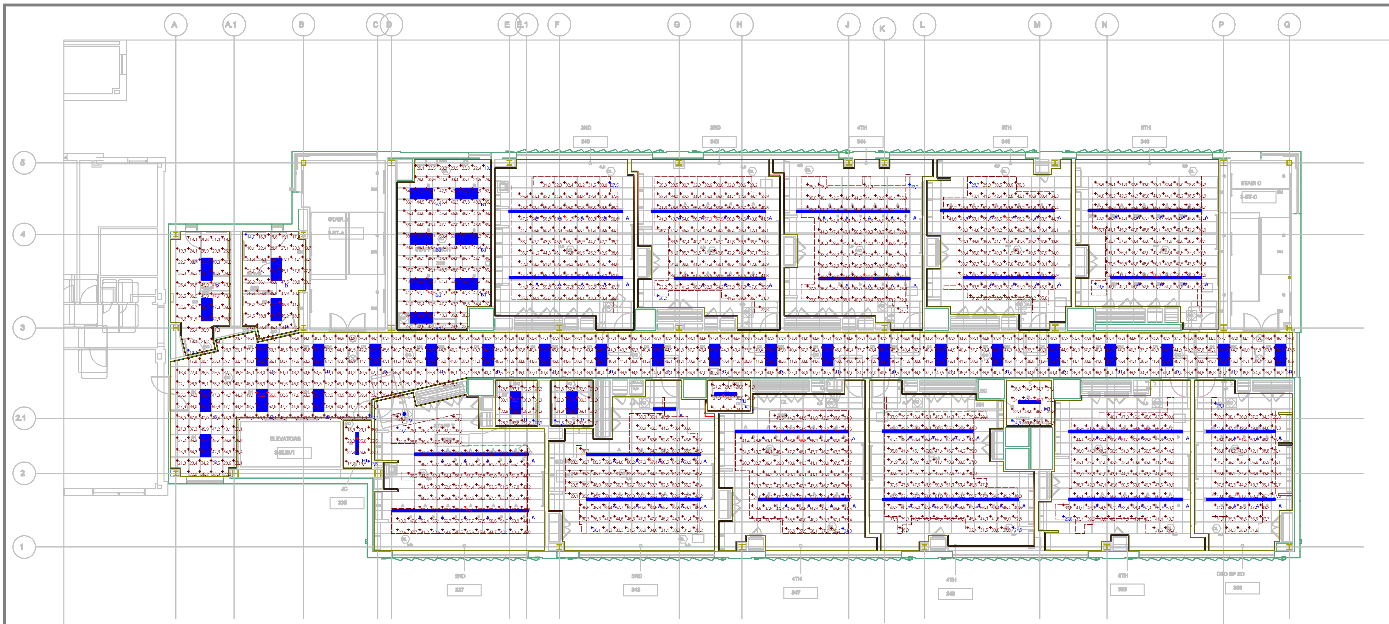
Power Statistics

Description	# Luminaires	Total Watts	Area	Density
1ST 247	8	240.0 W	674.2 ft²	0.4 W/ft²
1ST 250	8	240.0 W	690.8 ft²	0.3 W/ft²
Boys 236	2	80.6 W	185.0 ft²	0.4 W/ft²
CL 246	1	27.6 W	57.0 ft²	0.5 W/ft²
Corridor 200	23	926.9 W	1919.1 ft²	0.5 W/ft²
CSD SP ED 249	6	180.0 W	454.6 ft²	0.4 W/ft²
Elec. 245	1	34.8 W	64.0 ft²	0.5 W/ft²
Girls 234	2	80.6 W	193.1 ft²	0.4 W/ft²
JC 235	1	20.3 W	41.6 ft²	0.5 W/ft²
Kinder 239	11	314.7 W	903.5 ft²	0.3 W/ft²
Kinder 241	10	300.0 W	902.5 ft²	0.3 W/ft²
Kinder 242	12	360.0 W	932.3 ft²	0.4 W/ft²
Kinder 243	10	284.7 W	903.7 ft²	0.3 W/ft²
Kinder 244	11	314.7 W	937.0 ft²	0.3 W/ft²
Kinder 248	12	344.7 W	914.7 ft²	0.4 W/ft²
Staff T 237A	1	40.3 W	59.9 ft²	0.7 W/ft²
Staff T 240	1	40.3 W	66.6 ft²	0.6 W/ft²
Staff Work 237	5	135.0 W	398.2 ft²	0.3 W/ft²
Telecom 238	7	142.2 W	356.9 ft²	0.4 W/ft²
Toilet 239A	1	40.3 W	40.4 ft²	1.0 W/ft²
Toilet 241A	1	40.3 W	41.0 ft²	1.0 W/ft²
Toilet 242A	1	40.3 W	40.8 ft²	1.0 W/ft²
Toilet 243A	1	40.3 W	40.5 ft²	1.0 W/ft²
TOILET 244A	1	40.3 W	40.5 ft²	1.0 W/ft²
Toilet 248A	1	40.3 W	40.7 ft²	1.0 W/ft²

PS108X
2ND FLOOR LIGHTING CALCULATIONS

Designer
HA/YD
Date
01/6/2021
Scale
Not to Scale
Drawing No.

Summary



Plan View
Scale - 1" = 8ft

THIRD FLOOR LIGHTING CALCULATIONS

Schedule

Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	LLF	Wattage	Efficiency	Distribution	Polar Plot	Notes
	A		103	FINELITE, INC.	FINELITE HP-4-ID-4ft-H--S-835			320	TYPE A - HP-4-ID-4ft-H-S-835-ITL85125.007.ies	15	0.63	42.9	100%			
	B1		7	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-S-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-S-8-35-ITL85145.005.ies	12	0.9	27	100%			
	B2		0	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-H-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-H-8-35-ITL85145.007.ies	17	0.9	40.6	100%			
	D		29	EATON - CORELITE (FORMER COOPER LIGHTING)	DRI-WD-3L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	DRI-WD-3L35-UNV-24-T1-STD.ies	17	0.9	40.3	100%		Max: 1693cd	
	H1		2	Lithonia Lighting	CLX L48 3000LM SEF FDL MVOLT GZ10 35K 80CRI	CLX LED Linear 48" 3,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3500 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_3000LM_SEF_FDL_MVOLT_GZ10_35K_80CRI.ies	2738	0.9	20.32	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H2		0	Lithonia Lighting	CLX L48 4000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 4,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_4000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	3557	0.9	27.58	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	H3		1	Lithonia Lighting	CLX L48 5000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 5,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_5000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	4450	0.9	34.8	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	V		1	Gotham Architectural Lighting	EVO4LW 35/15 AR LSS	EVO 4IN ROUND, LENSED WASH, 3500K, 1500LM, SEMI-SPEC, 80CRI		1	TYPE V4 - EVO4LW_35_15_AR_LSS.ies	1061	0.9	14.7	100%	DIRECT, SC-0=1.79, SC-90=1		

x/Min	Avg/Min
1:1	2.4:1
2:1	1.7:1
9:1	2.1:1
4:1	1.8:1
6:1	2.0:1
4:1	1.8:1
5:1	1.9:1
0:1	1.5:1
5:1	1.8:1
4:1	1.8:1
3:1	2.2:1
9:1	1.4:1
1:1	2.2:1
2:1	1.7:1
0:1	1.4:1
6:1	2.4:1
4:1	1.2:1
8:1	2.1:1
5:1	1.2:1
4:1	1.2:1

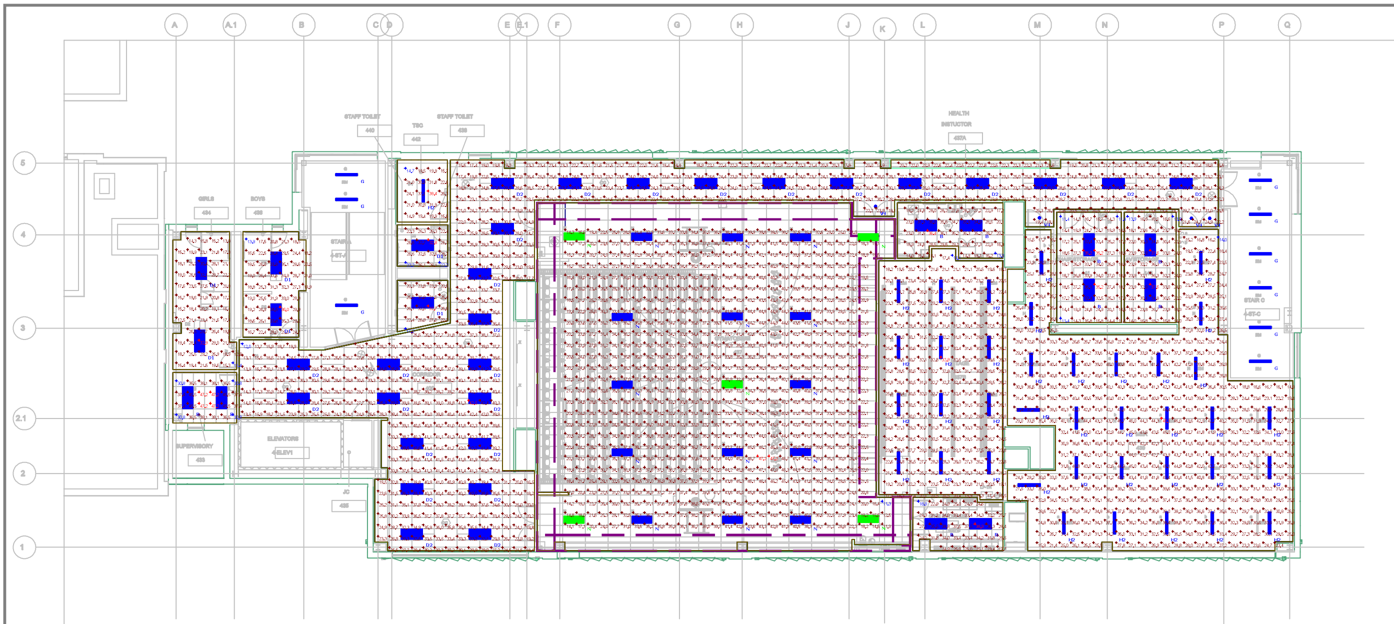
Power Statistics

Description	# Luminaires	Total Watts	Area	Density
2ND 337	5	214.5 W	733.4 ft²	0.3 W/ft²
2ND 340	10	429.0 W	686.8 ft²	0.6 W/ft²
3RD 342	8	343.2 W	677.6 ft²	0.5 W/ft²
3RD 343	11	471.9 W	715.4 ft²	0.7 W/ft²
4TH 344	8	343.2 W	685.2 ft²	0.5 W/ft²
4TH 347	9	386.1 W	681.9 ft²	0.6 W/ft²
4TH 349	9	386.1 W	697.5 ft²	0.6 W/ft²
5TH 346	9	386.1 W	677.3 ft²	0.6 W/ft²
5TH 348	9	386.1 W	669.8 ft²	0.6 W/ft²
5TH 353	10	429.0 W	689.7 ft²	0.6 W/ft²
Boys 336	2	80.6 W	187.5 ft²	0.4 W/ft²
CL 345	1	20.3 W	40.5 ft²	0.5 W/ft²
Corridor 300	23	926.9 W	1941.2 ft²	0.5 W/ft²
CSD SP ED 355	6	257.4 W	468.2 ft²	0.5 W/ft²
Elec 351	1	34.80 W	63.92 ft²	0.54 W/ft²
Girls 334	2	80.6 W	195.7 ft²	0.4 W/ft²
JC 335	1	20.3 W	42.7 ft²	0.5 W/ft²
Staff Lunch 338	7	189.0 W	470.3 ft²	0.4 W/ft²
STAFF T 339	1	40.3 W	59.9 ft²	0.7 W/ft²
STAFF T 341	1	40.3 W	60.1 ft²	0.7 W/ft²

Designer

Date
1/6/2021
Scale
Not to Scale
Drawing No.

Summary



Plan View
Scale - 1" = 8ft

Schedule

Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	LLF	Wattage	Efficiency	Distribution	Polar Plot	Notes
	B		10	FINELITE, INC.	FINELITE HPR-LED-A-2X4-DCO-S-8-35			320	TYPE B - OFFICE CAFETERIA - HPR-LED-A-2X4--DCO-S-8-35-ITL85145.005.ies	12	0.9	27	100%			
	H2		39	Lithonia Lighting	CLX L48 4000LM SEF FDL MVOLT GZ10 30K 80CRI	CLX LED Linear 48" 4,000 lumens, Standard Efficiency, Less louver, Flat diffuse lens, General distribution, MVOLT, 0-10V dimming, 3000 CCT, 80 CRI	LED	1	TYPE H - CLX_L48_4000LM_SEF_FDL_MVOLT_GZ10_30K_80CRI.ies	3557	0.9	27.58	100%	DIRECT, SC-0=1.18, SC-90=1.22		
	N		14	Lithonia Lighting	IBL 12L WD SD125 LP840	I-BEAM LED, 16"X45", WITH 12,000 NOMINAL LUMENS, WIDE DISTRIBUTION, 4000K 80 CRI LEDS, AND SEMI-DIFFUSE ACRYLIC LENS	LED	1	TYPE N - GYM - IBL_12L_WD_SD125_LP840.ies	9967	0.9	100	100%	DIRECT, SC-0=1.3, SC-90=1.05		
	D1		6	EATON - CORELITE (FORMER COOPER LIGHTING)	DRI-WD-2L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	TYPE D - CORRIDOR - DRI-WD-2L35-UNV-24-T1-STD.ies	14	0.9	31.33	100%			
	G		9	Lithonia Lighting	WL4 30L LP835	WL4 4ft 3000 NOMINAL LUMENS 3500K	LED	1	TYPE G - STAIRS - WL4_30L_LP835.ies	3095	0.9	28.19	100%	SEMI-DIRECT, SC-0=1.19, SC-90=1.28		
	D2		26	COOPER LIGHTING SOLUTIONS - CORELITE (FORMERLY EATON)	DRI-WD-3L35-UNV-24-T1-STD	DIVIDE RECESSED 2x4 LED LUMINAIRE, WaveStream DIFFUSE OPTIC	(308) 3500K CCT, 80 CRI LEDS ABSOLUTE PHOTOMETRY IS BASED ON CALIBRATION FACTORS CREATED USING LAB LUMEN STANDARDS IN GONIOPHOTOMETER WITH TEST DISTANCE OF 24 FT	308	TYPE D2 - DRI-WD-3L35-UNV-24-T1-STD.ies	17	0.9	40.3	100%			
	V4		4	Gotham Architectural Lighting	EVO4LW 35/15 AR LSS	EVO 4IN ROUND, LENSED WASH, 3500K, 1500LM, SEMI-SPEC, 80CRI		1	TYPE V4 - EVO4LW_35_15_AR_LSS.ies	1061	0.9	14.7	100%	DIRECT, SC-0=1.79, SC-90=1		

n	Max/Min	Avg/Min
fc	2.6:1	1.8:1
fc	3.5:1	2.4:1
fc	2.9:1	1.9:1
fc	4.2:1	3.0:1
fc	2.1:1	1.6:1
fc	2.8:1	2.0:1
fc	3.3:1	2.5:1
fc	1.9:1	1.5:1
fc	1.5:1	1.2:1
fc	2.3:1	1.9:1
fc	3.1:1	2.0:1
fc	2.7:1	1.8:1
fc	1.5:1	1.3:1
fc	2.6:1	1.6:1

Power Statistics

Description	# Luminaires	Total Watts	Area	Density
BOYS 436	2	62.7 W	195.5 ft²	0.3 W/ft²
CORRIDOR	26	1047.8 W	2609.0 ft²	0.4 W/ft²
GIRLS 434	2	62.7 W	246.1 ft²	0.3 W/ft²
GYM	14	1400.0 W	3728.9 ft²	0.4 W/ft²
GYM STORAGE	2	54.0 W	141.6 ft²	0.4 W/ft²
HEALTH INSTRUCTOR 437A	2	54.0 W	171.2 ft²	0.3 W/ft²
MER	26	717.1 W	1974.2 ft²	0.4 W/ft²
STAFF TOILET 438	1	31.3 W	73.0 ft²	0.4 W/ft²
STAFF TOILET 440	1	31.3 W	65.0 ft²	0.5 W/ft²
STAGE	12	331.0 W	915.5 ft²	0.4 W/ft²
STORAGE 441	2	54.00 W	223.21 ft²	0.24 W/ft²
STORGAE 443	2	54.00 W	178.40 ft²	0.30 W/ft²
SUPER 433	2	54.0 W	101.5 ft²	0.5 W/ft²
TSC 442	1	27.6 W	97.5 ft²	0.3 W/ft²

4TH FLOOR LIGHTING CALCULATIONS

Designer

Date
1/6/2021
Scale
Not to Scale
Drawing No.

Summary

1 of 1

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:

Table of Contents

1. Executive Summary

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

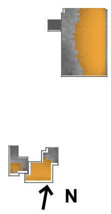
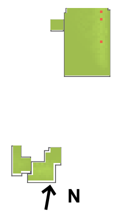
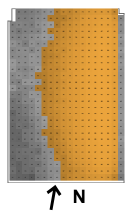
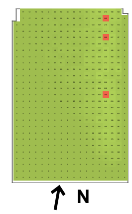
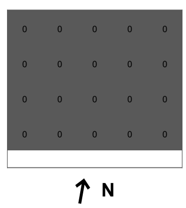
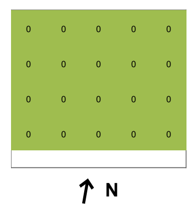
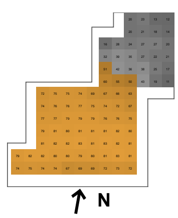
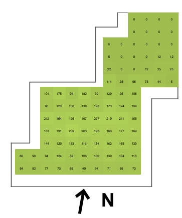
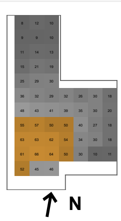
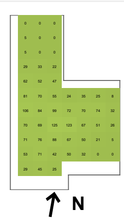
This is anticipated to allow for a total of 2 points towards the project's GSG certification.

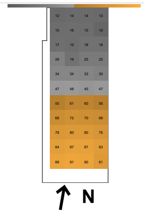
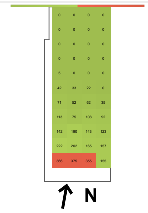
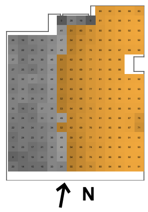
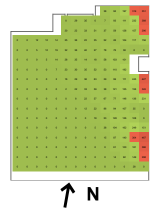
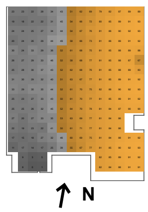
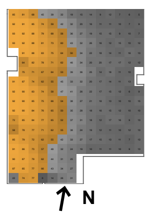
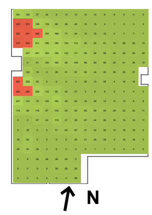
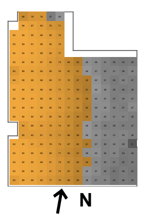
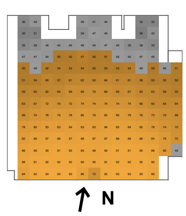
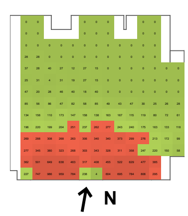
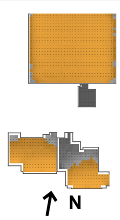
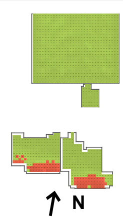
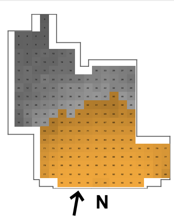
LEED v4.1 Daylight Credit

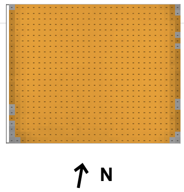
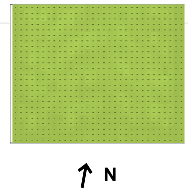
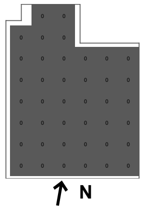
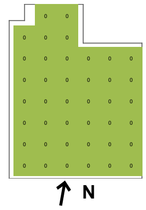
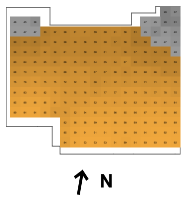
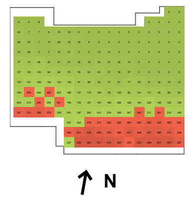
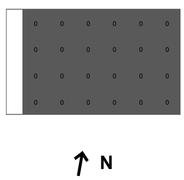
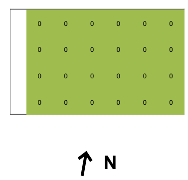
Option 1 Total: *2 points*

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 (ft^2)	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:		**Submission Phase:**	
Address:	1	**Architect:**	
LLW #		**Preparer:**	
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

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

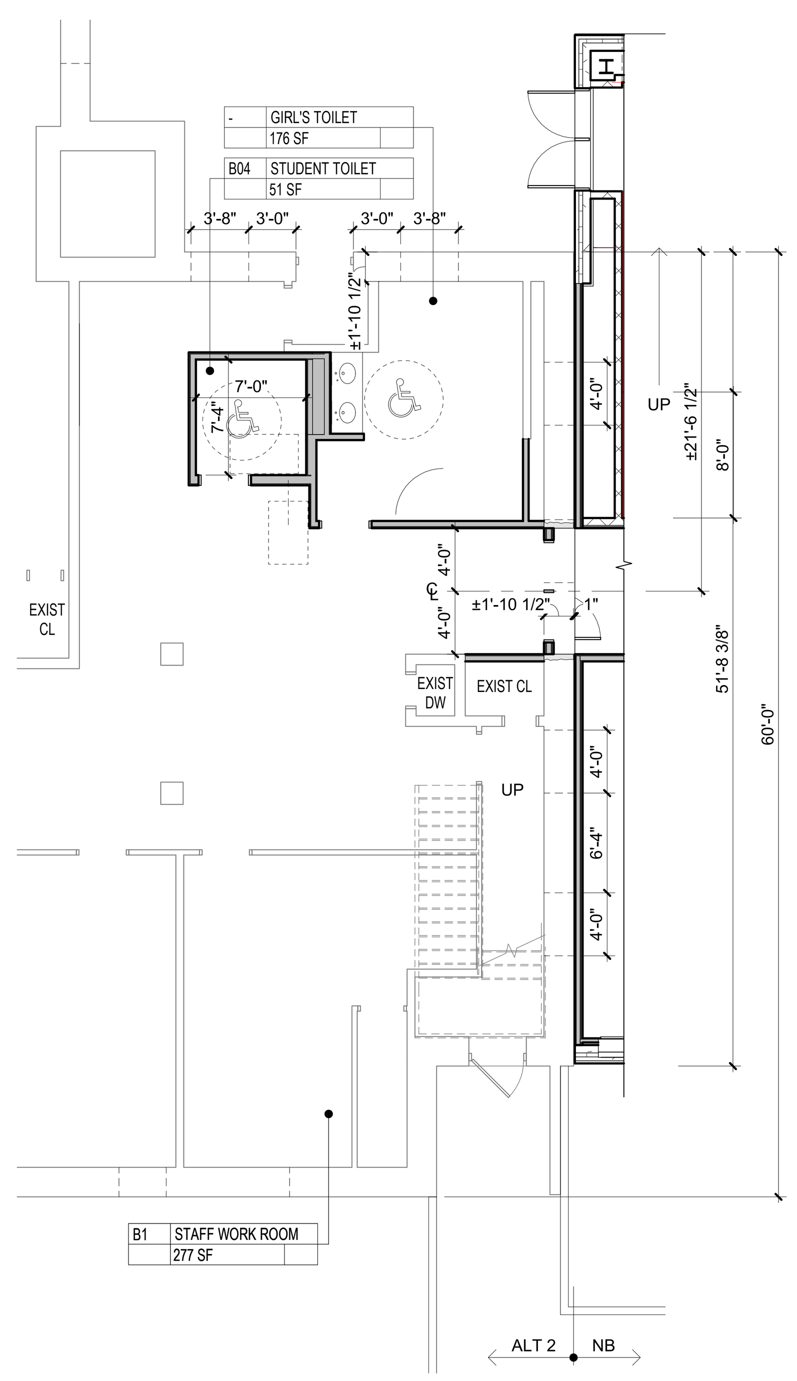
Project:		**Submission Phase:**	
Address:		**Architect:**	
LLW #		**Preparer:**	
Design #	0	**Revision Date:**	**44264**

Step 1: Complete Views Calculation Table for all Regularly Occupied Spaces

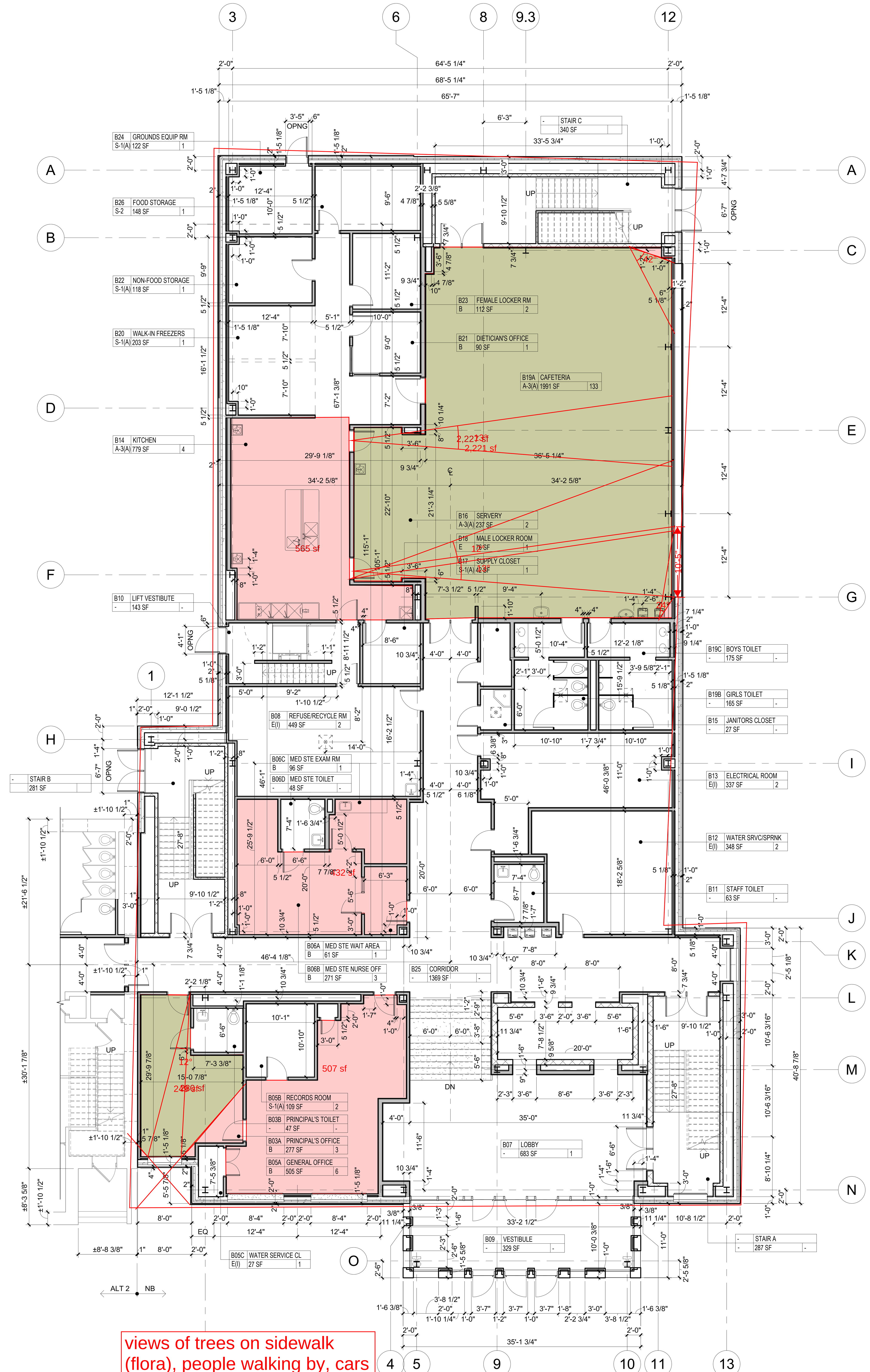
Space ID	Space Type	Regularly Occupied Floor Area (SF)	Area with direct line of site to outdoors (SF)	View Type 1 (See Reference Table 1)	View Type 2 (See Reference Table 1)
213	gym office	182	0		
308	supervisor office	108	0		

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
2 1/8" = 1'-0"



views of trees on sidewalk (flora), people walking by, cars on street (movement)

views of trees on sidewalk (flora), people walking by, cars on street (movement)

FLOOR PLAN - BASEMENT
X 1/8" = 1'-0"

SCA
NYC School Construction Authority

Architecture & Engineering
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:
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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Acoustical Consultant:
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Food Service Consultant:
Romano Gatland
58 Albany Avenue Suite 201, Amityville, NY 11701 (t) 631-226-7700

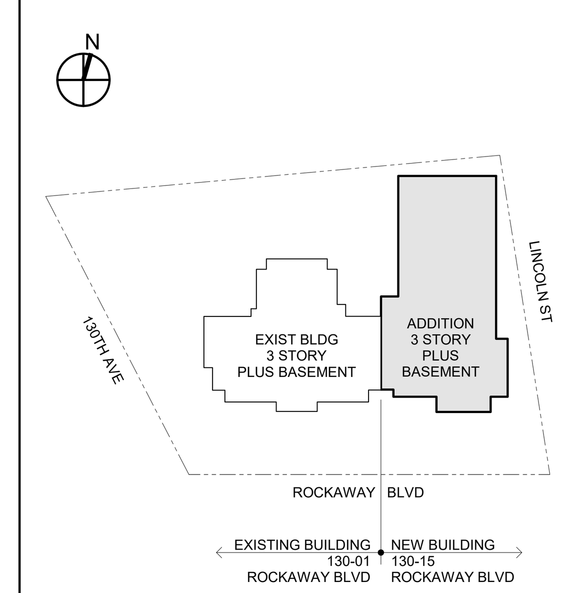
Sustainability Consultant:
Vidaris, Inc.
360 Park Avenue South, 15th Floor, New York, NY 10010 (t) 212-689-5389

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

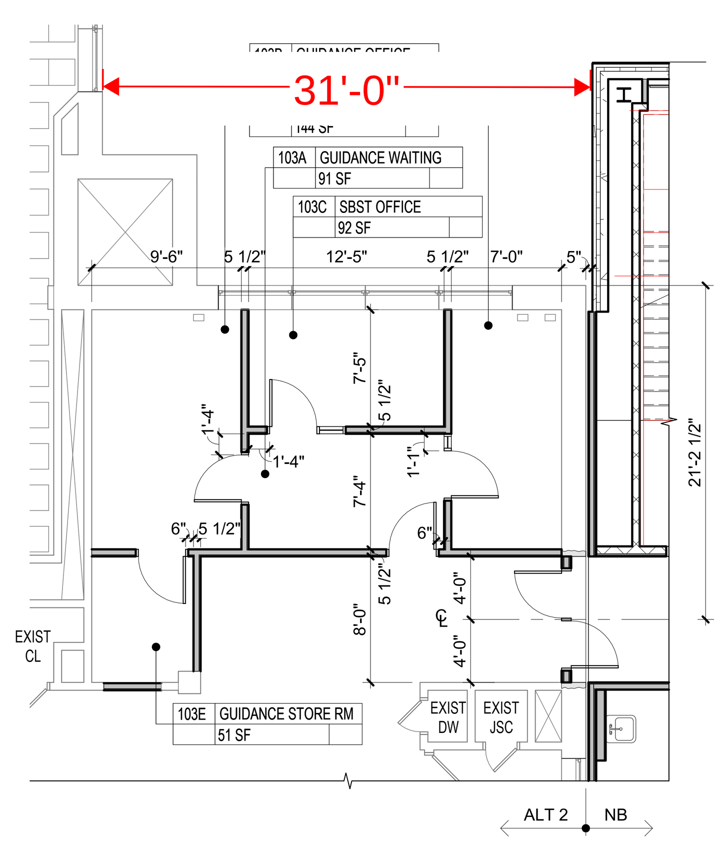
Drawing No.:
A100.00

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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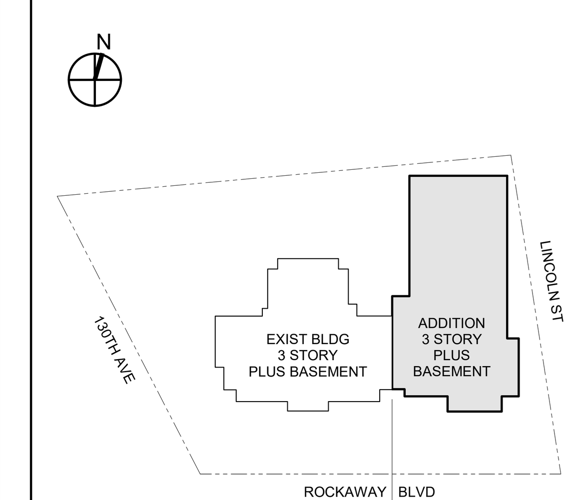
NOTE: Drawing may be printed at reduced scale

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

Key Plan:



ROCKAWAY BLVD

EXISTING BUILDING 130-01 ROCKAWAY BLVD | NEW BUILDING 130-15 ROCKAWAY BLVD

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

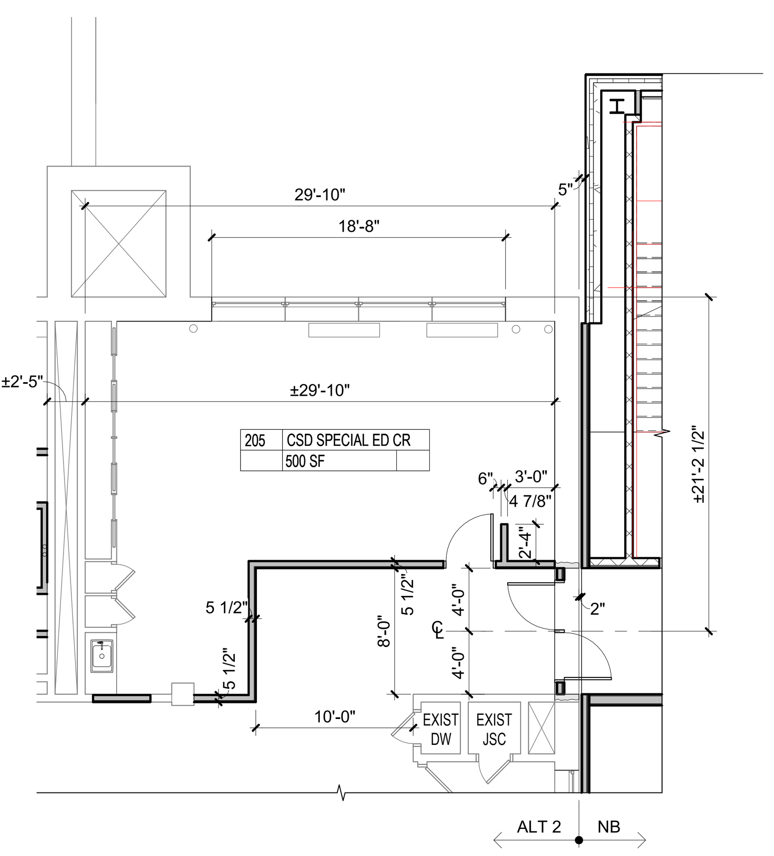
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - FIRST FLOOR

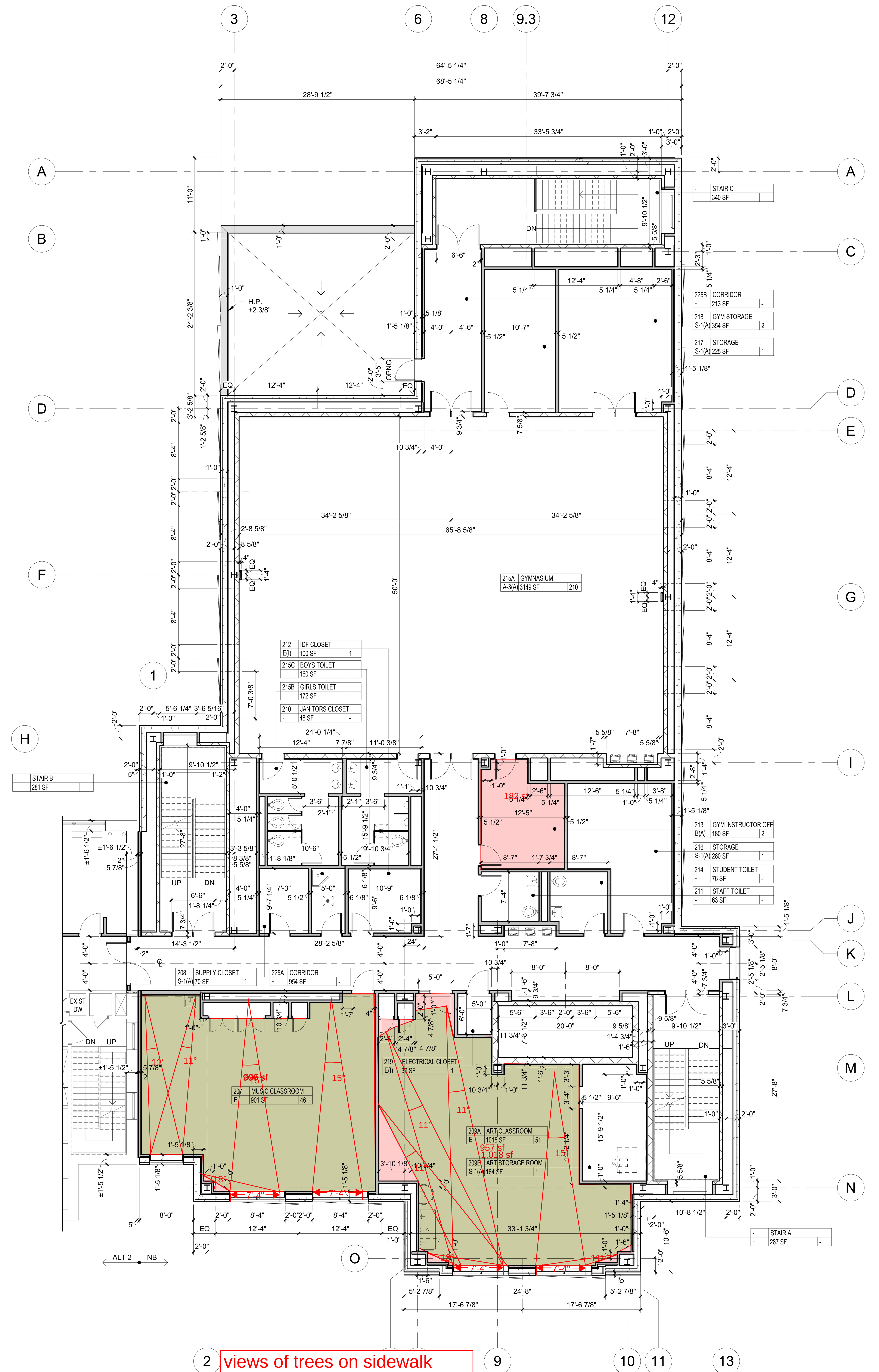
Drawing No.: A101.00

Sheets in Contract Set: of XXX

Sheets in DOB Set: of XXX



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.

FLOOR PLAN - SECOND FLOOR
1/8" = 1'-0"

NYC School Construction Authority

Architecture & Engineering

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MEP Engineer:
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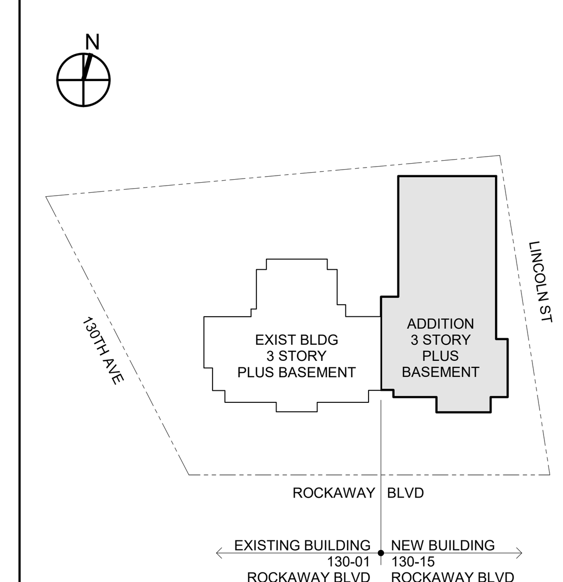
NOTE: Drawing may be printed at reduced scale

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.: 116480 | Facility Code: Q096 | Date: 7/22/2021

Project:
P.S. 96 - QUEENS ADDITION

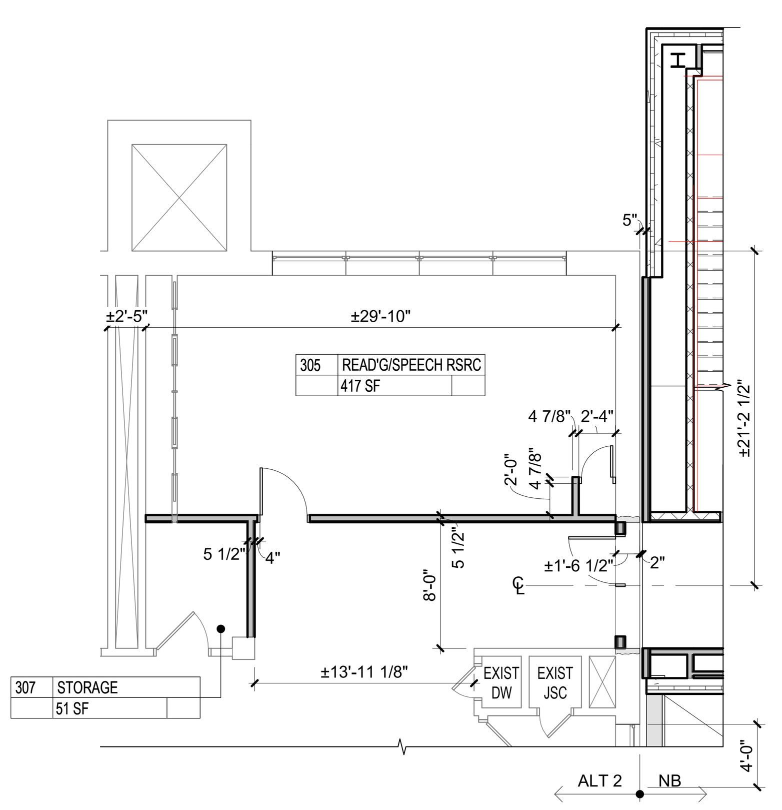
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
FLOOR PLAN - SECOND FLOOR

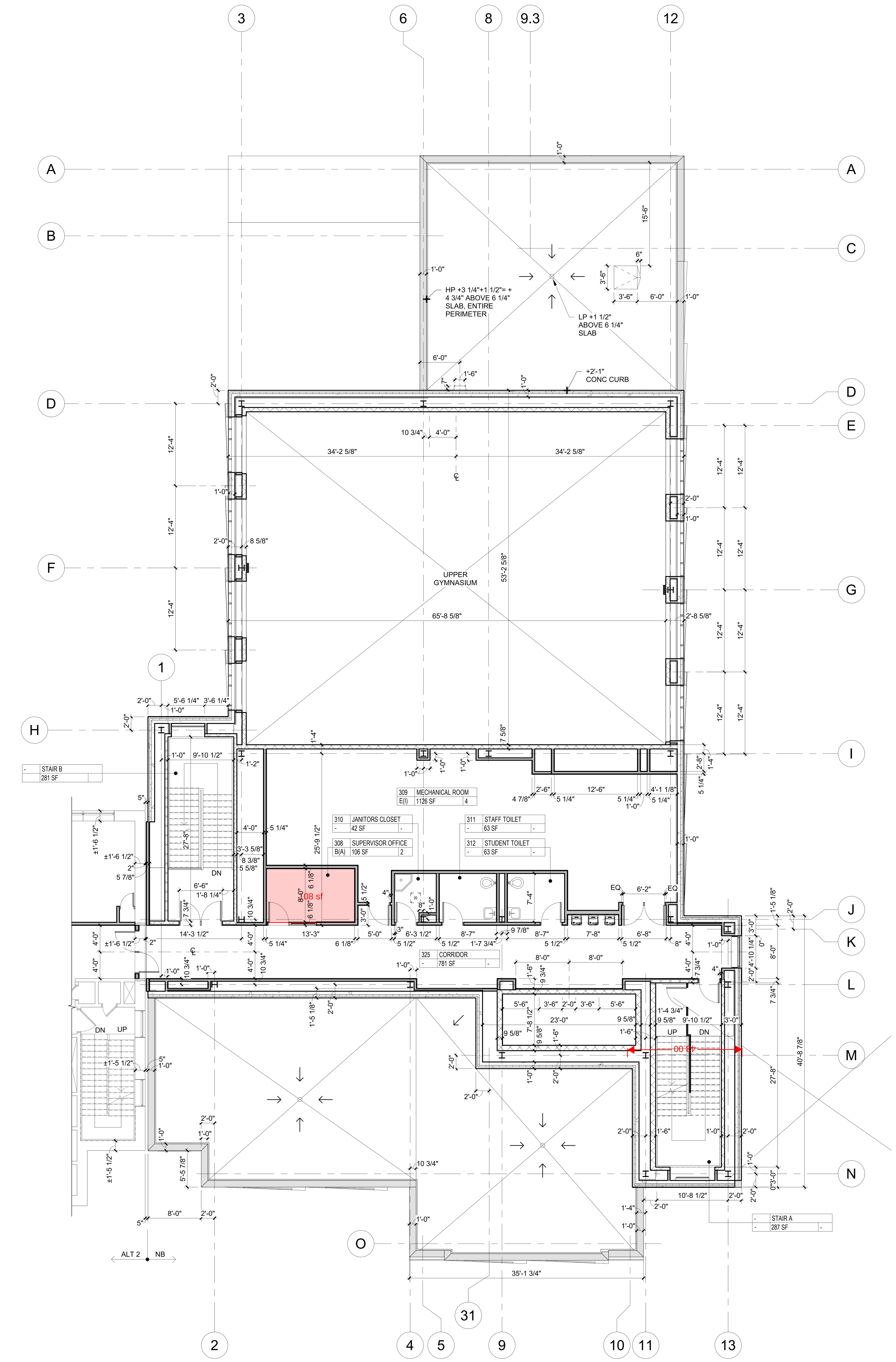
Drawing No.:
A102.00

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"

SCA NYC School Construction Authority

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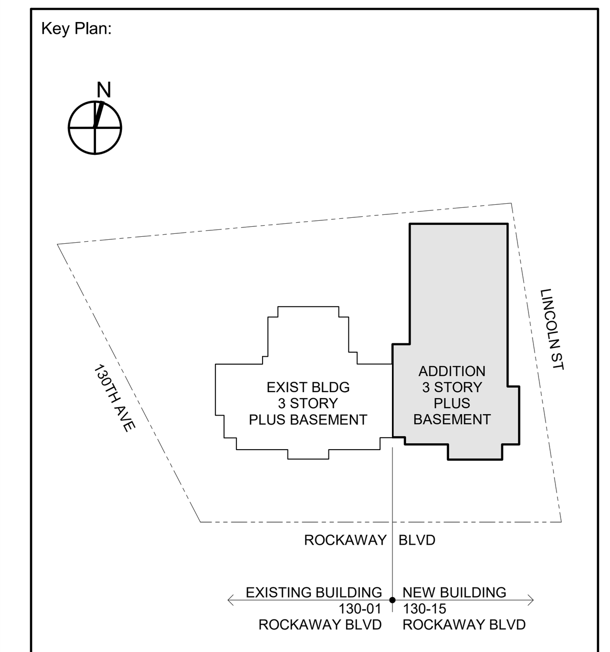
NOTE: Drawing may be printed at reduced scale

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

Key Plan:



Block No. 11694 Lot No. 27

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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

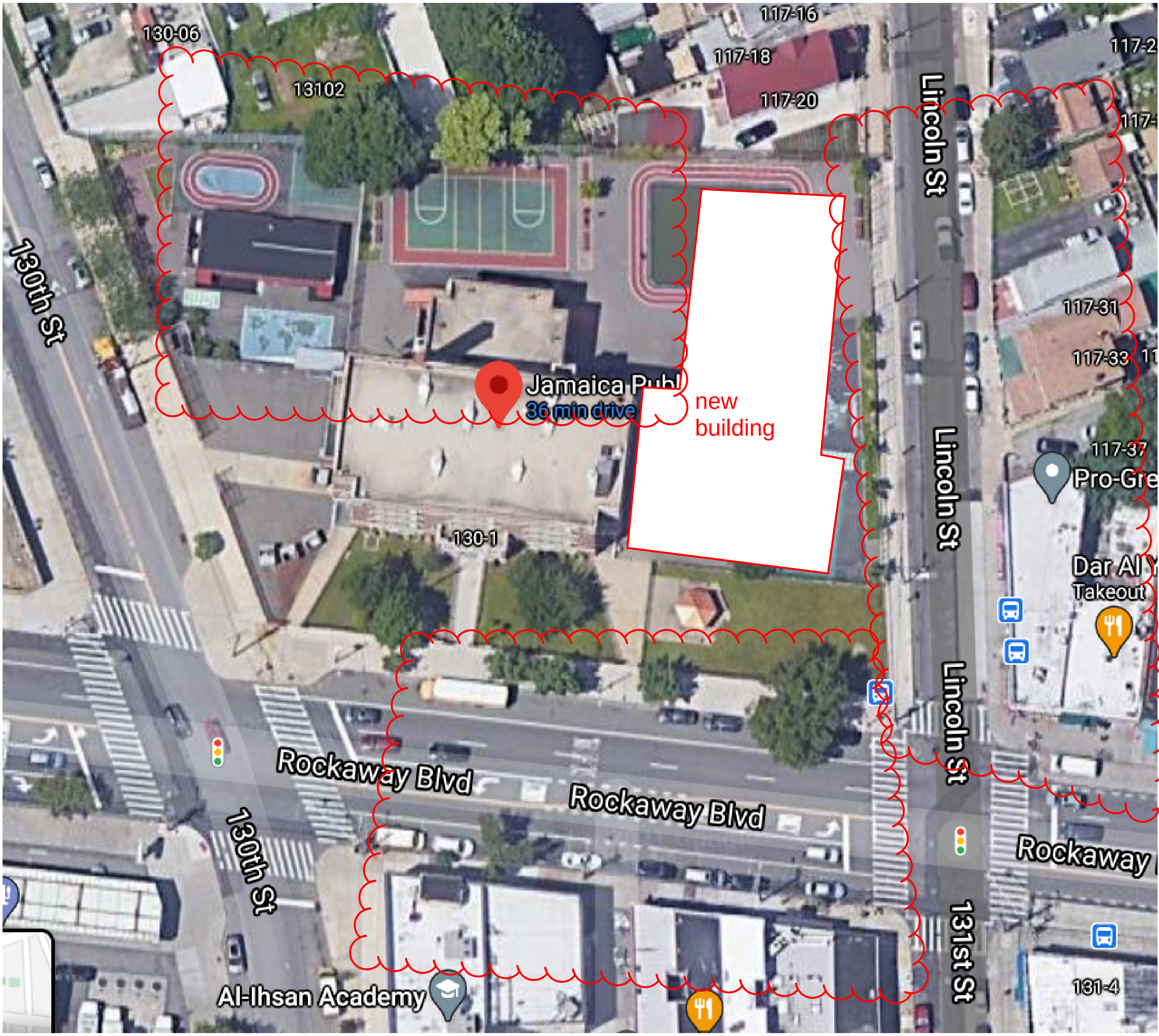
Drawing Title:
FLOOR PLAN -THIRD FLOOR

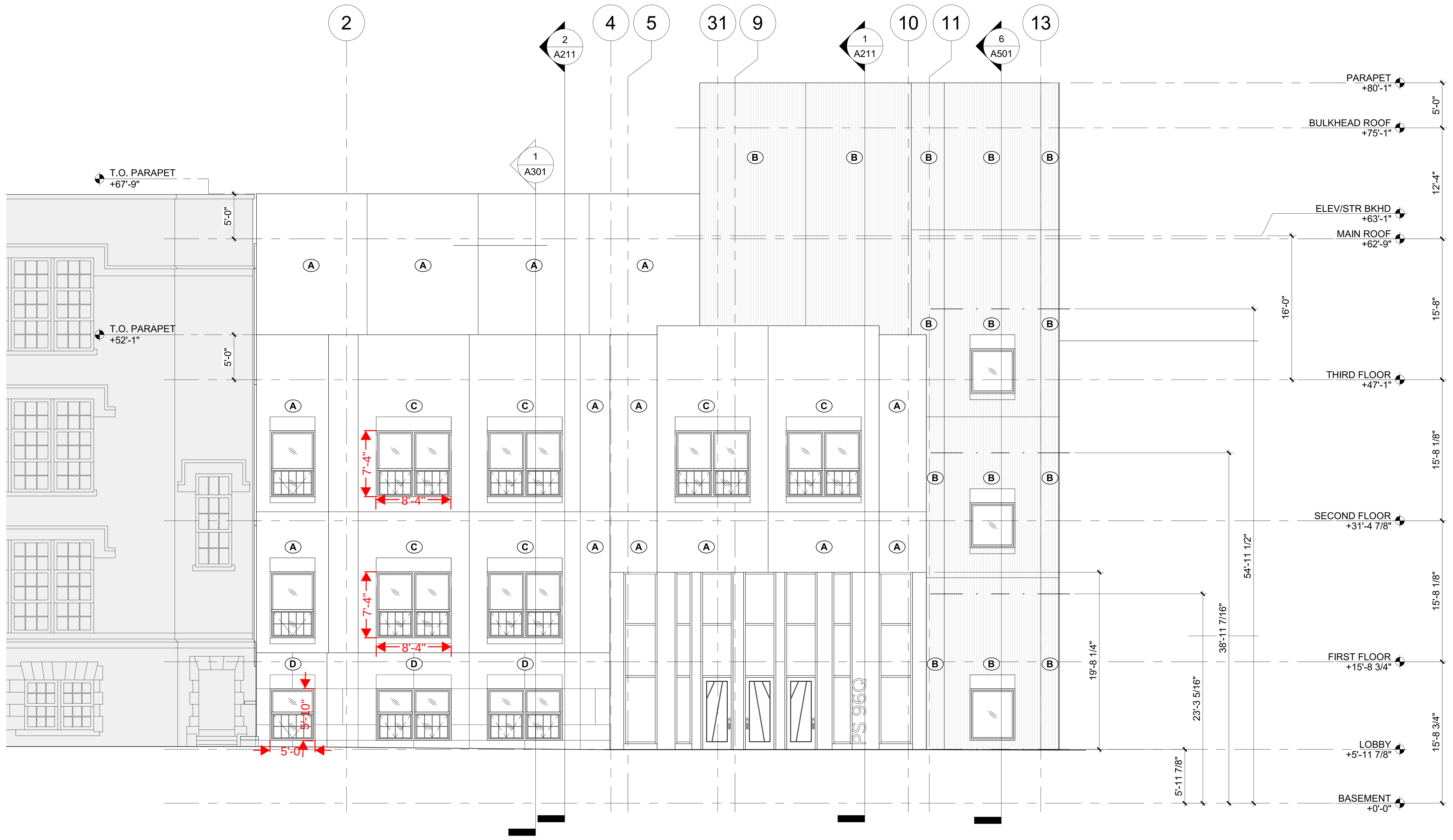
Drawing No.:
A103.00

Sheets in Contract Set:
of XXX

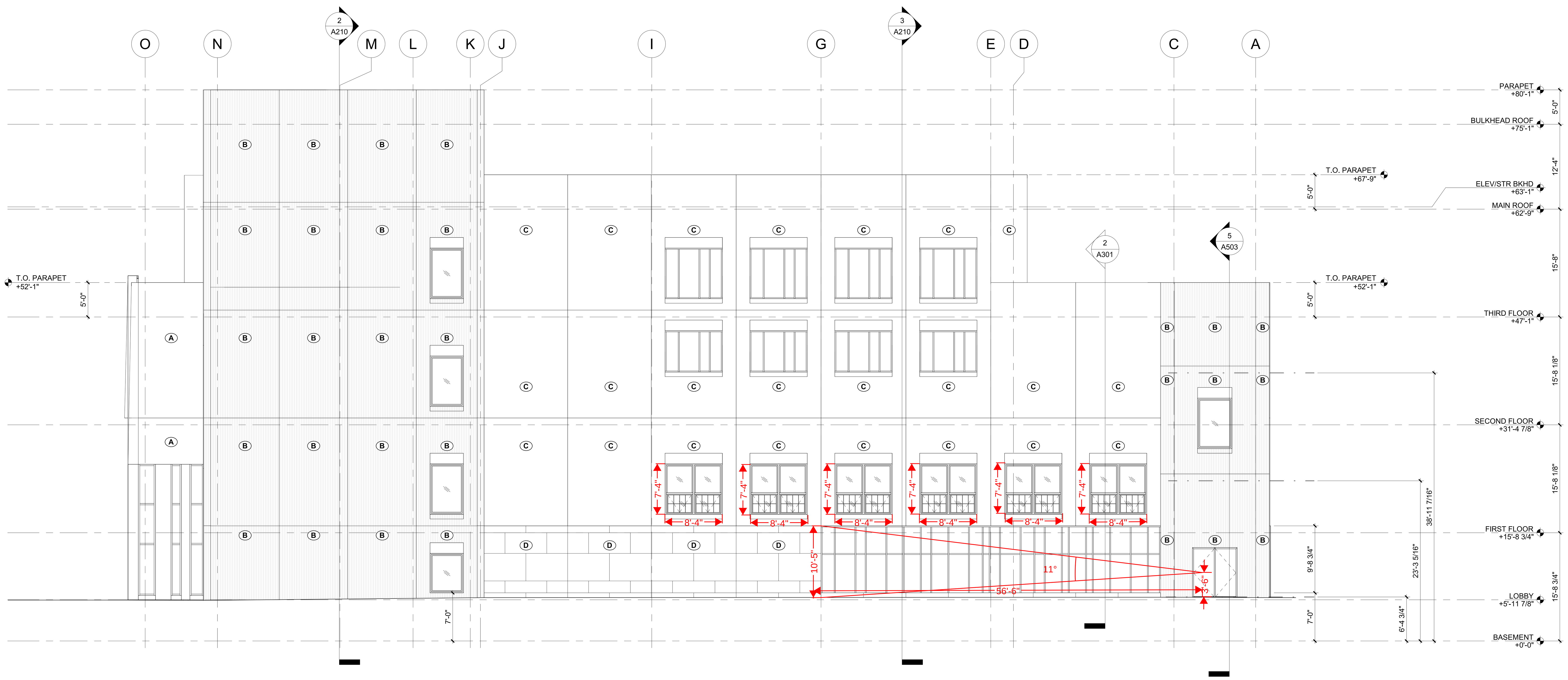
Sheets in DOB Set:
of XXX

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

Architecture & Engineering

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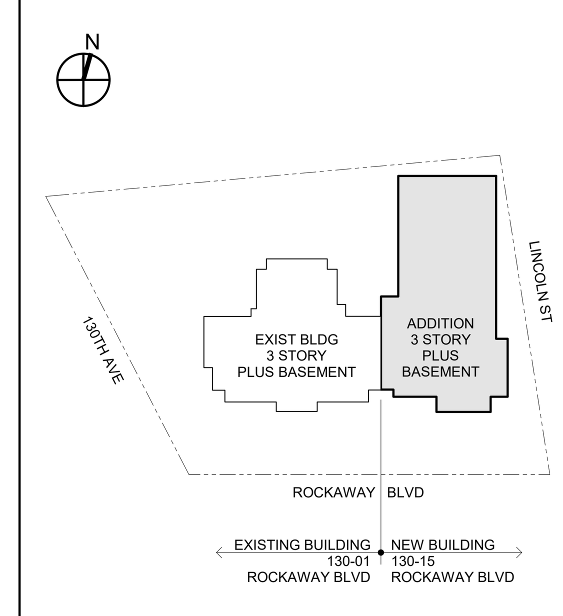
Environmental Consultant to SCA:
AECOM
1255 Broad Street, Suite 201, Clifton, NJ 07013 (t) 973-883-8500

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

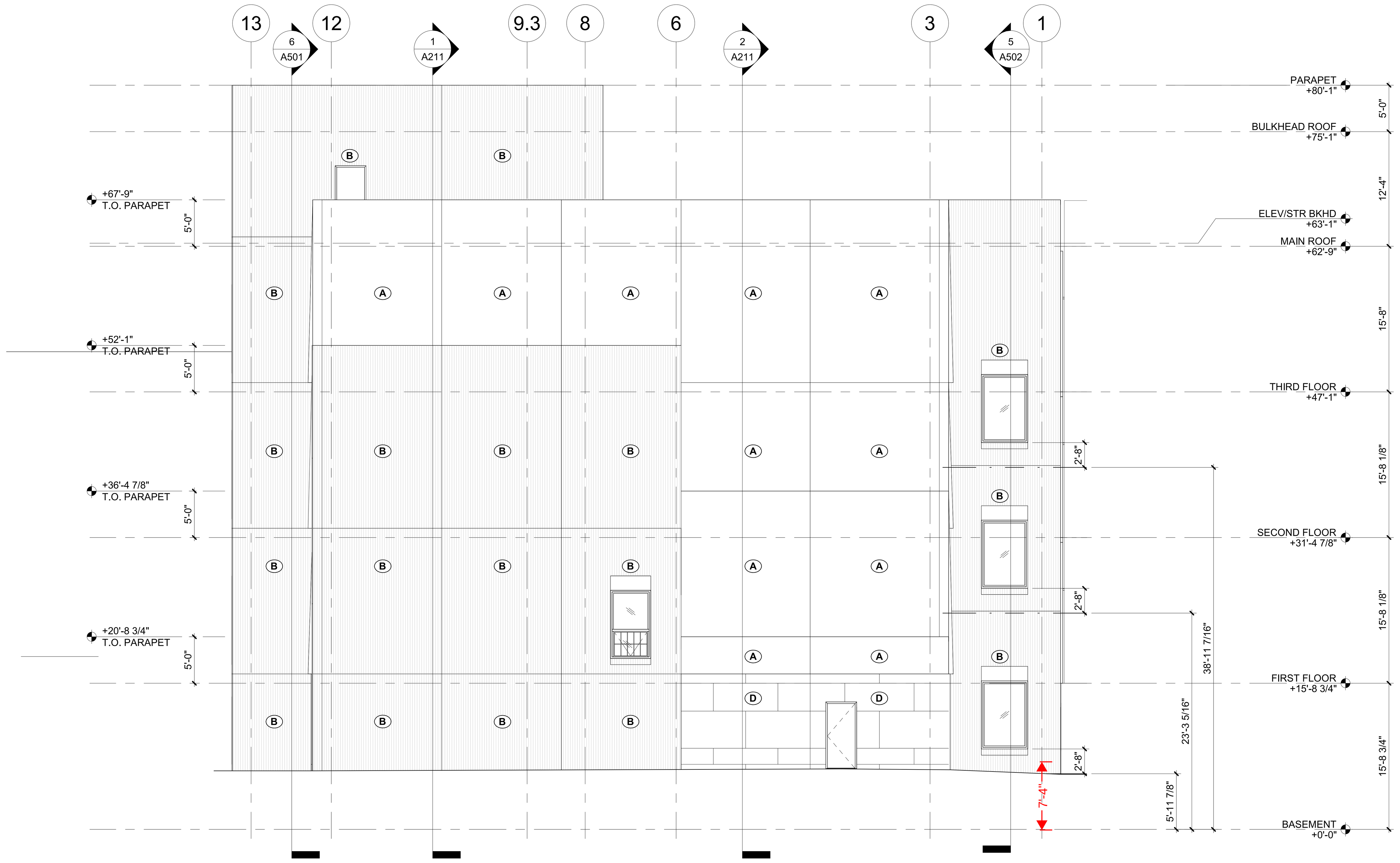
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
EXTERIOR ELEVATIONS - 1

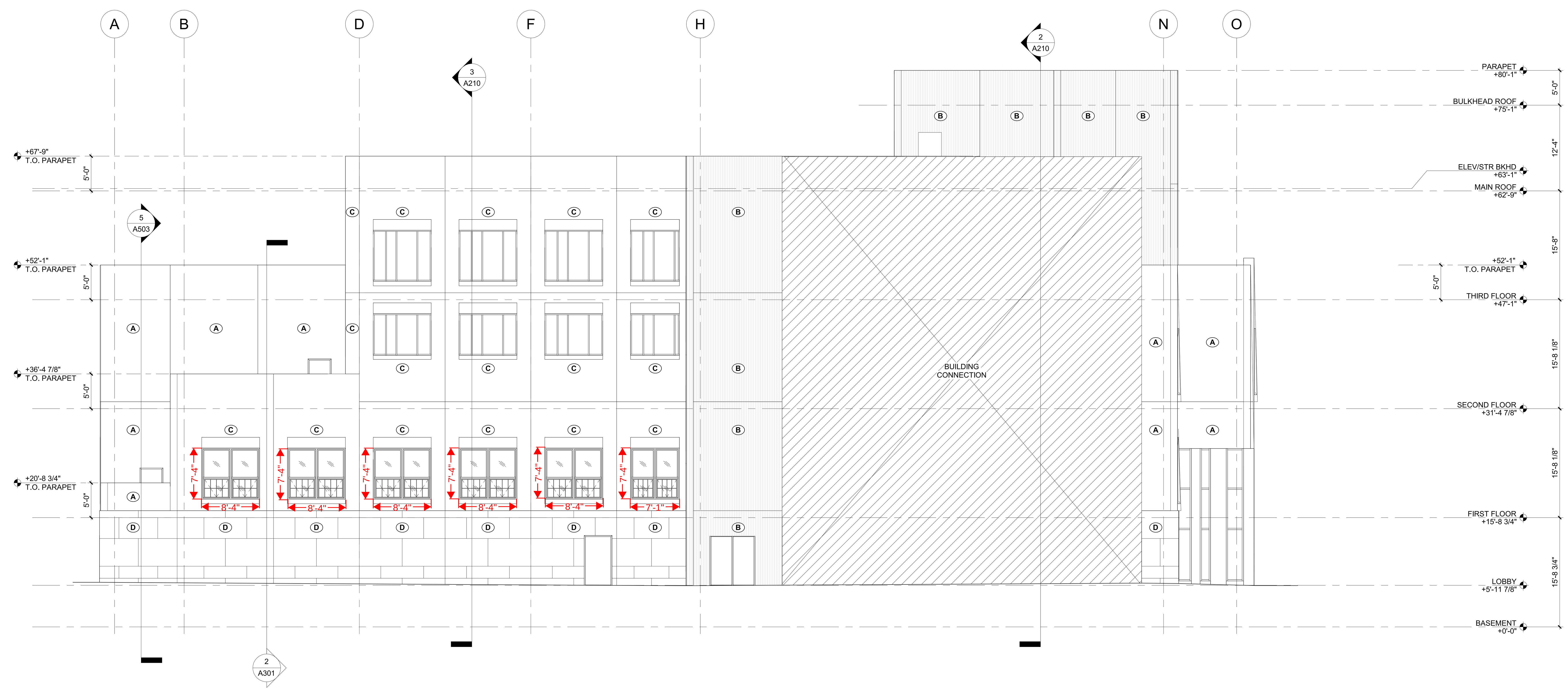
Drawing No.:
A201.00

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

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

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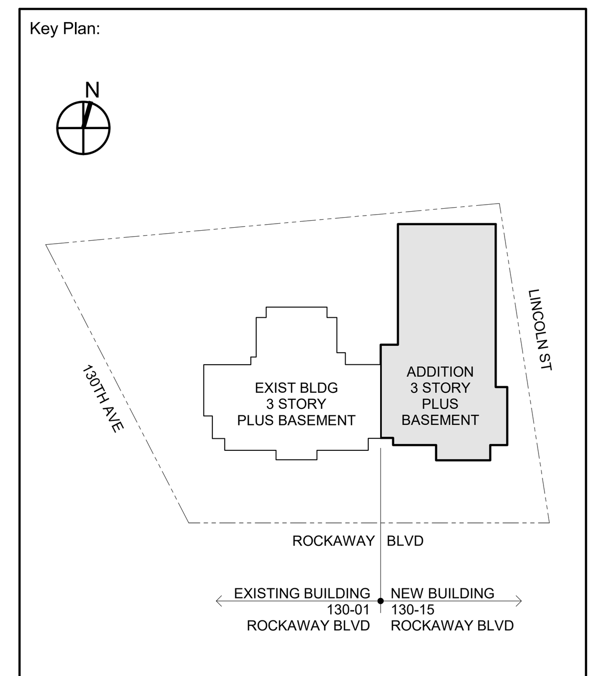
No.	Date	Revision
	2/23/2021	30% DD SUBMISSION

Key Plan:



Block No. 11694 Lot No. 27

SCA Design Manager:	BERNARD FORTE, DM
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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

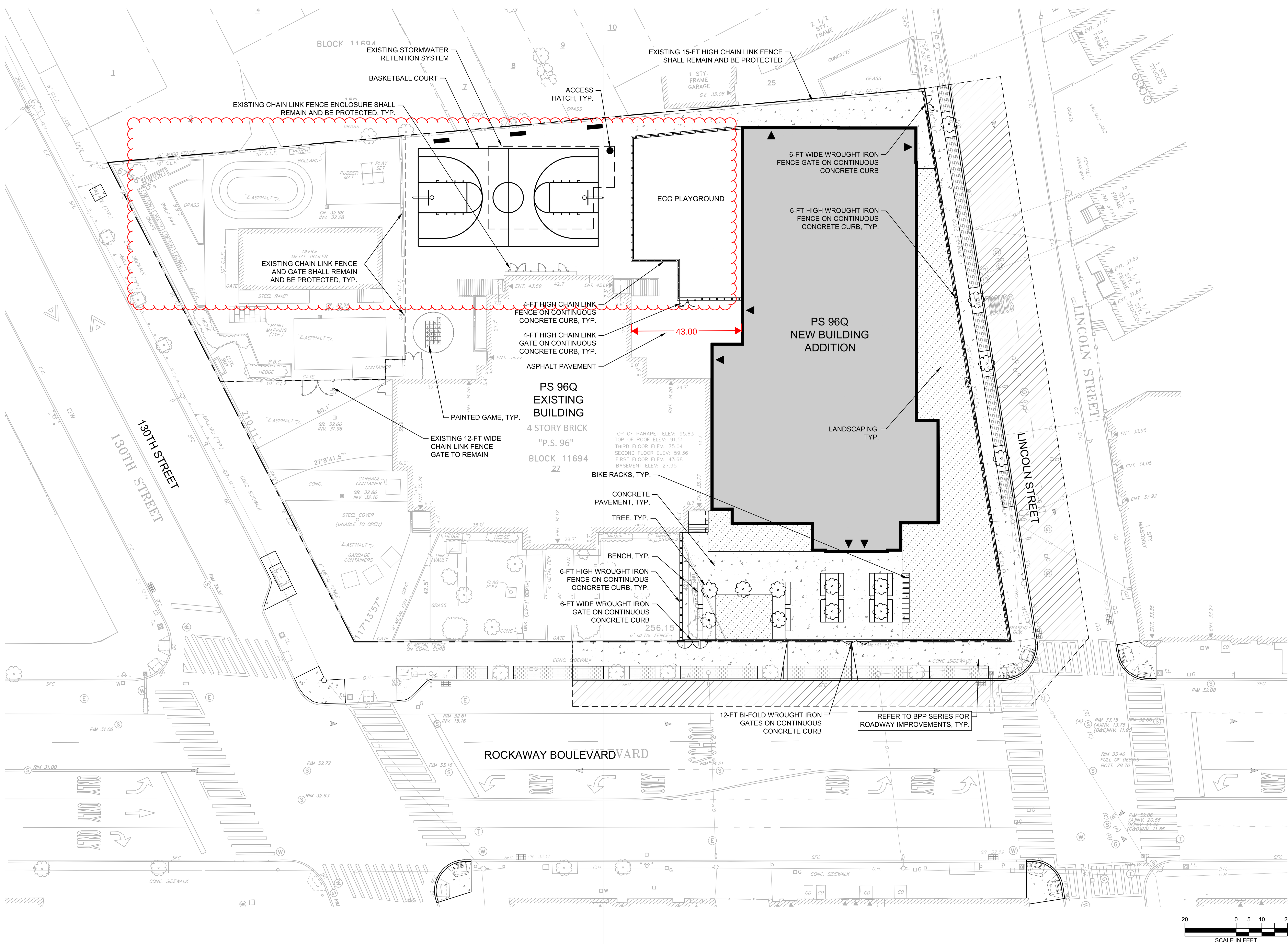
Address:
New Bldg - 130-17 Rockaway Blvd, Queens, NY 11420
Exist Bldg - 130-01 Rockaway Blvd, Queens, NY 11420

Drawing Title:
EXTERIOR ELEVATIONS - 2

Drawing No.:
A202.00

Sheets in Contract Set:
of XXX

Sheets in DOB Set:
of XXX



LEGEND:

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

Consultants:

Drawing may be printed at reduced scale

2/23/2021	30% CD SUBMISSION

SCA Design Manager:

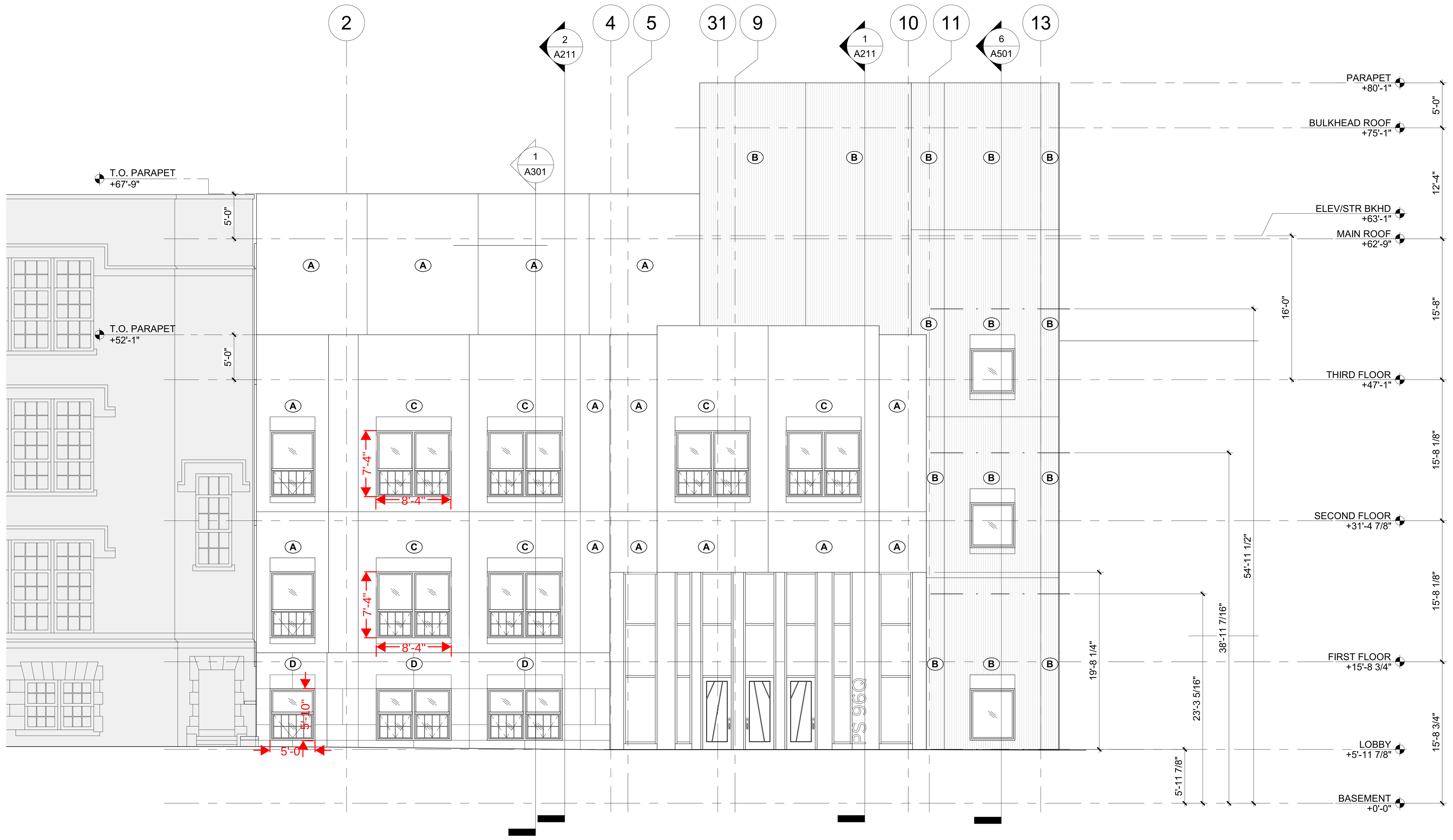
E

LLW No.: Facility Code: 7/22/2021

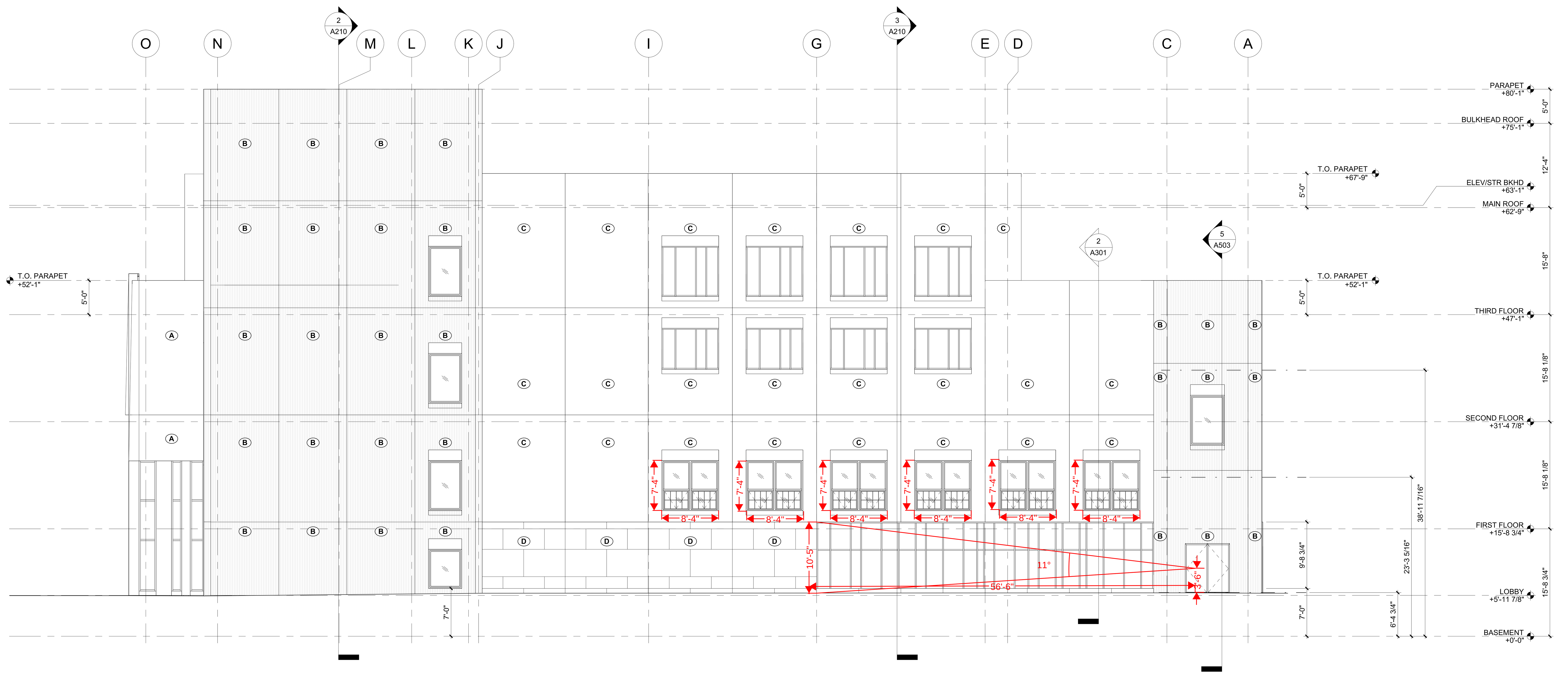
Drawing Title:
SITE IMPROVEMENTS PLAN

C020.00

of



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

SCA NYC School Construction Authority

Architecture & Engineering

Consultants:

NOTE: Drawing may be printed at reduced scale

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

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by:
LLW No: Facility Code: Date:

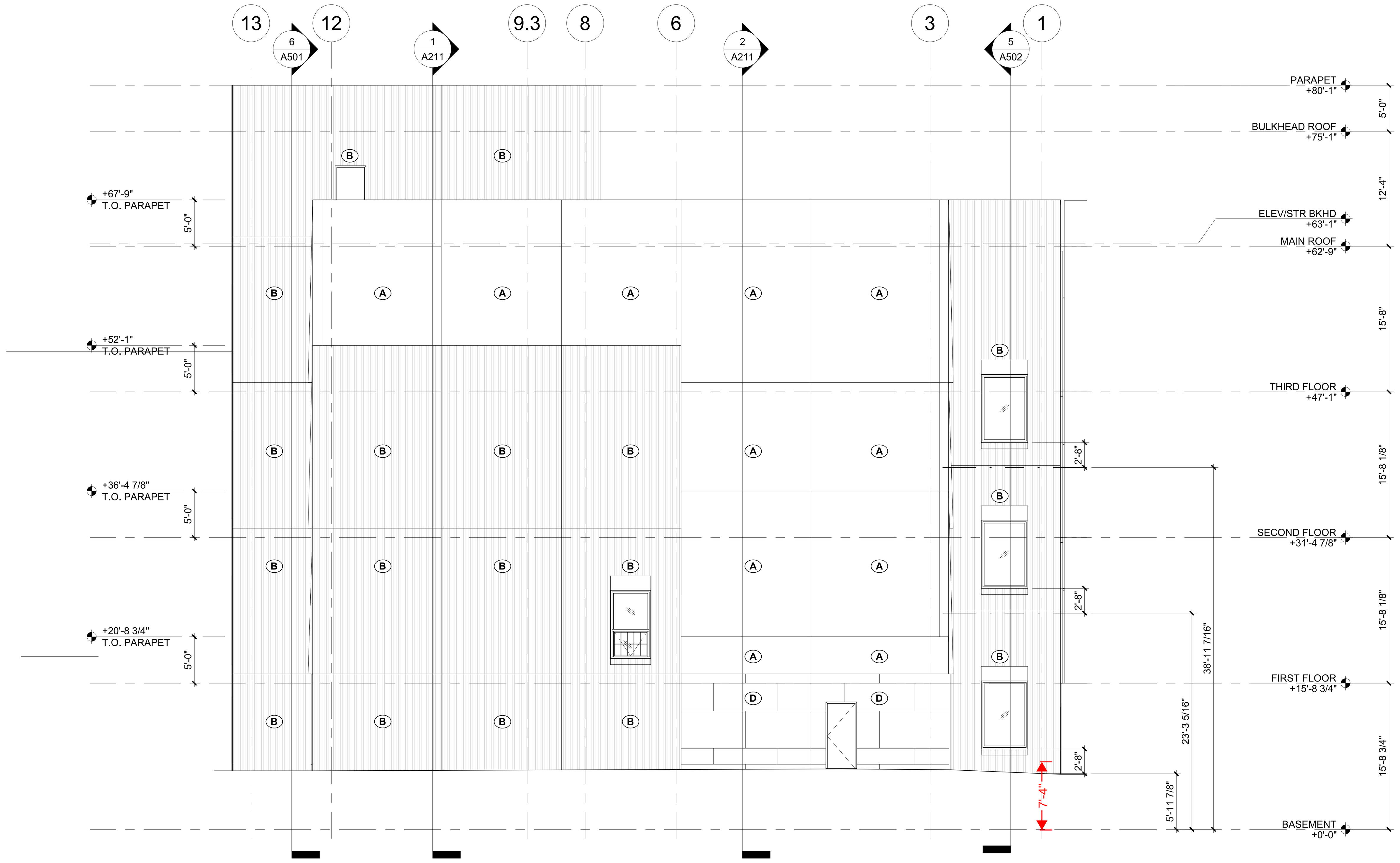
Project:
P.S. 96 - QUEENS ADDITION
Address:

Drawing Title:
EXTERIOR ELEVATIONS - 1

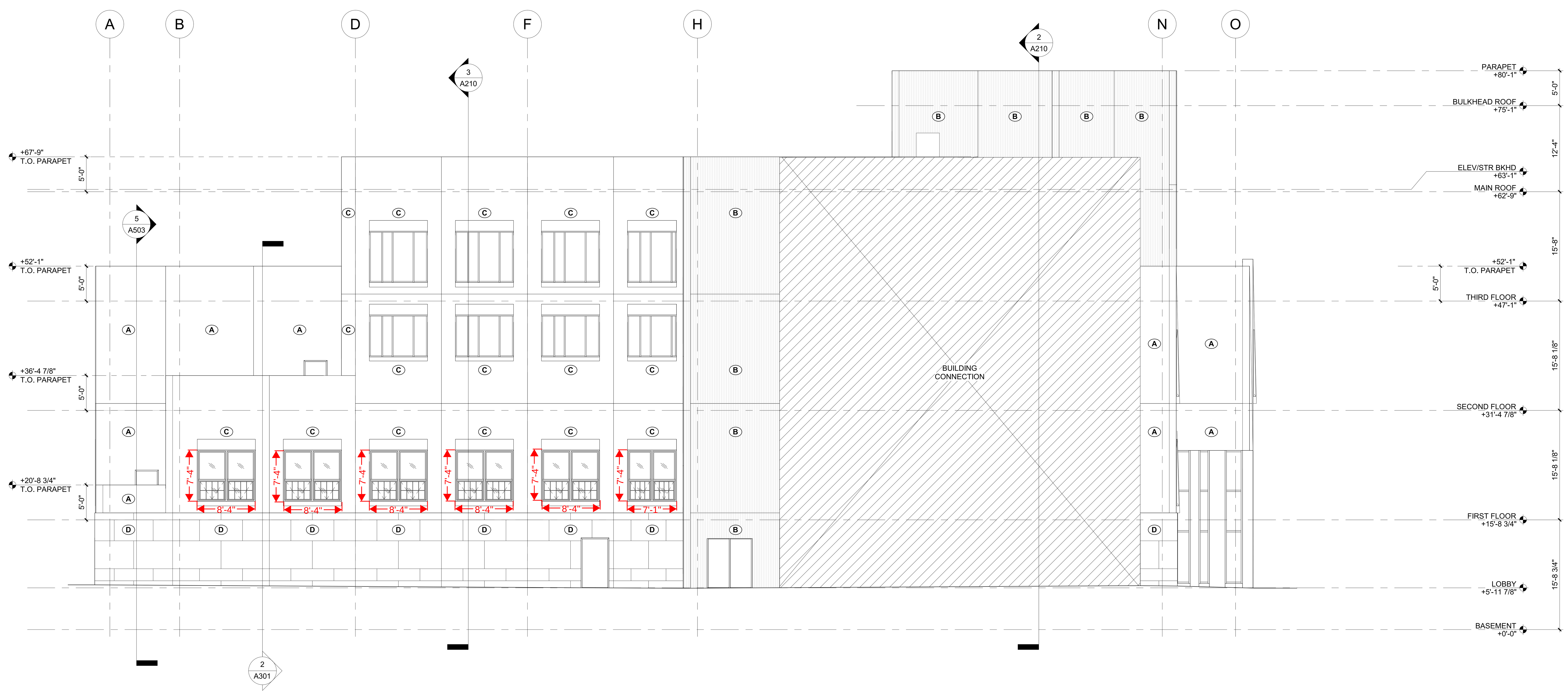
Drawing No.:
A201.00

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

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

Architecture & Engineering

Standards

NOTE: Drawing may be printed at reduced scale

	2/23/2021	30% DD SUBMISSION

SCA Design Manager:
Project Architect/Engineer:
Discipline Lead:
Designer:
Drawn by:
Checked by: ROLANDO KENNY, RA
LLW No.: | Facility Code: | Date: 7/22/2021

Project:

Address:

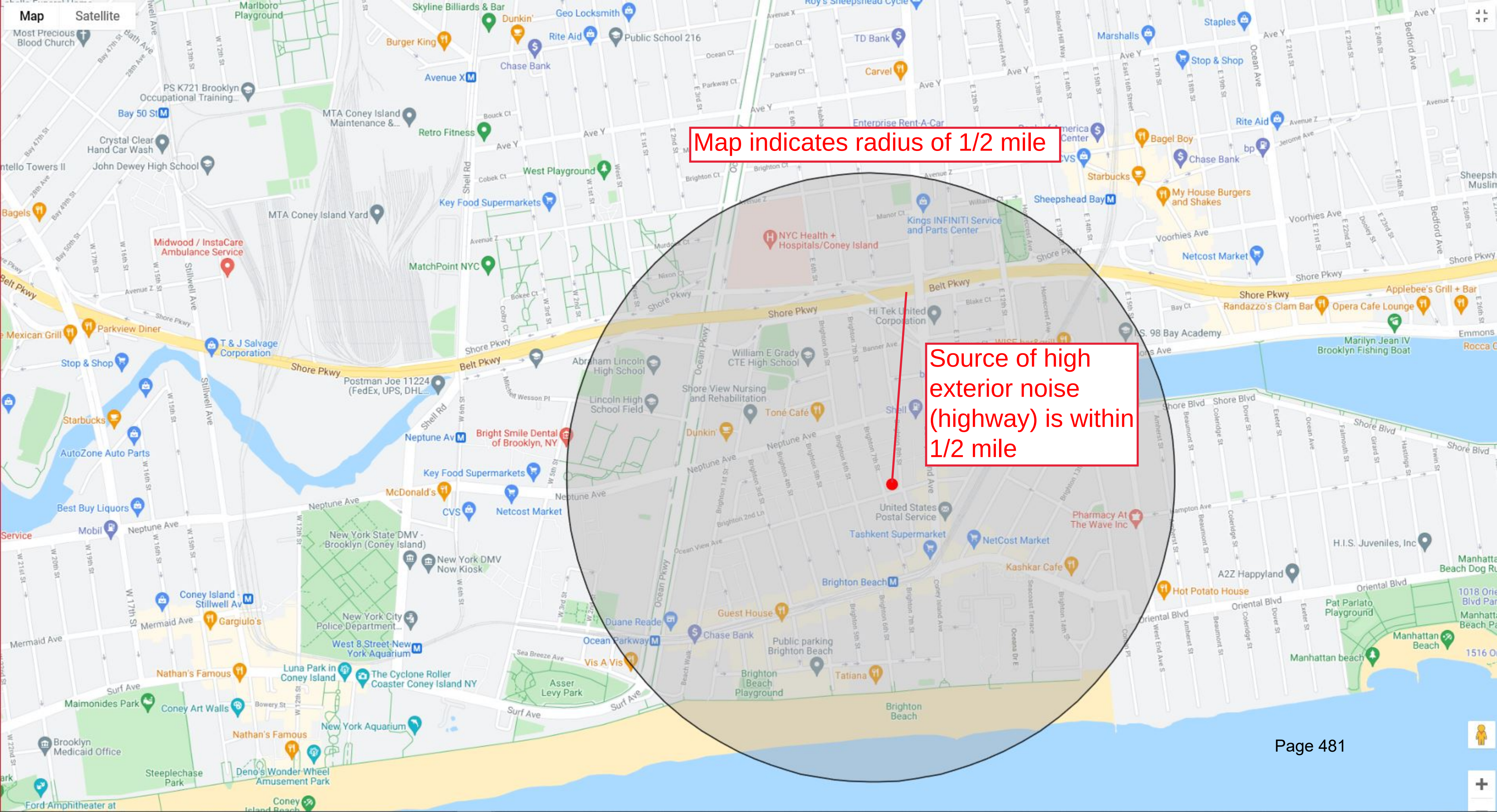
EXTERIOR ELEVATIONS - 2

Drawing No.: A202.00

Sheets in Contract Set:

Sheets in DOB Set: 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
Shore Pkwy
Belt Pkwy
Neptune Ave
Ocean Pkwy
Brighton Beach
NYC Health + Hospitals/Coney Island
William E Grady CTE High School
Abraham Lincoln High School
Lincoln High School Field
Shore View Nursing and Rehabilitation
United States Postal Service
Tashkent Supermarket
NetCost Market
Kashkar Cafe
Brighton Beach
Guest House
Chase Bank
Duane Reade
Ocean Parkway
Public parking Brighton Beach
Brighton Beach Playground
Tatiana
Hot Potato House
Pharmacy At The Wave Inc
Hi Tek United Corporation
Kings INFINITI Service and Parts Center
Sheepshead Bay
Coney Island Stillwell Av
New York Aquarium
Luna Park in Coney Island
The Cyclone Roller Coaster Coney Island NY
Asser Levy Park
Manhattan Beach
Oriental Blvd
Surf Ave
Mermaid Ave
John Dewey High School
MTA Coney Island Yard
Neptune Av
West 8 Street-New York Aquarium

This is GSG-60% acoustical report sample, which is based on DD CDs.

Environmental, Planning, and Engineering Consultants

January 27, 2020

Re: , New York)
Design Development & Green Schools Guide - Acoustical Narrative Report

Dear

has completed a review of the 1/15/20 Design Development drawings submitted by your office. Based on this review, a narrative of the relevant/applicable School Constructions Authority (SCA) Green Schools Guide (GSG) Requirements, Sections Q8.1P and Q8.2, Design Requirements (DR), and American National Standards Institute (ANSI) standards are provided below.

Q8.1P – MINIMUM ACOUSTICAL PERFORMANCE

- Intent: To ensure that core learning spaces (i.e., classrooms) are quiet, so that teachers can speak to their class without straining their voices and students can effectively communicate with each other.
- **Credit Feasibility: Yes.**
- SCA DR/ANSI Standards:
  - 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)
  - ANSI S12.60-2002

EXTERIOR NOISE

- Intent: To provide adequate control of exterior noise potentially penetrating into classroom/core learning spaces at sites adjoining intrusive exterior transportation noise sources such as highways, railroads and airports.
- Requirements: Implement acoustic treatment and other measures to minimize noise intrusion from exterior sources. Projects at least one-half mile from any significant noise sources are exempt.

Offices in New York ● New Jersey ● Pennsylvania ● Maryland ● Connecticut

- Screening: Based on a review of the latest aerial maps of the project site/neighborhood, the nearest airport to the project site is LaGuardia, approximately 5-miles to the south. The project site lies outside the 60 DNL contour (the lowest airport noise level contour provided by the FAA). Furthermore, due to the residential character of the project site's surrounding area and the absence of proximity to high volume roadways or elevated rail lines, the site was screened out of requiring a site-specific environmental noise or vibration survey.

REVERBERATION TIME

- Requirements: Design classroom (and other core learning spaces) to include sufficient sound-absorptive finishes for compliance with reverberation time requirements. ANSI Standard S12.60-2002 specify the maximum mid-frequency (500, 1,000, and 2,000 Hertz) reverberation time of 0.6 seconds.
- Design Approach:
  - Classrooms: Acoustic ceiling tiles (ACT) in all classrooms (i.e., Pre-K, Kindergarten, 1st through 5th Grade, CSD Special Education, and Music Room) should be specified with a minimum Noise Reduction Coefficient (NRC) rating of 0.70. Based on a review of the reflected ceiling plans, AKRF does not anticipate additional absorption (e.g., acoustic wall panels, etc.) required to meet the reverberation time goals in classrooms.

HVAC BACKGROUND SOUND LEVEL

- Requirements: The maximum A-weighted background sound level requirements from heating, ventilating and air conditioning (HVAC) systems for all classroom and core learning spaces, as stipulated in the applicable GSG and DR guidelines, is 40 dB(A)/NC 35.
- Design Approach: In order to achieve background HVAC-related noise goals in all core learning spaces, a combination of noise control mechanisms may be required including:
  - Duct Silencers/Internal Acoustic Lining: Downstream of all Variable Air Volume (VAV) boxes and/or Air Handling Units (AHU's); and
  - Thicker Gauge Ductwork: 18 or 16-gauge supply/return main ductwork located above footprint of core learning spaces on upper floor.

will review all duct velocities and manufacturer sound data to determine compliance with the relevant DR and GSG requirements.

Q8.2 – ENHANCED ACOUSTICAL PERFORMANCE

- Intent: To provide classrooms that facilitate better teacher-to-student and student-to-student communication through effective acoustical design and reduce noise transfer from horizontally/vertically adjacent noise sensitive spaces that generate significant sound or impact noise levels to other noise sensitive spaces.
- **Credit Feasibility: Yes.**
- SCA DR/ANSI Standards:
  - 1.3.1.9 (Architectural Acoustics)
  - 4.1.1 (Building Façade – New Buildings and Additions)
  - 5.1.1 (Typical Room Finishes)
  - 5.2.2 (Interior Partitions)
  - 5.3.1 (Floor Types)
  - 5.5.1 (Interior Doors and Frames)
  - 6.2.25 (HVAC Acoustical Standards)

SOUND ISOLATION (EXTERIOR):

- Requirements: Façade constructions shall meet a minimum Sound Transmission Class (STC) rating of 50.
- Design Approach: Building wall and plan sections, as shown on A301/A303, indicate 14-inch thick precast concrete panel assemblies as the current design for the exterior walls of the new building. The minimum STC 50 requirement will be met with the currently designed precast concrete sandwich panel assemblies.

AIRBORNE SOUND ISOLATION (INTERIOR ADJACENCIES):

- Requirements: All interior demising partitions and floor/ceiling assemblies separating horizontally and vertically adjacent noise sensitive spaces will need to meet the acoustical requirements outlined in DR 1.3.1.9.
- Design Approach (Core Learning Spaces):
  - Horizontal Adjacencies: The design of all demising interior partition constructions between two horizontally adjacent noise sensitive spaces (i.e., classroom-to-classroom, classroom-to-corridor) shall include constructions as outlined in Schematic Design Report.
  - Vertical Adjacencies: The currently designed 3-1/4" light weight concrete over 3", 18-gauge metal deck structural slab in combination with a dropped ACT ceiling will meet the minimum airborne noise (STC 50) requirements between vertically adjacent classroom spaces.
- Design Approach (Classrooms Below Mechanical Equipment Room and Music Classroom):
  - Vertical Adjacencies: The currently designed 3-1/4" light weight concrete over 3", 18-gauge metal deck structural slab in combination with a dropped ACT ceiling with <u>minimum 4" thick mineral wool batt insulation "wall-to-wall" in the ceiling cavity</u> will marginally meet the airborne (STC 60) noise requirements.

IMPACT SOUND ISOLATION (INTERIOR ADJACENCIES):

- Requirements: All interior demising floor-ceiling assemblies separating vertically adjacent noise sensitive spaces shall meet the acoustical requirements outlined in DR 1.3.1.9 (B).
- Design Approach:
  - Core Learning Spaces: The design of all floor-ceiling constructions separating vertically adjacent classrooms will include the following: vinyl finished flooring on top of a 3-1/4" light weight concrete over 3" deep composite 18-gauge metal deck structural slab in combination with a dropped ACT ceiling. These constructions will marginally meet the vertical impact sound isolation criteria (i.e., IIC 50).
  - Gymatorium: The demising floor-ceiling assembly separating the fourth floor Gymatorium from the vertically adjacent third floor classrooms will include the following constructions:
    - 4" thick normal weight isolated concrete slab
    - 3-1/4-inch thick lightweight concrete (f'c = 3500 psi) over 3-inch deep composite 18-gauge metal deck structural slab (115 PCF). *Note: 40ksi will be maintained to aid in limiting deflection*; and
    - Dropped ACT ceiling (in third floor classrooms below Gymatorium).

  Achieving the minimum IIC 60 rating, as per DR 1.3.1.9, will require specialized isolated slab constructions. Two types of isolated slab constructions were outlined in AKRF's 10/18/19 Schematic Design Report, including a spring "jack-up" slab and a dimpled rubber underlayment floating slab. Based on the programmatic usage of the Gymatorium, which includes basketballs bouncing, children running, etc., significant levels of impact noise/energy will be transferred to the isolated and building structural slabs. Structural vibration and the building structure response is largely dependent on the structural slab stiffness and natural frequency. Mass and column bay span largely influence the structural slab's natural frequency. For structural designs with column spacing greater than 25 feet, it is extremely important to evaluate the building's structural slab dynamic response based on anticipated uses.

In order to assist office with the design of the structural slab supporting the Gymatorium, AKRF will reference the design criteria outlined in the American Institute of Steel Construction Design Guide (AISC Design Guide) for Reinforced Steel Systems Chapter 5, "Design for Rhythmic Excitation." Meeting the acoustical guidelines in AISC Guide may be challenging due to the project's proposed lightweight structures with relatively long spans between columns. Failure to address these structural design guidelines can result in vibration-related issues that cannot be addressed simply through an isolated jack-up slab. AKRF recommends that YAS confirm the structural design of the Gymatorium/Stage slab:

- Achieves a minimum natural frequency of 11 Hertz (refer to **Figure 1**); and
- Confirm that the design of the structural slab will satisfy the AISC peak acceleration design guidelines (refer to **Figure 2**).

Table 5.3
Application of Design Criterion, Equation (5.1), for Rhythmic Events

Activity Acceleration Limit Construction	Forcing Frequency[1] f, Hz	Effective Weight of Participants w_p		Total Weight w_t		Minimum Required Fundamental Natural Frequency[3] f_n, Hz
		kPa	psf	kPa	psf	
Dancing and Dining $a_o/g = 0.02$						
Heavy floor 5 kPa (100 psf)	3	0.6	12.5	5.6	112.5	6.4
Light floor 2.5 kPa (50 psf)	3	0.6	12.5	3.1	62.5	8.1
Lively Concert or Sports Event $a_o/g = 0.05$						
Heavy floor 5 kPa (100 psf)	5	1.5	31.0	6.5	131.0	5.9[2]
Light floor 2.5 kPa (50 psf)	5	1.5	31.0	4.0	81.0	6.4[2]
Aerobics only $a_o/g = 0.06$						
Heavy floor 5 kPa (100 psf)	8.25	0.2	4.2	5.2	104.2	8.8[2]
Light floor 2.5 kPa (50 psf)	8.25	0.2	4.2	2.7	54.2	9.2[2]
Jumping Exercises Shared with Weight Lifting $a_o/g = 0.02$						
Heavy floor 5 kPa (100 psf)	8.25	0.12	2.5	5.12	102.5	9.2[2]
Light floor 2.5 kPa (50 psf)	5.5	0.12	2.5	2.62	52.5	10.6[2]

Notes to Table 5.3:
[1] Equation (5.1) is supplied to all harmonics listed in Table 5.2 and the governing forcing frequency is shown.
[2] May be reduced if, according to Equation (2.5a), damping times mass is sufficient to reduce 2nd and 3rd harmonic resonance to an acceptable level.
[3] From Equation (5.1).

Figure 1 – Minimum Fundamental Natural Frequency (AISC Design Guide, Chapter 5)

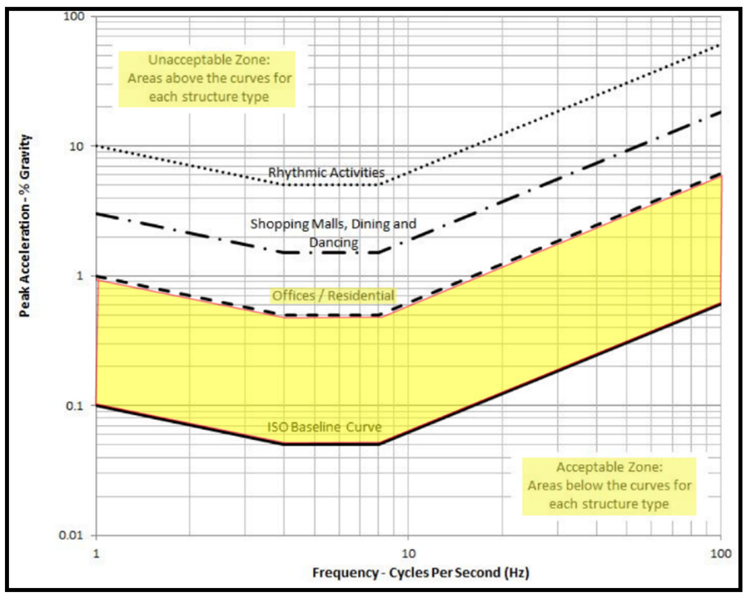


Figure 2 – Recommended Peak Acceleration

BACKGROUND SOUND LEVEL REQUIREMENTS:

- Requirements: The design of the HVAC systems is still in progress. HVAC-related background noise goals will be confirmed during the 60% and 100% Construction Document submissions.

This completes our comments at this time. If you have any questions, please do not hesitate to contact me at

Sincerely,

Technical Director

Acoustical Consultant

cc:

This is GSG-100% acoustical report sample, which is based on 100% CDs.

Memorandum

To:

From:

Date: March 8, 2021 *(Revised 3/25/21)*

Re: Green School Guide (2019) Acoustical Compliance Memorandum

cc:

, Inc.

---

has reviewed the revisions to the 100% Construction Documents set associated with the PS 108X addition project. All recommendations provided in 's 1/26/21 "100% CD & GSG Acoustical Report" pertaining to acoustical compliance with GSG have been successfully implemented in design.

CREDIT Q8.1P (MINIMUM ACOUSTICAL PERFORMANCE)

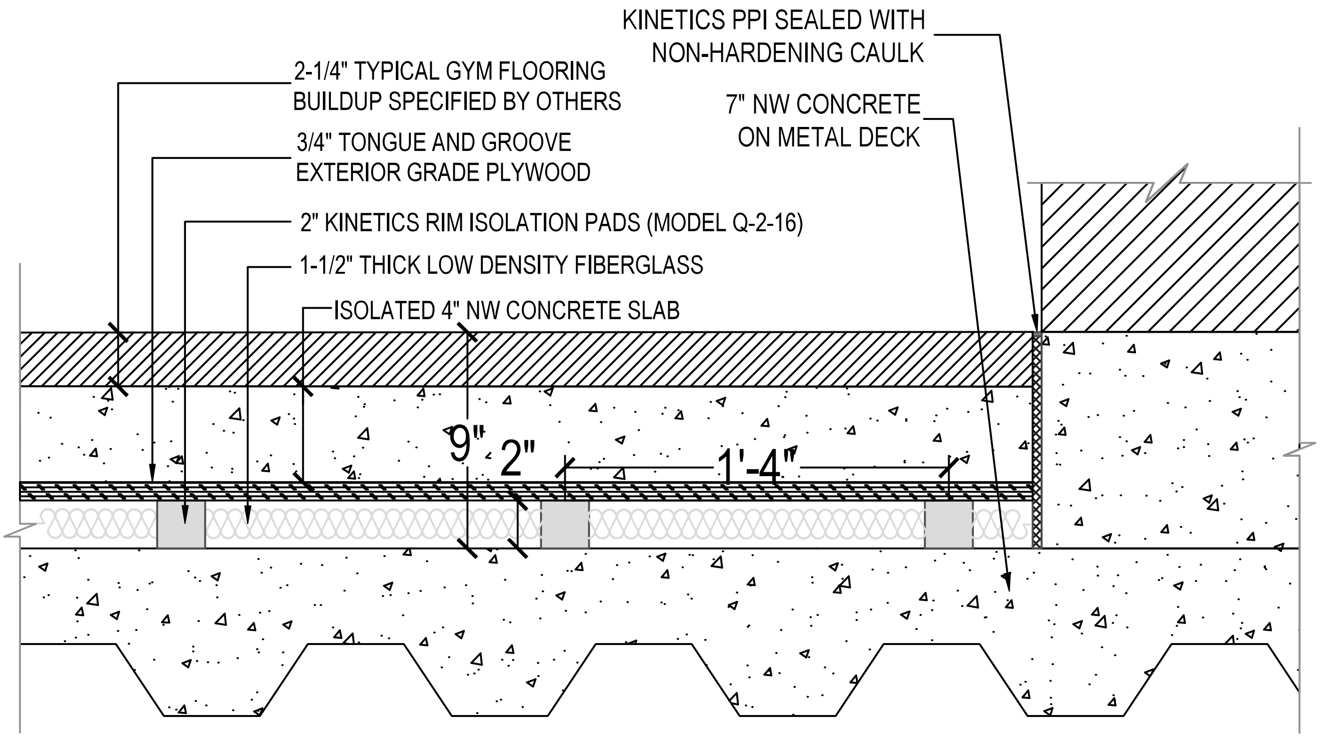
- Background Sound Levels: HVAC systems incorporate all noise control features necessary to comply with the 40 dB(A) background sound level criterion in classrooms.
- Exterior Noise: environmental noise associated with project site transportation sources (e.g., vehicular traffic, aircraft flyovers, etc.) is anticipated to be adequately controlled in core learning spaces with the proposed, standard SCA window assembly (1/4-inch laminated glass, 1/2-inch airspace, 1/4-inch laminated glass).
- Reverberation Time: Classroom and other Core Learning Spaces will have acoustical finishes equal to or greater than the ceiling area with an acoustical rating of NRC 0.70+ in accordance with Q8.1 Option 1.
- **Credit Achieved**

CREDIT Q8.2 (ENHANCED ACOUSTICAL PERFORMANCE)

- **Credit Not Pursued/Achieved.**

✷

SCHEMATIC INTENT ONLY - NOT FOR CONSTRUCTION



Subject: GYMATORIUM - NON-VENTED ISOLATED SLAB DETAIL

Project: (BRONX, NY)

Date: 01/26/2021 Scale: NTS Sketch: 190243-01

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

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.

TABLE OF CONTENTS

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

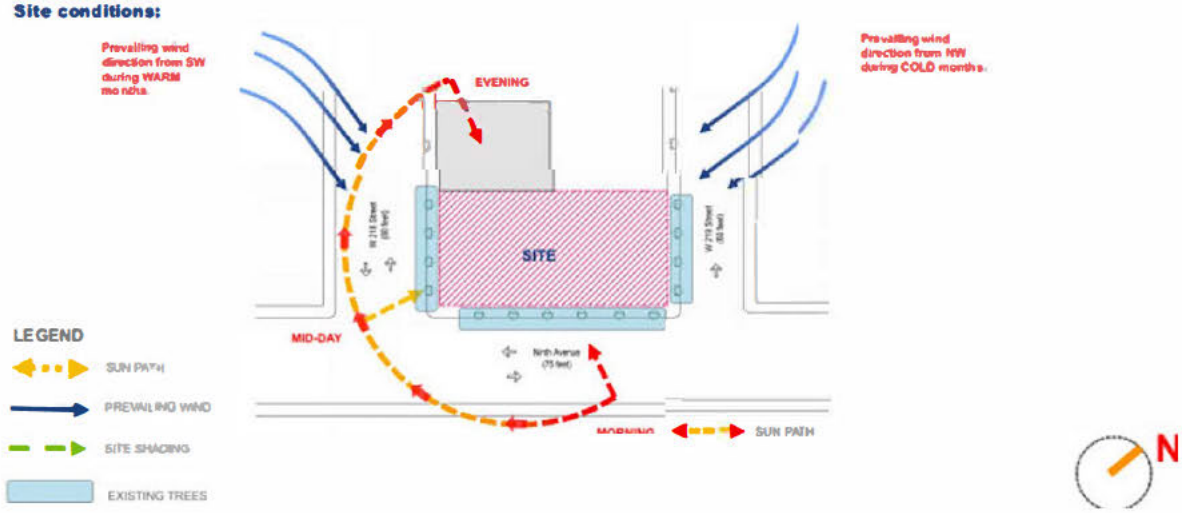
- Based on the subsurface investigation performed at the site, the percolation tests concluded that the permeability of the soil meets the NYC DEP and DOB standards for infiltration practices. As part of the design, the stormwater for the entire site will be collected and conveyed to a stormwater retention 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.

Integrative Design Report and Recommendations

2.0 Discovery # 1 Energy and Daylight Related Systems\

2.1 Energy and Daylight Systems

Site conditions:



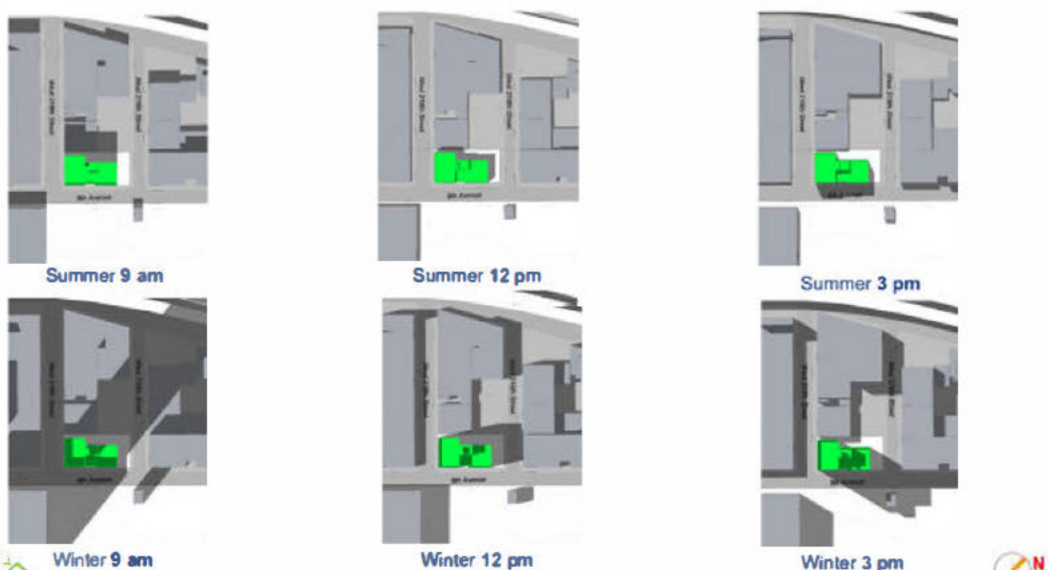
Site conditions: Exterior lighting at exit and entrance

SCHEME A SCHEME B SCHEME C

Integrative Design Report and Recommendations

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



Integrative Design Report and Recommendations

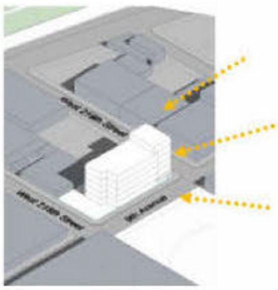
Discovery #1 Scheme C
Energy and Daylight Related System
Site conditions: Summer & winter solstice shadows

Discovery #1 Scheme A, B, & C
Energy and Daylight Related System
Gymatorium Daylight

SCHEME A
SCHEME B
SCHEME C

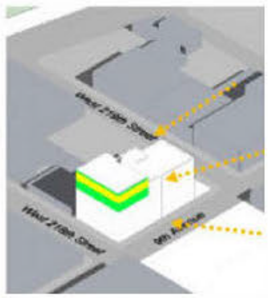
Integrative Design Report and Recommendations

Discovery #1 Scheme A, B, & C
Energy and Daylight Related System
Gymatorium Daylight



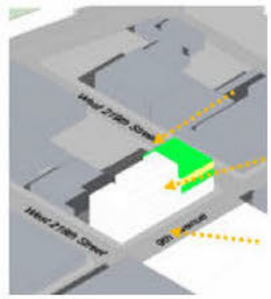
SCHEME A

- Minimum exposure to daylight
- Gymatorium is facing West
- Minimal building obstruction



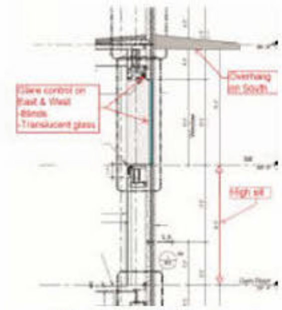
SCHEME B

- 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

Integrative Design Report and Recommendations

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

Integrative Design Report and Recommendations

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.

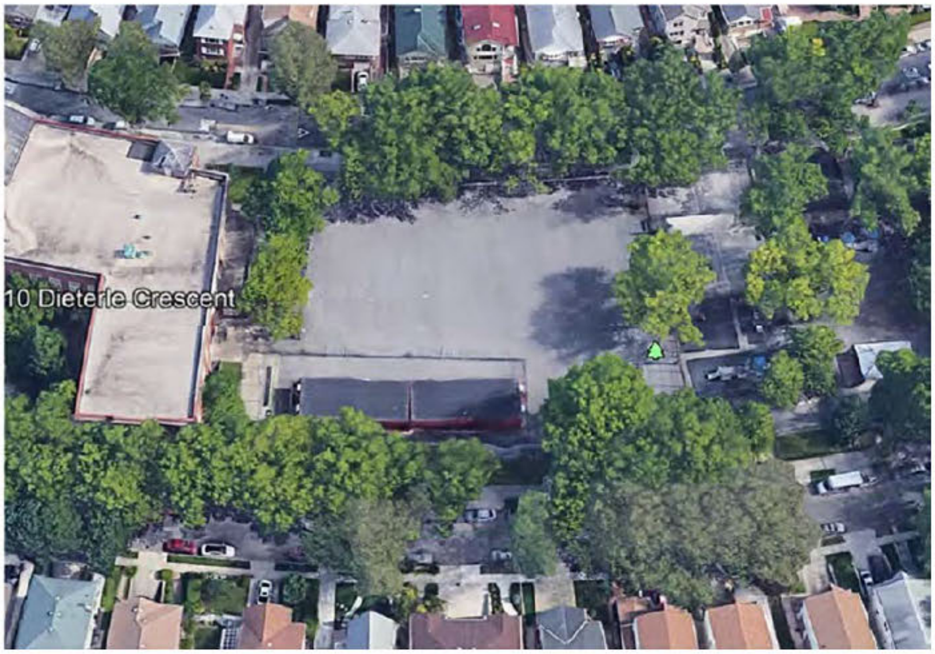
Trees may be implemented on the design where it doesn't obstruct any entrances or exits. There will be more trees in the sidewalk to comply with the park department requirement. The goal is to maintain the existing nine trees on the sidewalk.

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

Schematic Green Design Report
The New York City School Construction Authority

Integrative Design Report and Recommendations

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

SCA NYC School Construction Authority

Integrative Design Report and Recommendations

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.

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.

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.

Integrative Design Report and Recommendations

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.

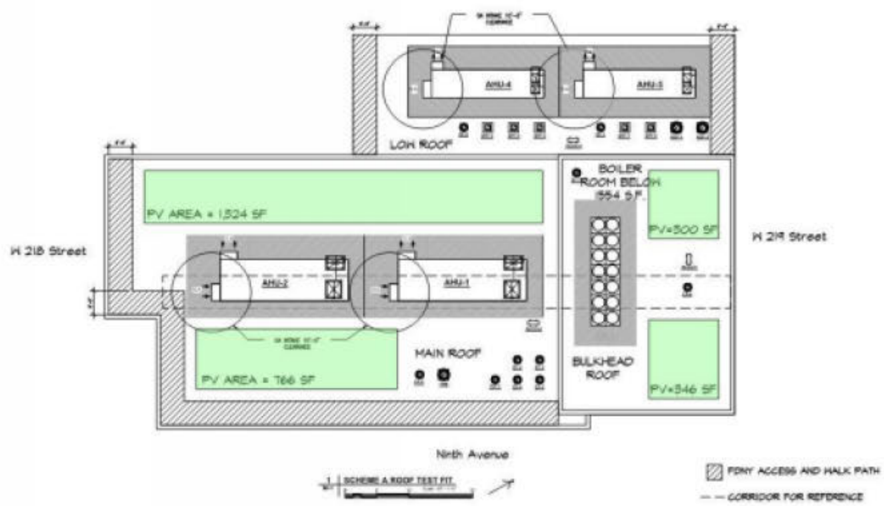
Building Scheme	Scheme A	Scheme B	Scheme C
PV System Capacity	52.9 kW	41.7 kW	25.9 kW
Annual Energy Generation	68,319 kWh	46,343 kWh	33,437 kWh

NYC School Construction Authority

Integrative Design Report and Recommendations

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 / MOP ROOM
EF-5	CUSTD. 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**

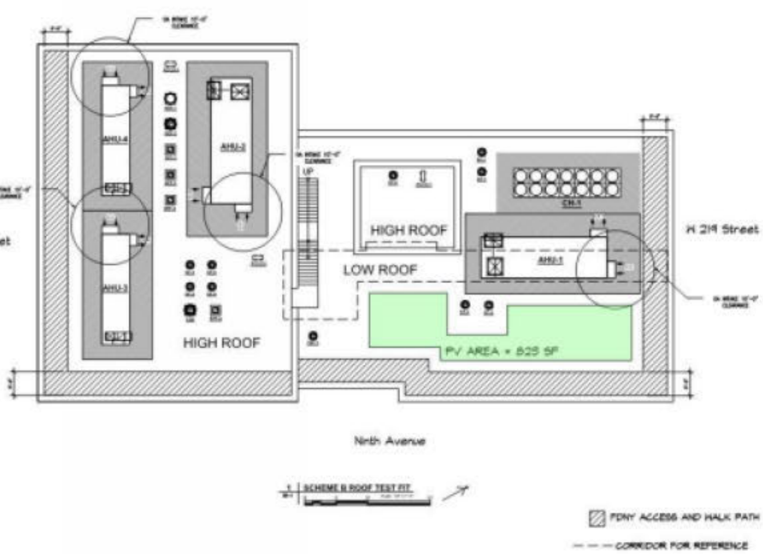
We evaluated the pre-schematic design schemes for solar PV potential. The following drawings consider HVAC equipment clearances (shown as dashed lines) and FDNY for rooftop access requirements for buildings less than 100 feet in height with roof slopes less than 20 degrees from horizontal. Mechanical 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



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 / MOP ROOM
EF-5	CUSTD. 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	KITCHEN SMOKE PURGE
SPF-4	CAFE. SMOKE PURGE
TEF-1	TOILETS
FHE	LAB HOOD EXHAUST

RESULTS

105,642 kWh/Year*

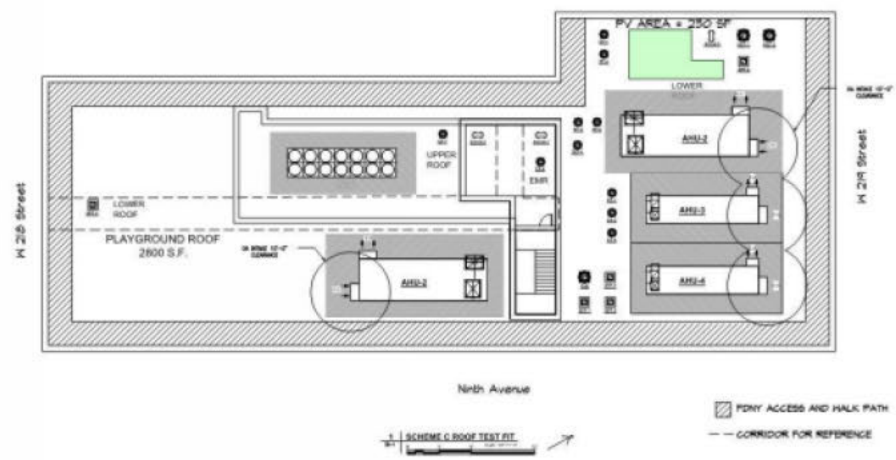
System output may range from 101,406 to 109,181 kWh per year near this location.

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**

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



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 / MOP ROOM
EF-5	CUSTD. 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

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**

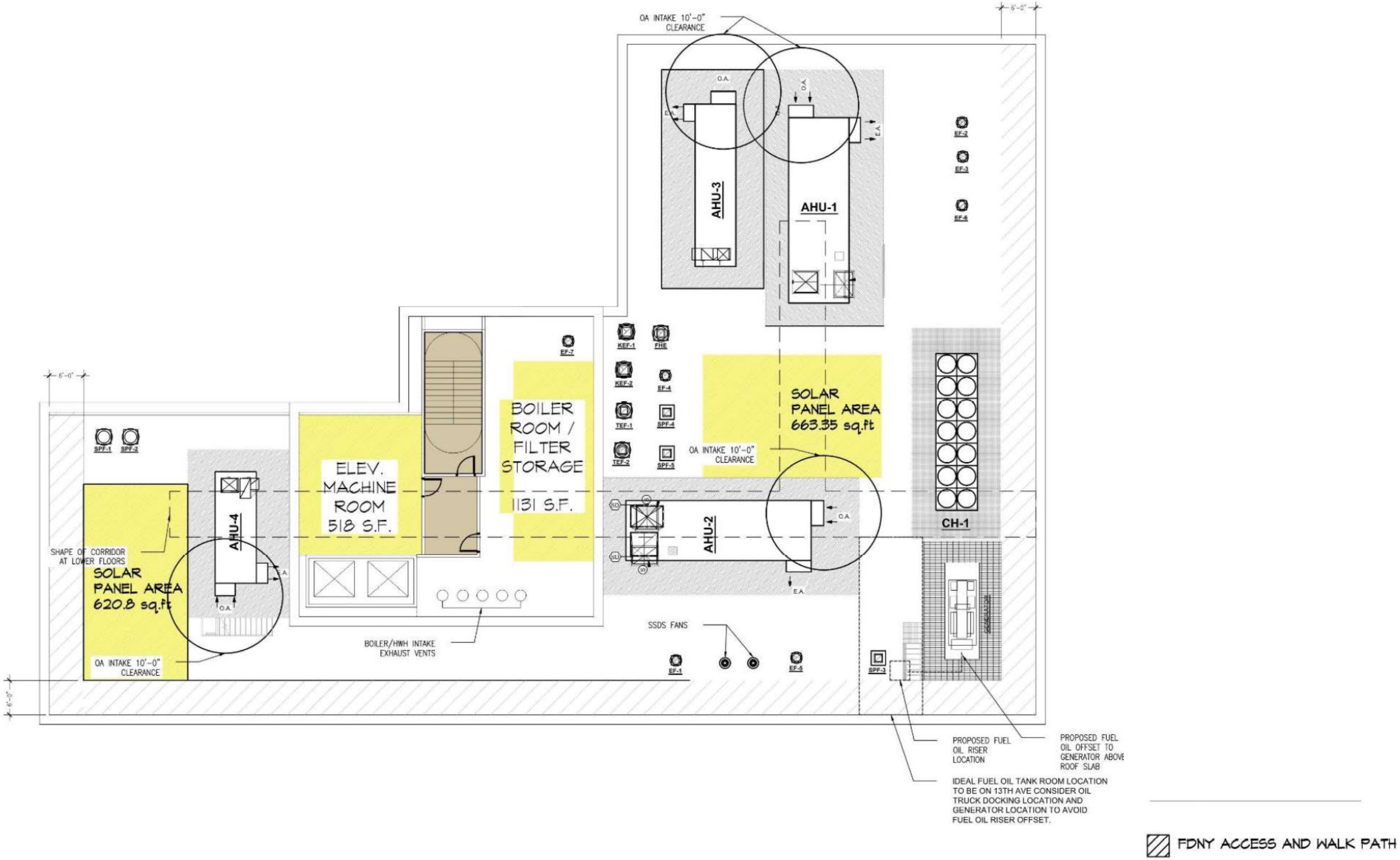
Local Law 94 of 2019 – Sustainable Roofing Zone

Refer to Sustainable Roofing Zone Diagrams below

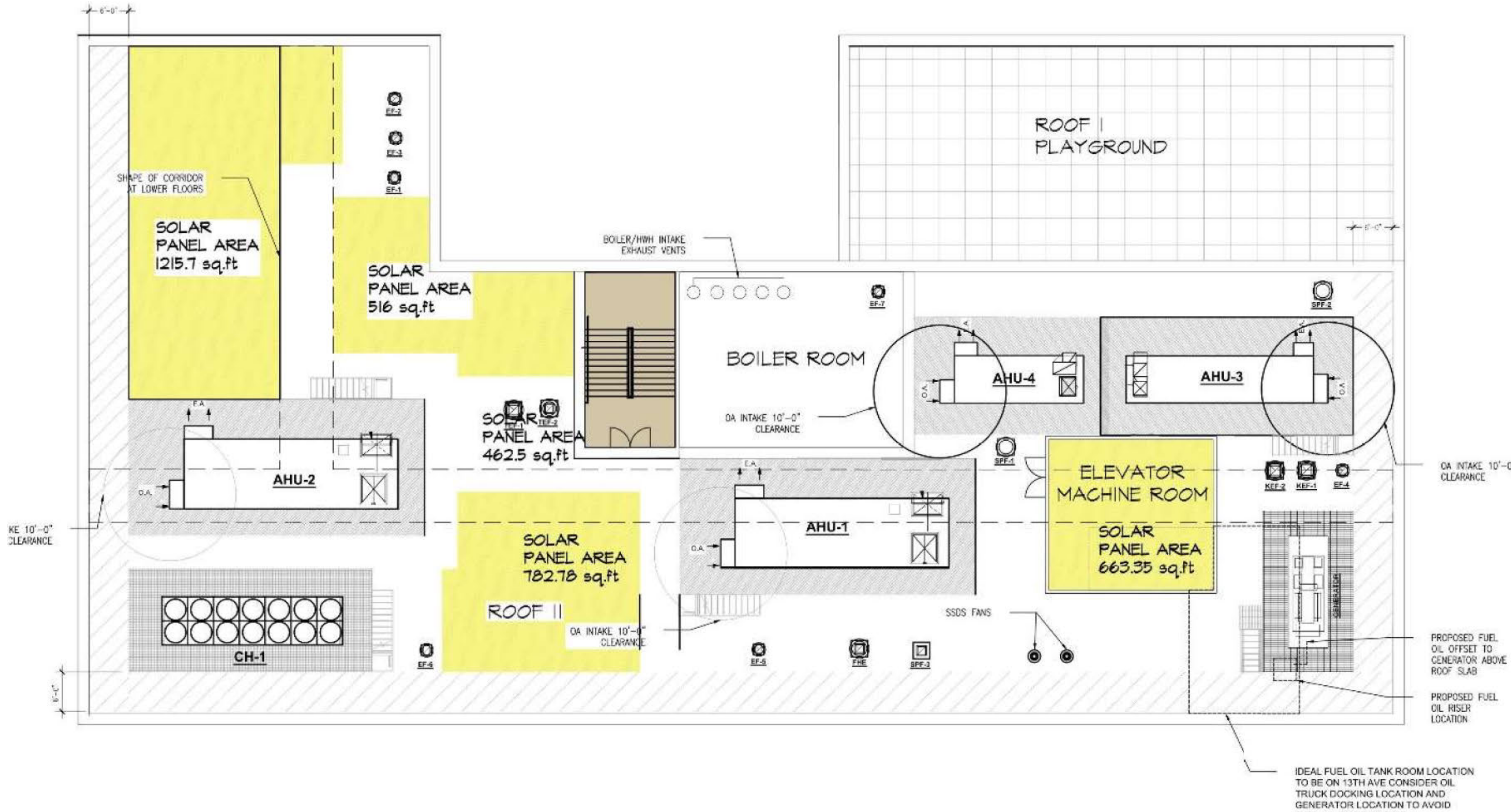
Discovery #1 Scheme A

Energy and Daylight Related Systems

Renewable Energy Analysis

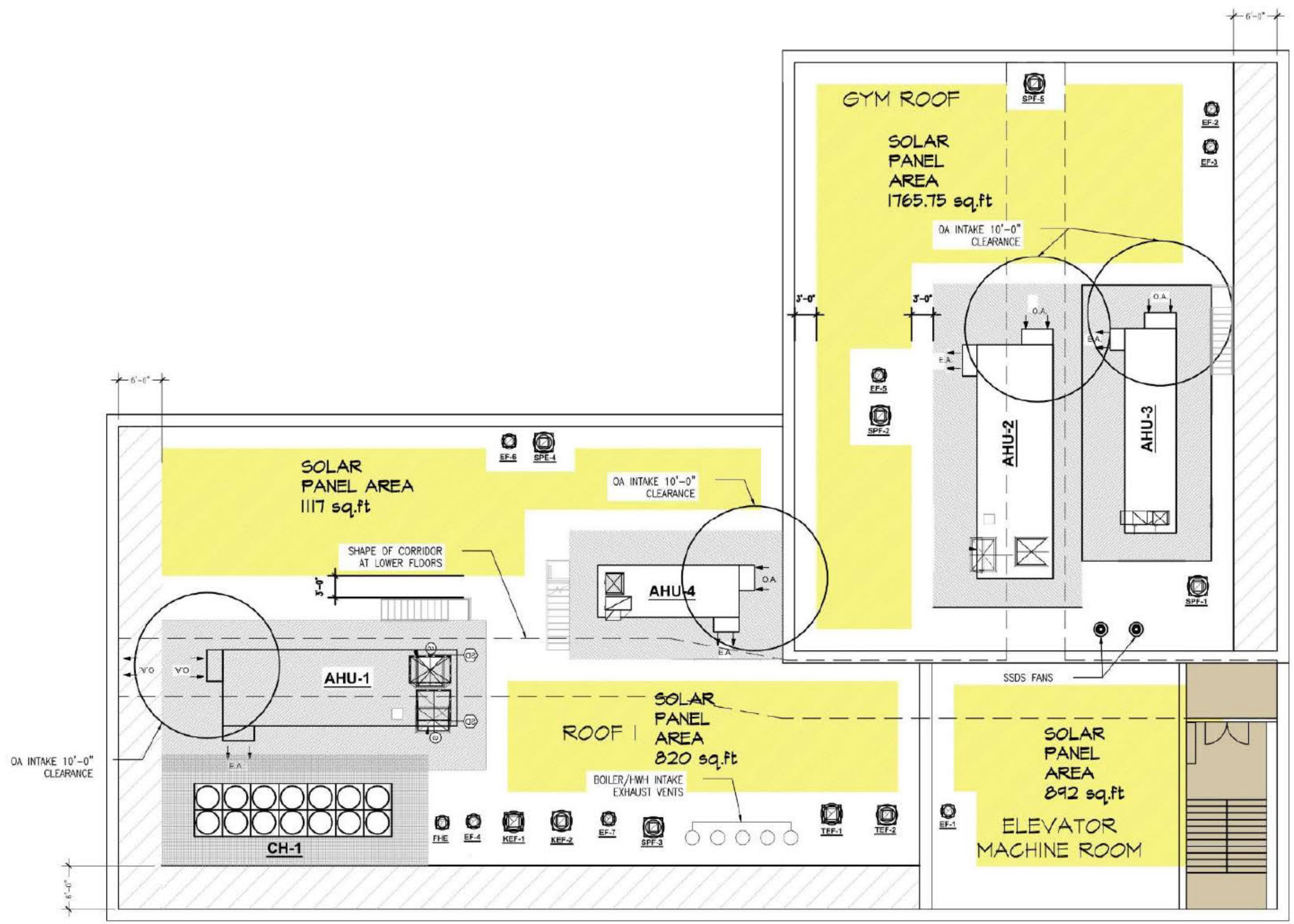


Discovery #1 Scheme B
Energy and Daylight Related Systems
Renewable Energy Analysis



SCA School Construction Authority

Discovery #1 Scheme C
Energy and Daylight Related Systems
Renewable Energy Analysis



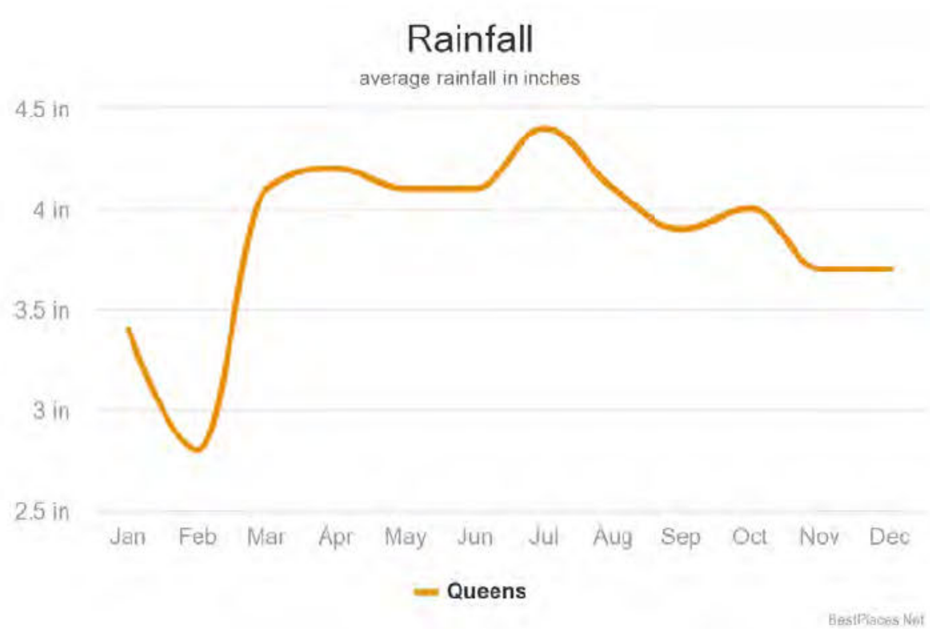
Discovery #2 - Water-Related Systems

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
Annual Rainfall	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 aqual 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" + "Summer 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 PCR 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

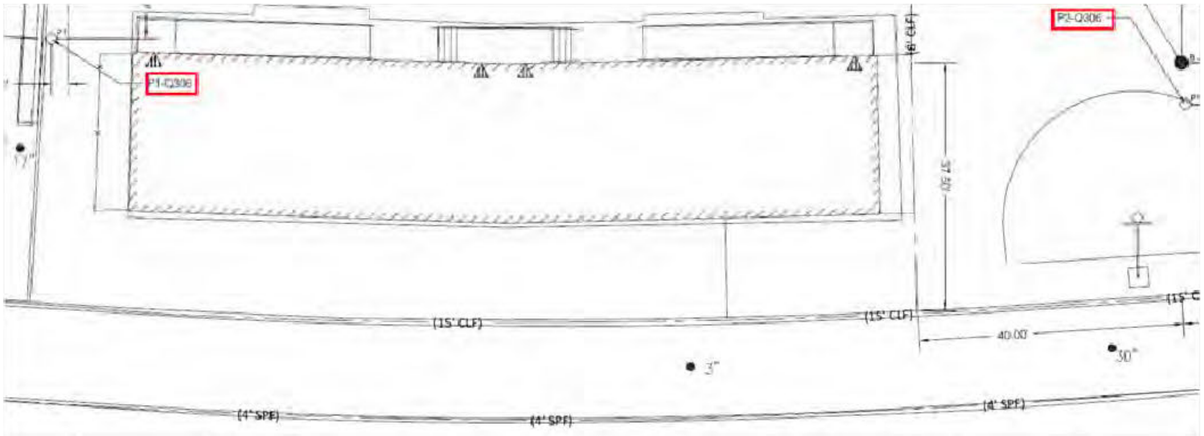
Test Fit / Sketch Study:

- 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.

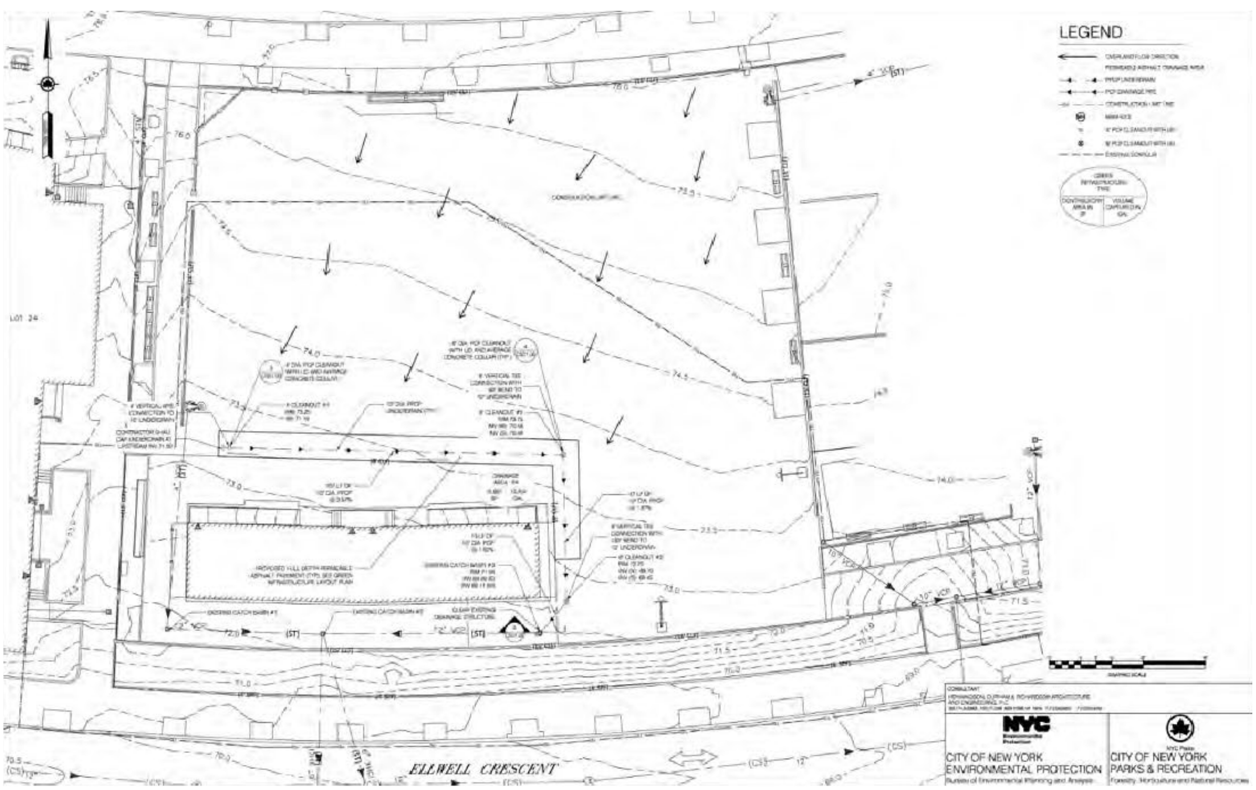
Documentation from DEP Green Infrastructure project Q306-2, previously planned for Painters Playground, is shown below.

- 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

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

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

Integrative Design Report and Recommendations

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

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

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	20,00000	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		2,213.07	

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

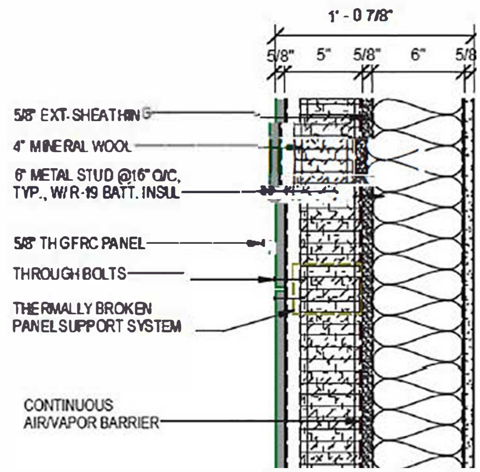
Sanitary Flow (cfs)	Population Density per Acre	Site Area (sq.ft.)	Gallons Per Person Per Day	Peak
0.0142	10,000	20,000.00	1	2

DISCOVERY #3 PRELIMINARY LIFE-CYCLE IMPACTS

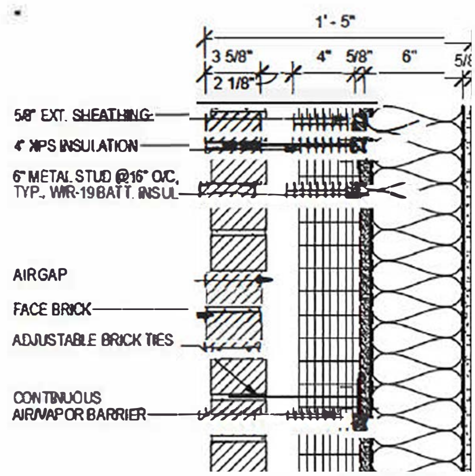
Comparative life-cycle assessment of potential wall systems was investigated in the Athena software.

The LCA comparison is between:

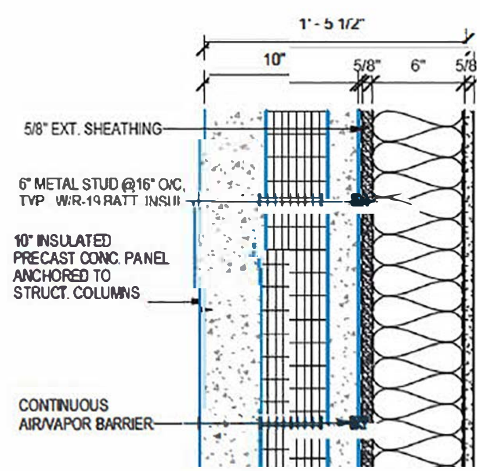
- BASE: Brick/CMU Cavity wall
- OPTION #1: Fiber Cement Panel On Metal Stud
- OPTION #2: Modular Brick On Metal Stud
- OPTION #3: Precast Concrete Panels On Metal Stud



OPTION 1
Fiber Cement Panel On Mtl Stud

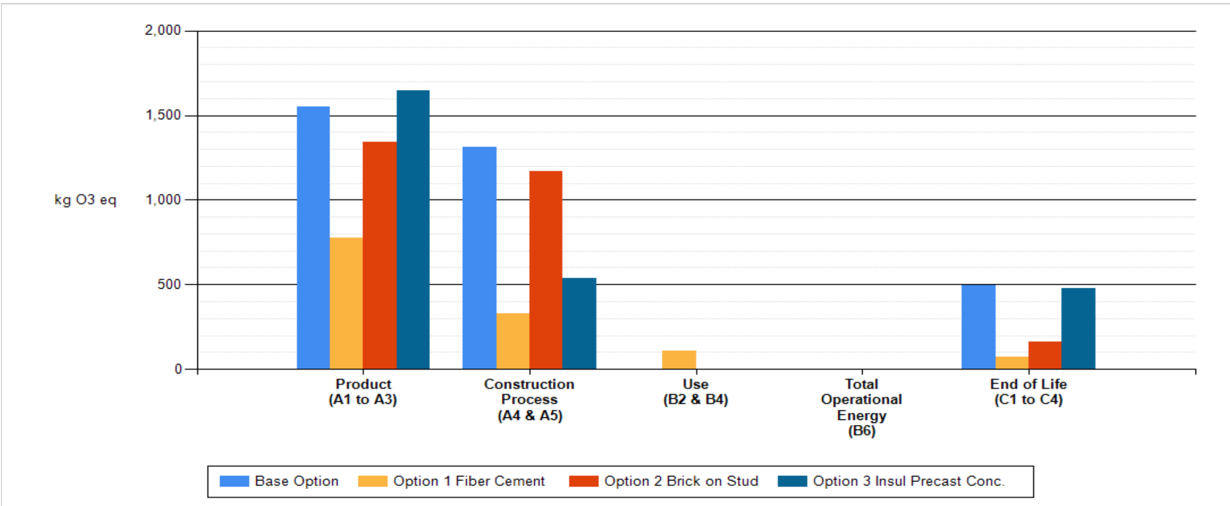


OPTION 2
Modular Brick On Mtl Stud



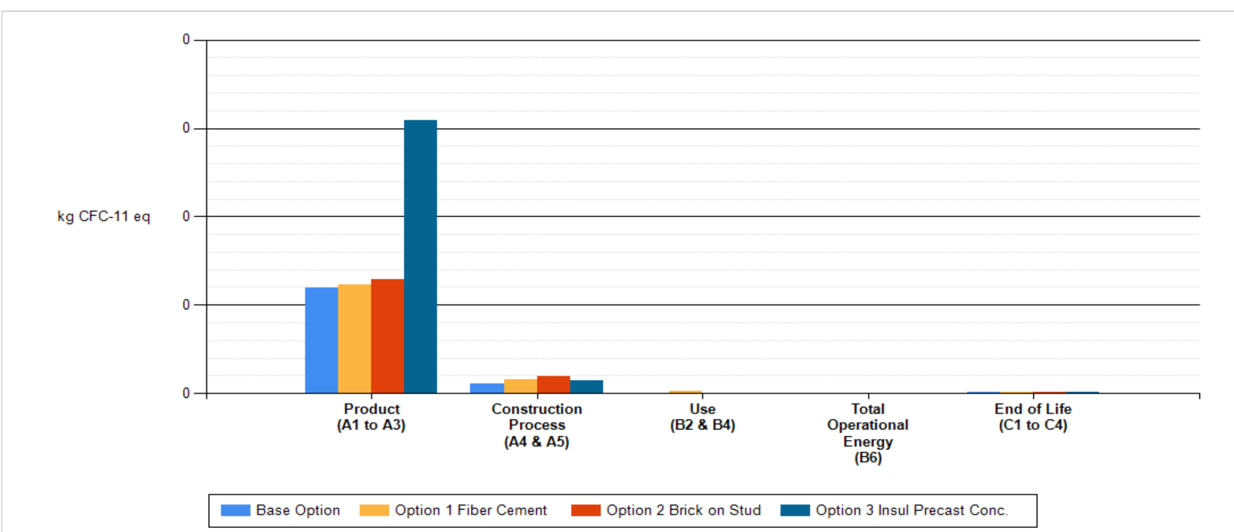
OPTION 3
Precast Concrete Panels On Mtl Stud

Comparison of Smog Potential By Life Cycle Stage



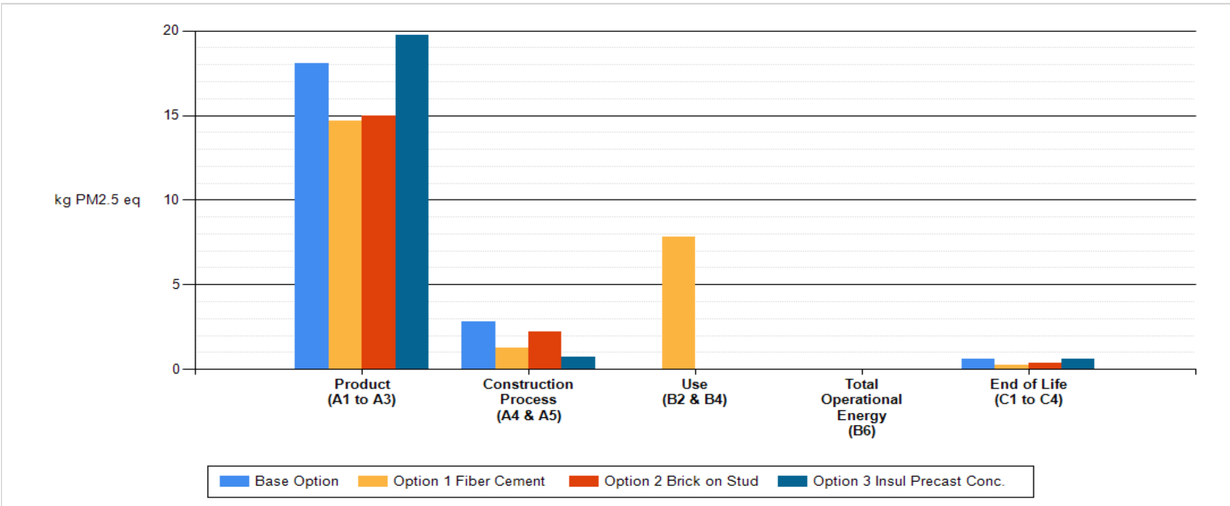
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg O3 eq	1.55E+03	1.31E+03	0.00E+00	0.00E+00	4.94E+02	**3.35E+03**
Option 1 Fiber Cement	kg O3 eq	7.75E+02	3.30E+02	1.05E+02	0.00E+00	7.44E+01	**1.28E+03**
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



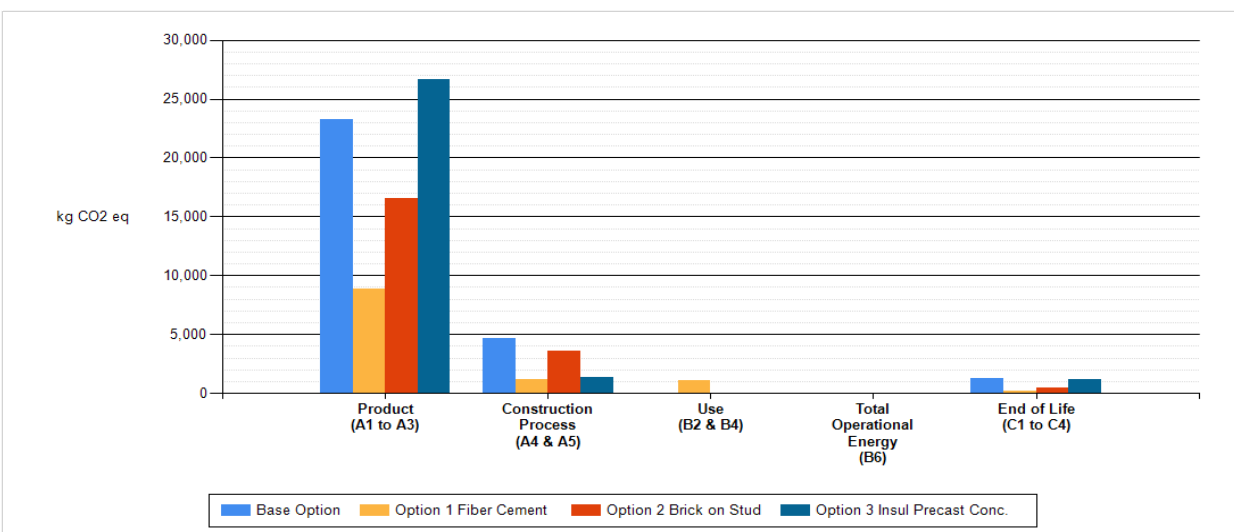
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CFC-11 eq	2.40E-04	2.28E-05	0.00E+00	0.00E+00	4.94E-08	**2.63E-04**
Option 1 Fiber Cement	kg CFC-11 eq	2.45E-04	3.20E-05	4.50E-06	0.00E+00	8.28E-09	**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



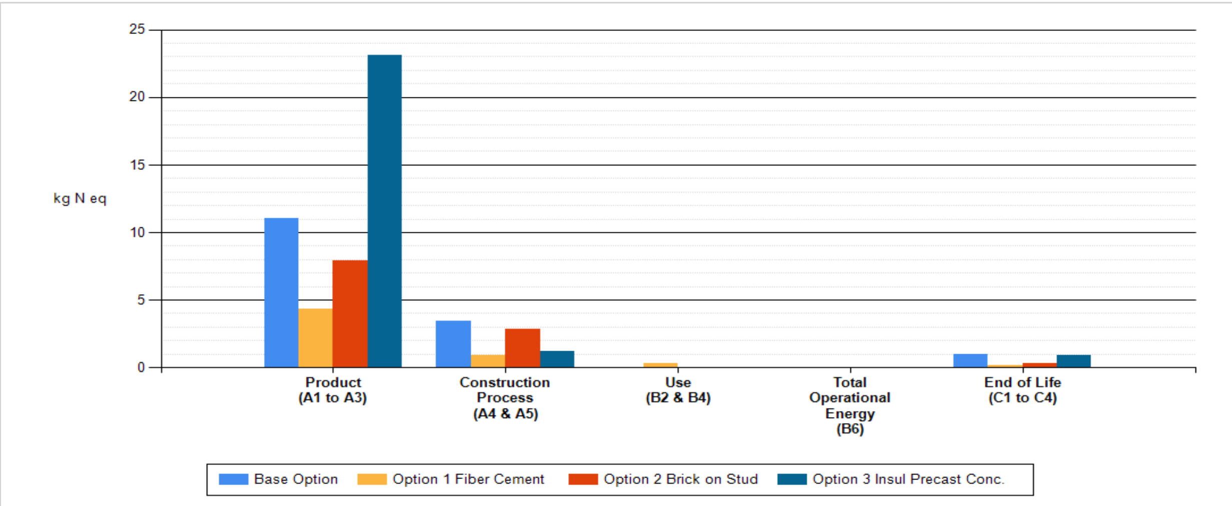
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg PM2.5 eq	1.81E+01	2.82E+00	0.00E+00	0.00E+00	5.78E-01	**2.15E+01**
Option 1 Fiber Cement	kg PM2.5 eq	1.47E+01	1.28E+00	7.84E+00	0.00E+00	2.48E-01	**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



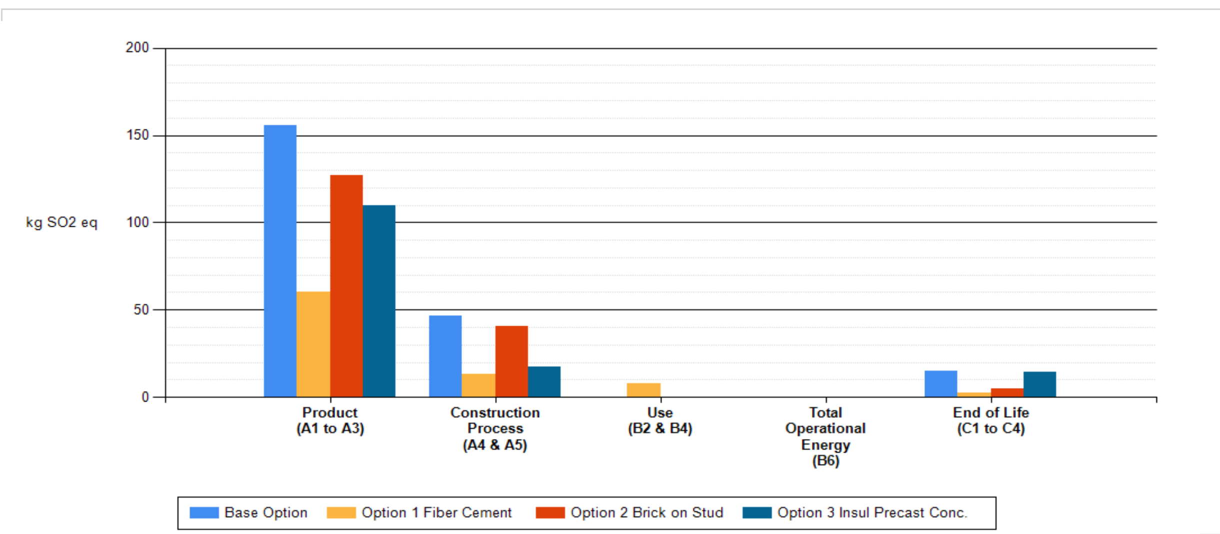
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CO2 eq	2.32E+04	4.67E+03	0.00E+00	0.00E+00	1.24E+03	**2.91E+04**
Option 1 Fiber Cement	kg CO2 eq	8.88E+03	1.22E+03	1.04E+03	0.00E+00	2.08E+02	**1.13E+04**
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



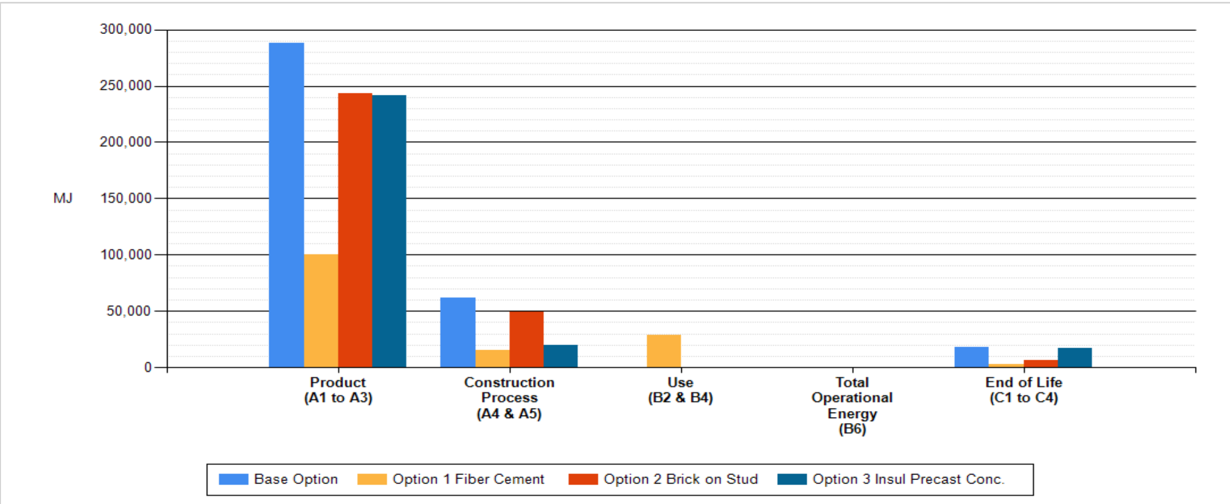
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg N eq	1.10E+01	3.41E+00	0.00E+00	0.00E+00	9.44E-01	**1.54E+01**
Option 1 Fiber Cement	kg N eq	4.36E+00	8.73E-01	3.00E-01	0.00E+00	1.43E-01	**5.68E+00**
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



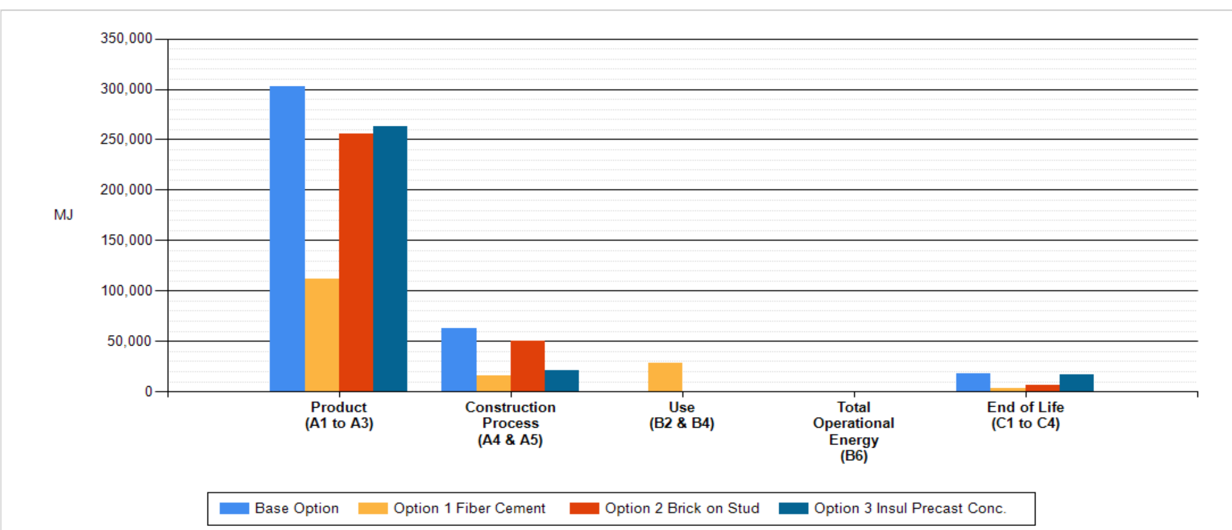
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg SO2 eq	1.56E+02	4.64E+01	0.00E+00	0.00E+00	1.51E+01	**2.17E+02**
Option 1 Fiber Cement	kg SO2 eq	6.01E+01	1.29E+01	7.89E+00	0.00E+00	2.30E+00	**8.32E+01**
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



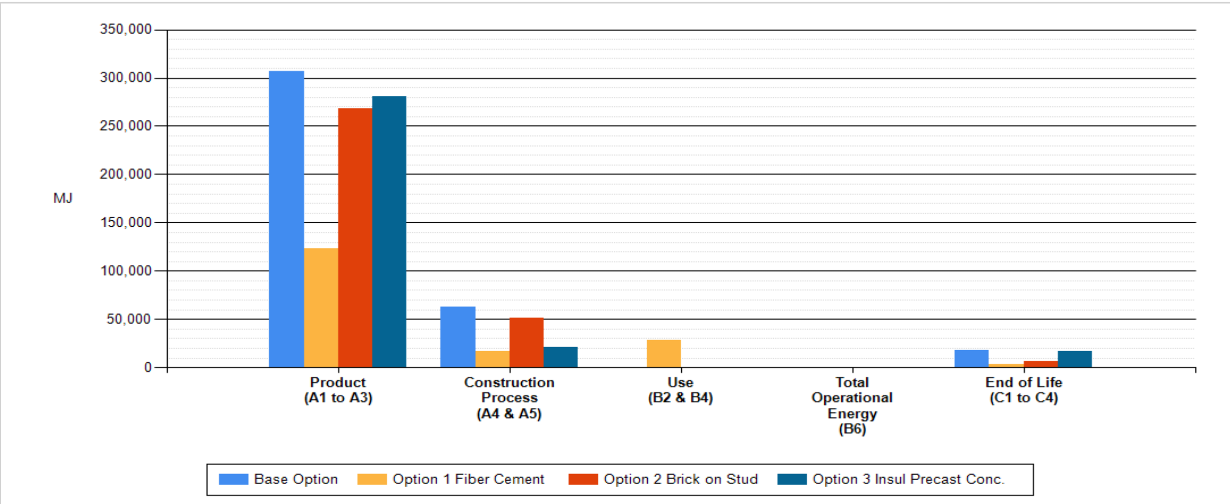
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	2.88E+05	6.17E+04	0.00E+00	0.00E+00	1.82E+04	**3.68E+05**
Option 1 Fiber Cement	MJ	9.99E+04	1.52E+04	2.83E+04	0.00E+00	3.04E+03	**1.46E+05**
Option 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**

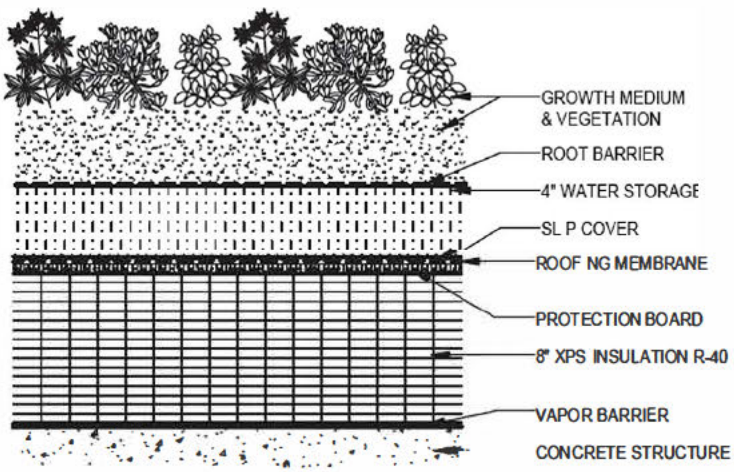
Project teams are to refer to the SCA LCA Impact Assessment Guidelines for instructions on correctly documenting the LCA considerations impacts for all wall and roof envelope assemblies.

DISCOVERY #3 PRELIMINARY LIFE-CYCLE IMPACTS

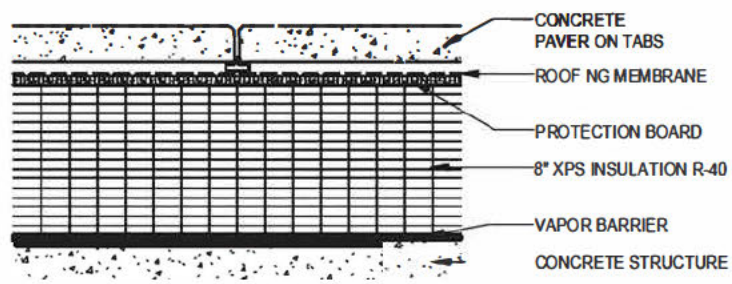
Comparative life-cycle assessment of potential roof systems was investigated in the Athena software.

The LCA comparison is between:

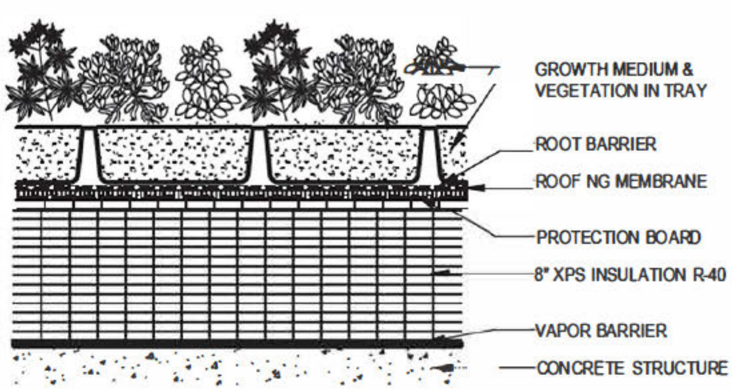
BASE Roof Option
OPTION #1: Blue Roof Seedums
OPTION #2: Green Roof Paver Area
OPTION #3: Green Roof Seedums



Blue Roof Seedums **OPTION 1**

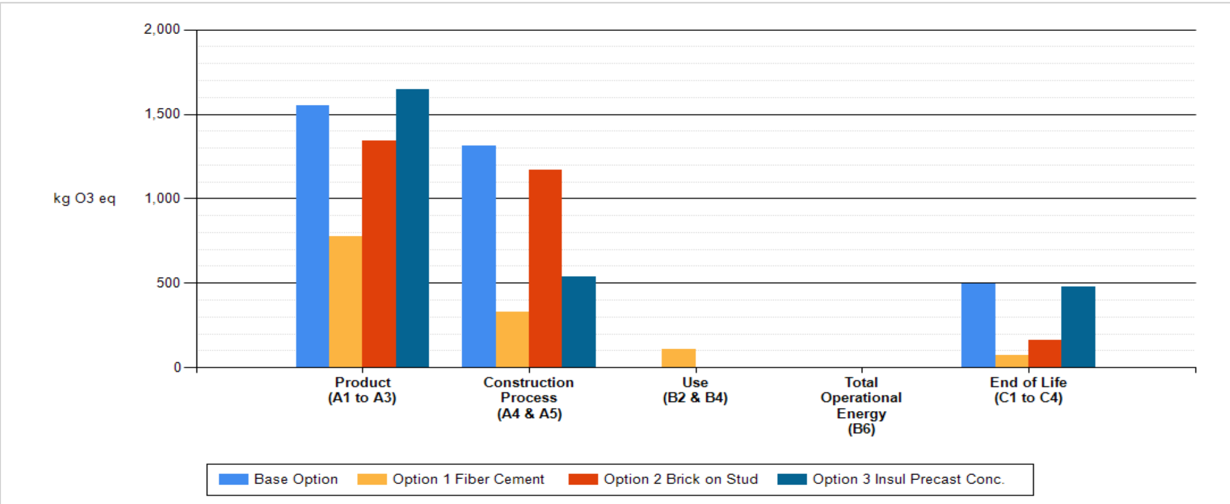


SCA Standard Roof **OPTION 2**



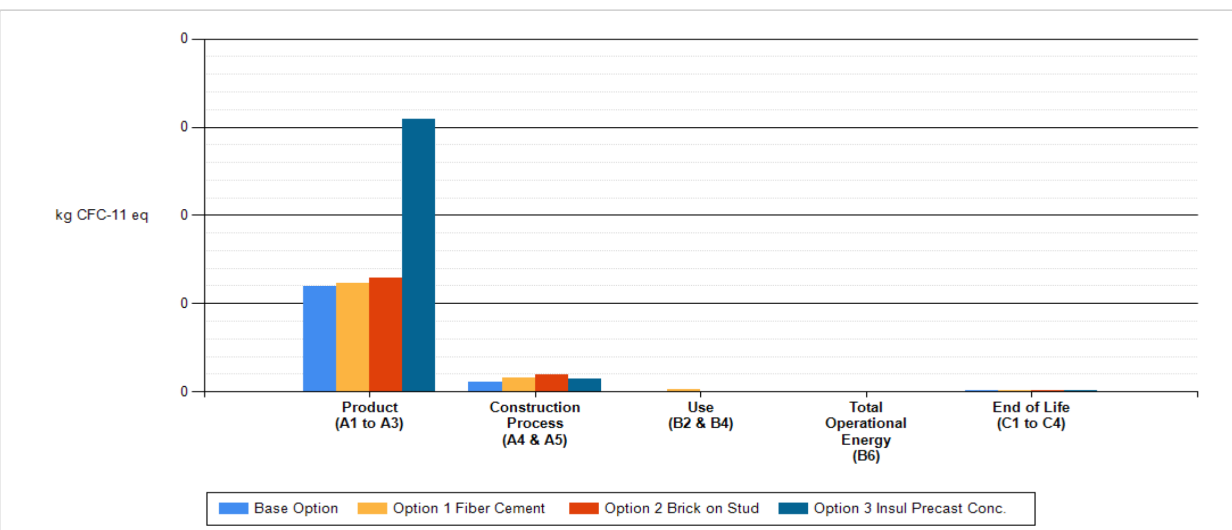
Green Roof Seedums **OPTION 3**

Comparison of Smog Potential By Life Cycle Stage



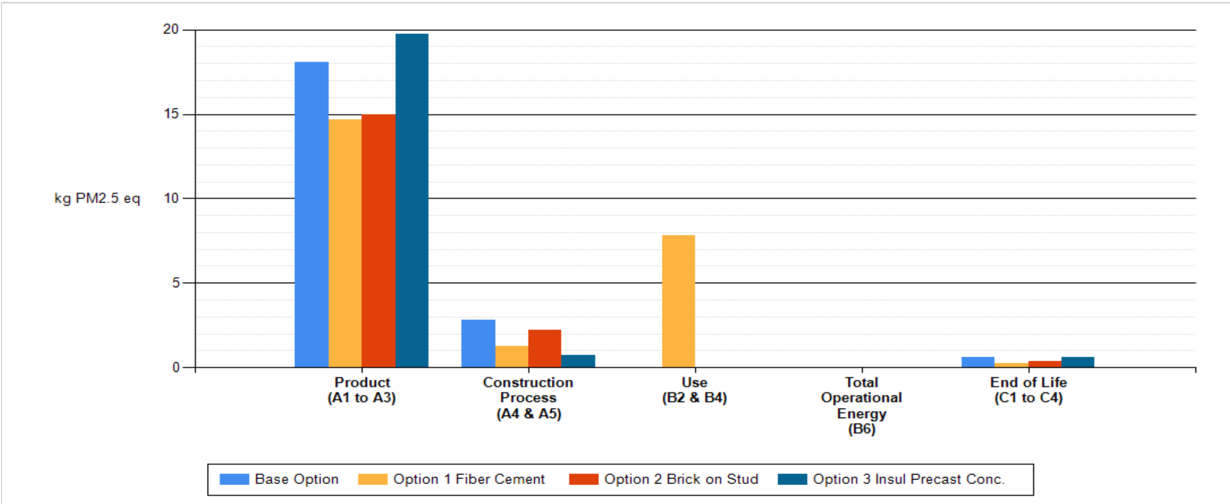
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg O3 eq	1.55E+03	1.31E+03	0.00E+00	0.00E+00	4.94E+02	**3.35E+03**
Option 1 Fiber Cement	kg O3 eq	7.75E+02	3.30E+02	1.05E+02	0.00E+00	7.44E+01	**1.28E+03**
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



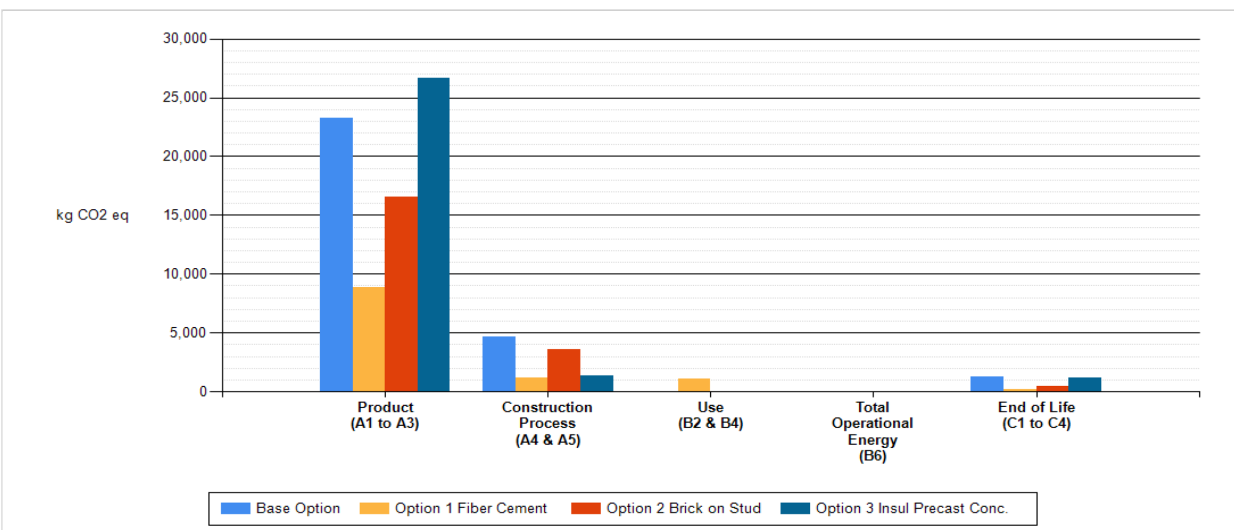
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CFC-11 eq	2.40E-04	2.28E-05	0.00E+00	0.00E+00	4.94E-08	**2.63E-04**
Option 1 Fiber Cement	kg CFC-11 eq	2.45E-04	3.20E-05	4.50E-06	0.00E+00	8.28E-09	**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



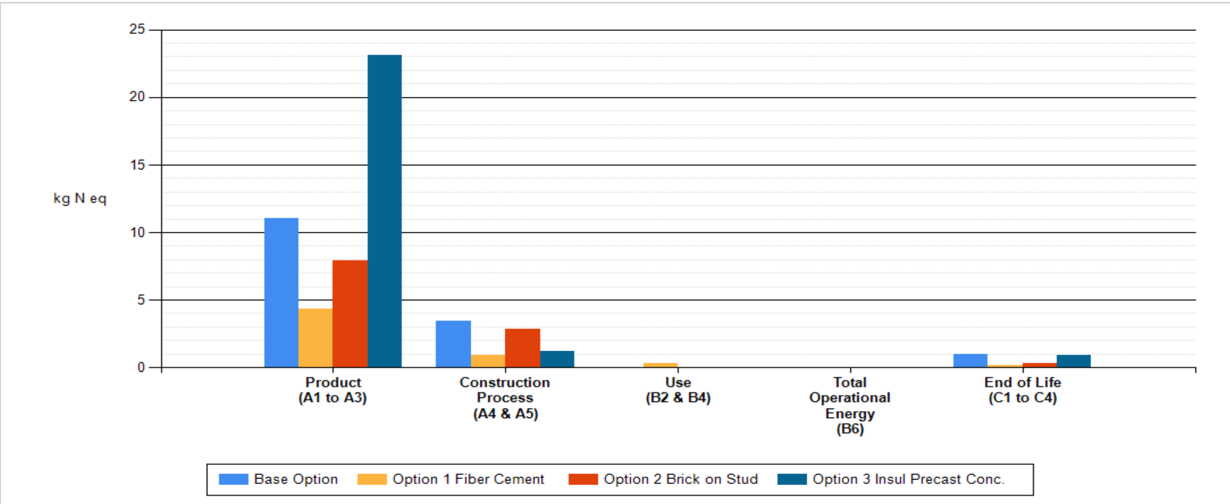
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg PM2.5 eq	1.81E+01	2.82E+00	0.00E+00	0.00E+00	5.78E-01	**2.15E+01**
Option 1 Fiber Cement	kg PM2.5 eq	1.47E+01	1.28E+00	7.84E+00	0.00E+00	2.48E-01	**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



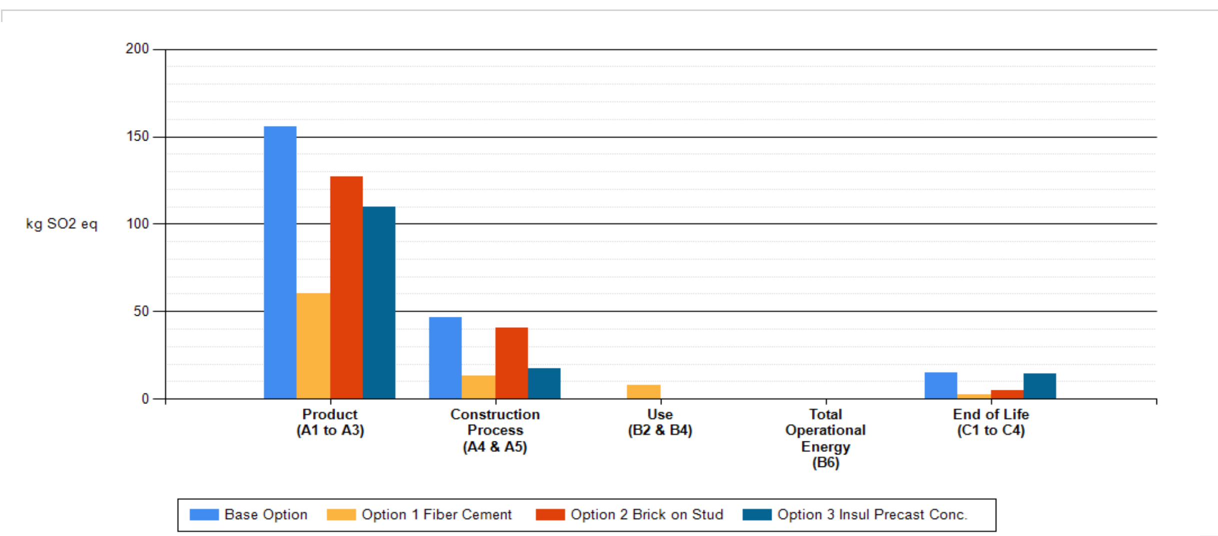
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg CO2 eq	2.32E+04	4.67E+03	0.00E+00	0.00E+00	1.24E+03	**2.91E+04**
Option 1 Fiber Cement	kg CO2 eq	8.88E+03	1.22E+03	1.04E+03	0.00E+00	2.08E+02	**1.13E+04**
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



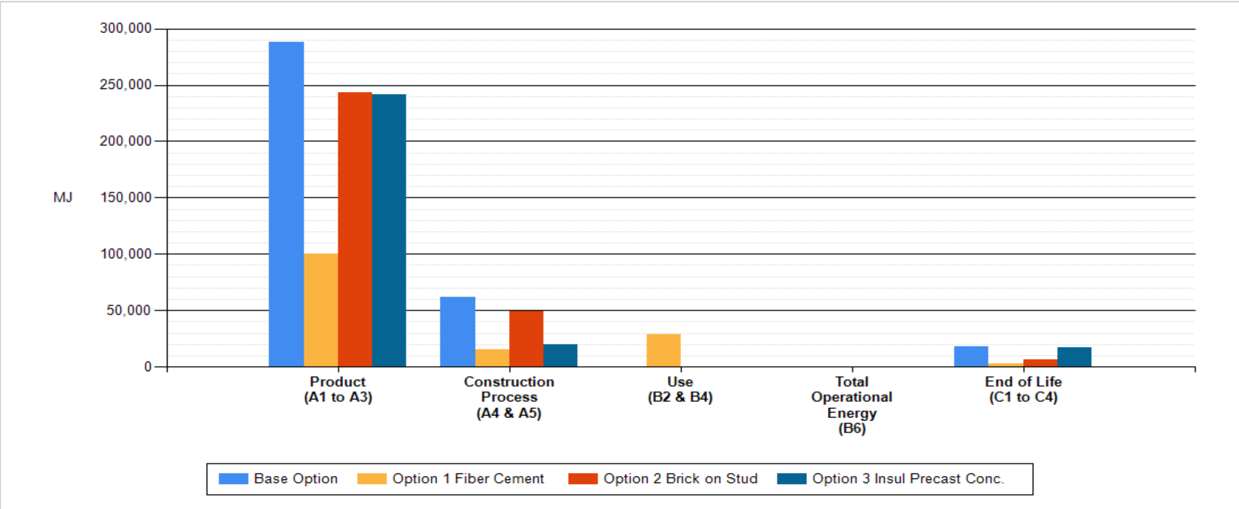
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg N eq	1.10E+01	3.41E+00	0.00E+00	0.00E+00	9.44E-01	**1.54E+01**
Option 1 Fiber Cement	kg N eq	4.36E+00	8.73E-01	3.00E-01	0.00E+00	1.43E-01	**5.68E+00**
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



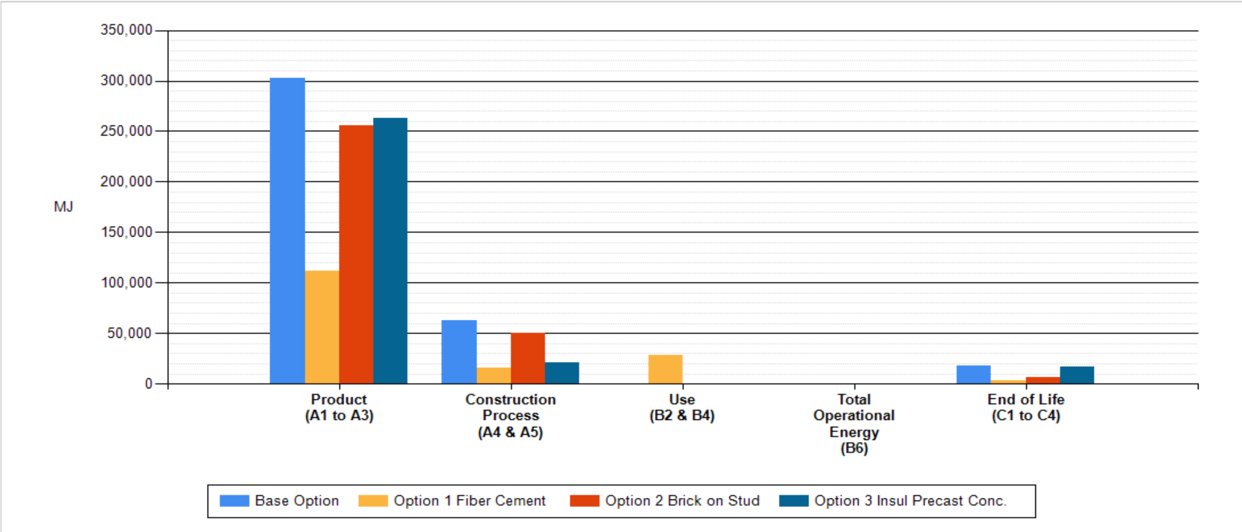
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	kg SO2 eq	1.56E+02	4.64E+01	0.00E+00	0.00E+00	1.51E+01	**2.17E+02**
Option 1 Fiber Cement	kg SO2 eq	6.01E+01	1.29E+01	7.89E+00	0.00E+00	2.30E+00	**8.32E+01**
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



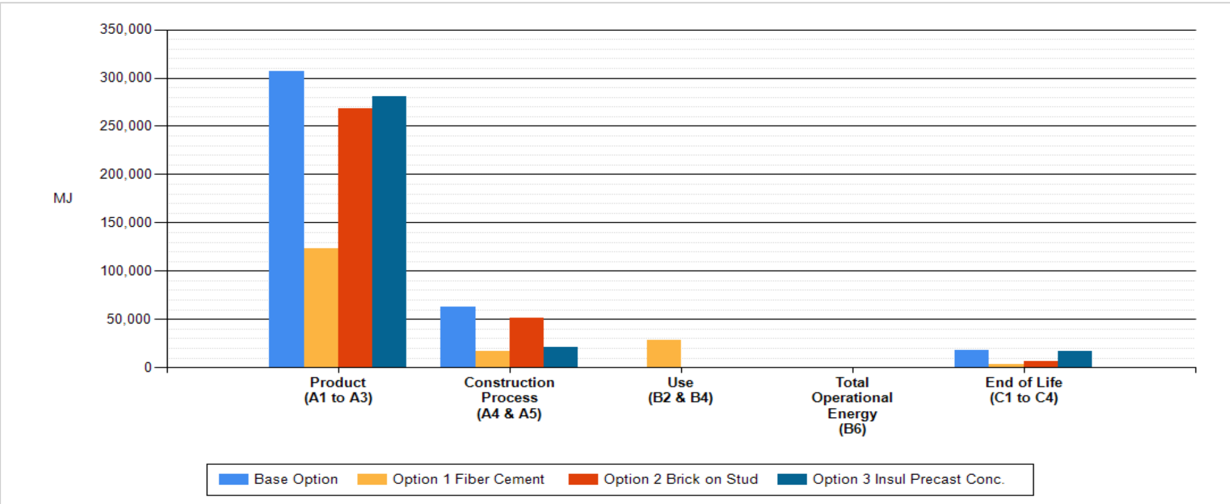
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	2.88E+05	6.17E+04	0.00E+00	0.00E+00	1.82E+04	**3.68E+05**
Option 1 Fiber Cement	MJ	9.99E+04	1.52E+04	2.83E+04	0.00E+00	3.04E+03	**1.46E+05**
Option 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

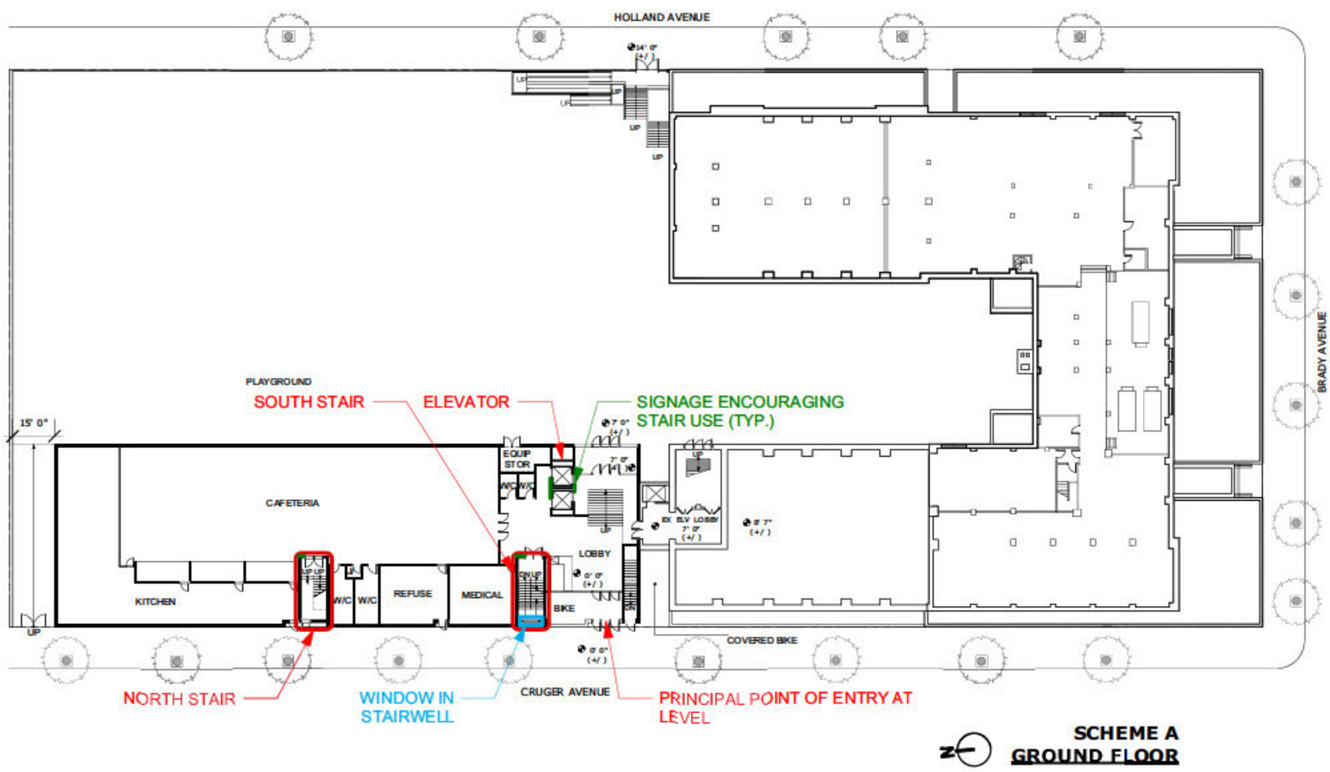


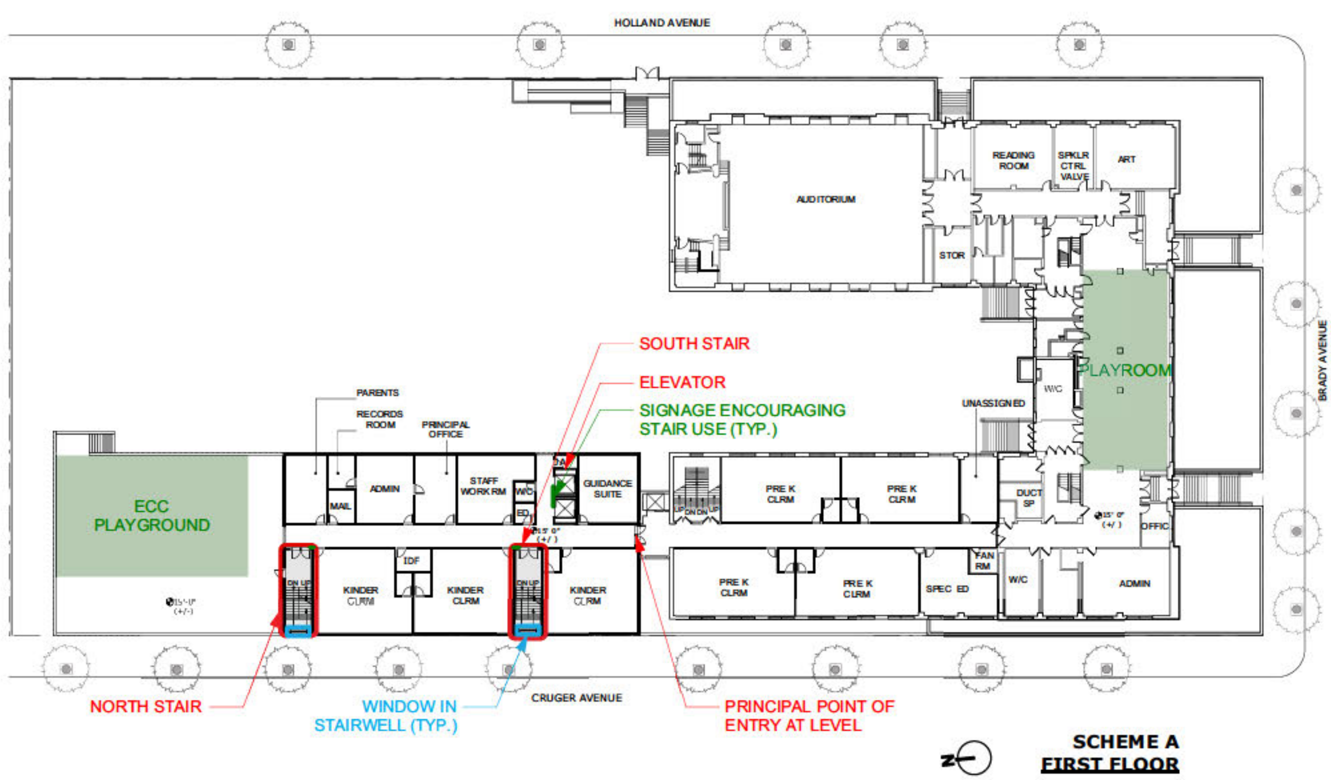
Project Name	Unit	Product (A1 to A3)	Construction Process (A4 & A5)	Use (B2 & B4)	Total Operational Energy (B6)	End of Life (C1 to C4)	Total
Base Option	MJ	3.07E+05	6.30E+04	0.00E+00	0.00E+00	1.82E+04	**3.88E+05**
Option 1 Fiber Cement	MJ	1.23E+05	1.69E+04	2.83E+04	0.00E+00	3.05E+03	**1.71E+05**
Option 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

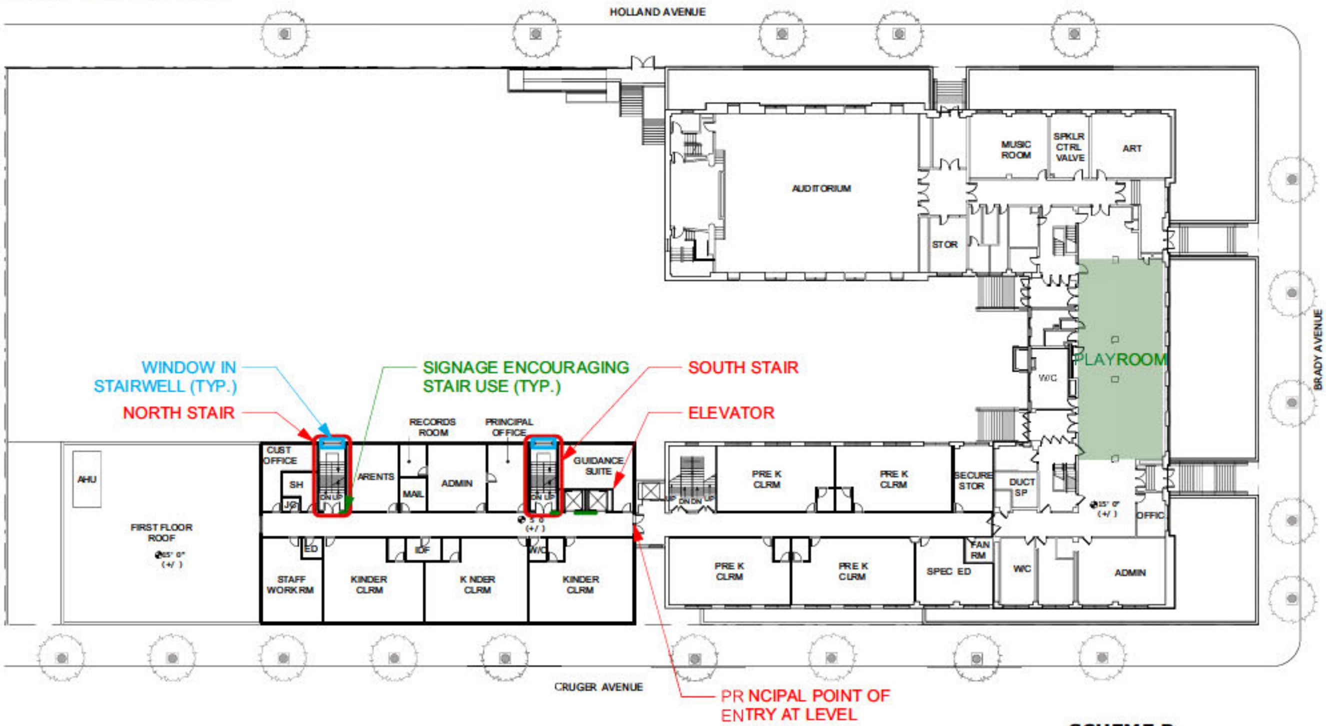
ACTIVE DESIGN

SCHEME A DIAGRAMS

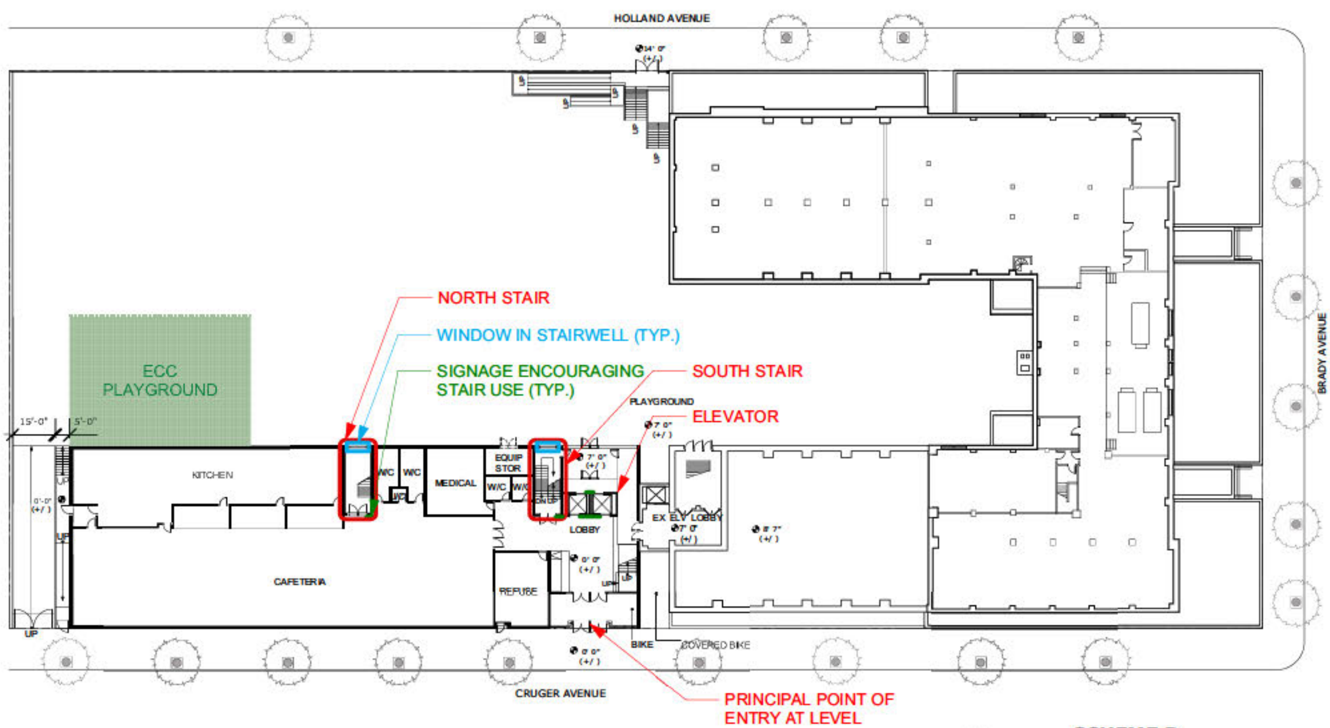




SCHEME B DIAGRAMS

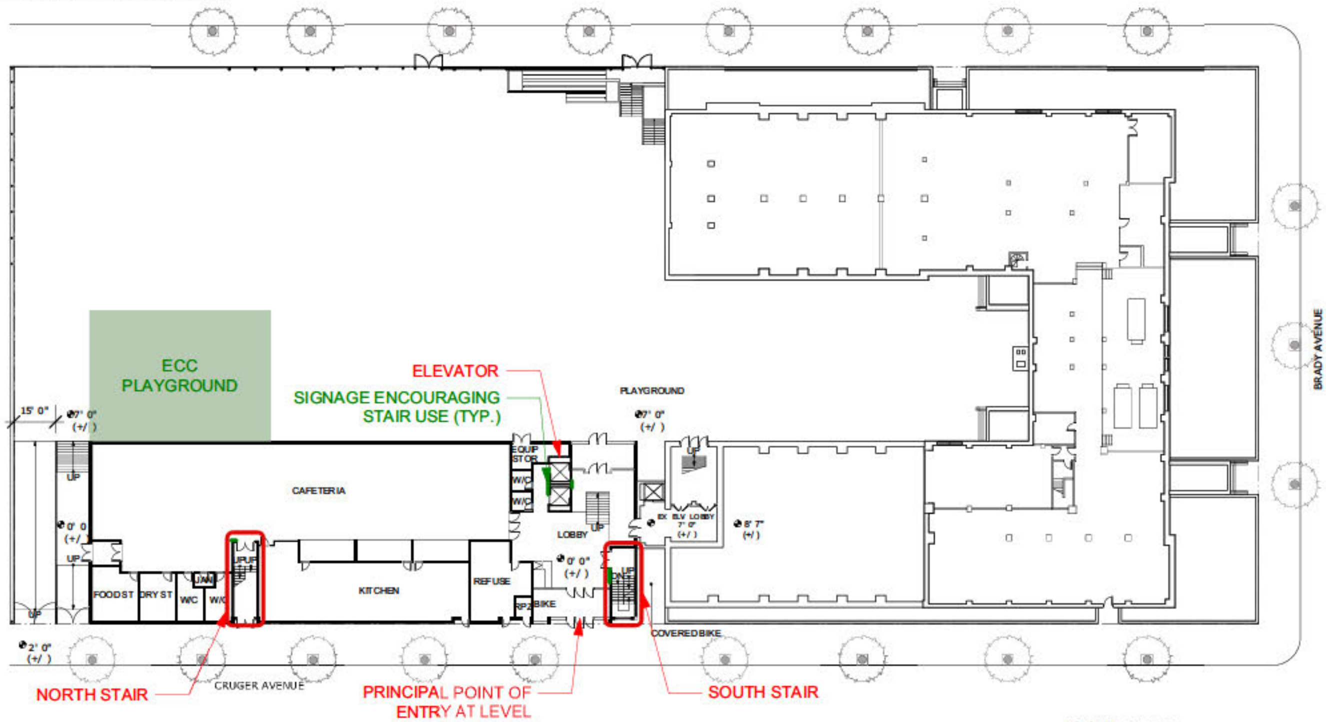


SCHEME B
FIRST FLOOR

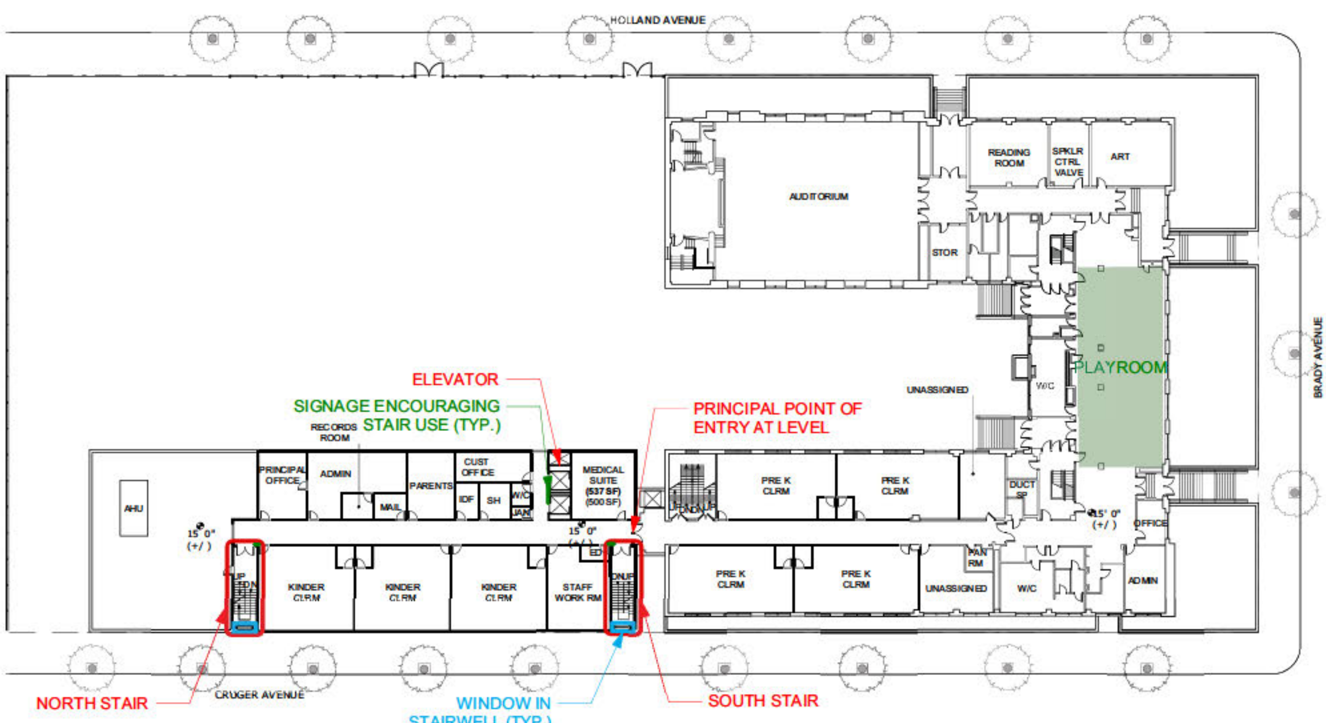


SCHEME B
GROUND FLOOR

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

FINDINGS

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**

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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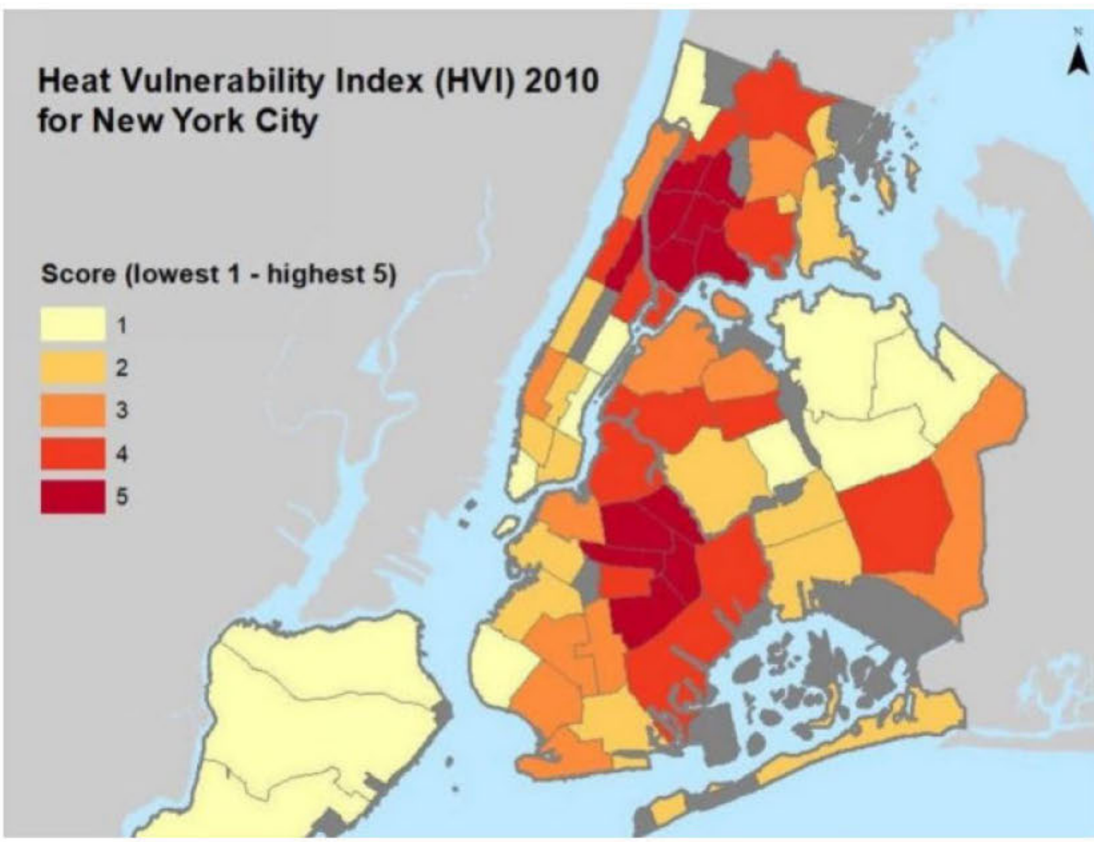
Integrative Design Report and Recommendations

7.0 Discovery #6 Climate Resiliency

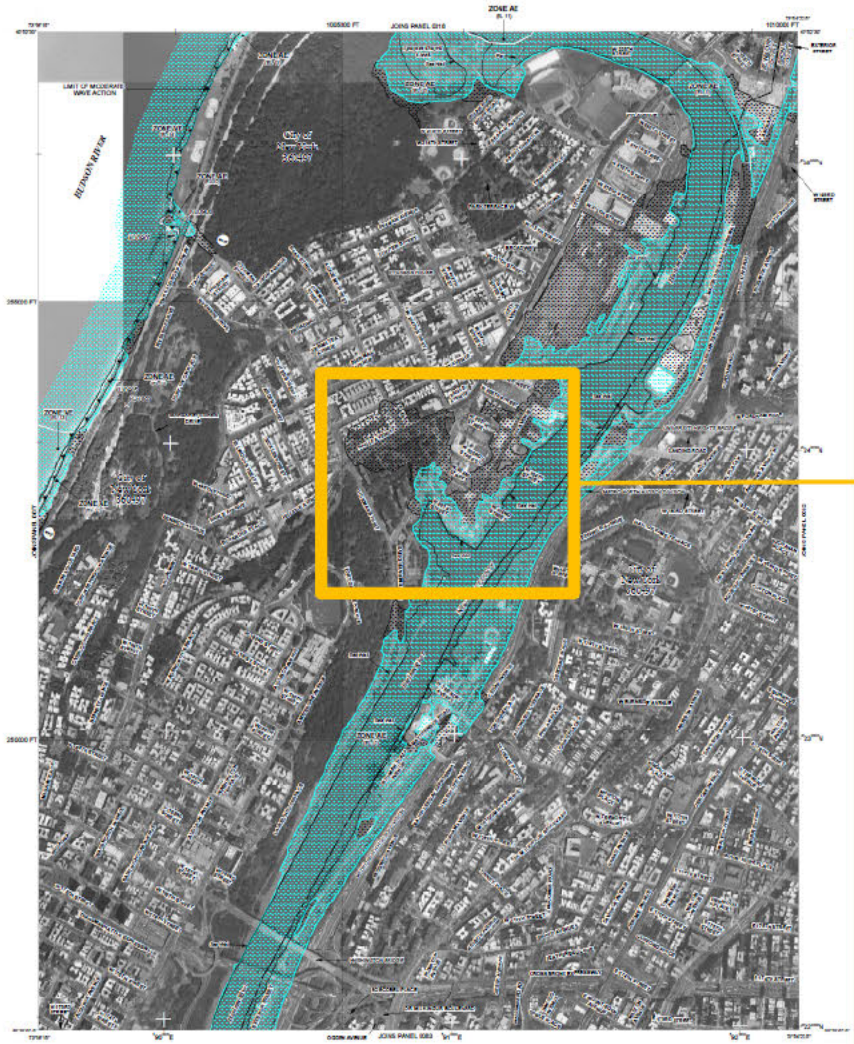
7.1 Narrative Summary

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



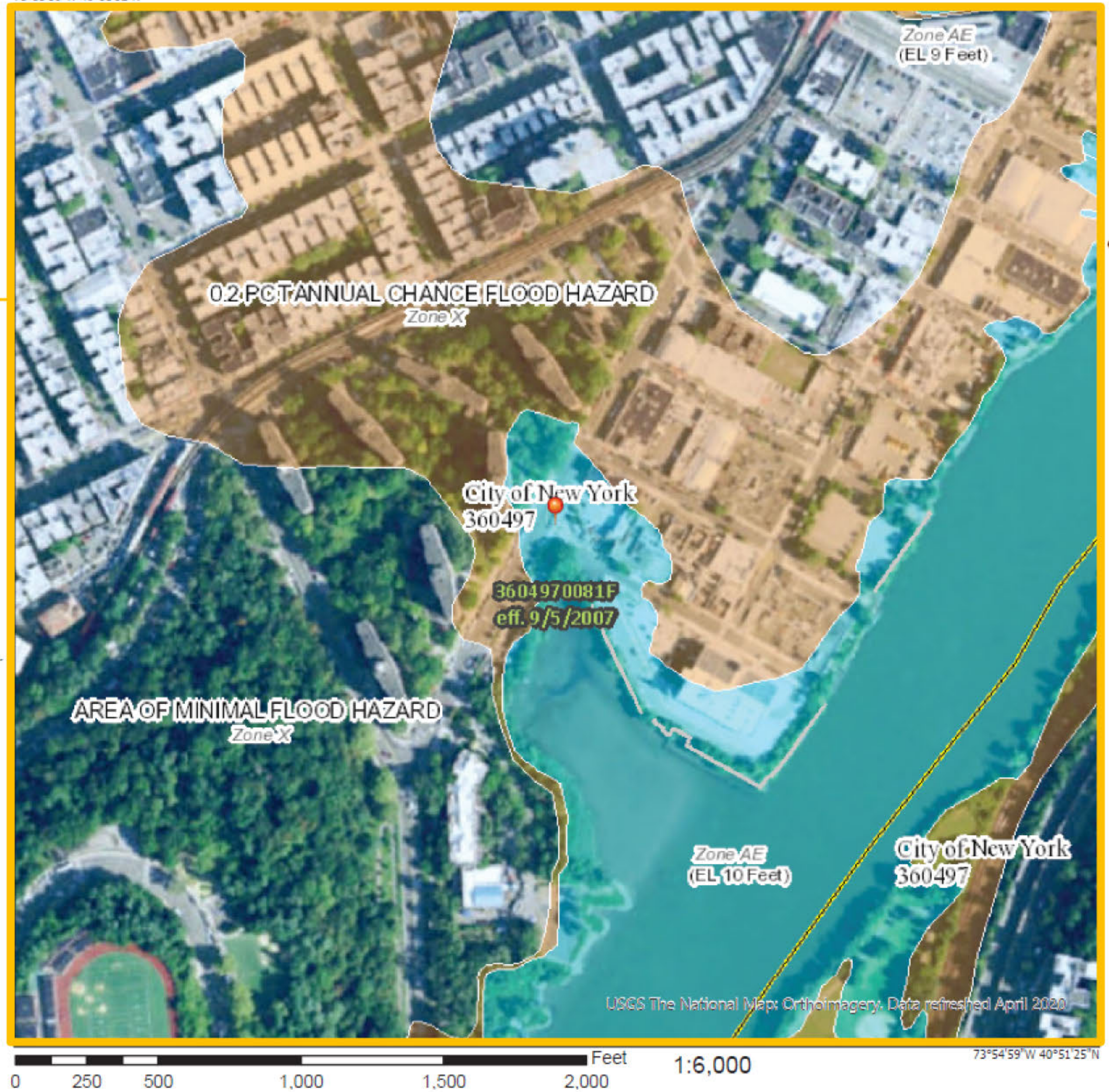
Pre-FIRM and FEMA Maps:



National Flood Hazard Layer FIRMette

FEMA

73°55'36"W 40°51'52"N



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
- 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.

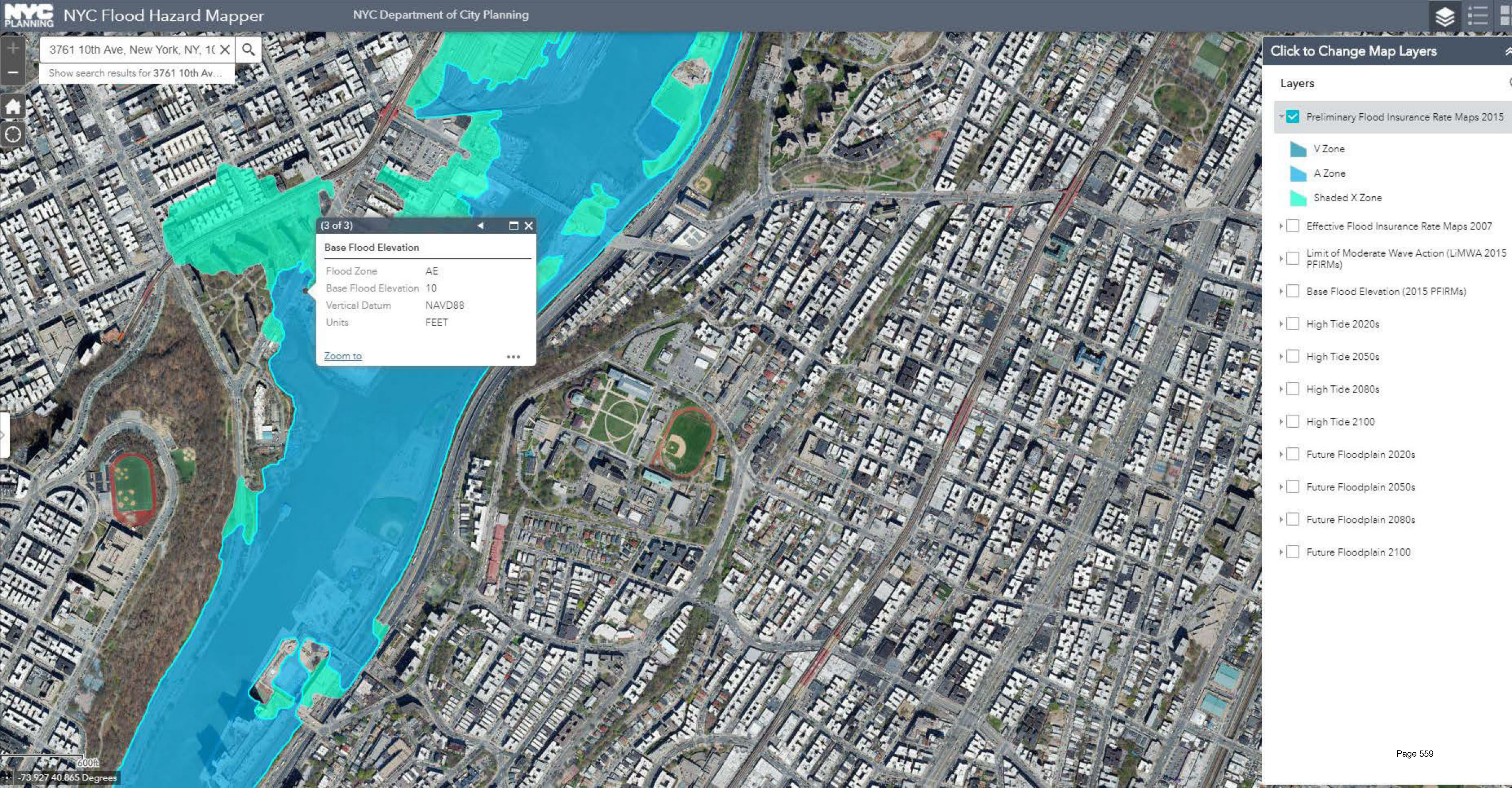
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

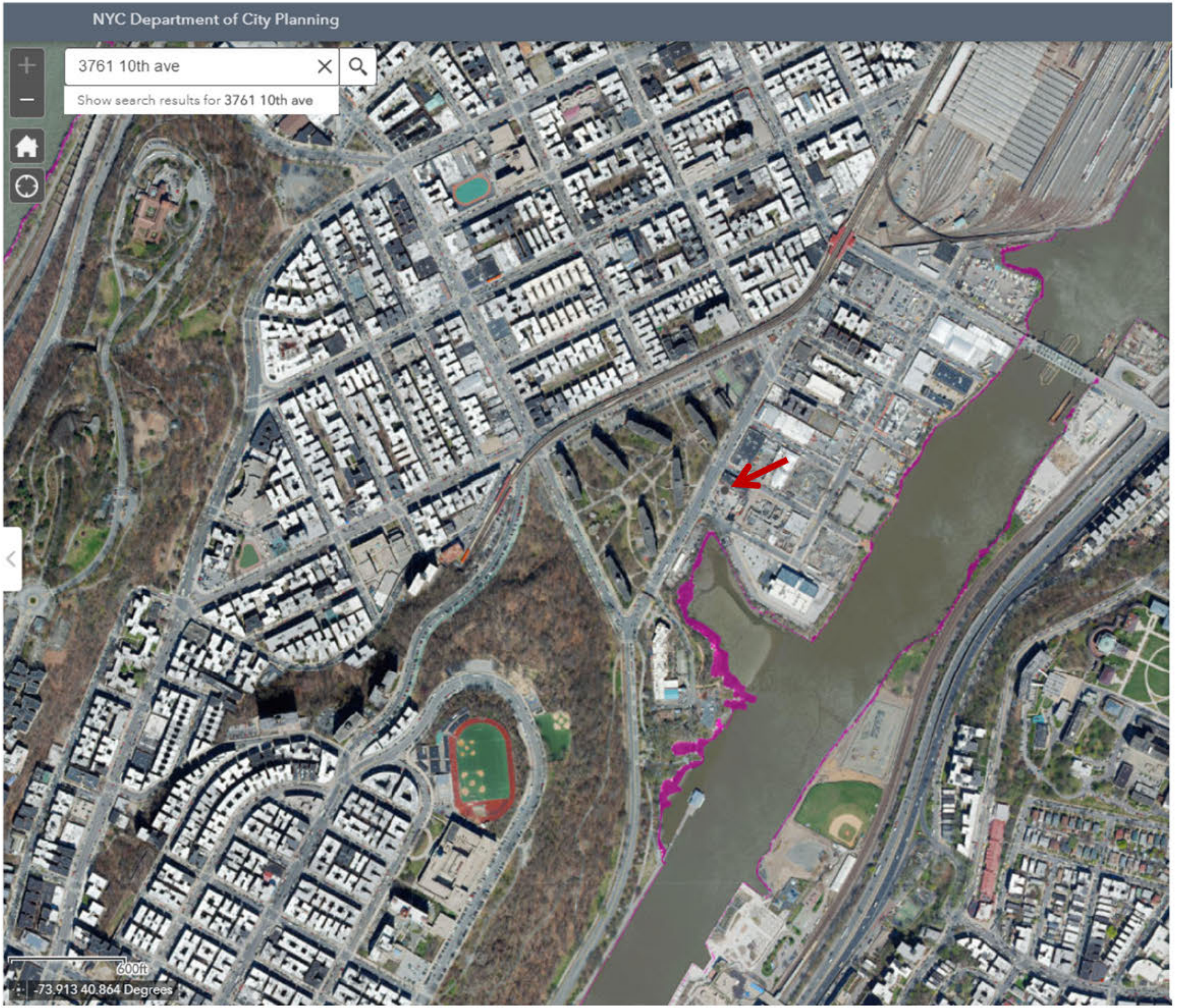
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/29/2020 at 8:34 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by 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.

N

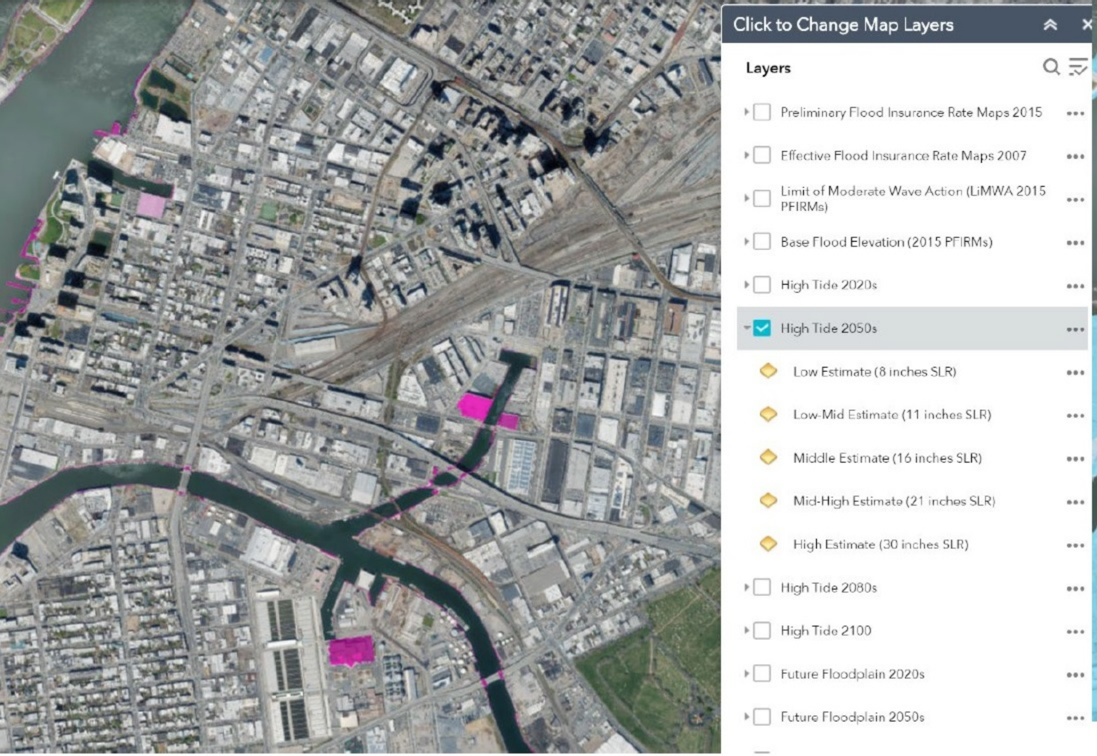
SCA
School Construction Authority

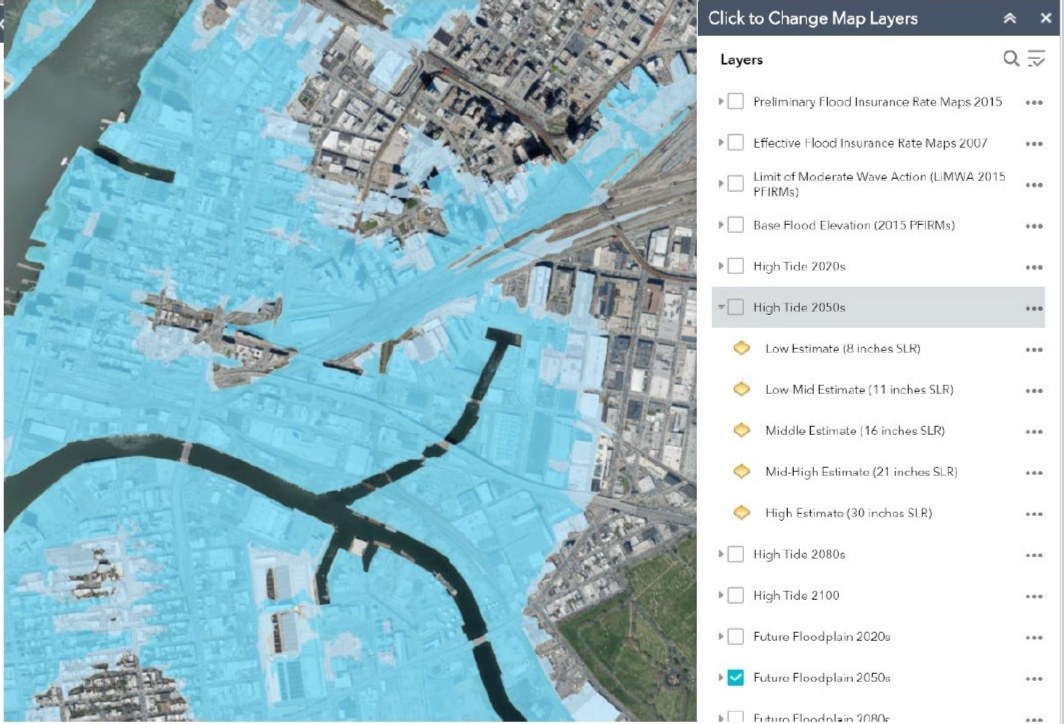

NYC PLANNING
NYC Flood Hazard Mapper
NYC Department of City Planning
3761 10th Ave, New York, NY, 1(
Show search results for 3761 10th Av...
(3 of 3)
Base Flood Elevation
Flood Zone AE
Base Flood Elevation 10
Vertical Datum NAVD88
Units FEET
Zoom to
Click to Change Map Layers
Layers
Preliminary Flood 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

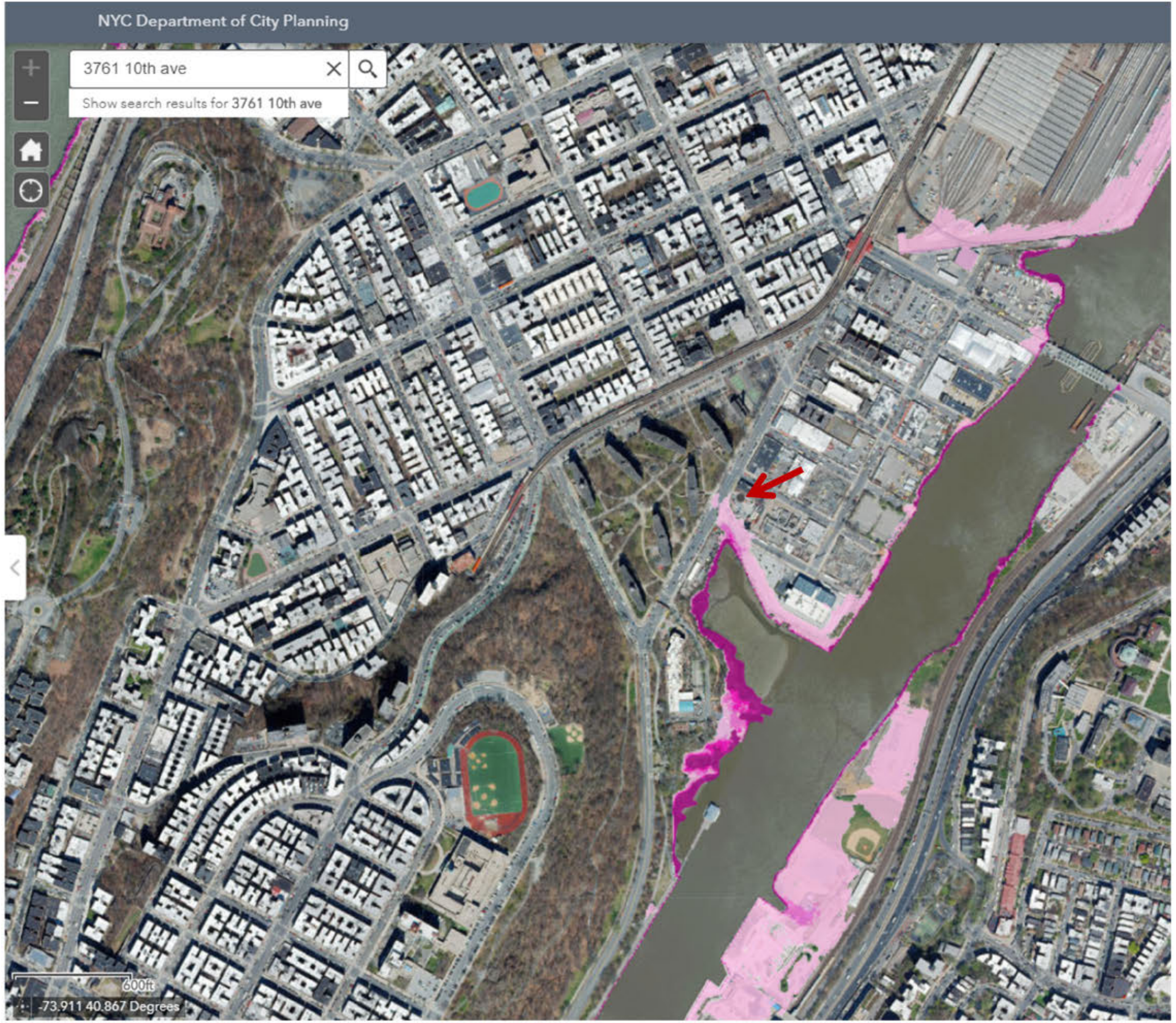
Future Flood Plain 2020s



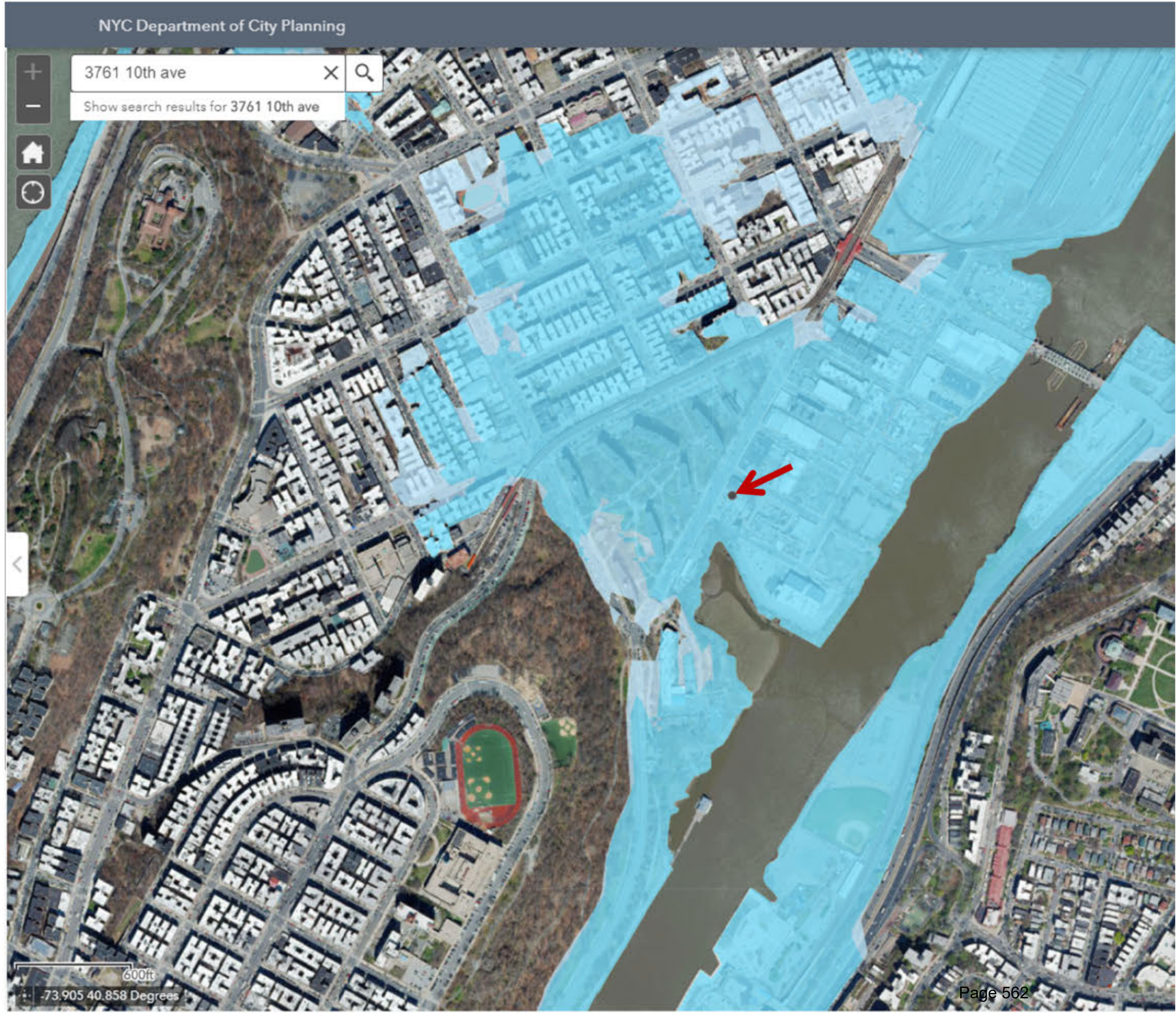


High Tide-2050s

Future FloodPlain 2050s

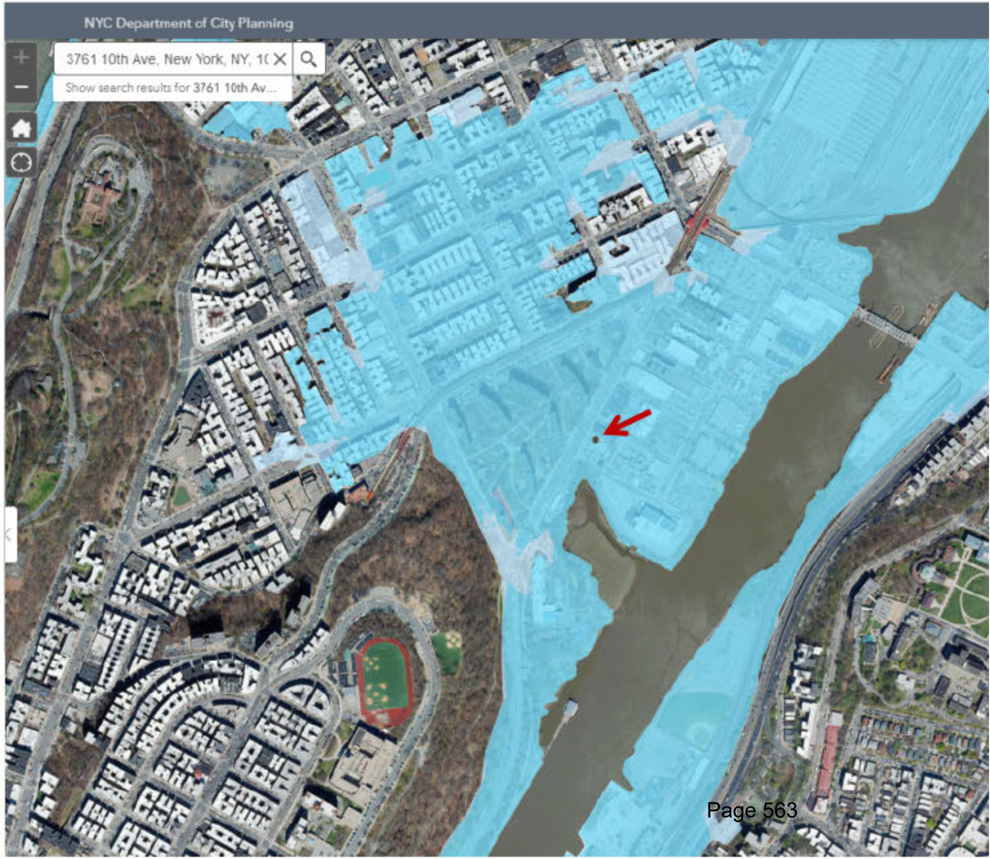


High Tide – 2080s



Future Flood Plain 2080s

High Tide – 2100s



Future Flood Plain 2100s

Integrative Design Report and Recommendations

SCA NYC School Construction Authority

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 / Exposure Rating: 2-5 Low; 6-8 Medium; 9-10 High
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	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.
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	Score 7 Medium
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 / Exposure Rating: 1 Low; 2 Medium; 3 High
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	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.
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	Score 2 Medium

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	Total Score and Next Steps
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	Total Score / Exposure Rating: 0 Not Exposed; 1 Low; 2 Medium; >3 High
	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	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.
	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	Score 0 Not Exposed

Total Score	Exposure Rating
0	Not Exposed
1	Low
2	Medium
>3	High

*For more information on how to use the Flood Hazard Mapper, see Section II.C

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	Hign 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[19]/ 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[20]	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:	

[19] Permanent perimeter flood walls are not permitted to meet floodproofing requirements in buildings with substantial improvements and/or damages.
[20] Utility redundancy design should be pursued for critical systems, not all building systems.

Design Strategies Checklist

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]er 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]er 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.