The Sustainable Renovation of

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

Proposal by Graam Liu

Updated 5/20/2020

235 PARK AVE. S, NEW YORK, NY 10003
(Or: 101 East 19th Street New York, NY 10003)

Executive Summary

40%

LL 97 reduction in NYC carbon emissions by 2030

80%

LL 97 reduction in NYC carbon emissions by 2080

$268

Per metric ton of emissions that go over the LL 97 limit

According to the United Nations, “Buildings and their construction together account for 36 percent of global energy use and 39 percent of energy-related carbon dioxide emissions annually.” New York City has enacted laws such as Local Law 97 to enforce strict carbon reduction standards and encourage sustainable buildings.

This renovation proposal seeks to provide a shining example of how even one of the worst performing buildings in NYC can be made compliant and then some. So, utilizing NYC’s 2018 Energy and Water Data Disclosure (Data for Calendar Year 2017), 235 Park Ave S was chosen for its low performance in terms of energy and water usage, achieving an Energy Star score of only 8. This renovation’s goal is to make this score 90. In the following sections below, this proposal will detail how to achieve this score and achieve sustainable, social, financial, economic, safety, health, and well-being goals for tenants and the surrounding neighborhood.

Framework & Concept – project type, size, location, use, ownership structure, target demographic, and sustainable attributes and goals.

Neighborhood Demographics – neighborhood amenities and conveniences, social and economics characteristics of census tract, social & economic SWOT analysis

Energy & Water Profile – drivers of energy consumption, proposed range of energy consumption on a monthly and annual basis, drivers of water consumption, proposed range of water consumption on a monthly and annual basis, resulting design and operational features

Building Certification & Framework Alignment – project renderings and examples, project summary, certification program and pathway, features of project leading to certification

Climate Risk Exposure Analysis – physical risks (flooding, water risk, heat) & regulatory risk

Tech Applications & Solutions – efficiency, resource conservation, cost reduction, improving indoor occupant comfort, improving indoor occupant health, technological innovations

Financial Analysis – overview of energy efficiency project, assumptions, credits, incentives, demand response curtailment revenue, operating expenses, financial model, carbon tax credit

COVID-19 Impact – solutions to mitigating economic, safety, and health risks of COVID-19

Pre-Renovation of 235 Park Ave S During 2020

235 Park Ave S Renovation Proposal Table of contents

Framework & Concept

235 Park Ave S

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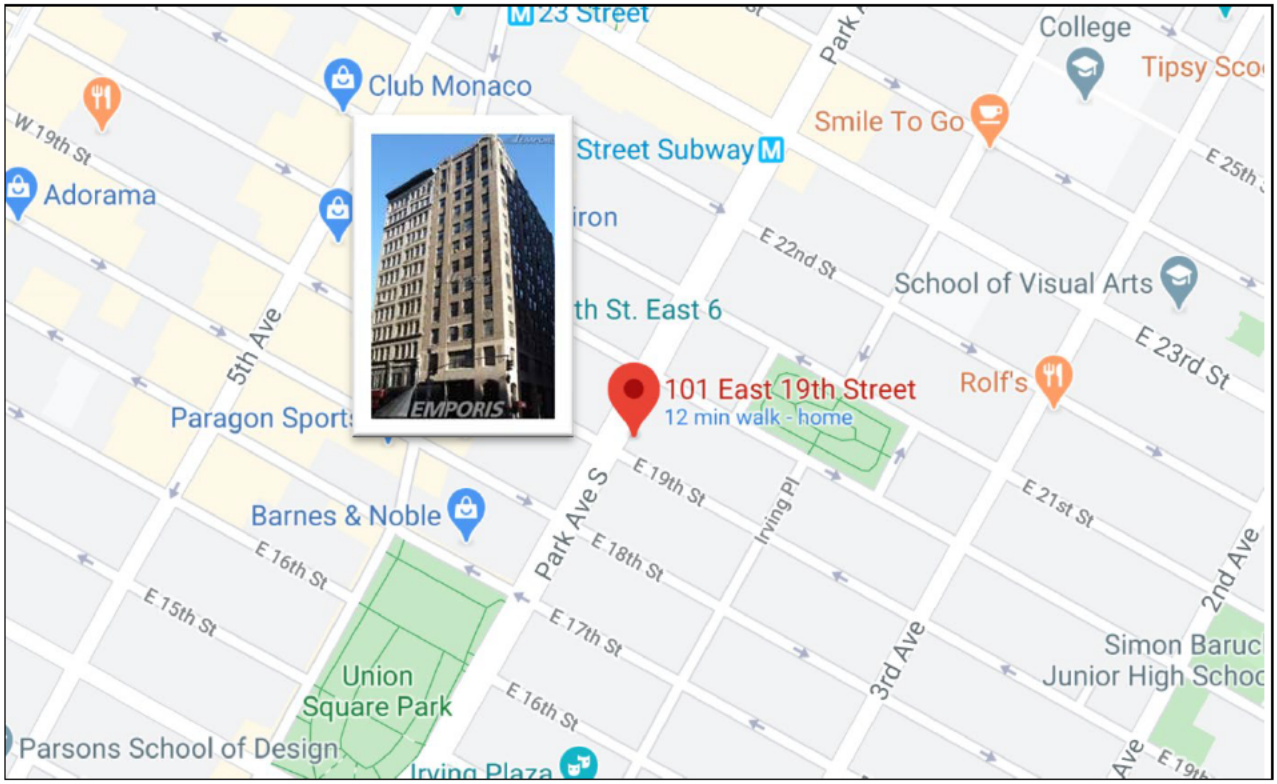
Introduction

This section provides project context and gives an overview of the project type, size, and location. In addition, it will describe the building's proposed use and ownership structure. Afterwards, this section will go in-depth about the target audience or type of tenant the renovation is planning to attract. Reasons will be given why tenants value sustainable renovations and offices. Lastly, there will be an overview of some of the sustainable attributes and goals which will be discussed throughout the proposal.

Project Type, Size, and Location

This project will be a renovation of an existing single building: 235 Park Ave S (101 East 19th Street) New York, NY 10003, BIN: 1017906 (DOF). The building is in the Gramercy Park neighborhood of Manhattan with a total gross floor area of 69,000 square feet (DOF). It was built in 1921, so a pre-war style with "stone and brick" (Vecsey) will be followed while also exploring options to improve the energy efficiency of that design.

Neighborhood amenities include convenient access to the 4, 5, 6, N, Q, R, W subway lines and access to well-known parks: Union Square and Madison Square Park. Gramercy Park is a vibrant neighborhood with live music, museums, colleges (Baruch College), etc.



Proposed Use and Ownership Type

The use will remain commercial, specifically, office space with two restaurants (Union Square Café and Daily Provisions) on the ground floor (DOF). The ownership will be held by an LLC.

Target Demographic

The intended beneficiaries are the landlord and tenants of the building who are office lessees and the restaurants Union Square Café and Daily Provisions. Overall, tenants which require a lower density of workers, who are sustainably conscious, do not require 24/7 access, and in strong industries like tech will be sought after.

Priority will be to keep tenants, and having a sustainable building is often a big consideration. According to an Energy Star report, in 2011, Li & Fung USA wanted to lease space specifically in the Empire State building due to their recent energy efficient retrofit (Successes). Therefore, having a sustainable building and program is important for attracting and maintaining tenants.

The priorities for tenants will be to reduce their maintenance and utility costs. Terms will be added in their leases to reduce their rent by the percentage of energy, water, or waste they reduce; thereby, giving them an incentive to adopt sustainable operations and procedures. This will effectively be giving them a discount on their maintenance bill.

In addition, tenants want a building and space that is in line with the sustainability goals. In the same Energy Star report, Li & Fung valued having a minimal environmental impact, and sought to maximize energy savings and reduce operating expenses as well. Furthermore, the report cites another company, Reed Smith, as earning back their energy savings on their initial sustainable investment in “less than 2 years…with savings accruing every year after that through the remainder of the 16-year lease” (Successes).

Sustainable Attributes and Goals

The building currently uses Fuel Oil #4 (Green). So, the biggest objective is to replace the boiler and fuel source so that it follows PlaNYC by 2030 (Navarro). This will allow the building to use a cleaner fuel and make it more sustainable. The progress will be my measured by emissions of metric tons of CO2e (Green). In addition, information systems will be better integrated in the building's submeters to allow tenants to track their own energy usage. In an Energy Star report, L Brands used Vornado's Energy Information Portal to track energy consumption and they were able to reduce their usage by 15%, saving nearly $150,000 (Successes).

In addition, other design aspects such as energy efficient lighting, windows, plumbing, heating, cooling, etc. will be explored and measured by electricity use (kBtu and kWh) and water use intensity, gal/ft squared (Green). Taking these steps in the renovation will allow tenants more control over their own sustainability objectives and allow the landlord to attract additional tenants who are concerned over energy savings and environmental impact. Therefore, the project's target demographics will find the renovation beneficial and helpful.

The two restaurants will be encouraged to reduce their food waste and other waste by participating in composting and recycling programs. In addition, there will be steps taken to reduce their water and energy usage by installing energy efficient appliances and fixtures.

Conclusion

By achieving the project's goals, the building's renovation will have the best chance to attract its intended audience and become one of the many success stories for the neighborhood. The project will be ambitious, but it will strive for some of the latest technology and operating procedures while becoming resilient to economic, social, and environmental changes. This renovation is invested in the idea that tenants want a sustainable building to support their business and the world around them.

Neighborhood Demographics

235 Park Ave S

New York, NY 10003

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Gramercy Park

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Introduction

To attract and retain the target audience of tenants that will lease in the building after the renovation, it is important to analyze the strength of the neighborhood and its amenities. In "How Three D.C. Landlords Are Attracting Tech Tenants," in Urban Land, experts have noted that, "Urban amenities are what all tenants look for." The building's neighborhood of Gramercy Park is full of amenities that will attract tenants like those in tech. Also, renovating the building will not only improve its amenities for tenants but for residents in the neighborhood. Thereby, giving back to the community and providing increased levels of well-bring.

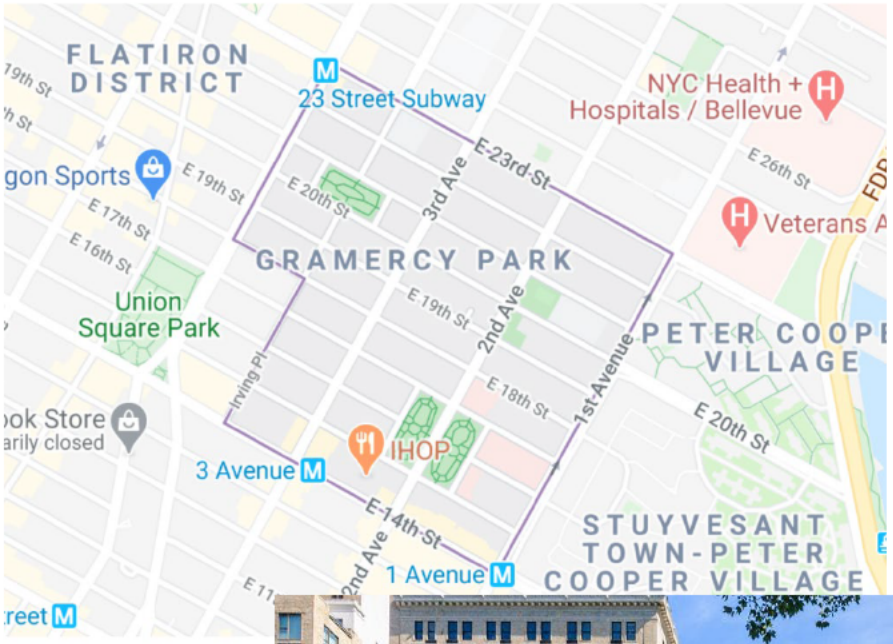
In this section, an analysis of the neighborhood's amenities and services will be conducted. This analysis will include research on social and economic vulnerability from U.S. Census data with a SWOT analysis completed afterwards.

Union Square Park Alliance Event

Neighborhood Amenities and Conveniences

The property is in the vibrant neighborhood of Gramercy Park, in the heart of lower Manhattan. The neighborhood and surrounding area boast fantastic transportation and things to do which will make the property highly desirable for tenants and workers. In addition, a plethora of schools, conveniences and basic services will entice employees to live in the neighborhood itself and walk to work at 235 Park Ave S. Thereby, reducing carbon emissions and creating a strong community.

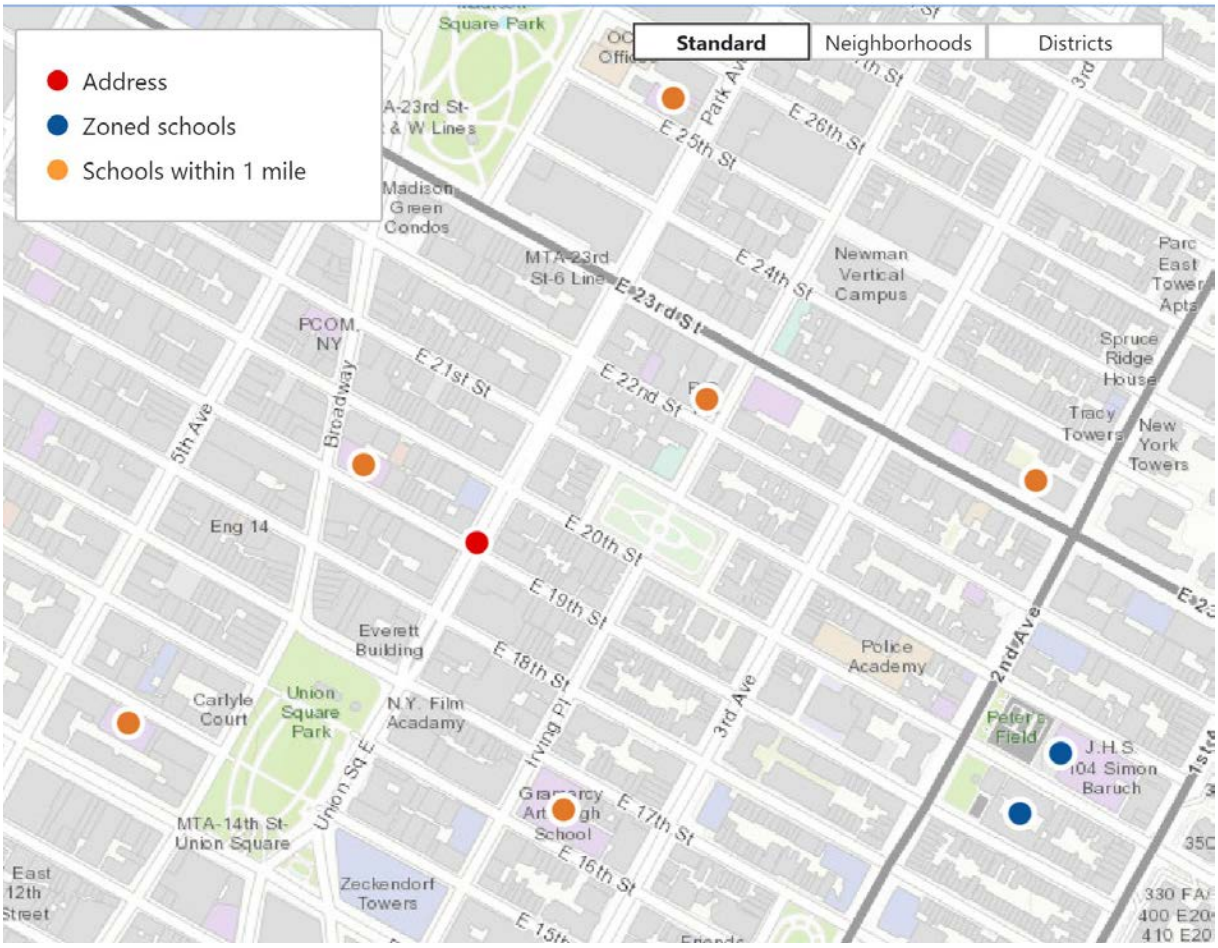
Almost all amenities are within a 12-minute walk or less (within a 2500-foot radius) assuming a person is walking 3 MPH according to the Walkingenglishman.com calculator. The only exception are hospitals which are all within an 18-minute walk or less (within a 3/4-mile radius).



NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

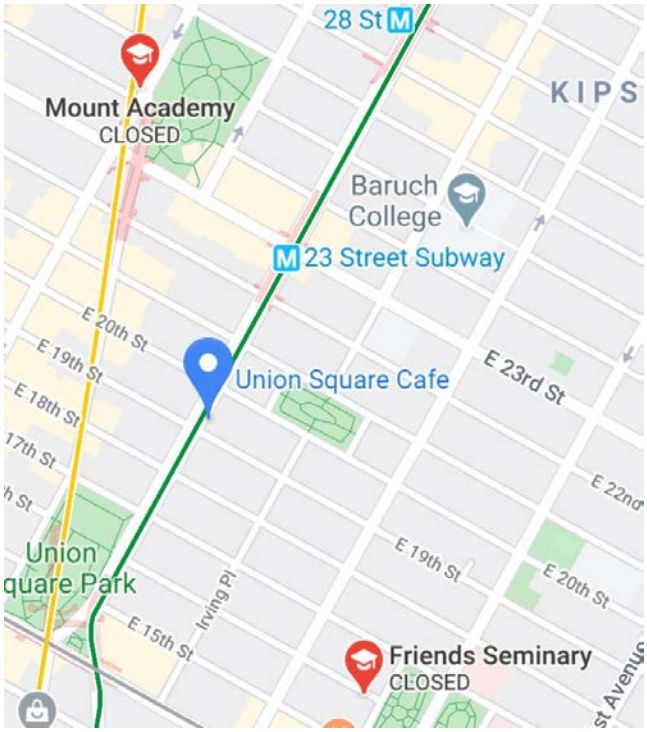
Schools	Address	Distance (in Feet)
Public Schools		
P.S. 040 Augustus Saint-Gaudens - M040 (Elementary School)	320 EAST 20TH STREET Manhattan 10003	1,970
The 47 American Sign Language & English Lower School - M347 (PK-8)	223 EAST 23 STREET Manhattan 10010	1,836
J.H.S. 104 Simon Baruch - M104 (Middle School)	330 EAST 21 STREET Manhattan 10010	2,034
Ballet Tech, NYC Public School for Dance - M442 (K-12)	890 BROADWAY Manhattan 10003	540
The Clinton School - M260 (High School)	10 E 15th St, New York, NY 10003	1,357
Baruch College Campus High School - M411	55 E 25th St, New York, NY 10010	1,536
School of the Future High School - M413	127 EAST 22 STREET Manhattan 10010	854
Union Square Academy for Health Sciences - M533 (High School)	40 IRVING PLACE Manhattan 10003	819
Charter Schools		
Success Academy Union Square (Manhattan 1) - M174	40 IRVING PLACE Manhattan 10003	900
Private Schools		
Mount Academy (High School)	1001 Broadway, New York, NY 10010	1,670
Friends Seminary (K-12)	222 E 16th St, New York, NY 10003	1,560
Colleges and Universities		
Baruch College	137 E 22nd St # C 120, New York, NY 10010 (nearest)	956
New York University	105 E 17th St, New York, NY 10003 (nearest)	520
The New School	6 E 16th St New York, NY 10003 (nearest)	1,211
School of Visual Arts	209 E 23rd St, New York, NY 10010	1,610
Technical Schools		
Fedcap Rehabilitation	119 W 19th St #401, New York, NY 10011	2,340
Code Fellows	119 W 24th St floor 4, New York, NY 10011	2,800
Other Adult Education		
General Assembly New York	10 E 21st St #2, New York, NY 10010	1,050



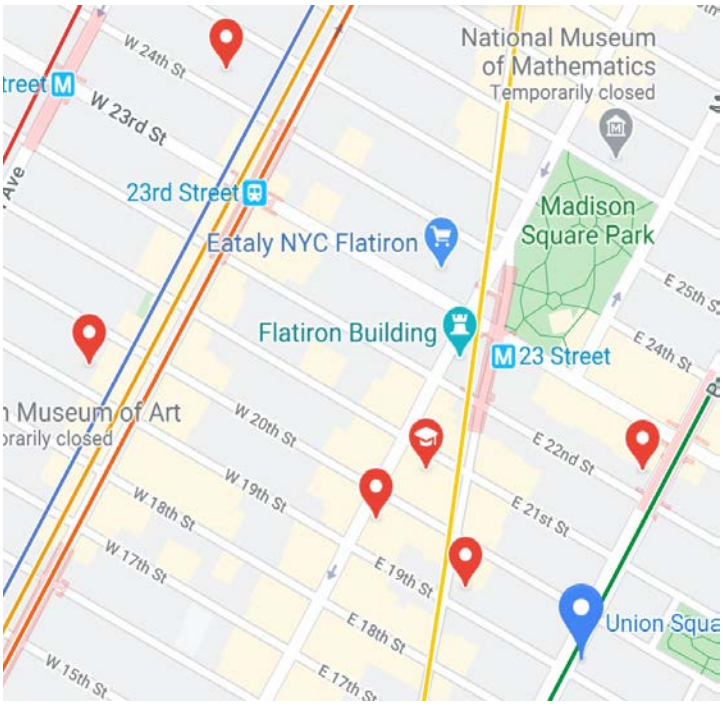
Public and Charter Schools

NEIGHBORHOOD DEMOGRAPHICS

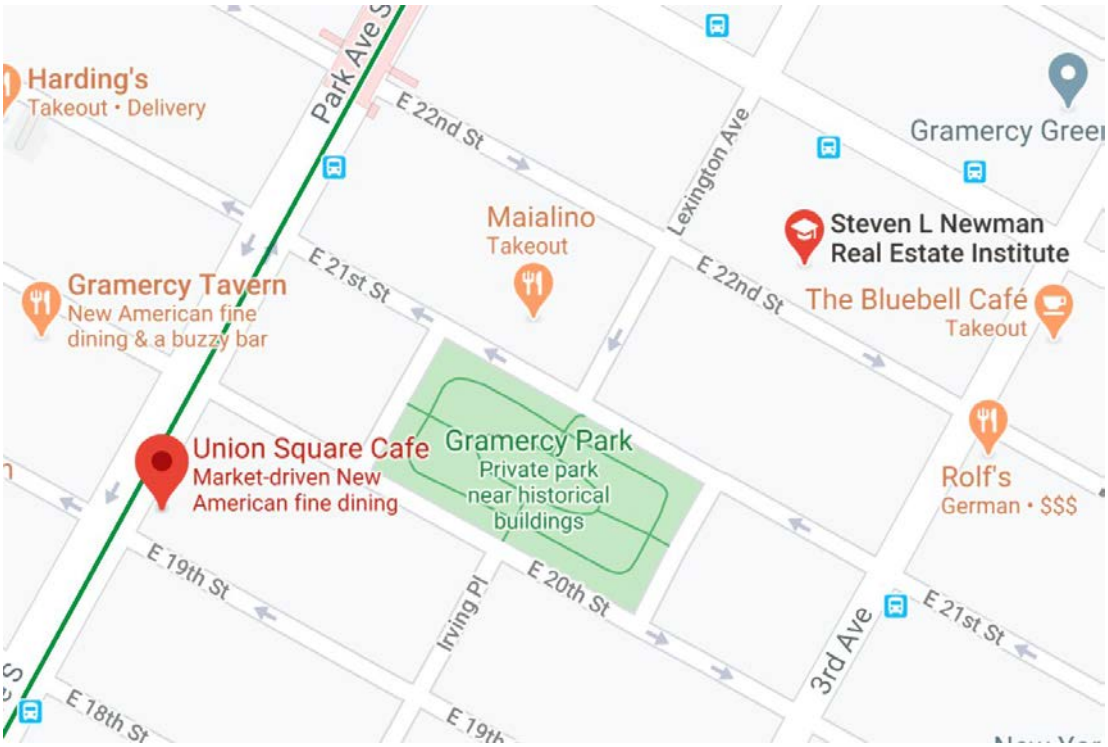
235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)



Private Schools



Technical Schools and Other Adult Ed.



Closest University or College

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

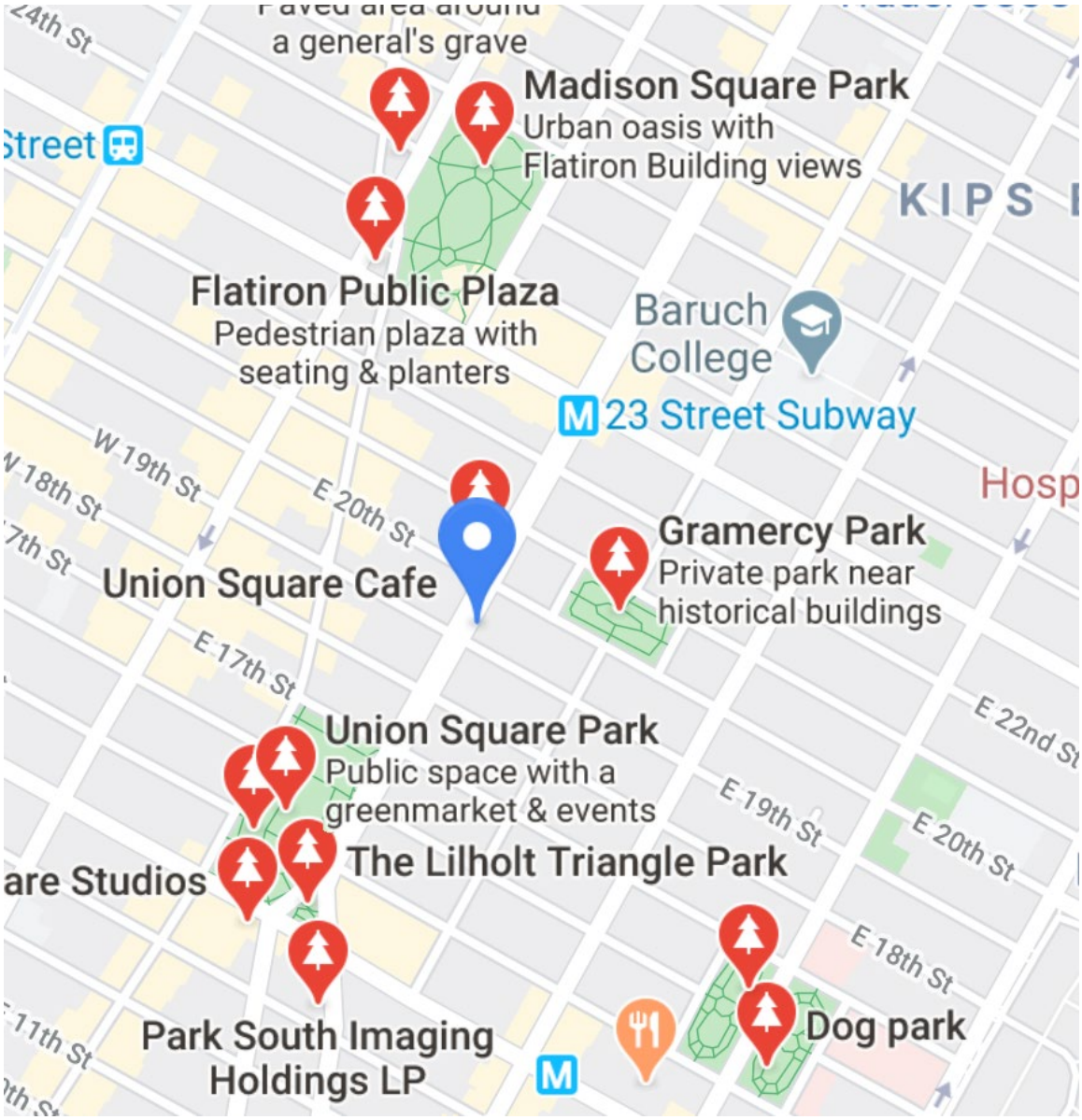
Grocery	Address	Distance (in Feet)
Trader Joe's	142 E 14th St, New York, NY 10003	1,574
Food Emporium	10 Union Square E, New York, NY 10003	1,282
Whole Foods Market	4 Union Square E S, New York, NY 10003	1,426
Garden of Eden Marketplace	7 E 14th St, New York, NY 10003	1,541
Casa Bosques Chocolates	41 Union Square W, New York, NY 10003	793
Midoriya	11 E 17th St, New York, NY 10003	874
Eataly NYC Flatiron	200 5th Ave, New York, NY 10010	1,609
Morton Williams Supermarkets	278 Park Ave S, New York, NY 10010	669
Westside Market	180 3rd Ave, New York, NY 10003	1,068
East Way Gourmet	169 3rd Ave, New York, NY 10003	1,233
Health Food Store	162 3rd Ave, New York, NY 10003	1,160

Grocery Markets

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Park Amenities	Address	Distance (in Feet)
Union Square Park	201 Park Ave S, New York, NY 10003	570
Madison Square Park	11 Madison Ave, New York, NY 10010	1,159
Gramercy Park (Private)	2 Lexington Ave, New York, NY 10010	312
Stuyvesant Square Park	9, Rutherford Pl, New York, NY 10003	1,539
The Lilholt Triangle Park	58-60 E 14th St, New York, NY 10003	1,113
Flatiron Public Plaza	27 W 24th St Suite 800B, New York, NY 10010	1,430
Worth Square	200 5th Ave, New York, NY 10010	1,836

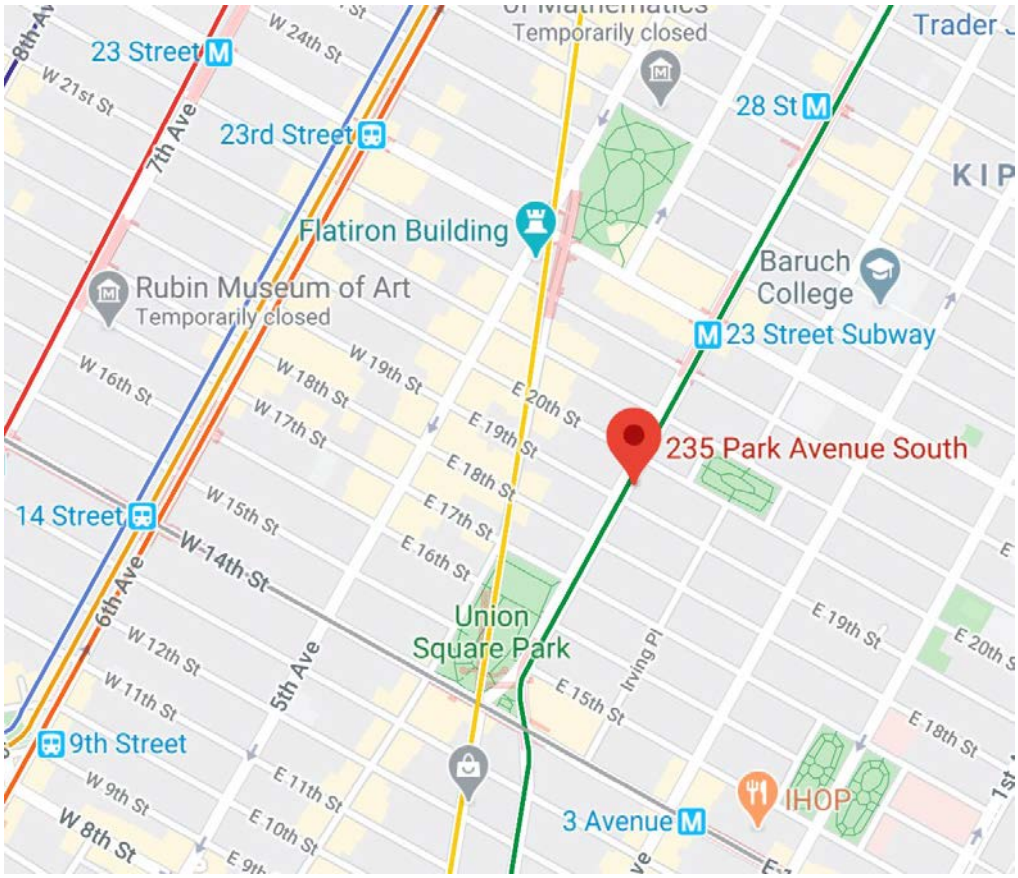


Parks

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Transportation	Address	Distance (in Feet)
Subway		
23rd St Subway (4,6 Train)	23rd and Park Ave S	848
23rd St Subway (N,Q,R,W Train)	23rd and Broadway	1,245
23rd St Subway (Path, F,M, Train)	23rd and 6th Ave	2,269
14th St Subway (F,M,L Train)	14th and 6th Ave	2,490
14th St Union Square Subway (4,5,6,L,N,Q,R,W)	14th and Union Square E	1,300
3rd Ave Subway (L Train)	14th and 3rd Ave	1,692
Bus		
Park Av S/E 18 St (M1,M2,M3)	18th St and Park Ave S	314
Park Av S/E 21 St (M1,M2,M3)	21st St and Park Ave S	591
Park Av South/E 22 St (SIM1C,SIM3C,SIM4C,SIM33C)	22nd St and Park Ave S	609
East 23 St & Park Av (BM2,BM3,M23-SBS,QM21)	23rd St and Park Ave S	1,049
E 23 St / Park Av S (BM1, BM2, BM3, BM4, M23-SBS)	23rd St and Park Ave S	944
E 23 St/Lexington Av (X63,X64,X68)	23rd St and Lexington Ave	1,080
3 Av/E 21 St (M101,M102,M103)	21st St and 3rd Ave	1,069
3 Avenue & East 20 St (M101,M102,M103)	20th St and 3rd Ave	922
Bike		
Citi Bike	E 20 St & Park Ave, New York, NY 10003	203
Citi Bike	E 17 St & Broadway, New York, NY 10003	665
Citi Bike	Broadway & E 22 St, New York, NY 10010	1,019
Citi Bike	E 24 St & Park Ave S, New York, NY 10010	1,252
Citi Bike	E 19 St & 3 Ave, New York, NY 10003	1,049



Subway Stops

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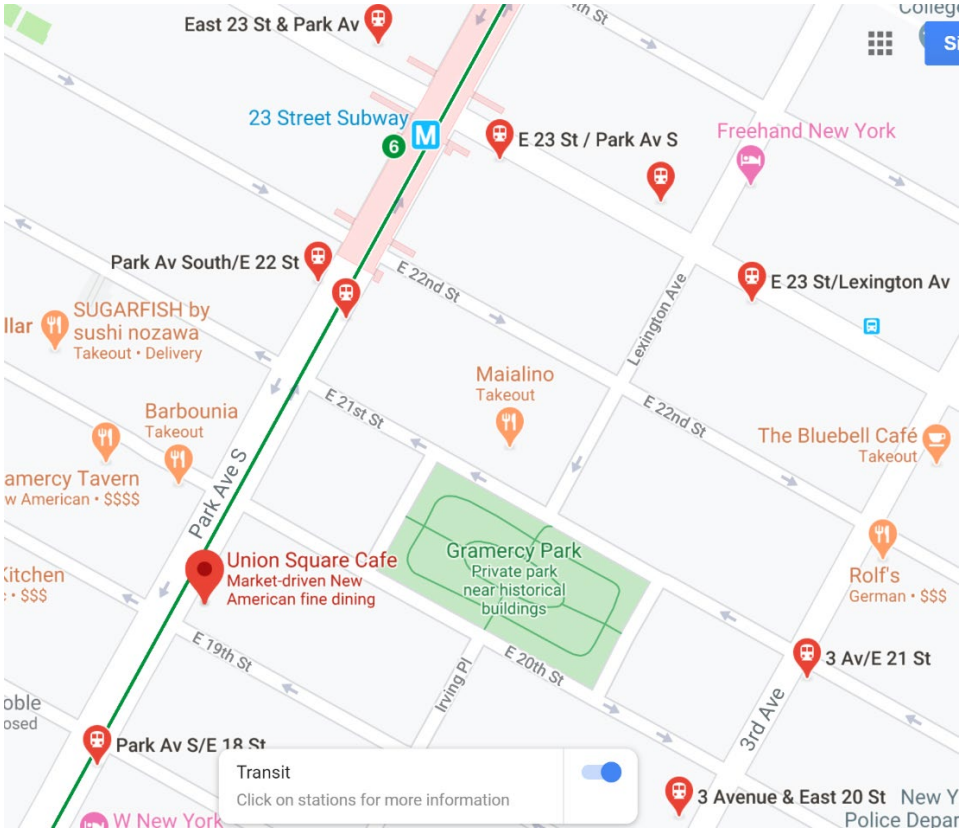
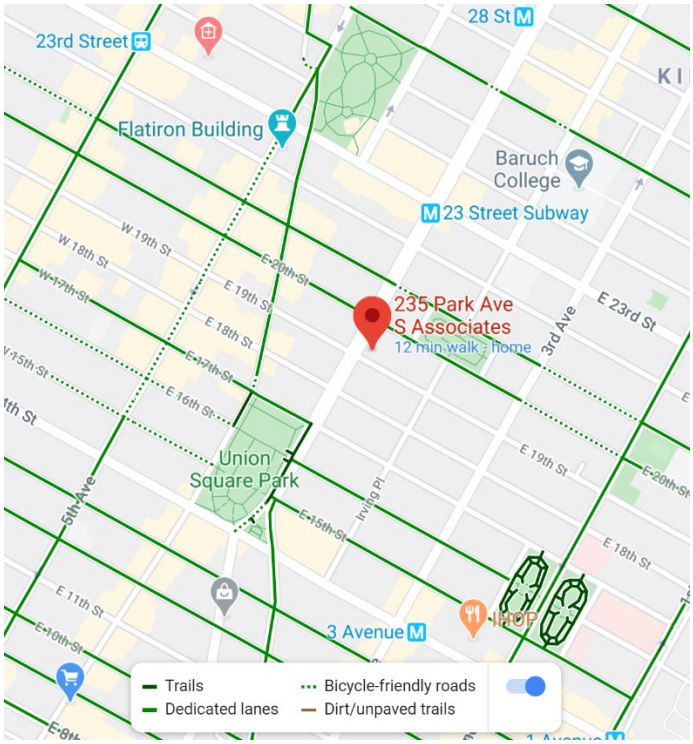
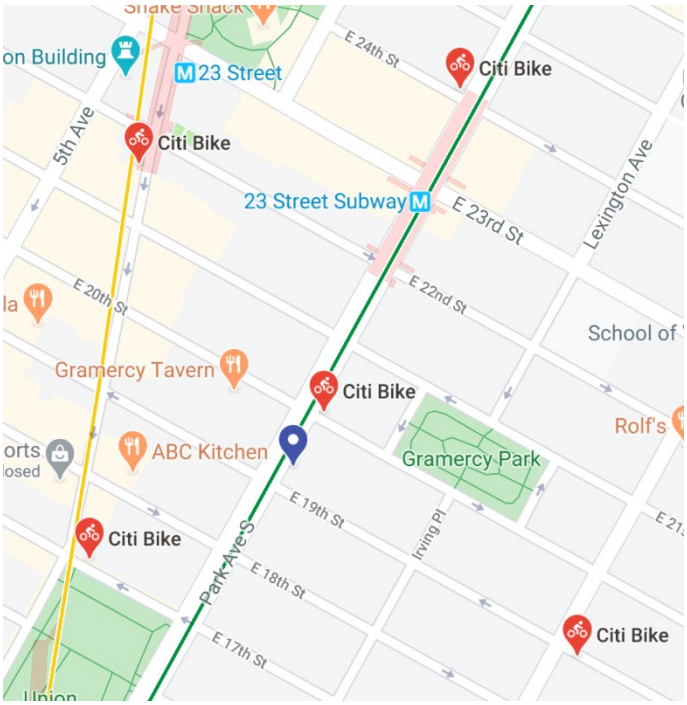


Bus Stops



Bike Paths



Citi Bike Rental Spots

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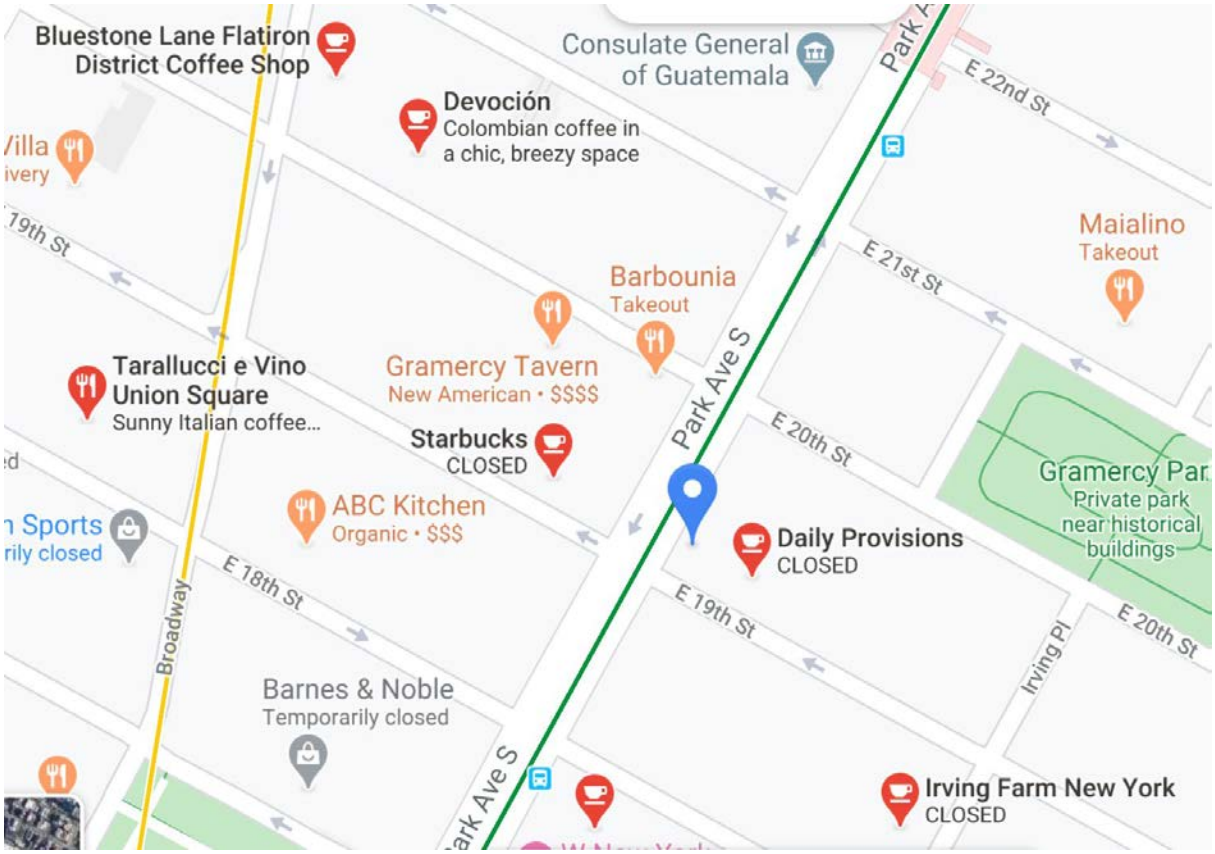
Coffee Shop Amenities	Address	Distance (in Feet)
Irving Farm New York	71 Irving Pl, New York, NY 10003	443
Daily Provisions (Cafe on Property)	103 E 19th St, New York, NY 10003	0
Starbucks	240 Park Ave S, New York, NY 10003	184
Tarallucci e Vino Union Square	15 E 18th St, New York, NY 10003	762
Devoción	25 E 20th St, New York, NY 10003	590
Bluestone Lane Flatiron District Coffee Shop	902 Broadway, New York, NY 10010	728



Coffee Shops

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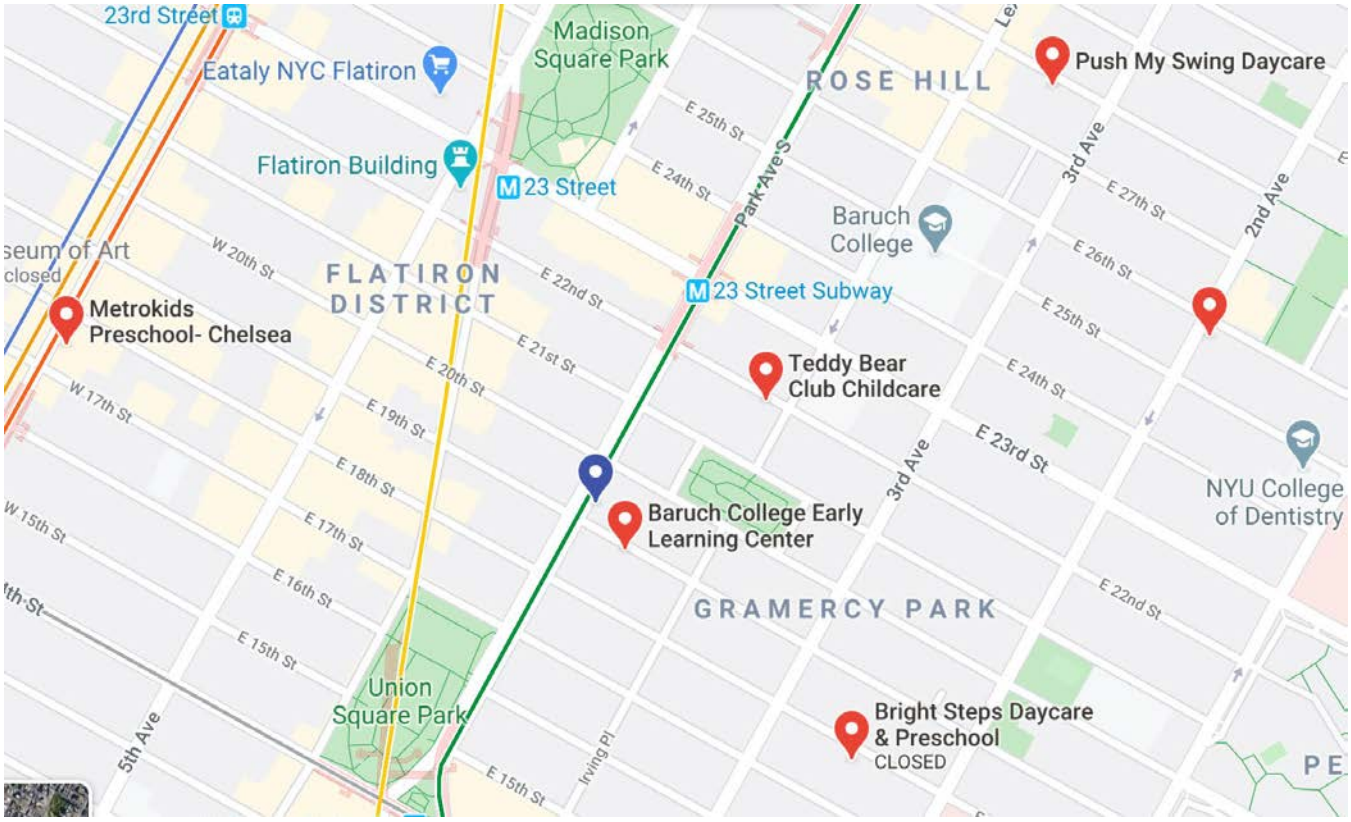
Miscellaneous Conveniences	Address	Distance (in Feet)
Daycare, Preschool or Learning Center		
Bright Steps Daycare & Preschool	222 E 18th St, New York, NY 10003	1,376
Baruch College Early Learning Center	104 E 19th St, New York, NY 10003	171
Metrokids Preschool- Chelsea	600 6th Ave, New York, NY 10011	2,068
Teddy Bear Club Childcare	6, Lexington Ave, New York, NY 10010	756
Explore + Discover Early Learning Center	444 2nd Ave, New York, NY 10010	2,425
Push My Swing Daycare	148 E 28th St, New York, NY 10016	2,336



Daycare, Preschool or Learning Center

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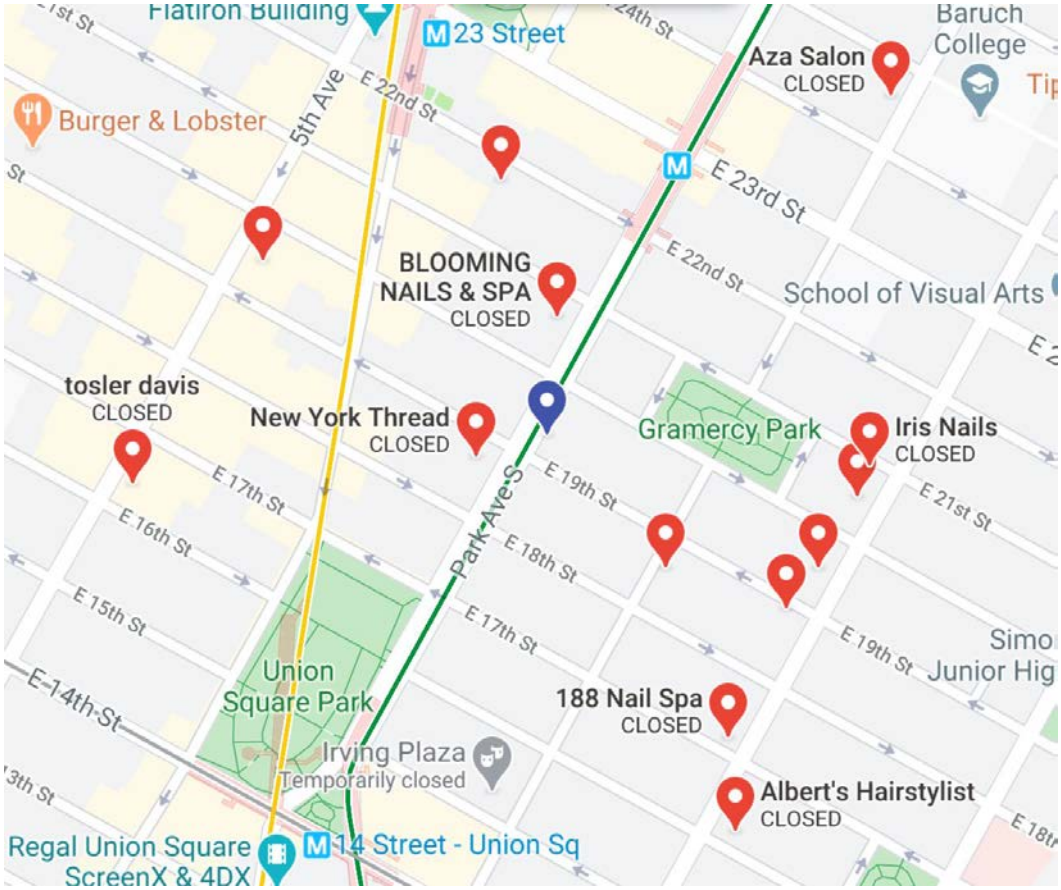
Salon		
New York Thread	228 Park Ave S, New York, NY 10003	226
tosler davis	89 5th Ave 10th floor, New York, NY 10003	1,228
Warren Tricomi Salon	125 5th Ave, New York, NY 10037	994
BLOOMING NAILS & SPA	260 Park Ave S, New York, NY 10010	370
Miwa-Alex Salon	24 E 22nd St, New York, NY 10010	762
Aza Salon	50 Lexington Ave, New York, NY 10010	1,422
Iris Nails	258 3rd Ave, New York, NY 10010	992
Dream Blue Beauty Nail Spa	250 3rd Ave, New York, NY 10010	953
BeSu Salon and Day Spa	234 3rd Ave, New York, NY 10003	900
Joshua Barbieri Hair	1, 72 1/2 Irving Pl, New York, NY 10003	540
Balayage Me Hair Salon	150 E 19th St, New York, NY 10003	873
188 Nail Spa	188 3rd Ave, New York, NY 10003	1,031
Albert's Hairstylist	201 E 16th St # 2A, New York, NY 10003	1,287



Hair and Nail Salons

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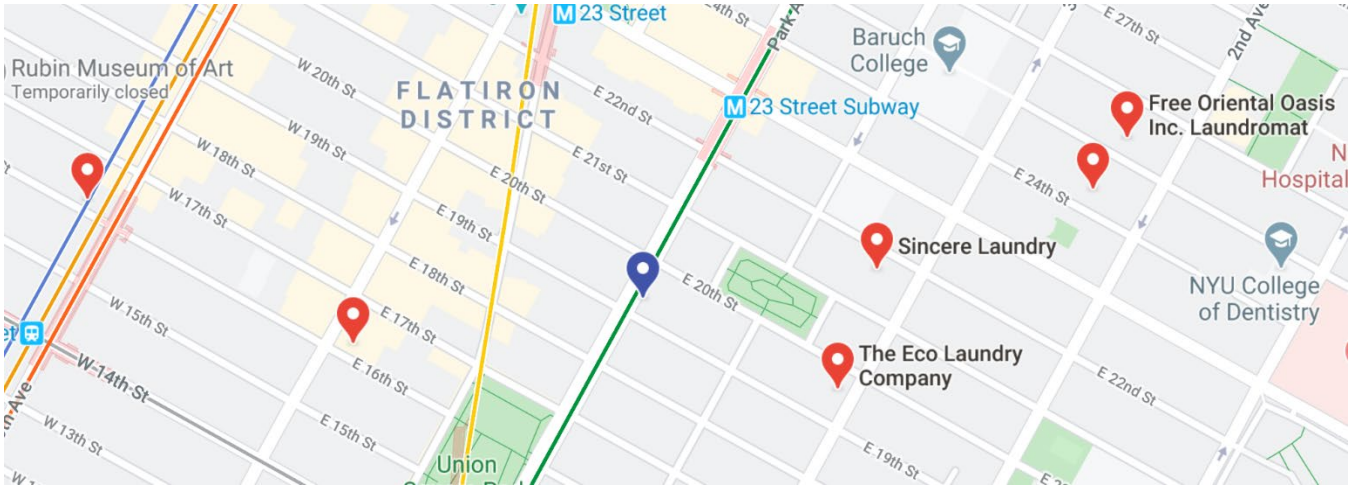
Laundromat or Dry Cleaner		
New York Laundromat	105 W 16th St # A, New York, NY 10011	2,305
Fort Handyman	85 5th Ave, New York, NY 10003	1,166
Sincere Laundry	152 E 22nd St, New York, NY 10010	978
The Eco Laundry Company	236 3rd Ave, New York, NY 10003	890
Best Touch Cleaners & Laundry	235 E 24th St, New York, NY 10010	1,927
Free Oriental Oasis Inc. Laundromat	235 E 25th St, New York, NY 10010	2,181



Laundromat

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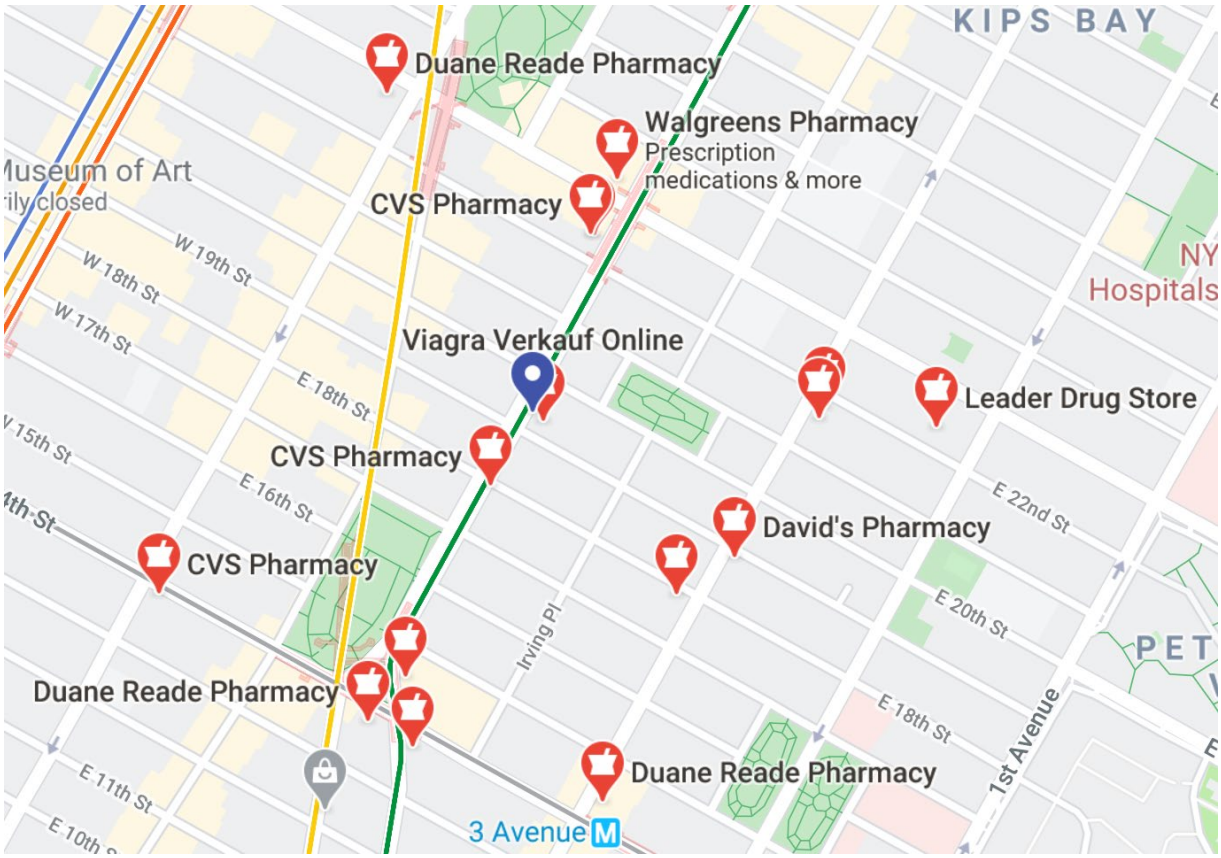
Pharmacy		
Duane Reade Pharmacy	184 5th Ave, New York, NY 10010	1,466
CVS Pharmacy	300 Park Ave S, New York, NY 10010	759
Walgreens Pharmacy	33 E 23rd St, New York, NY 10010	1,035
CVS Pharmacy	215 Park Ave S, New York, NY 10003	341
CVS Pharmacy	275 3rd Ave, New York, NY 10010	1,200
David's Pharmacy	205 3rd Ave, New York, NY 10003	1,010
Duane Reade Pharmacy	125-133 3rd Ave, New York, NY 10003	1,589
Walgreens Pharmacy	145 4th Ave, New York, NY 10003	1,432
Duane Reade Pharmacy	1 Union Square South, New York, NY 10003	1,449
CVS Pharmacy	65 5th Ave, New York, NY 10003	1,677

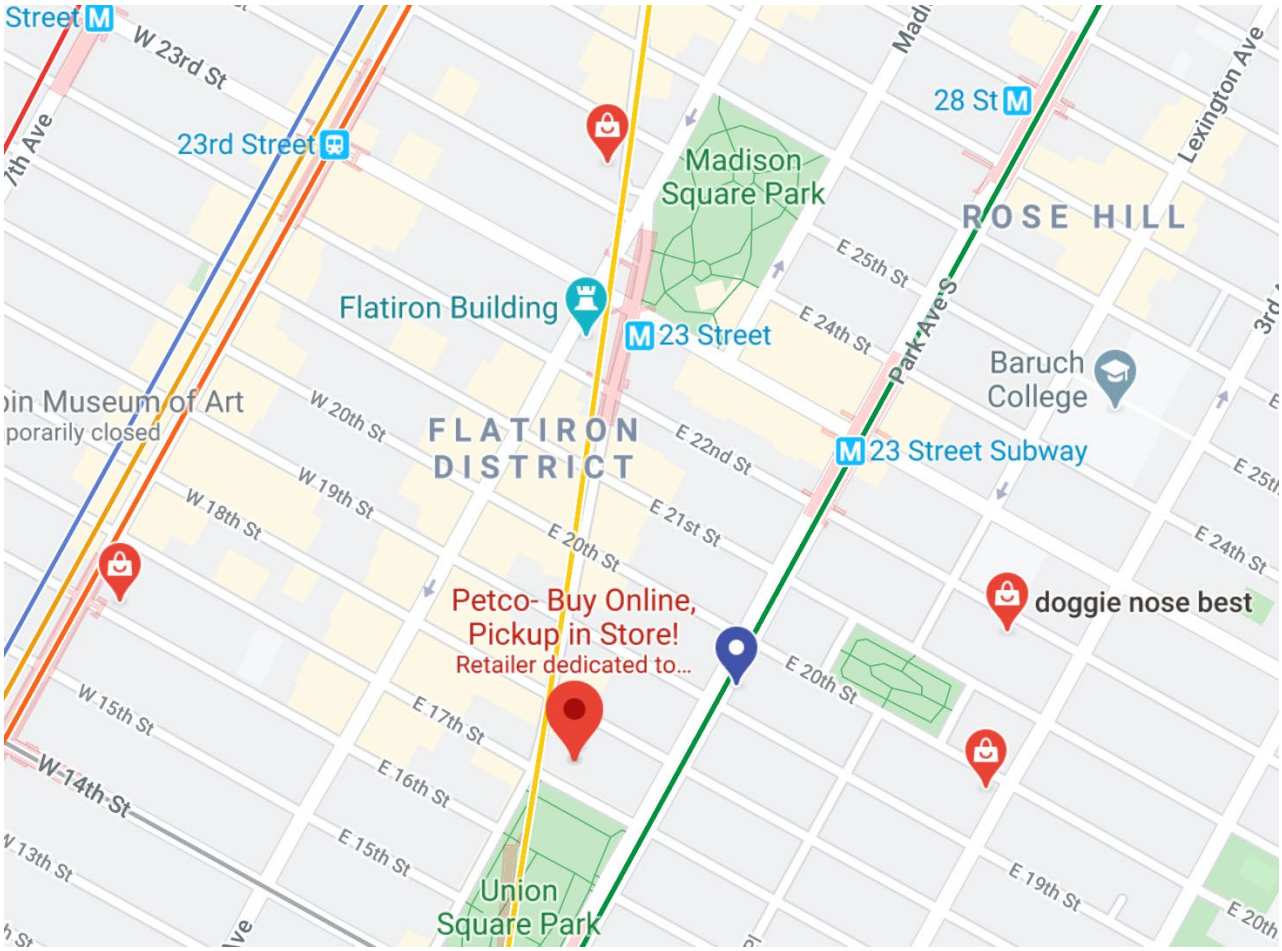


Pharmacy

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Pet Amenities and Services (Store, Pet Boarding, Veternarian)		
Petco (Store and Groomer)	860 Broadway Ste B, New York, NY 10003	597
Pet Central (Store)	55 W 16th St #1, New York, NY 10011	2,086
PetSmart (Store and Groomer)	1107 Broadway #101, New York, NY 10010	1,828
doggie nose best (Store)	144 E 22nd St, New York, NY 10010	972
Canis Minor (Store)	238 3rd Ave, New York, NY 10003	872
Wiggly Pups (Dog Day Care Center)	152 E 22nd St basement 3, New York, NY 10010	973
D is for Doggy (Dog Day Care Center)	552 6th Ave, New York, NY 10011	2,216
New York Dog Spa and Hotel	32 W 25th St, New York, NY 10010	2,171
New York Dog Nanny Inc (Groomer)	126 Lexington Ave 2nd fl, New York, NY 10016	2,348
New York Veterinary Practice	41 W 13th St, New York, NY 10011	2,260
BluePearl Pet Hospital	1 W 15th St, New York, NY 10011	1,578
Gramercy Park Animal Hospital	37 E 19th St, New York, NY 10003	352
Gotham Animal Clinic	329 2nd Ave, New York, NY 10003	1,587
First Avenue Veterinary Hospital	335 1st Avenue, New York, NY 10003	2,308

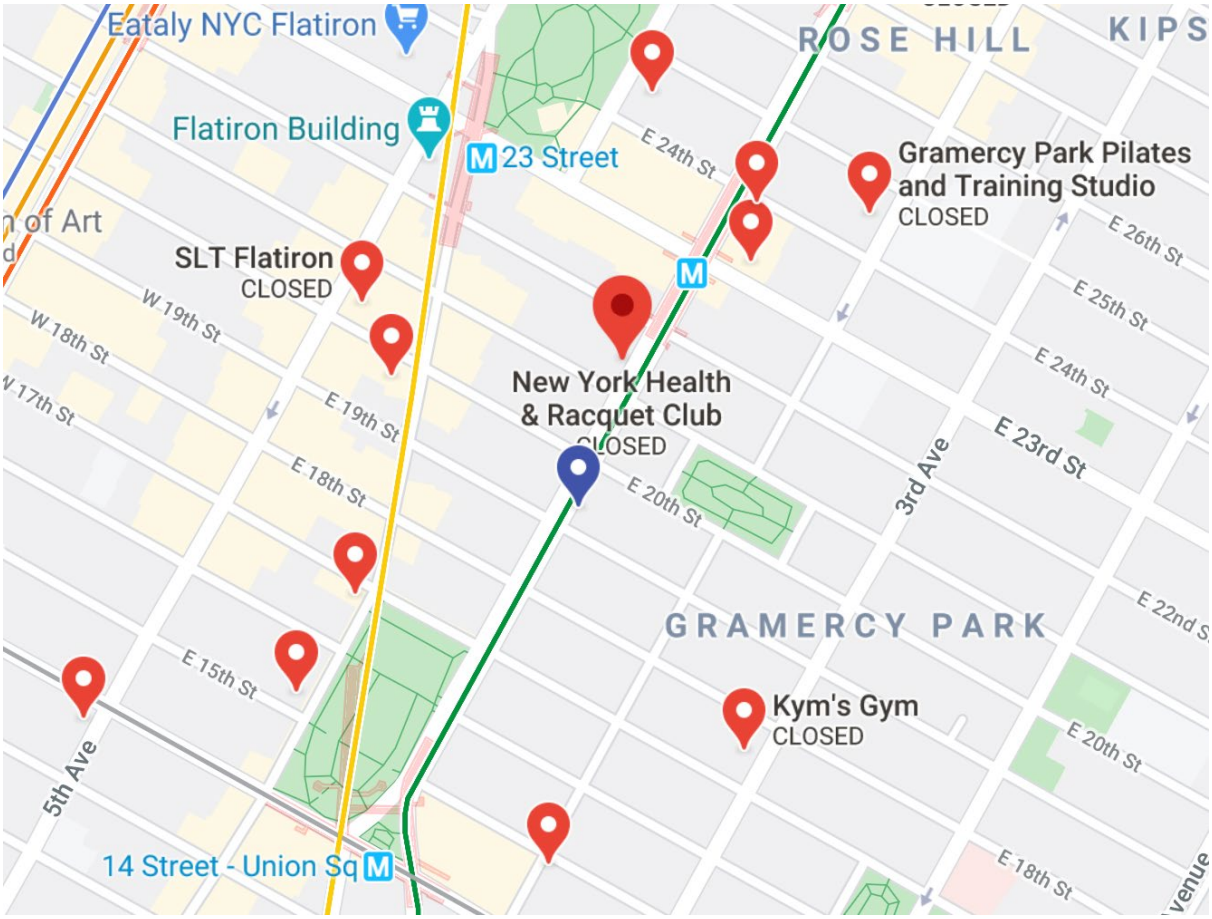


Pet Amenities and Services

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Gym and Fitness Centers		
Fitness Club At 11 Ave	11 Madison Ave, New York, NY 10010	1,406
Gramercy Park Pilates and Training Studio	50 Lexington Ave, New York, NY 10010	1,420
Equinox Gramercy	315 Park Ave S, New York, NY 10010	1,237
New York Sports Clubs	113 E 23rd St, New York, NY 10010	997
New York Health & Racquet Club	270 Park Ave S, New York, NY 10010	539
Equinox Flatiron	897 Broadway, New York, NY 10003	782
SLT Flatiron	137 5th Ave #2, New York, NY 10010	1,049
Hype Gym Union Square	37 Union Square W f2, New York, NY 10003	852
Definitions Private Training Gyms	19 Union Square W, New York, NY 10003	1,134
CITYROW Union Square	80 5th Ave #1501, New York, NY 10011	1,801
New York Sports Clubs	10 Irving Pl, New York, NY 10003	1,206
Kym's Gym	194 3rd Ave, New York, NY 10003	994



Gyms and Fitness Centers

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

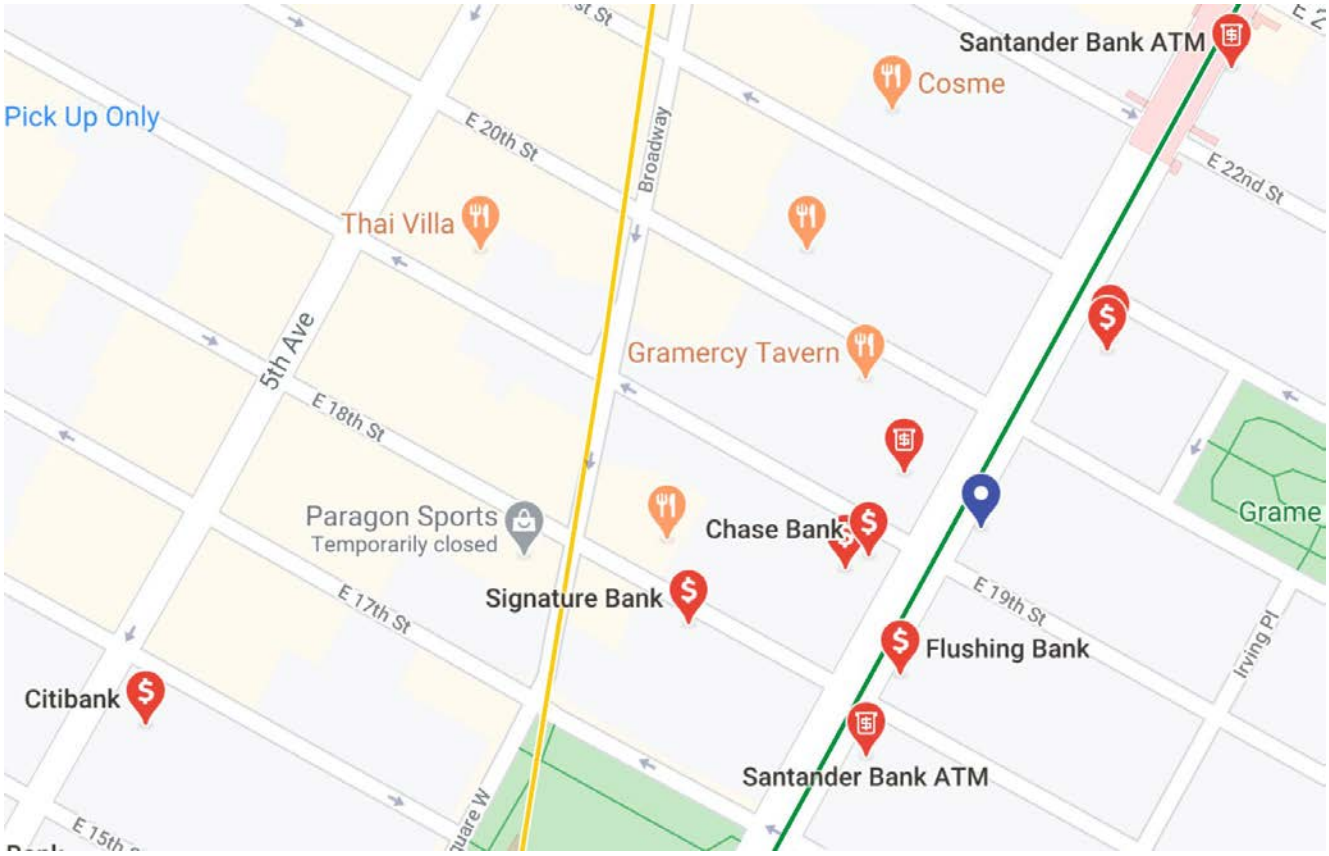
Hospitals	Address	Distance (in Feet)
Major Medical Centers		
Mount Sinai-Union Square (includes Urgent Care Center)	10 Union Square E, New York, NY 10003	1,225
Mount Sinai Beth Israel	281 1st Avenue, New York, NY 10003	2,256
Veterans Affairs	423 E 23rd St, New York, NY 10010	2,649
NYC Health + Hospitals / Bellevue	462 1st Avenue, New York, NY 10016	3,013
NYU Langone Health	550 1st Avenue, New York, NY 10016	3,740
Urgent Care Centers		
MinuteClinic (Within CVS)	215 Park Ave S, New York, NY 10003	330
ProHEALTH Urgent Care of Gramercy Park	291 3rd Ave, New York, NY 10010	1,307
CityMD East 23rd Urgent Care - NYC	212 E 23rd St, New York, NY 10010	1,538
CityMD West 23rd Urgent Care - NYC	37 W 23rd St, New York, NY 10010	1,837
CityMD West 14th Urgent Care - NYC	14 W 14th St, New York, NY 10011	1,966
CityMD East 14th Urgent Care - NYC	216 E 14th St, New York, NY 10003	1,860

Hospitals

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Banks/ATMs	Address	Distance (in Feet)
Citibank	79 5th Ave, New York, NY 10003	1,307
Signature Bank	Everett Building, 200 Park Ave S #501, New York, NY 10003	465
Santander Bank ATM	215 Park Ave S, New York, NY 10003	378
Flushing Bank	225 Park Ave S, New York, NY 10003	244
E-Complish	228 Park Ave S Suite 89324, New York, NY 10003	189
Chase Bank	230 Park Ave S, New York, NY 10003	165
Bank of America ATM	240 Park Ave S, New York, NY 10003	137
Metropolitan Venture Partners	257 Park Ave S #15, New York, NY 10010	323
Alliance Investment Banking Group	257 Park Ave S 7th floor, New York, NY 10010	323
Santander Bank ATM	300 Park Ave S, New York, NY 10010	808

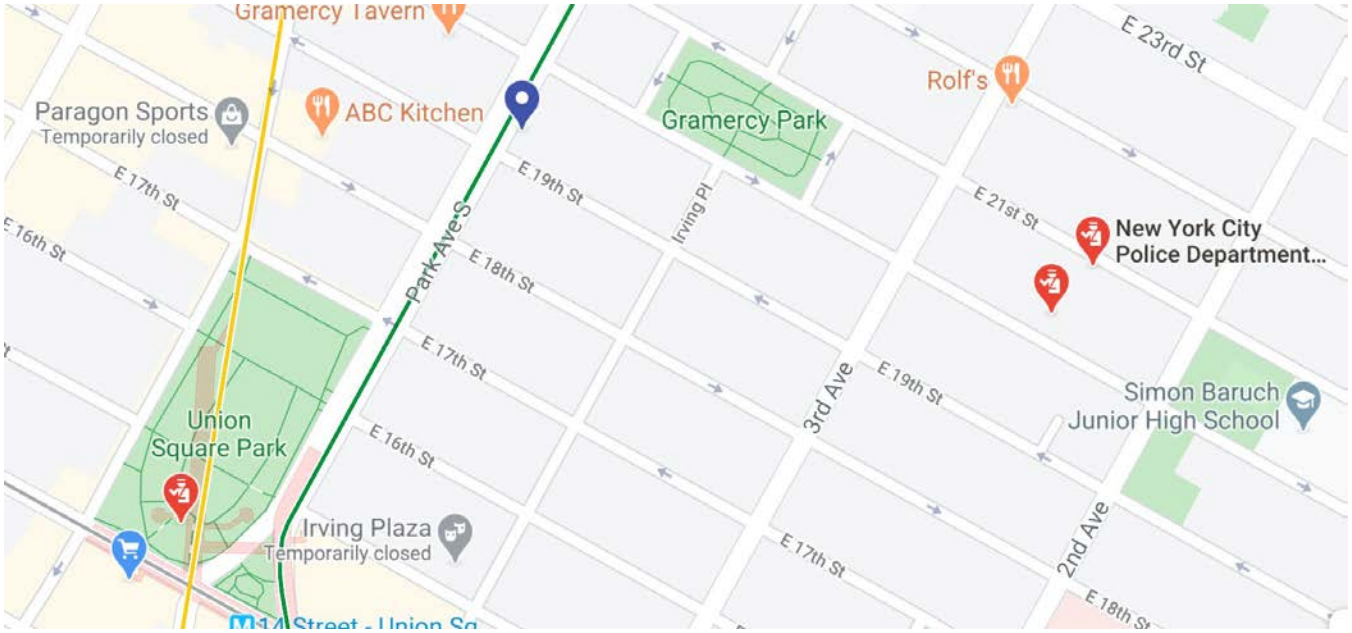


Banks and ATMs

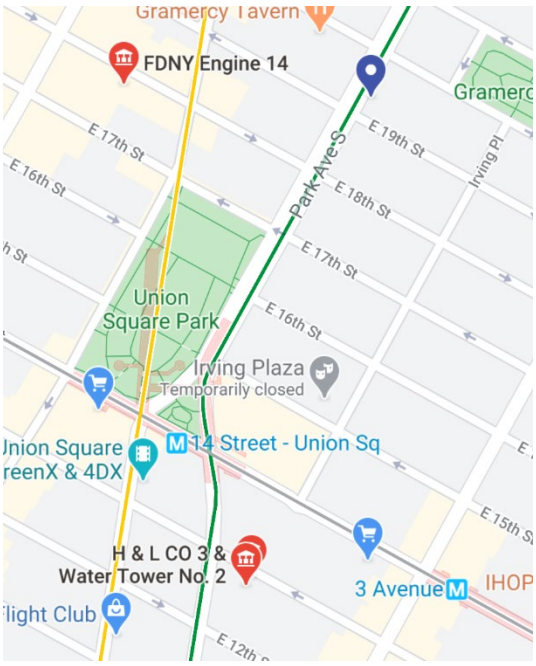
NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Police and Fire Station	Address	Distance (in Feet)
New York City Police Department - 13th Precinct	230 E 21st St, New York, NY 10010	1,444
NYPD Transit District 4	101 E 14th St, New York, NY 10003	1,278
FDNY Engine 14	14 E 18th St, New York, NY 10003	862
H & L CO 3 & Water Tower No. 2 (Fire Station)	108 E 13th St, New York, NY 10003	1,744



Police Stations



Fire Stations

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

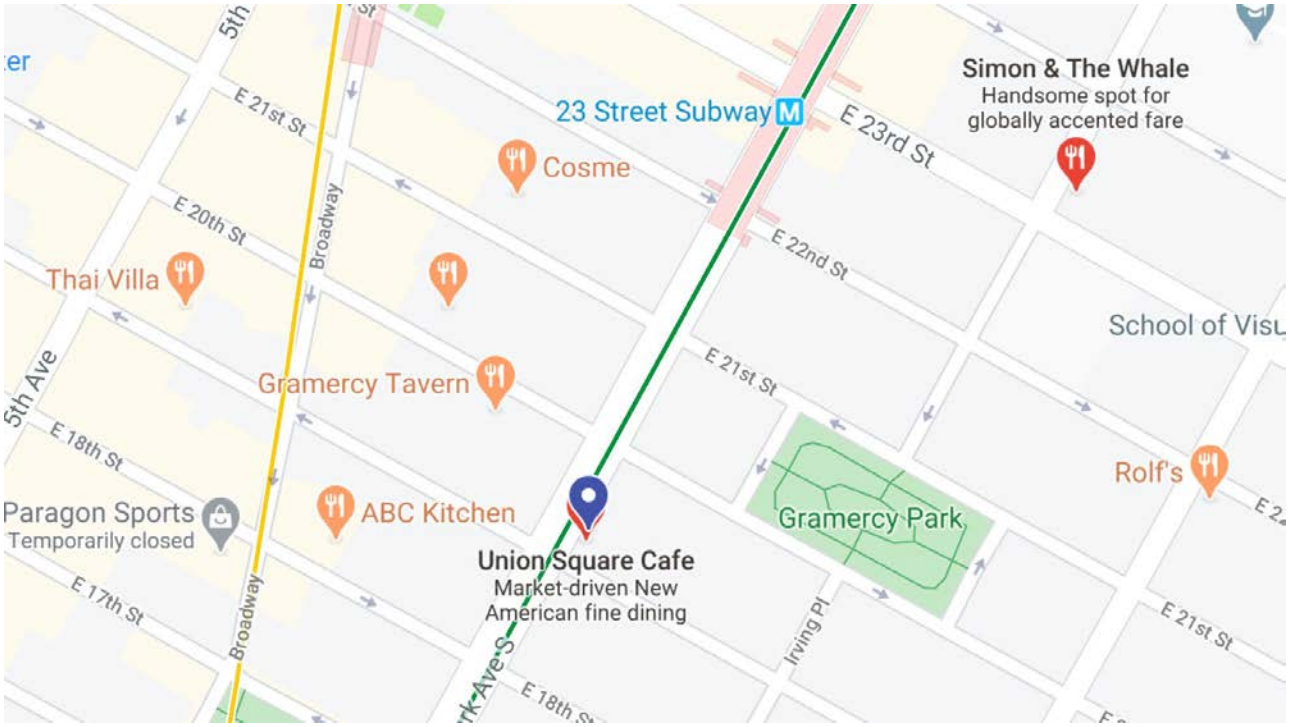
Museum and Cultural Institutions	Address	Distance (in Feet)
Flatiron Building	175 5th Ave, New York, NY 10010	1,303
Fotografiska New York	281 Park Ave S, New York, NY 10010	603
Theodore Roosevelt Birthplace National Historic Site	28 E 20th St, New York, NY 10003	477
Rubin Museum of Art	150 W 17th St, New York, NY 10011	2,765
Museum of Candy	656 6th Ave, New York, NY 10011	1,867
Metropolitan (Museum)	Fifth Avenue Hotel, 200 5th Ave, New York, NY 10010	1,825
National Museum of Mathematics	11 E 26th St, New York, NY 10010	1,955

Museum and Cultural Institutions

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Food and Entertainment	Address	Distance (in Feet)
Popular and Iconic Restaurants		
Union Square Café	101 E 19th St, New York, NY 10003	0
Gramercy Tavern	42 E 20th St, New York, NY 10003	305
ABC Kitchen	35 E 18th St, New York, NY 10003	455
SUGARFISH by sushi nozawa	33 E 20th St, New York, NY 10003	508
Thai Villa	5 E 19th St, New York, NY 10003	872
Cosme	35 E 21st St, New York, NY 10010	700
Simon & The Whale	23 Lexington Ave, New York, NY 10010	1,153
Rolf's	281 3rd Ave, New York, NY 10010	1,197
Live Music Venue		
Irving Plaza	17 Irving Pl, New York, NY 10003	1,062
Gramercy Theatre	127 E 23rd St, New York, NY 10010	1,067
Movie Theater		
AMC 19th St. East 6	890 Broadway, New York, NY 10003	576
Cinema Village	22 E 12th St, New York, NY 10003	2,029
Regal Union Square ScreenX & 4DX	850 Broadway, New York, NY 10003	1,479
Mind Movie	37 W 17th St, New York, NY 10011	1,744

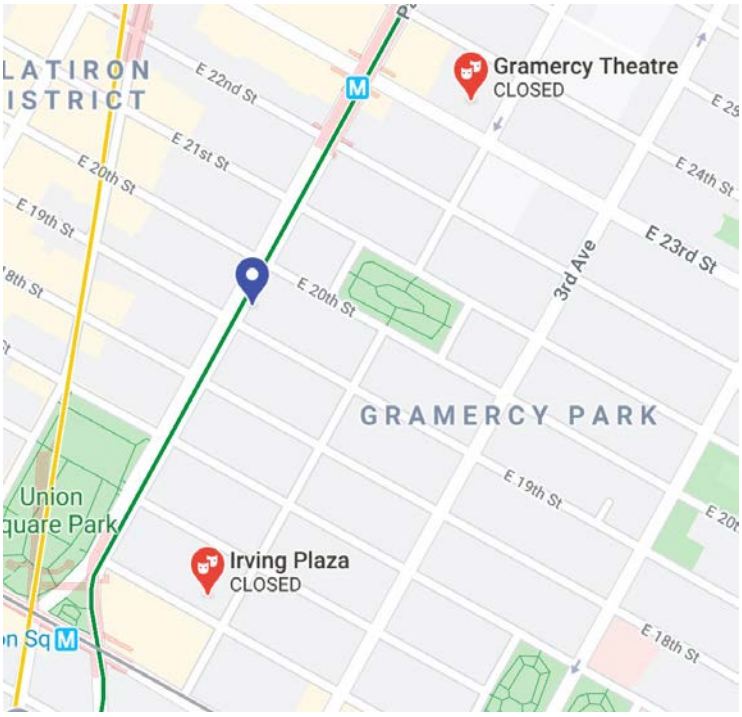


Popular and Iconic Restaurants

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Movie Theaters

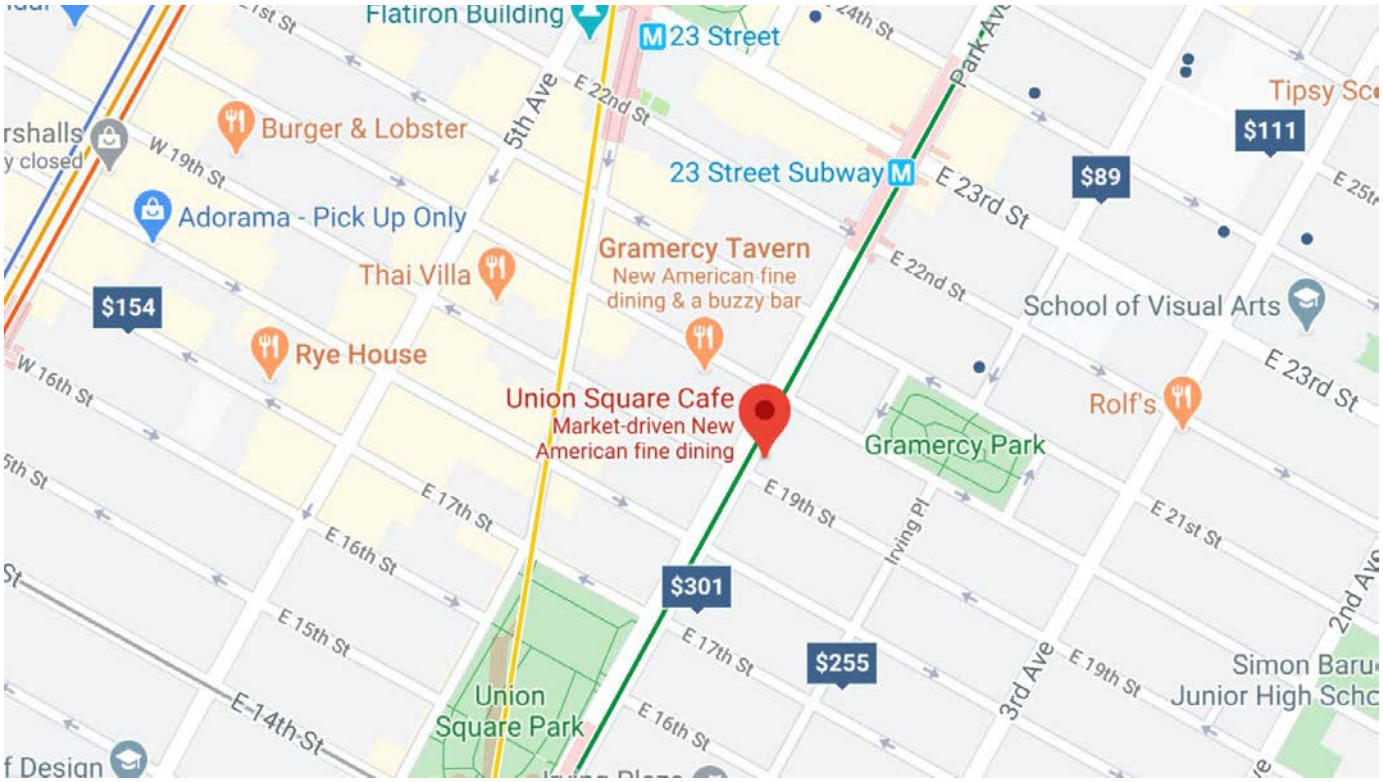


Live Music Venues

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Hotel and Lodging	Address	Distance (in Feet)
Gramercy Park Hotel (5 Stars)	2 Lexington Ave, New York, NY 10010	673
W New York – Union Square (4 Stars)	201 Park Ave S, New York, NY 10003	502
Inn At Irving Place (4 Stars)	56 Irving Pl, New York, NY 10003	710
Freehand New York (4 Stars)	23 Lexington Ave, New York, NY 10010	1,235
Chelsea Inn Hotel (2 Stars)	46 West 17th Street, New York, NY 10011	1,841
Carlton Arms Hotel (2 Stars)	160 E 25th St, New York, NY 10010	1,717



Hotels and Lodging

Social and Economic Characteristics of Census Tract

Table 6.1. Indicators of vulnerability (based on Cutter *et al.*, 2009)

Concept or characteristic	Proxy variable	Effect on social vulnerability
Socioeconomic status	% poverty	Increases
	Per capita income	High-decreases; low-increases
Gender	% female-headed households	Increases
Race and/or ethnicity	% African Americans	Increases
	% Hispanics	Increases
Age	% elderly	Increases
	% under 18	Increases
Housing tenure (ownership)	% renters	Increases
	% homeowners	Decreases
Employment	% unemployed	Increases
Occupation	% agricultural workers	Increases
	% low-skilled service jobs	Increases
Family structure	% single-parent households	Increases
	Large family	Increases
Education	% less than high school	Increases
Population growth	Rapid growth	Increases
Access to medical services	Higher density of medical establishments and services	Decreases
Access and functional needs populations	Homeless, tourists, transients, nursing home residents	Increases
Social dependence	% social security recipients	Increases

Sustainability & Social Equity

Matched Address	
Address	235 PARK AVE S, NEW YORK, NY, 10003
MSA/MD Code	35614
State Code	36
County Code	061
Tract Code	0050.00
MSA/MD Name	NEW YORK-JERSEY CITY-WHITE PLAINS, NY-NJ
State Name	NEW YORK
County Name	NEW YORK COUNTY

Census demographic data for the year 2020 are currently unavailable.

Census Demographic Data

User Select Tract

Social Characteristics

According the U.S. Census, the property lies in Census Tract 50 in New York County, New York. The subcategories that describe the social aspects of the surrounding area are: Households by Type, Relationship, Marital Status, Fertility, Grandparents, School Enrollment, Educational Attainment, Veteran Status, Disability Status of the Civilian Noninstitutionalized Population, Residence 1 Year Ago, Place of Birth, U.S. Citizenship Status, Year of Entry, World Region of Birth of Foreign Born, Language Spoken at Home, Ancestry, Computers and Internet Use.

The guidelines issued by Sustainability & Social Equity will be used to highlight which characteristics are of interest and influence vulnerability. Please note that in the tables, any row highlighted yellow is of interest and will be discussed below. In general, the neighborhood is at a very low risk of social vulnerability.

- **Households by Type**
  - In terms of family structure and age, the neighborhood is below the city's percentages for the following: number of single-parent households, the percentage of female-headed households, average family size, households with one or more people under 18 years and households with one or more people 65 years and over. This suggests that for family structure, the neighborhood has a lower vulnerability, which makes the project's target audience more enticed to rent and invest in the neighborhood.
- **Fertility**
  - In terms of population growth, the number of births per 1,000 women 15 to 50 years old is below the city's percentage. However, for the number of births per 1,000 women 35-50 years old it is above the city's percentage for that age range. This implies that in the neighborhood, women are waiting longer to have families and the effect is that it may lower immediate population growth and make the neighborhood more vulnerable. This would affect the targeted audience if they wanted to invest long term (20 plus years) in the neighborhood and hire locally. However, it is anticipated they will hire outside the neighborhood from other parts of the city or country.
- **Educational Attainment**
  - In terms of education, the neighborhood is way below the city's percentage of those with less than a 9th grade education. In addition, it is way above the city's percentage of high school graduate or higher and bachelor's degree or higher. This suggests that the neighborhood is extremely educated and is at low risk of vulnerability when it comes to education. The targeted audience will find this enticing due to the amount of talent they can recruit from.

- **Disability Status of the Civilian Noninstitutionalized Population**
  - In terms of age, the neighborhood is below the city's percentage of people under 18 years (10.82% compared to 21.06%) and 65 years and over (12.01% compared to 13.78%). This suggests that the neighborhood is at a lower risk of vulnerability in terms of age. Again, the targeted audience will be enticed to rent in a property where talent in the immediate vicinity are of working age.
- **Residence 1 Year Ago**
  - In terms of population, the neighborhood has seen a higher percentage of people moving in (compared to the city) from a different county, different state or abroad. This indicates that despite the birthrate being lower in the neighborhood compared to the rest of the city, there are more people moving in to help make up for it. Therefore, this influx of new people and growth will be a deciding factor for tenants to lease in the building.

SOCIAL - CENSUS TRACT 50 (235 Park Ave S)	ESTIMATE	PERCENT	% in NYC	ESTIMATE IN NYC
HOUSEHOLDS BY TYPE				
Total households	2,917	2,917	3,154,103	3,154,103
Family households (families)	849	29.10%	59.90%	1,887,978
With own children of the householder under 18 years	316	10.80%	25.20%	795,899
Married-couple family	815	27.90%	36.80%	1,159,906
With own children of the householder under 18 years	291	10.00%	15.70%	494,106
Male householder, no wife present, family	13	0.40%	5.50%	172,928
With own children of the householder under 18 years	13	0.40%	1.80%	55,842
Female householder, no husband present, family	21	0.70%	17.60%	555,144
With own children of the householder under 18 years	12	0.40%	7.80%	245,951
Nonfamily households	2,068	70.90%	40.10%	1,266,125
Householder living alone	1,644	56.40%	32.20%	1,015,605
65 years and over	426	14.60%	11.30%	357,845
Households with one or more people under 18 years	316	10.80%	29.20%	920,772
Households with one or more people 65 years and over	546	18.70%	28.00%	883,169
Average household size	1.76	(X)	(X)	2.62
Average family size	2.73	(X)	(X)	3.39
RELATIONSHIP				
Population in households	5,141	5,141	8,266,644	8,266,644
Householder	2,917	56.70%	38.20%	3,154,103
Spouse	834	16.20%	14.00%	1,157,618
Child	610	11.90%	29.80%	2,467,404
Other relatives	21	0.40%	10.70%	888,058
Nonrelatives	759	14.80%	7.30%	599,461
Unmarried partner	201	3.90%	2.10%	172,873
MARITAL STATUS				
Males 15 years and over	2,152	2,152	3,262,773	3,262,773
Never married	1,121	52.10%	45.60%	1,488,804
Now married, except separated	888	41.30%	43.80%	1,427,850
Separated	0	0.00%	2.30%	76,052
Widowed	19	0.90%	2.30%	73,834
Divorced	124	5.80%	6.00%	196,233

Females 15 years and over	2,536	2,536	3,687,800	3,687,800
Never married	1,418	55.90%	41.50%	1,531,940
Now married, except separated	850	33.50%	37.00%	1,365,285
Separated	0	0.00%	3.70%	134,658
Widowed	123	4.90%	8.40%	310,212
Divorced	145	5.70%	9.40%	345,705
FERTILITY				
Number of women 15 to 50 years old who had a birth in the past 12 months	23	23	103,213	103,213
Unmarried women (widowed, divorced, and never married)	0	0.00%	31.10%	32,136
Per 1,000 unmarried women	0	(X)	(X)	23
Per 1,000 women 15 to 50 years old	13	(X)	(X)	46
Per 1,000 women 15 to 19 years old	0	(X)	(X)	10
Per 1,000 women 20 to 34 years old	0	(X)	(X)	63
Per 1,000 women 35 to 50 years old	43	(X)	(X)	36
GRANDPARENTS				
Number of grandparents living with own grandchildren under 18 years	0	0	227,612	227,612
Grandparents responsible for grandchildren	0	-	26.70%	60,687
Years responsible for grandchildren				
Less than 1 year	0	-	4.80%	11,031
1 or 2 years	0	-	5.70%	12,931
3 or 4 years	0	-	4.40%	10,044
5 or more years	0	-	11.70%	26,681
Number of grandparents responsible for own grandchildren under 18 years	0	0	60,687	60,687
Who are female	0	-	71.00%	43,066
Who are married	0	-	60.80%	36,876
SCHOOL ENROLLMENT				
Population 3 years and over enrolled in school	681	681	2,018,104	2,018,104
Nursery school, preschool	53	7.80%	6.80%	138,047
Kindergarten	16	2.30%	5.10%	103,836
Elementary school (grades 1-8)	240	35.20%	37.70%	760,849
High school (grades 9-12)	58	8.50%	19.00%	383,365
College or graduate school	314	46.10%	31.30%	632,007
EDUCATIONAL ATTAINMENT				
Population 25 years and over	4,363	4,363	5,923,498	5,923,498
Less than 9th grade	11	0.30%	9.50%	565,345
9th to 12th grade, no diploma	20	0.50%	8.80%	523,873
High school graduate (includes equivalency)	125	2.90%	24.00%	1,421,617
Some college, no degree	160	3.70%	13.80%	815,961
Associate's degree	131	3.00%	6.40%	379,457
Bachelor's degree	2,051	47.00%	21.80%	1,292,814
Graduate or professional degree	1,865	42.70%	15.60%	924,431
High school graduate or higher	4,332	99.30%	81.60%	4,834,280
Bachelor's degree or higher	3,916	89.80%	37.40%	2,217,245
VETERAN STATUS				
Civilian population 18 years and over	4,639	4,639	6,674,840	6,674,840
Civilian veterans	117	2.50%	2.30%	156,514
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION				
Total Civilian Noninstitutionalized Population	5,202	5,202	8,379,895	8,379,895
With a disability	254	4.90%	10.80%	905,592
Under 18 years	563	563	1,764,874	1,764,874
With a disability	16	2.80%	3.40%	60,631
18 to 64 years	4,014	4,014	5,460,031	5,460,031
With a disability	91	2.30%	7.90%	432,783
65 years and over	625	625	1,154,990	1,154,990
With a disability	147	23.50%	35.70%	412,178
RESIDENCE 1 YEAR AGO				

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Population 1 year and over	5,177	5,177	8,337,697	8,337,697
Same house	4,271	82.50%	90.00%	7,503,083
Different house in the U.S.	642	12.40%	8.90%	743,726
Same county	366	7.10%	5.50%	460,018
Different county	276	5.30%	3.40%	283,708
Same state	127	2.50%	2.00%	166,294
Different state	149	2.90%	1.40%	117,414
Abroad	264	5.10%	1.10%	90,888
PLACE OF BIRTH				
Total population	5,202	5,202	8,443,713	8,443,713
Native	4,292	82.50%	63.00%	5,316,424
Born in United States	4,170	80.20%	59.30%	5,003,656
State of residence	2,277	43.80%	48.20%	4,073,915
Different state	1,893	36.40%	11.00%	929,741
Born in Puerto Rico, U.S. Island areas, or born abroad to American parent(s)	122	2.30%	3.70%	312,768
Foreign born	910	17.50%	37.00%	3,127,289
U.S. CITIZENSHIP STATUS				
Foreign-born population	910	910	3,127,289	3,127,289
Naturalized U.S. citizen	436	47.90%	56.00%	1,749,863
Not a U.S. citizen	474	52.10%	44.00%	1,377,426
YEAR OF ENTRY				
Population born outside the United States	1,032	1,032	3,440,057	3,440,057
Native	122	122	312,768	312,768
Entered 2010 or later	74	60.70%	13.20%	41,341
Entered before 2010	48	39.30%	86.80%	271,427
Foreign born	910	910	3,127,289	3,127,289
Entered 2010 or later	353	38.80%	17.20%	538,033
Entered before 2010	557	61.20%	82.80%	2,589,256
WORLD REGION OF BIRTH OF FOREIGN BORN				
Foreign-born population, excluding population born at sea	910	910	3,127,286	3,127,286
Europe	458	50.30%	14.50%	454,287
Asia	289	31.80%	29.20%	913,986
Africa	0	0.00%	4.70%	147,127
Oceania	48	5.30%	0.40%	10,987
Latin America	37	4.10%	50.40%	1,576,983
Northern America	78	8.60%	0.80%	23,916
LANGUAGE SPOKEN AT HOME				
Population 5 years and over	5,014	5,014	7,891,844	7,891,844
English only	4,259	84.90%	51.30%	4,050,904
Language other than English	755	15.10%	48.70%	3,840,940
Speak English less than "very well"	176	3.50%	22.80%	1,797,641
Spanish	112	2.20%	24.20%	1,910,951
Speak English less than "very well"	0	0.00%	11.00%	867,528
Other Indo-European languages	312	6.20%	12.80%	1,008,954
Speak English less than "very well"	61	1.20%	5.40%	425,110
Asian and Pacific Islander languages	279	5.60%	8.80%	695,474
Speak English less than "very well"	102	2.00%	5.50%	435,686
Other languages	52	1.00%	2.90%	225,561
Speak English less than "very well"	13	0.30%	0.90%	69,317
ANCESTRY				
Total population	5,202	5,202	8,443,713	8,443,713
American	184	3.50%	4.50%	377,184
Arab	51	1.00%	1.20%	102,479
Czech	20	0.40%	0.10%	12,010
Danish	0	0.00%	0.10%	8,248
Dutch	64	1.20%	0.30%	21,578

English	358	6.90%	1.60%	137,212
French (except Basque)	104	2.00%	0.80%	65,549
French Canadian	0	0.00%	0.10%	10,685
German	412	7.90%	2.90%	248,646
Greek	177	3.40%	0.70%	62,903
Hungarian	135	2.60%	0.60%	53,955
Irish	347	6.70%	4.30%	364,226
Italian	340	6.50%	6.40%	536,472
Lithuanian	81	1.60%	0.20%	13,567
Norwegian	47	0.90%	0.30%	24,554
Polish	354	6.80%	2.40%	200,541
Portuguese	0	0.00%	0.20%	13,837
Russian	412	7.90%	2.30%	198,079
Scotch-Irish	19	0.40%	0.20%	14,021
Scottish	71	1.40%	0.50%	39,035
Slovak	62	1.20%	0.10%	6,764
Subsaharan African	0	0.00%	2.40%	198,870
Swedish	63	1.20%	0.30%	23,149
Swiss	0	0.00%	0.10%	8,316
Ukrainian	14	0.30%	0.80%	64,635
Welsh	14	0.30%	0.10%	11,121
West Indian (excluding Hispanic origin groups)	0	0.00%	6.90%	584,810
COMPUTERS AND INTERNET USE				
Total households	2,917	2,917	3,154,103	3,154,103
With a computer	2,823	96.80%	87.50%	2,758,928
With a broadband Internet subscription	2,762	94.70%	79.40%	2,505,211

Economic Characteristics

The subcategories that describe the economic aspects of the surrounding area are: Employment Status, Commuting to Work, Occupation, Industry, Class of Worker, Income and Benefits, Health Insurance Coverage, Percentage of Families and People Whose Income in the Past 12 Months is Below the Poverty Level.

The guidelines issued by Sustainability & Social Equity will be used to highlight which characteristics are of interest and influence vulnerability. Please note that in the tables, any row highlighted yellow is of interest and will be discussed below. In general, the neighborhood is at a very low risk of economic vulnerability.

- **Employment Status**
  - In terms of employment, the neighborhood unemployment rate is slightly lower than the city overall. This suggests that the neighborhood is at a low to moderate risk of vulnerability in terms of employment. This is important to the targeted audience who wants to invest in a neighborhood that has the financial means to support their business.

- **Commuting to Work**
    - In terms of modes of commuting, the neighborhood has a higher percentage of taking public transportation or walking compared to the rest of the city. This suggests that the neighborhood is walkable and near good transportation. These factors indicate a convenient and healthy environment which makes it easier for future tenants to attract new business and talent.
- **Occupation**
    - In terms of occupation, the neighborhood has a far lower percentage of service occupations compared to the rest of NYC. This suggests that in terms of occupation, the neighborhood is at a much lower vulnerability level than the city. The targeted audience will be looking for workers that are highly skilled and will want to locate in a neighborhood like Gramercy Park where they can find workers with those qualifications.
- **Industry**
    - In terms of occupation, the neighborhood has no one that works in agriculture, forestry, fishing and hunting, and mining. This indicates that the neighborhood is at some of the lowest levels of vulnerability when it comes to occupation. Again, tenants will be looking for highly skilled workers to work for them, and this neighborhood will be able to provide that for them.
- **Income and Benefits**
    - In terms of socioeconomic status and social dependence, the neighborhood percentage of households which make $200,000 or more is greater than 3x that of the city. In addition, family per capita income is more than 3x that of the city as well. Also, the neighborhood has a lower percentage of households which use social security and families which use SNAP benefits (compared to the city). All these factors suggest that the neighborhood has a low vulnerability in terms of socioeconomic status and social dependence. The targeted audience will want to invest in a neighborhood that can support their business. For example, the two restaurants on the property can greatly benefit from people who have money to dine out.
- **Health Insurance Coverage**
    - In terms of medical services access, the neighborhood has a higher percentage of people who have health insurance compared to the city. This suggests that the neighborhood can access and utilize medical services which makes it have a lower vulnerability (compared to the city). The targeted audience will want to invest in a healthy environment where their customers are healthy and can continue to do business.

- **Percentage of Families and People Whose Income in the Past 12 Months is Below the Poverty Level (2018).**
    - In terms of socioeconomic status, the neighborhood had half the percentage of families and people whose income was at the poverty level (within 12 months in 2018) in NYC. This suggests that the neighborhood has a low vulnerability in terms of socioeconomic status. Therefore, the targeted audience will want to lease in the building where they know their business can thrive and receive many customers.

ECONOMIC - CENSUS TRACT 50 (235 Park Ave S)	ESTIMATE	PERCENT	% in NYC	ESTIMATE IN NYC
EMPLOYMENT STATUS				
Population 16 years and over	4,675	4,675	6,860,360	6,860,360
In labor force	3,831	81.90%	63.50%	4,356,776
Civilian labor force	3,831	81.90%	63.50%	4,354,474
Employed	3,587	76.70%	59.10%	4,053,141
Unemployed	244	5.20%	4.40%	301,333
Armed Forces	0	0.00%	0.00%	2,302
Not in labor force	844	18.10%	36.50%	2,503,584
Civilian labor force	3,831	3,831	4,354,474	4,354,474
Unemployment Rate	(X)	6.40%	6.90%	(X)
Females 16 years and over	2,536	2,536	3,642,664	3,642,664
In labor force	1,889	74.50%	58.50%	2,130,876
Civilian labor force	1,889	74.50%	58.50%	2,130,364
Employed	1,728	68.10%	54.50%	1,986,266
Own children of the householder under 6 years	215	215	619,948	619,948
All parents in family in labor force	117	54.40%	63.10%	391,319
Own children of the householder 6 to 17 years	337	337	1,060,266	1,060,266
All parents in family in labor force	213	63.20%	66.90%	708,828
COMMUTING TO WORK				
Workers 16 years and over	3,587	3,587	3,953,532	3,953,532
Car, truck, or van -- drove alone	166	4.60%	22.30%	883,066
Car, truck, or van -- carpooled	80	2.20%	4.50%	177,245
Public transportation (excluding taxicab)	2,251	62.80%	56.20%	2,223,087
Walked	587	16.40%	9.90%	392,607
Other means	205	5.70%	2.90%	112,933
Worked at home	298	8.30%	4.20%	164,594
Mean travel time to work (minutes)	25.6	(X)	(X)	41.2
OCCUPATION				
Civilian employed population 16 years and over	3,587	3,587	4,053,141	4,053,141
Management, business, science, and arts occupations	2,804	78.20%	41.30%	1,673,223
Service occupations	94	2.60%	22.70%	918,538
Sales and office occupations	638	17.80%	20.80%	842,017
Natural resources, construction, and maintenance occupations	28	0.80%	6.10%	245,935
Production, transportation, and material moving occupations	23	0.60%	9.20%	373,428
INDUSTRY				
Civilian employed population 16 years and over	3,587	3,587	4,053,141	4,053,141
Agriculture, forestry, fishing and hunting, and mining	0	0.00%	0.10%	3,870
Construction	13	0.40%	5.10%	206,067
Manufacturing	173	4.80%	3.30%	133,626
Wholesale trade	119	3.30%	2.10%	85,255
Retail trade	114	3.20%	9.30%	378,143
Transportation and warehousing, and utilities	0	0.00%	6.40%	259,590
Information	334	9.30%	3.80%	154,804
Finance and insurance, and real estate and rental and leasing	889	24.80%	9.50%	383,827
Professional, scientific, and management, and administrative and waste management services	1,098	30.60%	13.70%	555,773
Educational services, and health care and social assistance	495	13.80%	26.70%	1,080,586
Arts, entertainment, and recreation, and accommodation and food services	197	5.50%	10.90%	440,995

Other services, except public administration	92	2.60%	5.40%	218,455
Public administration	63	1.80%	3.80%	152,150
CLASS OF WORKER				
Civilian employed population 16 years and over	3,587	3,587	4,053,141	4,053,141
Private wage and salary workers	2,960	82.50%	80.30%	3,254,637
Government workers	199	5.50%	13.10%	531,808
Self-employed in own not incorporated business workers	428	11.90%	6.50%	261,635
Unpaid family workers	0	0.00%	0.10%	5,061
INCOME AND BENEFITS (IN 2018 INFLATION-ADJUSTED DOLLARS)				
Total households	2,917	2,917	3,154,103	3,154,103
Less than $10,000	132	4.50%	8.80%	277,465
$10,000 to $14,999	62	2.10%	6.20%	196,924
$15,000 to $24,999	129	4.40%	9.40%	297,771
$25,000 to $34,999	0	0.00%	8.20%	258,598
$35,000 to $49,999	111	3.80%	10.50%	332,258
$50,000 to $74,999	453	15.50%	14.70%	462,374
$75,000 to $99,999	215	7.40%	11.00%	345,558
$100,000 to $149,999	258	8.80%	14.00%	440,162
$150,000 to $199,999	434	14.90%	7.00%	222,014
$200,000 or more	1,123	38.50%	10.20%	320,979
Median household income (dollars)	166,602	(X)	(X)	60,762
Mean household income (dollars)	239,520	(X)	(X)	97,647
With earnings	2,518	86.30%	78 20%	2,465,699
Mean earnings (dollars)	255,999	(X)	(X)	105,649
With Social Security	411	14.10%	26.00%	821,385
Mean Social Security income (dollars)	18,743	(X)	(X)	17,317
With retirement income	288	9.90%	12.70%	401,837
Mean retirement income (dollars)	41,175	(X)	(X)	27,450
With Supplemental Security Income	16	0.50%	7 90%	249,247
Mean Supplemental Security Income (dollars)	N	N	(X)	9,332
With cash public assistance income	16	0.50%	4.40%	137,887
Mean cash public assistance income (dollars)	N	N	(X)	3,609
With Food Stamp/SNAP benefits in the past 12 months	29	1.00%	19 80%	624,636
Families	849	849	1,887,978	1,887,978
Less than $10,000	0	0.00%	6.00%	112,405
$10,000 to $14,999	0	0.00%	4.10%	77,738
$15,000 to $24,999	22	2.60%	8 90%	168,362
$25,000 to $34,999	0	0.00%	8.50%	160,633
$35,000 to $49,999	41	4.80%	11 20%	210,893
$50,000 to $74,999	43	5.10%	15 20%	287,074
$75,000 to $99,999	25	2.90%	11.40%	214,732
$100,000 to $149,999	141	16.60%	15.10%	284,755
$150,000 to $199,999	120	14.10%	7 90%	148,457
$200,000 or more	457	53.80%	11 80%	222,929
Median family income (dollars)	250,000+	(X)	(X)	68,004
Mean family income (dollars)	341,650	(X)	(X)	109,515
Per capita income (dollars)	138,553	(X)	(X)	37,693
Nonfamily households	2,068	2,068	1,266,125	1,266,125
Median nonfamily income (dollars)	107,394	(X)	(X)	45,515
Mean nonfamily income (dollars)	197,592	(X)	(X)	75,536
Median earnings for workers (dollars)	125,231	(X)	(X)	38,845
Median earnings for male full-time, year-round workers (dollars)	161,394	(X)	(X)	54,127
Median earnings for female full-time, year-round workers (dollars)	126,114	(X)	(X)	51,327
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	5,202	5,202	8,379,895	8,379,895
With health insurance coverage	5,016	96.40%	91 60%	7,672,151
With private health insurance	4,757	91.40%	57.50%	4,818,542
With public coverage	652	12.50%	42 80%	3,582,878
No health insurance coverage	186	3.60%	8.40%	707,744
Civilian noninstitutionalized population under 19 years	615	615	1,855,028	1,855,028
No health insurance coverage	0	0.00%	2.70%	49,352
Civilian noninstitutionalized population 19 to 64 years	3,962	3,962	5,369,877	5,369,877
In labor force:	3,558	3,558	4,102,491	4,102,491

NEIGHBORHOOD DEMOGRAPHICS

235 Park Ave. S New York, NY 10003 (Or: 101 East 19th Street New York, NY 10003)

Employed:	3,324	3,324	3,825,543	3,825,543
With health insurance coverage	3,214	96.70%	88.70%	3,395,066
With private health insurance	3,161	95.10%	72 60%	2,778,950
With public coverage	53	1.60%	18.50%	709,097
No health insurance coverage	110	3.30%	11 30%	430,477
Unemployed:	234	234	276,948	276,948
With health insurance coverage	201	85.90%	81.10%	224,574
With private health insurance	182	77.80%	34.70%	96,183
With public coverage	19	8.10%	50 30%	139,298
No health insurance coverage	33	14.10%	18 90%	52,374
Not in labor force:	404	404	1,267,386	1,267,386
With health insurance coverage	404	100.00%	87.50%	1,108,889
With private health insurance	404	100.00%	40 60%	514,091
With public coverage	0	0.00%	53.10%	672,918
No health insurance coverage	0	0.00%	12.50%	158,497
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	(X)	0.00%	15 60%	(X)
With related children of the householder under 18 years	(X)	0.00%	22 30%	(X)
With related children of the householder under 5 years only	(X)	0.00%	16 30%	(X)
Married couple families	(X)	0.00%	9.50%	(X)
With related children of the householder under 18 years	(X)	0.00%	12.70%	(X)
With related children of the householder under 5 years only	(X)	0.00%	8 60%	(X)
Families with female householder, no husband present	(X)	0.00%	28.50%	(X)
With related children of the householder under 18 years	(X)	0.00%	39.00%	(X)
With related children of the householder under 5 years only	(X)	-	34 90%	(X)
All people	(X)	6.80%	18 90%	(X)
Under 18 years	(X)	0.00%	26 80%	(X)
Related children of the householder under 18 years	(X)	0.00%	26.50%	(X)
Related children of the householder under 5 years	(X)	0.00%	25 80%	(X)
Related children of the householder 5 to 17 years	(X)	0.00%	26 90%	(X)
18 years and over	(X)	7.60%	16 80%	(X)
18 to 64 years	(X)	7.30%	16.50%	(X)
65 years and over	(X)	10.10%	18 30%	(X)
People in families	(X)	0.00%	16 80%	(X)
Unrelated individuals 15 years and over	(X)	12.40%	25 90%	(X)

SWOT Analysis – Social

Helpful	Harmful
Strengths	**Weaknesses**
• "Stable" family structures and age ranges indicate low vulnerability and strong social vitality. • Very high levels of education among most residents. • Relatively higher rates of population growth from people moving in compared to the rest of NYC. • Easy access to multiple options of amenities and basic services like police, medical, fire, grocery, etc. • Located near multiple transportation stops/hubs and modes of transportation. • Neighborhood is very walkable. • Close to multiple outdoor recreation spaces (parks) which beautify the neighborhood and provide community events. For example, community events provided by Union Square Partnership or Madison Square Park Conservancy. • Access to arts and culture with proximity to historical attractions like the Flatiron building, museums, and live music venues.	• Delayed and lower birth rate compared to the rest of the city which does not fuel immediate population growth needed to attain social vitality. • Number of hotels and popularity of the area could bring a lot of tourists and transients. This would increase access and functional needs populations and increase social vulnerability, possibly reducing public safety and sense of community.
Opportunities	**Threats**
• (Referencing Sustainability and Social Equity), switching away from burning Fuel Oil #4 will improve air quality, addressing social equity.	• A pandemic or natural disaster like COVID-19 which could put a halt to all non-essential business and prevent people from enjoying outdoor spaces and events.

• Creating a community vulnerability assessment demonstrated by this proposal. • Energy retrofitting a building with a current Energy Star score of 8, which is failing NYC's LL97 standards. • Having equitable access to recycling. • Having equitable access to solar energy. • Adding to transportation options by including a bike storage and community sharing program. • Improving green infrastructure like installing integrated building systems and IoT sensors to reduce energy usage. • Reducing indoor health hazards like installing an algae bio-reactor to clean the circulated air.	• War, political unrest, or social injustices which upset the daily routines or normal lives of the community. • Running out of money or not being able to get financing to fulfill the proposed energy retrofit of the building. • Community backlash or protest for changing any part of the building/neighborhood or causing too much construction noise.

SWOT Analysis - Economic

Helpful	Harmful
Strengths	**Weaknesses**
• Extensive transportation infrastructure exists to help transport workers to their jobs and add to the local economy. • Residents are highly skilled workers and do not work in low-skilled service occupations or other vulnerable industries like agriculture. • Low dependence on social economic programs like SNAP or social security. • Higher levels of income compared to the rest of NYC. • Greater access to health insurance.	• The unemployment rate is only slightly better compared to the city. Even though this makes the neighborhood have a lower to moderate risk, things can still be done to improve employment. • Poverty is also much lower compared to the rest of the city, but this percentage should ideally not exist and more can be done to make this a reality.
Opportunities	**Threats**
• By attracting targeted businesses, this will help to provide good paying (high quality) jobs to those who are unemployed or suffer from poverty. In addition, it will help to grow the population. • Adding more modes of transportation like bikes or adding easy access to taxis like Uber/Lyft will help to bring more business and talent to the neighborhood and tenants. • Energy retrofit will save massive amounts of energy and money. This money can be used to invest in other endeavors like community programs (for example, job training or youth and school programs).	• Sudden recession or depression due to events like COVID-19 where all non-essential businesses and cities are shut down. This might make it hard to attain financing for the energy retrofit and start construction. • War or massive political events which can stall business and prevent people from working. • Global warming and extreme weather events.

Conclusion

From a social and economic perspective, the property is in a vibrant and strong community with a low vulnerability risk. This is largely in part to extensive amenities, transportation and other essential services which are within a mostly 15-minute walking distance. In addition, having great outdoor recreation space and access to arts and culture. Also having community events beautify this community to improve civic trust, appreciation, participation, and stewardship in public life.

The renovation and energy retrofit in the building will address social equity by improving such things as air quality and adding more transportation options. It is the goal to address the neighborhood's weaknesses such as a low birthrate and small levels of poverty/unemployment by attracting new businesses and people to live in the community of Gramercy Park. Threats such as COVID-19 will be addressed by reducing health hazards and investing in improving building safety.

The targeted audience of businesses that are socially conscious and provide high quality jobs will most likely align themselves with the vision of this building and the future of the neighborhood.

Energy & Water Profile

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

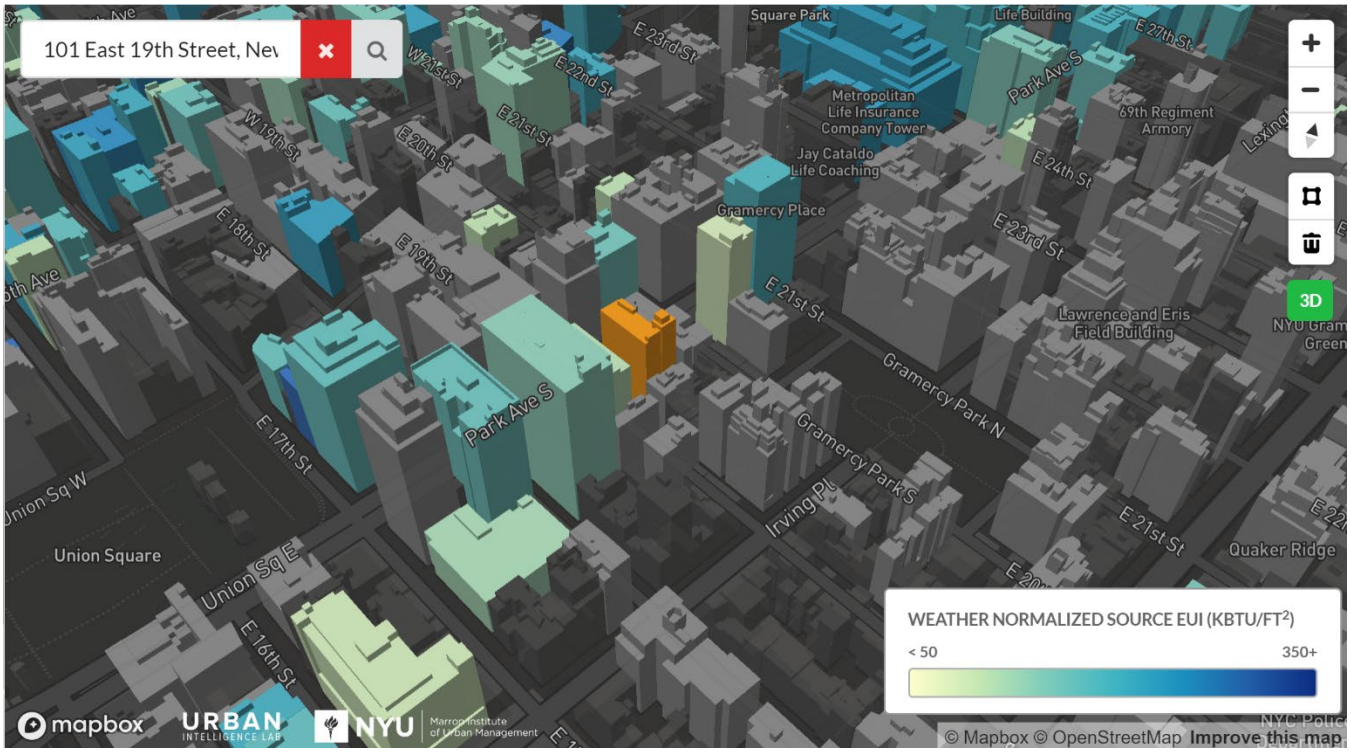
BBL: 1008750001

Introduction

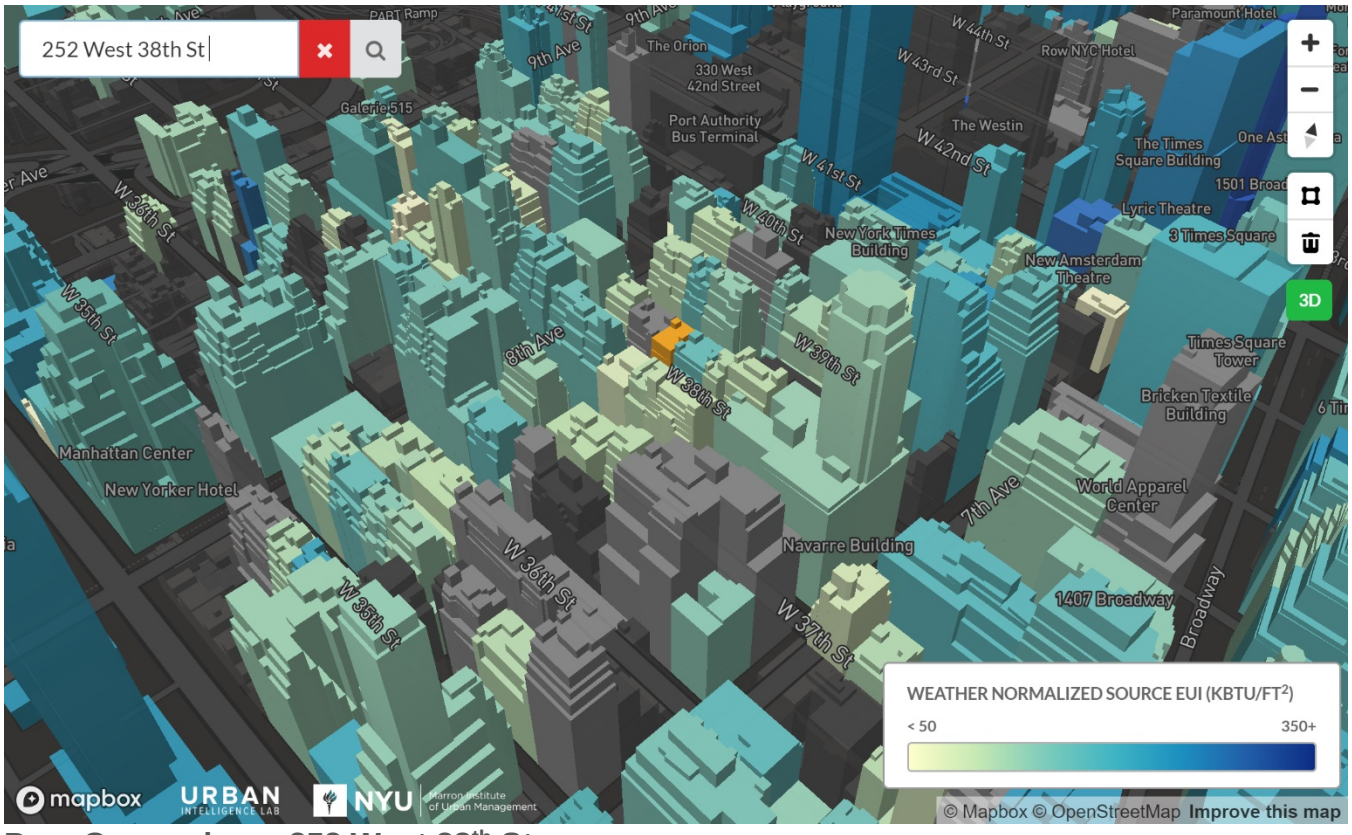
According to Columbia University, “New York is the most wasteful megacity in the world according to a 2015 Report on the per capita energy consumption of 27 global megacities.” Since this project is in New York City, its goal should be to minimize energy and water usage.

Using the NYC Energy & Water Performance Map, a basic energy audit can be done of 235 Park S and compare it to peer buildings that are more energy and water efficient. This section will review drivers of energy and water consumption while also modeling what the building’s potential energy usage could be in Energy Star. Lastly, an analysis of design and operational changes will be done to meet these goals.

Union Square Cafe on the First Level



Subject Property: 235 Park Ave S



Peer Comparison: 252 West 38th St

Drivers of Energy Consumption

For a peer comparison, 252 West 38th St was used (66,073 SF, occupancy: 100, built 1924) with an Energy Star score of 88 (compared to 235 Park South's score of 8). This helped to determine a goal for worker density and heating & cooling energy sources.

According to the NYC Energy and Water Consumption Map, in 2017 the worker density ratio was 5.07 workers for every 1000 SF in 235 Park Ave. S. Therefore, that is approximately 197 SF/Person. The goal is to achieve a similar density to that of the peer building, which is approximately 2.5 workers for every 1000 SF, which is about 400 SF/Person.

The proposed building of 235 Park Ave. S will hold approximately 11 separate offices, each around 5309 SF. The goal is to have tenants who do not require 24/7 access or a high density of workers. Hours of operation for office tenants will tentatively be from 7 AM until 10 PM.

On the ground floor are two restaurants. The first restaurant is Daily Provisions with 600 SF. On average, their hours of operation are 7 AM to 9 PM peaking from 9 AM to 12 PM. About 15 to 20 people can fit comfortably in the restaurant. The second restaurant is Union Square Café with 10,000 SF. On average, their hours of operation are 11 AM to 10 PM, peaking from 6 PM to 9 PM. About 150 people can fit comfortably in the restaurant.

Due to different individual business hours and the building most likely operating on a part load 99% of the time (according to facilitiesnet), a decentralized heating and cooling system will be implemented. This will allow building operators to provide services in different parts of the building when needed and save energy. However, it is generally expected that the building will be heated or cooled 7 days a week from 7 AM until 10 PM.

Using the peer building as an example, it was determined that heating and cooling will be powered with approximately 51% natural gas and 49% electricity.

Proposed Range of Energy Consumption on a Monthly and Annual Basis

In 2018, the Weather Normalized Source EUI (kBtu/ft²) for 235 Park Ave S was 468.1 kBtu/ft² for total annual normalized energy consumption of 32,298,900 kBtu/ft². Total monthly normalized energy consumption was 2,691,575 kBtu/ft². Again, the Energy Star score of 235 Park Ave S is an 8 which indicates that a major retrofit needs to be done to improve energy consumed on a PSF basis.

In 2018, for the peer building, it was 130.6 kBtu/ft² for total annual normalized energy consumption of 8,629,133.8 kBtu/ft². Total monthly normalized energy consumption was 719,094.483 kBtu/ft². The Energy Star score of the peer building is an 88 which indicates that the energy consumed on a PSF basis is efficient.

To raise the Energy Star score of 235 Park Ave S to at least a 75, the goal is to match the peer building's usage. Therefore, the goal is to have total annual normalized energy consumption be less than or equal to 8,629,133.8 kBtu/ft². Total monthly normalized energy consumption less than or equal to 719,094.483 kBtu/ft².

The goal (before inputting it into Energy Star) for specific energy source consumptions is broken down below based on the peer building's usage:

	Annual Weather Normalized Site Electricity (kWh)	Monthly Weather Normalized Site Electricity (kWh)	Annual Normalized Site Natural Gas Use (kBtu)	Monthly Weather Normalized Site Natural Gas Use (kBtu)
235 Park Ave S	572,057	47,671.44	2,379,681,810	198,306,817.50

However, by using the comparison property and modeling projections in Energy Star, the following was finalized as the projected energy usage by energy type (Score of 90). Heating and cooling will run on electricity with natural gas supporting restaurant usage.

Energy Type	Units	Est. Annual Energy Usage	Energy Rate ($/Unit)	Energy Cost/SF
Electric - Grid (68.7%)	kWh	580000	$0.16	$1.34
Natural Gas (31.3%)	therms	9000	$1.05	$0.14

Metric	Design Project	Design Target*	Median Property*
ENERGY STAR score (1-100)	90	88	50
Source EUI (kBtu/ft²)	94.0	101.0	194.7
Site EUI (kBtu/ft²)	41.7	44.8	86.4
Source Energy Use (kBtu)	6,486,087.6	6,969,675.2	13,431,257.5
Site Energy Use (kBtu)	2,878,959.8	3,093,608.1	5,961,690.6
Energy Cost ($)	102,250.01	109,873.56	211,737.17
Total GHG Emissions (Metric Tons CO2e)	215.4	231.5	446.0

Drivers of Water Consumption

Water consumption will follow close to the hours of operation of 7 AM to 10 PM every day of the week. However, this is a rough estimate due to the needs of individual tenants.

Tenants will provide their own janitorial services to better control their waste. Though the building will provide options such as recycling, side cycling, and upcycling to tenants. Common areas will be cleaned with the building's own janitorial services.

In terms of amenities, a green roof will be explored for employees (watered by rain). Also, green walls will also be considered (plants with minimal water use). However, there will be no gym or fitness center in the building due to its proximity to nearby gyms; this will save on any extra water usage. There will be one shared restroom on each floor since there is one office on each floor, with no private restrooms to save water. Some offices though may have kitchens with one sink.

Proposed Range of Water Consumption on a Monthly and Annual Basis

In 2018, 235 Park Ave South's total annual water usage was 5556.9 kgal and total monthly water usage was 463.075 kgal. For the peer building, total annual water usage was 611.2 kgal and total monthly water usage was 50.93 kgal.

An important thing to consider are the two restaurants on the ground floor of 235 Park Ave S. They will be a large consumer of water. However, lowering the density of the office spaces and having one single restroom on each floor will hopefully reduce water consumption overall.

Using the peer building as a benchmark, the goal of 235 Park Ave S will be to have a total annual water usage of 611.2 kgal and total monthly water usage of 50.93 kgal. However, this usage could be slightly higher due to the two restaurants.

Design and Operational Features That Will Contribute to Energy and Water Efficiency

A first step towards energy efficiency is upgrading all mechanical equipment to Energy Star approved equipment. In addition, the fuel oil #4 burner will need to be replaced with an air-source heat pump system which will run on electricity from the grid and possibly sourced from solar panels on the roof. This will greatly reduce the amount of emissions and provide greater efficiency. Also, having building automation systems, HVAC timers and occupancy/vacancy controls will allow greater control over energy. Building operators can follow the hours of operation and adjust if tenants are not using their space during hours of operation.

LED lighting will be pursued to reduce energy along with building design changes to allow more natural daylight if possible. In addition, photovoltaic panels with energy storage will be explored to supplement grid use. A green roof and window efficiency upgrades will also help to regulate the temperature of the building without using extra energy.

In terms of water efficiency, having water monitoring technology and efficient low flow plumbing fixtures (toilet flushers and faucets included) will help to assess and reduce the amount of water needed. Also, water for mechanical system will also be re-used whenever possible to avoid using extra water. This will also help to optimize the cooling tower's water usage. In addition, being able to regulate water pressure will avoid any burst pipes or leaks, and insulating piping will save on waiting for hot water to flow. Lastly, the green roof will be watered by natural rain.

The restaurants will also be encouraged to conserve water and install low flow fixtures to their faucets. In addition, there will be an initiative to make them adopt induction cookware to gradually minimize and eliminate their need for natural gas. In addition, restaurants will be encouraged to upgrade to Energy Star rated appliances. This will help to further conserve energy and hopefully raise the Energy Star score in the future (to a 90 and greater). Diners will most likely appreciate the steps the restaurants will take towards being more sustainable.

Conclusion

To make this renovation sustainable and environmentally conscious, it is important to consider the drivers of energy and water usage and how to minimize their use. It will be important to have the cooperation of the tenants, especially the restaurants which are possible heavy users of energy and water. An overview of the technologies and procedures to put this into action will be discussed in other sections like Tech Applications and Solutions.

Building Certification & Framework Alignment

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

Introduction

In order to follow a formal process and recognition of the renovation's efforts to be sustainable, it is necessary to have the building certified. Not only will it save the building energy and money, it will bring the honor and prestige that is demanded by the target audience of tenants. In addition, it will help to ensure the building's commitment to health and wellness for the building's inhabitants and surrounding area.

In this section, the project's framework and concepts will be discussed with a sample rendering and pictures as examples. There will also be an explanation for choosing LEED Platinum as the building's designation, with an in-depth analysis of how to achieve that designation.

Project Renderings and Pictures

Project Summary

The proposed renovation is 235 Park Ave S (BBL: 1008750001) in the Manhattan neighborhood of Gramercy Park. It is nearby to many amenities such as hospitals, fine dining restaurants, bars, gyms, pharmacies, Union Square Park, and transportation (subway and bus). The building is mostly office with two restaurants on the ground floor. Currently, the Energy Star rating is 8. However, after inputting target energy consumption into the Energy Star Portfolio, the goal is to have a 90. This will be accomplished with major renovation of the building's interior, exterior, and mechanical systems while also participating in a certification program. Some examples include electrification of heating systems, putting a green roof, metering of energy consumption, water flow fixtures, LED efficient lighting, replacing the use of fuel oil #4 with natural gas and electricity, and systems that allow for greater automation and control. In addition, induction cookware will be installed in the two restaurants to replace some of the natural gas consumption.

The target audience are small to medium sized companies who have a low worker density, want control over their energy usage and who do not need to have 24/7 access to the building. Ideally, tenants will not consume a high amount of energy through computer infrastructure or a high density of employees in the office. These factors will help to minimize energy consumption. How the building renovation will attract this target audience is by a reduction in maintenance and utility fees (through efficient energy use). If tenants remain within a threshold of energy consumption, they will get a 10% reduction in maintenance/utility costs. The new renovation will also meet certain criteria of some businesses that look for a specific building certification. This will put 235 Park Ave S at a much better leasing advantage than competing office buildings. In addition, some businesses want greater monitor and control over their individual energy consumption, and with the renovation those businesses will have the infrastructure to do so. On top of savings, improvements in the building's environment will also help worker productivity and well-being (another bonus for tenants).

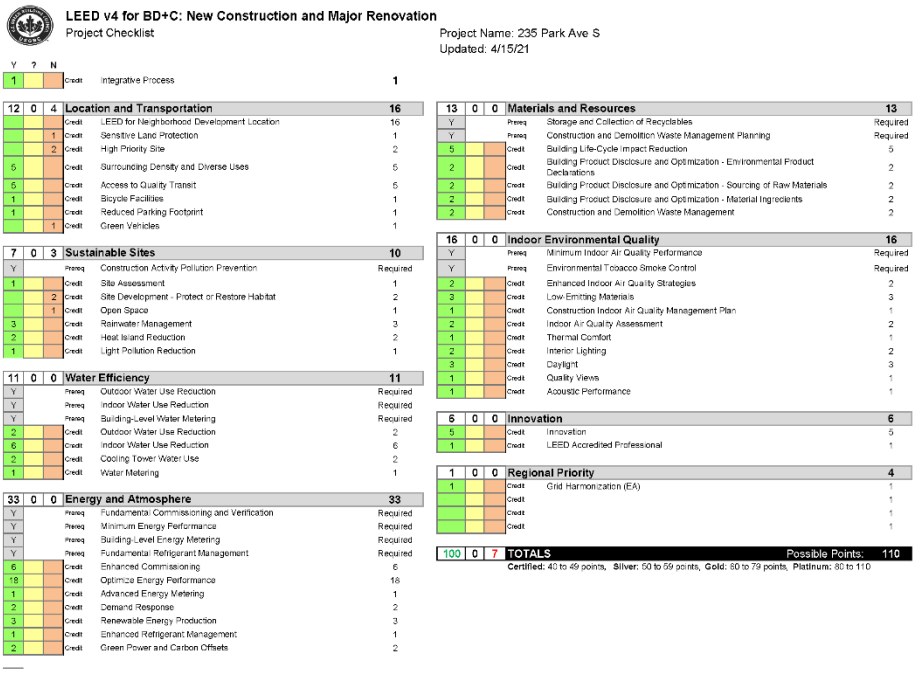
Certification Program & Certification Pathway

The certification program and level will be LEED Platinum (v4) under the BD+C: New Construction and Major Renovation pathway. A total score of 100 will achieve the level of Platinum.

This program and pathway apply to the project because it is in Manhattan and over 25% of Manhattan building square footage is covered by LEED according to a sustainability report. Also, according to the website Prologis, it is a reputable distinction being internationally recognized and "sponsored by the U.S. Green Building Council (USGBC)… [with a] focus on

energy savings, water efficiency, reduced carbon emissions and improved indoor air quality. Further, the design's overall stewardship of resources and sensitivity to their impact on the environment are taken into consideration." Therefore, following the criteria of a LEED Platinum certification will facilitate the renovation in meeting its sustainability goals. Lastly, USGBC states that "LEED buildings have faster lease-up rates and may qualify for a host of incentives, like tax rebates and zoning allowances. Not to mention they retain higher property values." This indicates that the designation will benefit the project's finances and value while also creating savings.

The designation also appeals to target audiences. For example, the USGBC states that, "LEED-certified buildings have been proven to use 25% less energy and a 19% reduction in aggregate operational costs in comparison to non-certified buildings." Therefore, tenants that care about energy reduction and lower maintenance/utility costs will most likely be enticed by a LEED designation. Another statistic from USGBC that supports tenant demand for designations like LEED is that "lease-up rates for green buildings typically range from average to 20 percent above average." In addition, tenant well-being and worker productivity is covered by the LEED designation. According to the USGBC, "building retrofits which improved the indoor environment of a building resulted in reductions of communicable respiratory diseases of 9-20%; allergies and asthma of 18-25%; and non-specific health and discomfort effects of 20-50%."



LEED v4 for BD+C: New Construction and Major Renovation
Project Checklist

Project Name: 235 Park Ave S
Updated: 4/15/21

Y	?	N			
1			Credit	Integrative Process	1

12	0	4	**Location and Transportation**		16
			Credit	LEED for Neighborhood Development Location	16
		1	Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
		1	Credit	Green Vehicles	1

7	0	3	**Sustainable Sites**		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
		2	Credit	Site Development - Protect or Restore Habitat	2
		1	Credit	Open Space	1
3			Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

11	0	0	**Water Efficiency**		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
6			Credit	Indoor Water Use Reduction	6
2			Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

33	0	0	**Energy and Atmosphere**		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
6			Credit	Enhanced Commissioning	6
18			Credit	Optimize Energy Performance	18
1			Credit	Advanced Energy Metering	1
2			Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

13	0	0	**Materials and Resources**		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
5			Credit	Building Life-Cycle Impact Reduction	5
2			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
2			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
2			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit	Construction and Demolition Waste Management	2

16	0	0	**Indoor Environmental Quality**		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
3			Credit	Daylight	3
1			Credit	Quality Views	1
1			Credit	Acoustic Performance	1

5	0	0	**Innovation**		6
5			Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

1	0	0	**Regional Priority**		4
1			Credit	Grid Harmonization (EA)	1
			Credit		1
			Credit		1
			Credit		1

100	0	7	**TOTALS**	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Features of Project Contributing to Certification

Integrative Process

To achieve an integrative process according to USGBC, there will be “an early analysis of the interrelationships among systems.” The first step will be to discovery energy-related systems and perform a simple box energy modeling analysis to reduce energy loads. An example of two strategies is assessing space allotment per person and anticipated operations while also assessing the site conditions such as landscape. There will also be an analysis of water-related systems by looking at such aspects like supply sources, process water demand, outdoor water demand and indoor water demand.

Location and Transportation

Due to the project being a renovation on an existing building in Manhattan, there was limited choice on the criteria of the site or development of new land or area. However, this building’s location is close to many amenities, open public spaces such as Union Square Park and public transportation (subway and bus). In addition, there is not existing parking, so all these factors contribute to the location and transportation profile for certification.

Sustainable Sites

In terms of sustainable sites, there are limitations in open space and restoring habitat. However, having an effective site assessment is possible along with collecting rainwater, installing a green roof, and designing lighting to reduce light pollution. These have made the building able to mark off many criteria in the sustainable sites category.

Water Efficiency

Furthermore, using efficient water fixtures, metering and cooling tower installation/maintenance contribute to the water efficiency score. Because there is not extensive landscaping (other than a green roof), outdoor water usage is limited, and this contributes to the score.

Energy and Atmosphere

In terms of the energy and atmosphere score, the first to consider is the enhanced commissioning credit. This will be done by completing Option 1 Path 2 (4 points) and completing the "commissioning process (CxP) activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0–2005 and ASHRAE Guideline 1.1–2007 for HVAC&R systems, as they relate to energy, water, indoor environmental quality, and durability…and develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems." These include (but are not limited to) reviewing contractor submittals, verifying seasonal testing, and addressing measurement requirements. Additionally, an envelope commissioning will be completed (2 points) by "the following commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0–2005 and the National Institute of Building Sciences (NIBS) Guideline 3–2012, Exterior Enclosure Technical Requirements for the Commissioning Process, as they relate to energy, water, indoor environmental quality, and durability. Commissioning authority must complete the following." This includes (but is not limited to) reviewing contractor submittals and verifying systems manuals updates and delivery.

Also, in terms of energy and atmosphere there will be a focus on energy optimization. It is the goal to achieve a 48% improvement in energy performance for a major renovation which should receive 18 points according to the EA Prerequisite Minimum Energy Performance guidelines. This will be done with a whole-building energy simulation. An energy performance target will be made (before the schematic phase) as kBtu/sf of source energy use. Also, research will be done on past analyses on similar buildings and on published data such as the Advanced Energy Design Guides. Input assumptions for the model will include unregulated loads for expected building energy consumption and include the restaurants which "may include refrigeration equipment, cooking and food preparation, clothes washing, and other major support appliances." Furthermore, there will be a "focus on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility." The building is anticipating to reduce worker density to 2.5 workers for every 1000 sf, and reducing building hours to 15 hours a day, 7 days a week. These will reduce the energy and HVAC use and improve the energy optimization score.

Also, for energy and atmosphere, there will be advanced energy metering of the entire building and each tenant end use that represents at least 5% of the total annual energy consumption of the building; this will give the 1 point for the advanced energy metering score. For demand response (2 points), enhanced equipment and building design will allow for load shedding, shifting and will anticipate demand and low peak periods to conserve energy. Also, sourcing renewable energy from the grid and generating on site solar energy on the roof will add 3

points for renewable energy production. Enhanced refrigerant management (1 point) will be achieved by limiting the use of refrigerants or using refrigerants with an ODP of 0 and GWP of less than 50. Lastly for green power and carbon offsets (2 points), the building will "engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract [will] specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs)."

Material and Resources

Materials and resources are checked off due to the re-use of materials in the renovation and the goal of maintaining most of the original building. New materials will be sourced locally whenever possible, with limited impact to the environment. Also, there are plans to dispose of waste efficiently which contributes to this score.

Environmental Quality

In terms of environmental quality, experts will be brought in to study the lighting, acoustic and environmental conditions of the building. Access to more daylight might be possible through more energy efficient windows or lightwells. Also, installation of efficient HVAC systems will contribute to hopefully better air quality and noise reduction. Green walls will also be installed throughout the building to improve the atmosphere and generate oxygen. Lastly, using green cleaning products will contribute to better air quality and better environmental conditions.

Innovation

For the innovation category, elements of passive house will be utilized to improve insulation and reduce the amount of energy needed to heat or cool the building. In addition, passive house principles create good air quality, comfort, and a resilient building. A LEED accredited professional will be on the project to ensure that these innovations meet LEED qualifications.

Regional Priority

Lastly, for regional priority, grid harmonization was chosen due to the project's goal of participating in an existing demand response program for the electric grid whenever there is a peak in electric demand.

Conclusion

While it might be ambitious to plan for a LEED Platinum, the long-term benefits are a goal worth striving for. The actual execution of how the building will be sustainable will be explained further in sections such as Tech Applications and Solutions. Again, tenants will be looking for a LEED designation and will be impressed by the building's LEED Platinum designation. According to Harvard Business Week, "Offices with the premier health story will get the premium rent and get the tenants, and the offices with a lagging health story will lag."

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: 235 Park Ave S
Updated: 5/20/20

Y	?	N			
1			Credit	Integrative Process	1

12	0	4	**Location and Transportation**		16
			Credit	LEED for Neighborhood Development Location	16
		1	Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
1			Credit	Reduced Parking Footprint	1
		1	Credit	Green Vehicles	1

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5			Credit	Innovation	5
1			Credit	LEED Accredited Professional	1

1	0	0	**Regional Priority**		4
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			Credit		1
			Credit		1
			Credit		1

100	0	7	**TOTALS**	Possible Points:	**110**

Certified 40 to 49 points, **Silver** 50 to 59 points, **Gold** 60 to 79 points, **Platinum** 80 to 110

Climate Risk Exposure Analysis

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

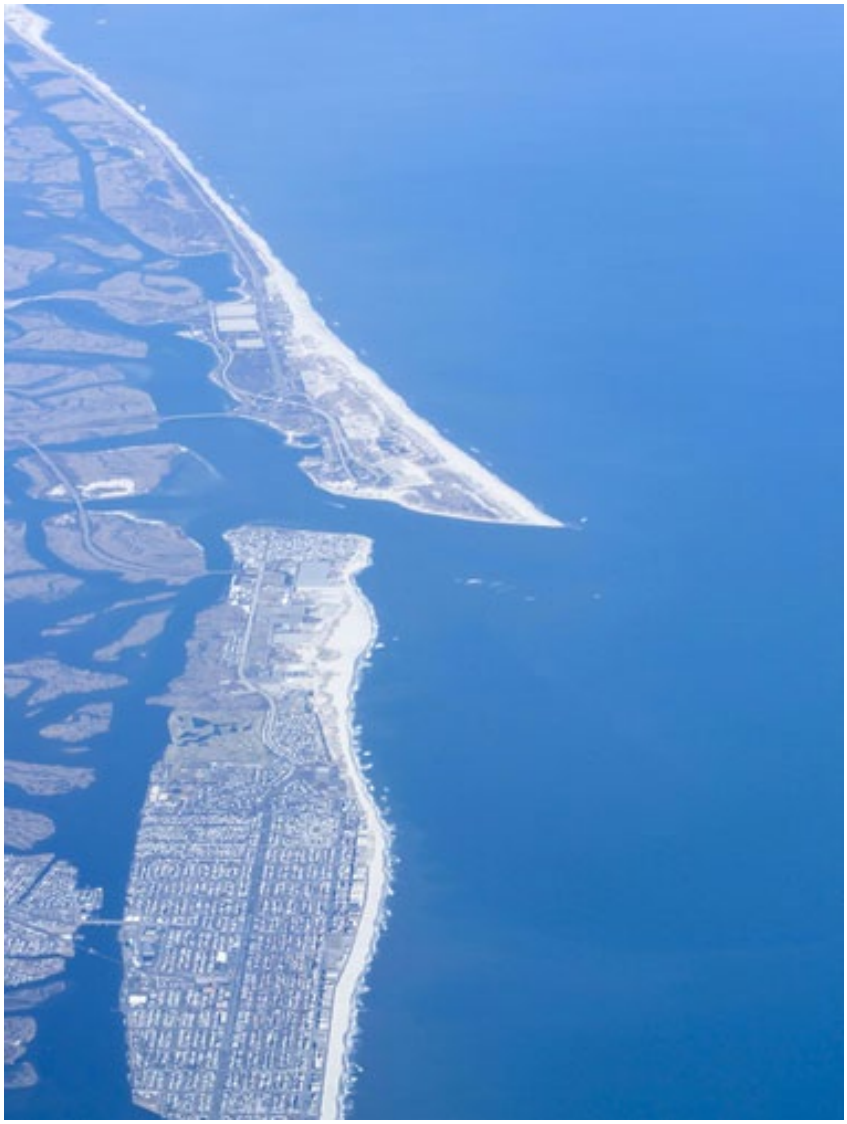
Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

Introduction

The renovation is not only needed on behalf of attracting tenants or adding value to the neighborhood, it is also needed to make the building resilient to future changes in climate and local policy such as Local Law 97. According to The Verge, “37 percent of lower Manhattan will be at risk for storm surges by 2050. By 2100, sea levels could rise by as much as 6 feet.” Therefore, analyzing the climate risks for the building is important for how it will be designed and operated.



This section will focus on the physical risks such as flooding (FEMA and NPCC), the heat island effect, water risk, climate resiliency guidelines and regulatory risk (Local Law 97). By analyzing these factors, it will be apparent that this renovation is needed to make 235 Park Ave S resilient for the future.

Physical Risks

I. FEMA

According to FEMA (Updated 09/05/2007), the property lies within Zone X of "Other Area" which means that it is "outside the 0.2% annual chance floodplain." The closest 0.2% annual chance floodplain boundary is 2,750 feet to Zone X of "Other Flood Area". This Zone X has a "0.2% annual chance [of] flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood." The closest 1% annual chance floodplain boundary is 3,050 feet to Floodway Areas in Zone AE. In this zone, "the floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights."

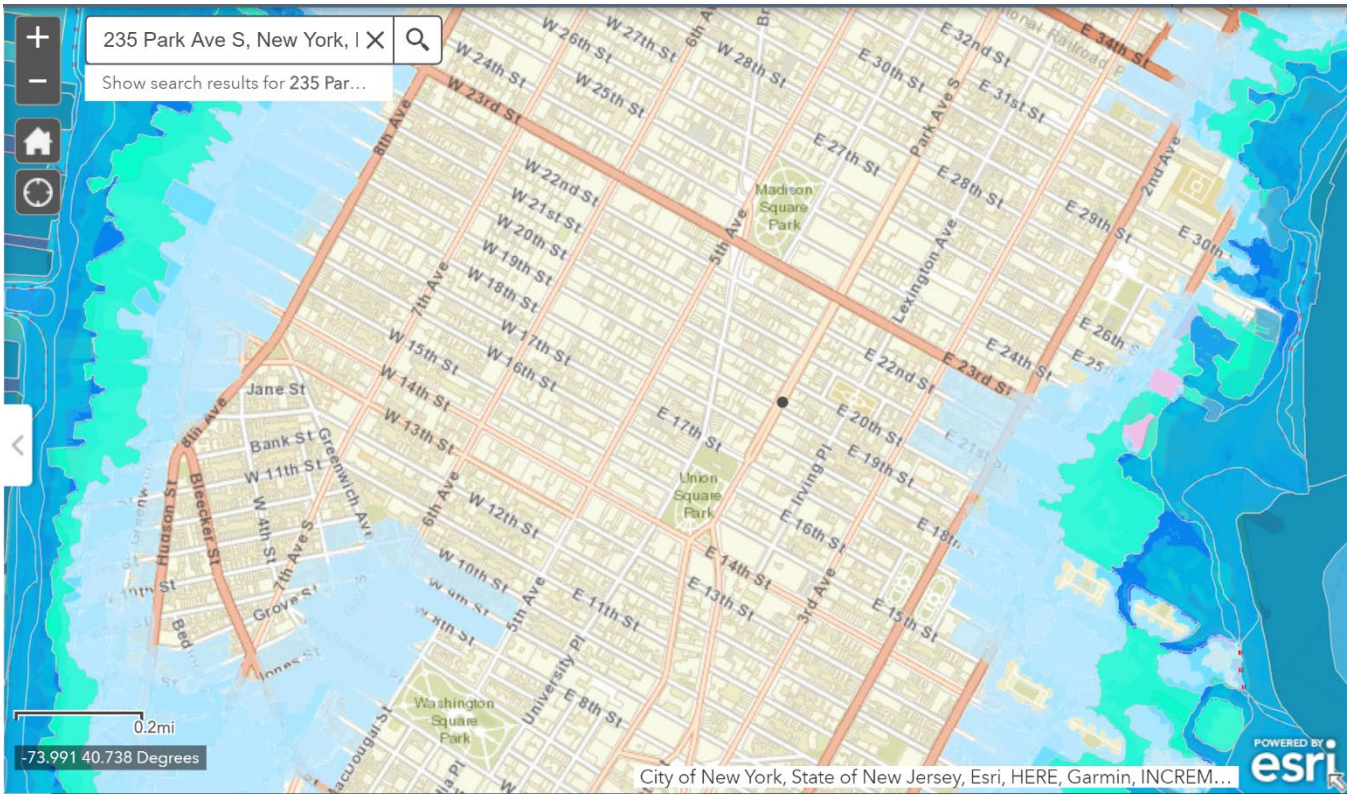
Therefore, using FEMA's 2007 boundaries and considering at least 1000 feet a safe distance, it can be assumed that the property has a very minimal exposure to flooding.

FEMA 2007

II. NPCC

According to the NPCC's worst case scenario of having all layers highlighted, the property is not located within any potential flood zone like a future floodplain or hightide area. In addition, it is at least 1000 ft from the boundary of the 2100 future floodplain, which contains both 1% and 0.2% annual chance floodplains. So, considering the NPCC's boundaries, and a distance of at least 1000 feet safe, it can be assumed the property will have a minimal exposure to flooding.

The difference between the NYC Mayor's office and FEMA is that FEMA's data is from 2007, and this may offer out of date estimates for flooding and sea level rise. According to the notes in NPC, "The projections take into account different climate change scenarios and inputs to arrive at high, middle, and low estimates for SLR in the 2020s, 2050s, 2080s, and 2100. NPCC's projections are likely to evolve over time because the science and underlying data are not static and will continue to advance." Therefore, NPCC is likely more forward looking compared to FEMA's 2007 data, so NPCC will likely predict more New York City land area affected by flooding.



NPCC

III. NYC Cool Neighborhoods

The property is located within Community Board 5. According to the "NYC Cool Neighborhoods Report," Community Board 5 is considered a Low-moderate vulnerability risk. So, NYC does not consider the property and neighborhood as having a high HVI. The report prioritizes the following neighborhoods as having a high HVI: "South Bronx neighborhoods, including Highbridge-Morrisania, Crotonia-Tremont, and Hunts Point Mott Haven, have among the highest rates of heat illness and death in NYC. Central Brooklyn and Central and East Harlem are also highly vulnerable to heat impacts."

Even though the property is at a Low-moderate risk, there are still methods to reduce the impact of heat according to the report. The problem is that asphalt and roofs reradiate heat or absorb especially at night. The first solution is to plant trees on the sidewalks surrounding the building which would provide shade and cause a process called evapotranspiration. The "shaded surfaces may be 20°F to 45°F cooler than unshaded surfaces; evapotranspiration, either alone or in conjunction with shading, can reduce peak temperatures by 2°F to 9°F." Another solution is the proposed green roof "which reduce energy and maintenance costs by protecting rooftops and building equipment from excessive sun exposure during warmer

seasons and increase heat retention during cooler seasons." Finally having reflective sidewalks that are light colored will reflect more sun radiation. In fact, "City simulations, using weather data from several U.S. cities, have found that reflective pavements, when used in conjunction with cool roofs and shade tree planting, can lower ambient air temperatures, on average by 4°F to 9°F."

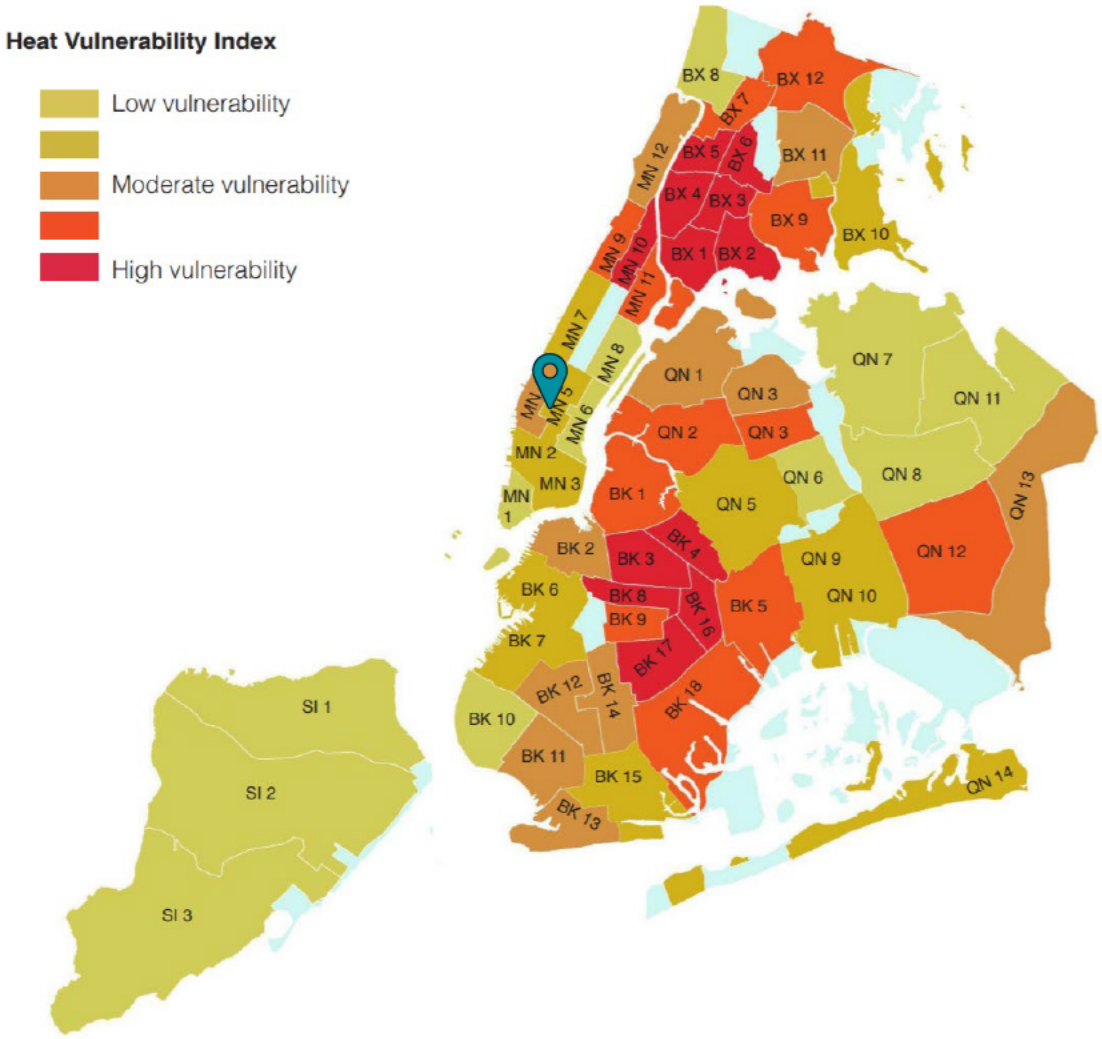


Figure 4 - Heat Vulnerability Index (HVI) for New York City Community Districts (Source: NYC DOHMH 2015). This analysis identifies physical, social, and economic factors associated with increased risk of heat-related morbidity and mortality.[17]

IV. WRI Aqueduct Water Risk Atlas

One analysis was done in the future timeframe of 2040 with a pessimistic view and absolute values. A pessimistic view assumes a "fragmented world with uneven economic development, higher population growth, lower GDP growth, and a lower rate of urbanization, all of which potentially affect water usage." The indicators are elaborated below:

- Water Stress: >80% which is **extremely high**. It is a measured "as the ratio of demand for water by human society divided by available water."
- Seasonal Variability: <0.33 which is **low**. It is "an indicator of the variability between months of the year. Increasing SV may indicate wetter wet months and drier dry months, and higher likelihood of droughts or wet periods."
- Water Supply: 30-100 cm which is in about the **midrange**. It is a measure of "total blue water (renewable surface water)."
- Water Demand: >30 cm which could be considered **extremely high**. It is a measure of water withdrawals.

Another analysis was done for the month of April. There were only three indicators which the program analyzed (please note that for an annual analysis, there were no data points or indicators for the property location). The three indicators are elaborated below:

- Water Stress: <10% which is considered **low**. It is a measure of "the ratio of total water withdrawals to available renewable surface and groundwater supplies."
- Water Depletion: <5% which is considered **low**. It is a measure of "the ratio of total water consumption to available renewable water supplies."
- Interannual Variability: 0.25-0.50 which is considered **Low-medium**. It is a measure of "the average between year variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations in available supply from year to year."

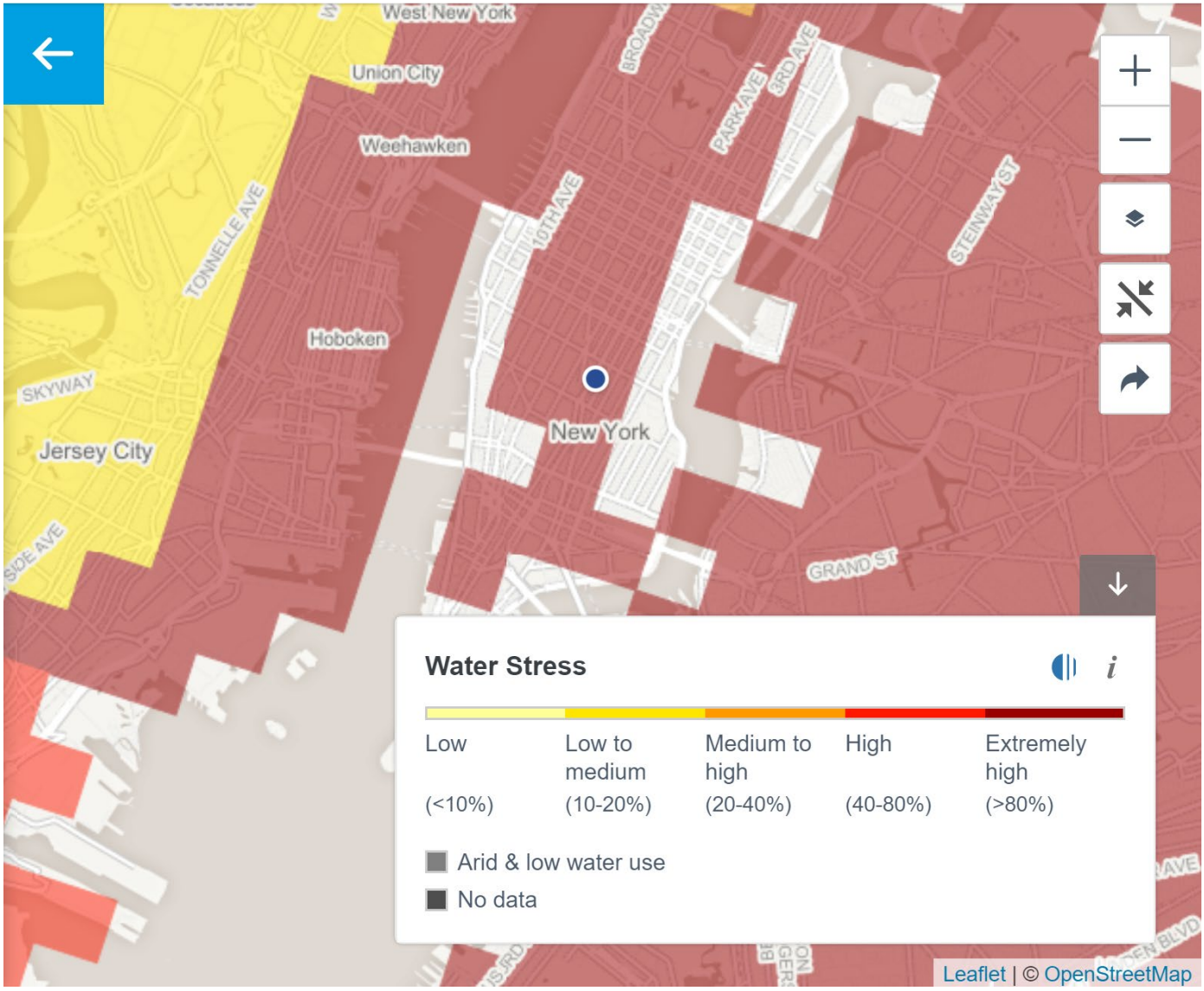
Combining these two analyses, the following can be assumed about the property:

<u>Most Concerning Risks</u>

- Water stress and water demand into 2040 will be a great concern even though it is currently considered low. This risk can be mitigated in the long-term by efficiently monitoring water usage and in the short-term by reducing building density, making shared bathrooms, and installing sustainable water fixtures which will help to keep water depletion low into 2040.

Least Concerning Risks

- Low variability in the available water supply into 2040.
- Water supply is in the midrange into 2040.



Water Risk Atlas - Water Stress 2040

V. Climate Resiliency Design Guidelines

The Exposure Screening Tool was used to determine the following:

Heat

1. Score 1: there will be "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." One example is the green roof which was mentioned earlier to reduce the HVI rating (one component is needed to score a 1).
2. Score 2: the property is located within Community Board 5 which is considered a Low-moderate vulnerability for HVI.
3. Score 3: It is assumed that the climate change projection would be for the 2050s based on the criteria that the property is having a retrofit and substantial improvements such as improving the building's envelope. In addition, HVAC and mechanical systems will be replaced for more efficient systems. Therefore, under the NYC guidelines, there will be 7 heatwaves per year.

Heat Total Score: 6 (Medium Exposure Rating)

Precipitation

1. Score 1: referring to figure 5, it demonstrates the increased intensity in rainfall into the future. Therefore, it is assumed that the DEP should be modified to reflect this.
2. Score 0: referring to the data in the 311 database, there were no incidents of flooding from 2010 onward. In addition, the property does not lie in a floodplain.
3. Score 0: there will be less impervious area after the renovation since there will be installation of systems on the roof that can collect and reuse rainwater, and there were also be a green roof to store stormwater.

Precipitation Total Score: 1 (Low Exposure Rating)

Sea Level Rise

1. Score 0: according the previous floodplain analysis, the property is not within the 1% annual chance floodplain.
2. Score 0: according to the previous floodplain analysis, the property is not within the 1% annual chance floodplain going into 2100, which is beyond the building's useful life.
3. Score 0: referring to the data in the 311 database, there were no incidents of flooding from 2010 onward. In prior analysis, the building is not in any high tide or floodplain zone going into 2100.

4. Score 0: referring to prior floodplain analysis, there are no critical roads which will be flooded within 1000 feet of the building going into 2100.

Sea Level Rise Total Score: 0 (Not Exposed)

Regulatory Risk

Space Type	Occupancy Group	Square Footage	2025 Building Emissions Limit (MT CO2e/SF)	2025 Emissions Limit	2030 Building Emissions Limit (MT CO2e/SF)	2030 Emissions Limit
Office	B	58,400	0.00846	494.064	0.00453	264.552
Restaurant	A2	10,600	0.01074	113.844	0.0042	44.52
Total		**69,000**		**607.908**		**309.072**

Energy Type	Annual Consumption	Unit of Use	Convert to KBTU	GHG Coefficient	Total Emissions
Electricity	580,000	kWh		0.000288962	167.598
Natural Gas	9000	therms	900,000	0.00005311	47.799
				Total GHG Emissions	**215.397**
				2025 Limit	607.908
				Over/(Under)	(392.51)
				Potential Penalty @ $268/ton	**$ -**
				2030 Limit	309.072
				Over/(Under)	(93.68)
				Potential Penalty @ $268/ton	**$ -**

With a potential Energy Star Score of 90 after renovation, the building will be under the 2025 and 2030 GHG emissions limits for Local Law 97 and will not incur any potential penalties.

If the renovation cannot physically reach the goal of 90 and is over the limits for 2025 and 2030, then relief provisions will be followed; specifically the “purchase of renewable energy credits or carbon offsets, and distributive energy resources such as on-site solar, wind or battery storage.” Or, under the relief provision, cite that there was a need for a major renovation (1c), but there was a physical barrier like space constraints. This might allow for an adjustment.

According to the Climate Resiliency Design Guidelines, potential costs for the project to be resilient in different climate scenarios could be for DEP planning and modification, or the flexible adaptive pathways which allow important systems to be raised or lowered due to rising water levels. In terms of heat impact, this could be investing in back-up power generators or hybrid systems in the case of grid disruptions during hot days. Additionally, building energy management systems and internal electricity rewiring will be invested in as well.

Conclusion

The largest physical risk is the future water demand and water stress going into 2040. In the short-term, efficient water fixtures and systems will be installed to combat this issue, worker density will be reduced, and bathrooms will be consolidated into single shared floor bathrooms. In the long term, there will be monitoring systems to make sure tenants are utilizing water efficiency.

The next risk will be the Low-moderate heat effect. In the short-term, items like a green roof, trees on the sidewalk and reflective sidewalks will be installed. In the long-term, working with neighboring buildings and the city to make cooling roofs or sidewalk trees will help to make the neighborhood cooler in general.

Installations of rainwater collection systems, DEP drainage modifications, and the green roof will help to further minimize the low precipitation and flooding risk. In addition, even though the building is not in a floodplain, no essential building systems will be installed in the basement, or if this is not possible, dry floodproofing measures will be taken along with flexible adaptation pathways.

With this renovation, the building will greatly mitigate regulatory risk and avoid penalties resulting from Local Law 97. Therefore, the time to renovate and invest for the future is now.

Tech Applications and Solutions

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

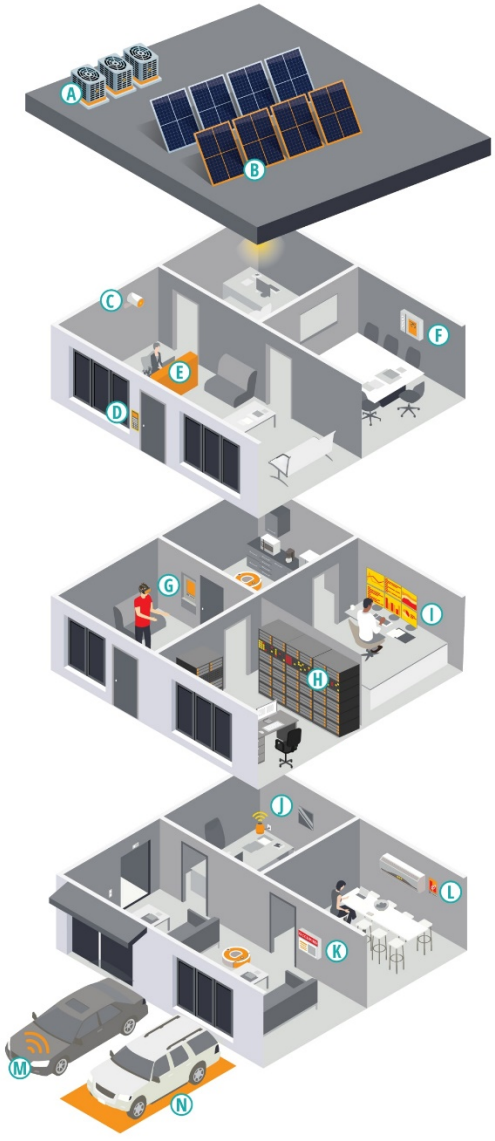
Introduction

Investment in efficient and sustainable technology can have great financial and health dividends for workers and tenants of the building. It will also help to target successful tenants. In “How Three D.C. Landlords Are Attracting Tech Tenants” in Urban Land, renovations in similar buildings are “garnering rents that compete with those of new ground-up development, and large leases from two tech companies that are household names.”

FIGURE 1

Deloitte’s smart building framework

Deloitte's smart building framework consists of the physical assets within the building, the digital assets that create a fabric throughout the connected space, and finally the use cases that are enabled by the marriage of physical and digital assets.



PHYSICAL COMPONENT OF SMART BUILDING

- (A) HVAC
- (B) Lighting
- (C) Sensors
- (D) Physical access control
- (E) Gateways
- (F) Energy meters

DIGITAL WILL BE AN IMPORTANT PILLAR

- (G) Digital automation
  - AR/VR
  - Robotics
  - Facial recognition
  - Biometric access
- (H) Cloud storage
  - Control software
  - Cybersecurity
  - Multifactor authentication
- (I) IoT platform
  - Artificial intelligence
  - Wi-Fi
  - Data collection and analysis
  - Machine learning

USE CASES CUSTOMIZED TO INDIVIDUAL PREFERENCE

- (J) Virtual assistant
- (K) Room reservation
- (L) Usage-based maintenance
- (M) Location awareness
- (N) Smart parking

Source: Deloitte analysis.

Deloitte Insights | deloitte.com/insights

This section will provide an overview of the exciting and emerging technologies this renovation will incorporate to differentiate this building from its competitors. This will be done by providing an energy efficiency/reduction in costs and providing individual user comfort and health benefits, made possibly through an integrated (cloud based) building system that collects data through IoT sensors.

Efficiency, Resource Conservation and Cost Reduction

I. Energy Efficiency

Reduced Lighting

LED lighting will be used to reduce overall lighting energy. According to the EnergyTrust of Oregon, LEDs can reduce energy by 50% + and can last for up to 100,000 hours, which is not only efficient but saves money on replacements.

The most important innovation will be the installation of a Networked Lighting Controls system (NLC) which can integrate the common lighting strategies below. According to the DesignLights Consortium, this system is used in only 1% of lighting retrofits which will differentiate this building from others. This system can adapt quickly to ever changing building and office uses via its graphical user interface software. It can also be controlled by a centralized management with remote access and connect with other building automation systems, device-usage reports, security systems, etc.

Occupancy Sensing Strategy: Passive Infrared Occupancy sensors (or PIR) will be installed for smaller rooms or offices where people move in and out in erratic patterns. These sensors will use infrared to collect data about the heat emitted by occupants in real time. So, when an occupant moves in and out of a room it will trigger the LED lighting system to turn on or off. According to Energy Star, these sensors are the least expensive and are not prone to false triggering. The future considerations these sensors give management is the ability to understand occupancy patterns and which rooms can have lights turned off at certain times.

Scheduling & Demand Response: the Networked Lighting Controls (NLC) will schedule when all lights turn on and off, according to the building's operations hours of 7 AM to 10 PM. Tenants can also use their smartphone or computer to adjust the personal light settings for their workstations and request more light after hours. The NLC will also anticipate peak power charges at a facility and utility curtailment signals as part of a demand response strategy. Future considerations could be adjusting building hours depending on if there are extra requests for the lights to remain on after hours. Another consideration according to the EnergyTrust of Oregon is the NLC being "able to learn building use trends and optimize comfort and energy savings by automatically adjusting lighting and other systems as patterns change over time."

Task Tuning: to prevent over lighting, the NLC will set the maximum amount of light in each room depending the task or the tenant.

Daylight Harvesting & Adaptive Compensation: Continuous dimmers will use real time photosensors to measure local light level data and then accordingly adjust the level of lights.

Dimmers are efficient because they can adjust for natural daylight in a room or for dirt buildup in lights. Also, dimmers will lessen light levels at night when tenants might need less light than during the day. Users will also be able to communicate with the dimmers and NLC to adjust the level of light and coloration with their computers or smartphones. Future considerations could be identifying which parts of the building do not have access to adequate daylight.

HVAC

Air source heat pumps will be used to heat and cool the building. The building will be divided into multiple zones with a heat pump installed in each zone. According to the website of New York Engineers, that “for a given heating output, a heat pump consumes 2 to 4 times less power than a resistance heater.” There will also be a speed control for all fans and pumps in the system.

An alternative and new A/C solution which could be integrated into the building is the desiccant enhanced evaporative air conditioner (DEVap) which was developed by NREL. It will have the ability to combine evaporative and desiccant cooling, so it can be used to create cool dry air in a non-arid climate like New York. It has been shown to provide up to 90% energy savings compared to traditional A/Cs. According to the NREL, the DEVap “uses no environmentally harmful fluids, hydrofluorocarbons, or chlorofluorocarbons; instead, it uses water and concentrated salt water.” Therefore, there is no risk to the building’s environment or to the global climate if there is a fluid leakage.

To reduce costs, a recyclable ductwork made from cardboard will be used. It will be fire resistant and waterproof, and according to the blog Architizer, “these triple-walled cardboard ducts are stronger, lighter, cheaper and require 20% less insulation than their sheet metal counterparts.” In addition, they are 100% recyclable when they need to be replaced.

In terms of control and maintenance, a smart HVAC system will be installed (which according to Serraview) uses “sensors [to] collect data about the conditions throughout [the] building…and specialized HVAC equipment provides the ability to fine-tune temperature, humidity, and air flow in various zones (based on data from the sensors) to optimize comfort while reducing energy consumption.” These sensors and systems are described below:

Thermal Sensors: these sensors will detect the different interior and exterior temperature, humidity, and weather conditions throughout the building and in real time adjust the HVAC system to that environment for the comfort of tenants and to reduce energy when not needed. Future considerations could be using this data to redesign rooms which get too hot or too cold very quickly.

CO2 Sensors: these sensors will detect levels of CO2 will the HVAC system to increase the amount of fresh air in the room. Future considerations could be using this data to redesign rooms which have bad air flow or accumulate CO2 quickly.

Occupancy Sensors & Demand Controlled Ventilation: these will use motion detection to be made aware of people in a room. So, in real time, the HVAC system can adjust its settings depending on if there are people in the room or not. According to Serraview, when the HVAC systems uses input from occupancy sensors they can ascertain when “utilization levels drop below design-based occupancy rates, this specialized ventilation equipment reduces… outdoor air intake which decreases energy usage.” Future consideration could be identifying which tenants utilize more resources than others.

Light Sensors: the HVAC system will be integrated with the NLC system and adjust the temperature of the room depending on how much natural daylight is in the room. With more daylight, the room might be warmer and may not need as much heating.

Variable Speed Fans: using occupancy sensor data and thermal data, the HVAC system can adjust the speed of the fan and save energy.

Vertical Transportation

Elevators will be designed by Thyssenkrupp which in 2017 made a net-zero energy elevator system. Using information from Construction Dive, the elevators will require no machine room, and in order to “lower energy use, the elevator cabins can be set to "hibernation" or "sleep" modes. The system is connected to an on-site, 3.75kW rooftop solar array whose dimensions match the footprint of the elevator shaft and generates the energy needed to run the system.” This building will possibly be the first in New York City to use this system and will be a defining characteristic compared to other buildings.

Also following the trends stated in Smithsonian Magazine, LED lights will be installed in the elevator cabs, and there will be a destination dispatch system where groups of people who are headed to the same floor or group of floors get into the same elevators, which will reduce overall energy.

Carbon Savings

The building will use a breakthrough solar panel technology published in Popular Mechanics which states the panels will be up to 50% efficient. This is much higher than the usual 15% used by other buildings. These solar panels will help to generate electricity for the elevator and other building systems like the HVAC. Exterior weather sensors will track the movement of the sun and then relay that information to the solar panels so they can follow with the sun, making

them more efficient. Energy will be stored in lithium-ion batteries such as Tesla's Powerwall battery (CNBC).

Energy meters with submetering will also be installed to "allow facility managers to track energy costs by area, department, tenant…the information can be used for creating an overall energy-savings plan, allocating costs and more" (Honeywell). For future consideration, lower maintenance costs can be rewarded to tenants who are more energy conscious and efficient, enticing them to renew their lease.

Water Efficiency

Following the USGBC and Sustainable Facilities Tool guidelines, water can be conserved efficiently by installing efficient plumbing fixtures and water technologies as noted below.

Aerator and Flow Restrictor for Faucets: they are "flow restriction devices designed to reduce the amount of water that comes out of a faucet by mixing air into the water stream." The flow rate would be 1.5 to 0.5 gpm which would achieve great water and energy savings.

Condensate Capture: collecting the condensed water from air handling units can divert water to the cooling tower especially in the warm humid summer months. This will ultimately save water.

Dual-Flush Toilets: they are "a higher water use flush (full flush) for solids and a lower water use one (reduced flush) for liquids. The effective flush volume of a dual flush toilet is 1.28 gallons per flush."

High Efficiency Toilet & High Efficiency Urinal: the use of toilets and urinals that limit the amount of water per flush will be used. A pressure assisted toiled will also be explored which uses the main water line pressure to empty the bowl and reduce water used.

Evapotranspiration Controllers/Weather-Based Controllers: sensors will use weather data to determine evapotranspiration which is the amount of water that is lost to evaporation in the soil. With this data, irrigation systems can regulate how much to water the green roof or sidewalk trees or plants.

Greywater Re-Use: wastewater from the sinks will be collected and re-used in place of potable water in toilets and urinals; thereby, reducing the amount of new freshwater being used.

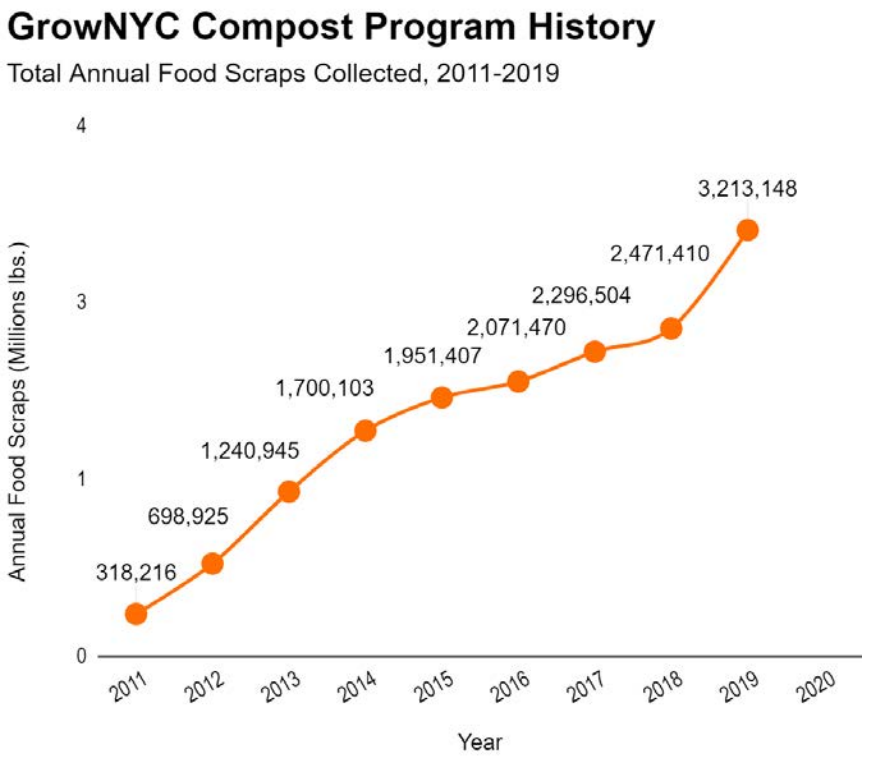
Rainwater Harvesting: rain will be collected and then used for non-potable uses like watering the green roof.

In addition, referring to the EPA guidelines, water metering and submetering systems will collect data on water usage by any equipment, process, or system. For future considerations,

management can understand discover water usage of tenants and then create a water reduction plan depending on their needs. For the two restaurants, certain water fixtures and Energy Star appliances will be installed to conserve water such as: ice machines, steam cookers, an in-line flow restrictor for lessening the flow rate of the dipper well, dishwashers, replacing pressure hoses with a mop, and composting any food waste so no water is used in their disposal.

Waste Reduction, Recycling and Waste Removal Cost Reduction

Because the building has two restaurants, there will be a partnership with the GrowNYC composting program to prevent extra food scraps from being mixed in with the other garbage (according to GrowNYC this could save about 21% of extra trash). The food scrapes will instead by hauled to one of composting facilities in the city.



The building will have a recycling program. All tenants will be provided with a trash, paper recycling and plastic/metal recycling can that has a weighing sensor on the bottom which keeps log of how many pounds of garbage a tenant creates within a certain timeframe. The data will determine which tenants create more trash than others, which will allow management to work with those tenants in creating a trash reduction program.

The building will also have a donation and re-use program where tenants can donate unwanted office furniture or fixtures to the community or within the building instead of throwing them out in the trash.

Janitorial Costs

Referring to the guidelines by a private company called Weiss Bros. the following can greatly reduce janitorial costs:

Automated Equipment and Systems: investing in automatic scrubbers can reportedly allow staff to clean a 5,000 SF area in about 15-30 minutes, which should reduce time and costs to clean.

Bulk Purchasing: purchasing 5-gallon green cleaning concentrates and then having staff dilute them with water in auto-dilution systems will save money and chemicals, which a person may unnoticeably waste while trying to dilute the solution themselves.

Safety Programs: all janitorial staff will have up to date training sessions in new procedures and safety in order to ensure their well-being and limit the cost of worker related injuries.

Workloading System: the record system will analyze how much time it takes janitorial staff to complete certain tasks. This way, “having this information helps contractors schedule cleaning tasks properly as well as streamline them, which helps reduce expenses.”

Improving Indoor Occupant Comfort

Ambient Temperature, Humidity and CO2 Content

How tenants can control their environment is through a smart thermostat such as 75F’s SmartStat Zone Controller, which according to their website supports WELL standards and uses sensors to monitor “temperature, humidity, CO2, VOCs, light, sound and occupancy.” In addition, it is a “cloud-based wireless building automation platform for HVAC, Indoor Air Quality, lighting and energy management to achieve energy savings in the 30-50% range in commercial buildings.”

The thermostat can be controlled on the actual radial touch user interface or through computer and mobile access. This technology is a secure mesh network that connects with current smart building systems and uses machine learning software to execute optimal zone conditions (using factors such as sensor data and load history).

Another cutting-edge technology that will be used is the algae bioreactor. According to Fast Company, it is a “closed system that works indoors, connecting with an HVAC system to

reduce CO2 levels inside and release cleaner air." It will grow algae which takes as much CO2 out of the atmosphere as an acre of trees. In addition, green walls will be installed to reduce the CO2 content while also adding aesthetic beauty and sound proofing in the building.

Algae Bioreactor from Hypergiant

Green Wall

Amenities & Security

Amenities and security will use RFID, geofencing and beacon technology. Using the NAIOP website as a reference, RFID is a wireless technology that allows for wireless radio tracking abilities. So, it will be used in security cards that tenants or workers can conveniently use to pass through turnstiles. Real time access control data will be collected and can verify the credentials and experience of maintenance workers, along with tenant and employee demographic information. For future consideration, these can create a tenant retention plan and determine when is the peak demand for building services (which can reduce energy usage during low periods).

Geofencing is a "virtual geographic boundary line, typically using GPS, cellular data or Wi-Fi, which can surround a specified geographic area such as a single building or an entire city. Entering a geofenced area triggers an event, such as the transmission of a message to a mobile device." Beacon technology is like geofencing, but it uses Bluetooth data instead of cellular and WIFI networks. How geofencing and beacon technology will be implemented will be described below.

Concierge Services: in order to be competitive and alluring to prospective tenants, concierge services will be provided. To save on costs they will be outsourced to a 3rd party. According to the website Locale Advisors, "collateral such as neighborhood guides, email newsletters showcasing experiences and events, monthly amenity calendars, and welcome materials are just some of the potential deliverables that can be offered." In addition, tenants who entertain clients will be attracted to the building's concierge services and be enticed to renew their lease. Also, the concierge will be able to connect tenants to the exciting opportunities in the surrounding Union Square/Gramercy neighborhood known for culture and shopping. Since the building is next to so many amenities, there will not be an exercise center in order to reduce energy. Referring to NAIOP, geofencing has collected wireless data which encompasses "accurate and quantifiable examples of consumer behavior." For future considerations, an application or computer program can predict tenant behaviors with this data, which a concierge can then use to anticipate tenant requests and provide better service.

Package Storage and Notification: in addition, there will be a package delivery room for tenants which will be managed by the concierge. Beacons will track wireless data and can give tenants push reminders to their computer or smartphone to pick up packages (NAIOP).

Bike Storage and Share: in terms of transportation services there will be a bike storage room to accommodate bicycle commuters. This will also encourage less use of cars; thereby, reducing the amount of CO2 emitted. In the bike room will be amenities such as a bicycle pump, basic bicycle repair tools and even communal bikes to be shared by all tenants. Tenants will be able to reserve these bikes through an application, and beacons will send push notifications to tenants when they are in the bicycle room about how many bikes are available.

Transportation Hub: also, the concierge will be responsible for helping visitors access transit maps and directions to closest public transportation. They will also order cabs or other special transportation accommodations for tenants at their request. In addition, there will be a visual lobby display linked to google maps and Uber/Lyft taxi information, which reads traffic and transit data in order to provide up to date directions and traffic patterns. Tenants will be able to determine the cheapest and fastest route for them.

Customer Information: for tenants and restaurants who want to track customer behavior, beacons can gather wireless data and inform these parties of customer trends. Thereby, allowing them to create a customer retention or marketing plans. In addition, beacons will allow restaurants and businesses to allow "contactless payment, navigations and automatic check-in" (NAIOP). These amenities will entice tenants to renew.

Filtered Water: on each floor will be a reverse osmosis alkaline water fountain which will dispense alkaline water which benefits overall health and well-being. Each fountain will have an IoT sensor of how many times it is used and will communicate with the building's integrated systems of when the filter needs to be replaced.

Improving Indoor Occupant Health

Carbon Monoxide

According to the website Arista, even carbon monoxide detectors can miss detecting small amounts of carbon monoxide. This can cause occupants to feel nausea, headaches, fatigue and even chest pain. Therefore, asides from installing carbon monoxide detectors and sensors, which will provide air quality data to the smart HVAC system to divert carbon monoxide out of the building, there will be regular inspections of the heat exchangers, vents and gas burning elements (such as gas stoves in the restaurants).

It is important to inspect heat exchangers due to their role in venting harmful gases out of the buildings, and "the most common cause of carbon monoxide leaks is a failed or leaking heat exchanger in your gas or oil furnace." Also, "blocked vents or chimney flues is another common cause of carbon monoxide leaks," so it is important to inspect vents and clean them to prevent these leaks.

Volatile Organic Compounds, Pollutants and Allergens

Using sensors to monitor for air quality will be able to collect data on such as allergens, NOx, Sox, ozone depleting chemicals and volatile organic compounds that might be circulated or emanated from building systems, construction, or office materials like furniture. This data will

be collected by a cloud based analytical system and displayed on a large display screen on the lobby and on each floor in real time to assure tenants of their health and safety. For future considerations, this system can help to determine which materials or processes contribute to poor air quality.

Bio-Hazards and Viral Infections

Despite needing extra fan power, HEPA filters for the HVAC system are great at capturing more than 99% of bio-hazards and viruses (as small as .3 microns in diameter) and are suitable for hospital or food preparation settings according to the website PV Heating & Air. Sensors will monitor the air flow and will communicate via IoT technology to the integrated building systems when the filters need to be replaced.

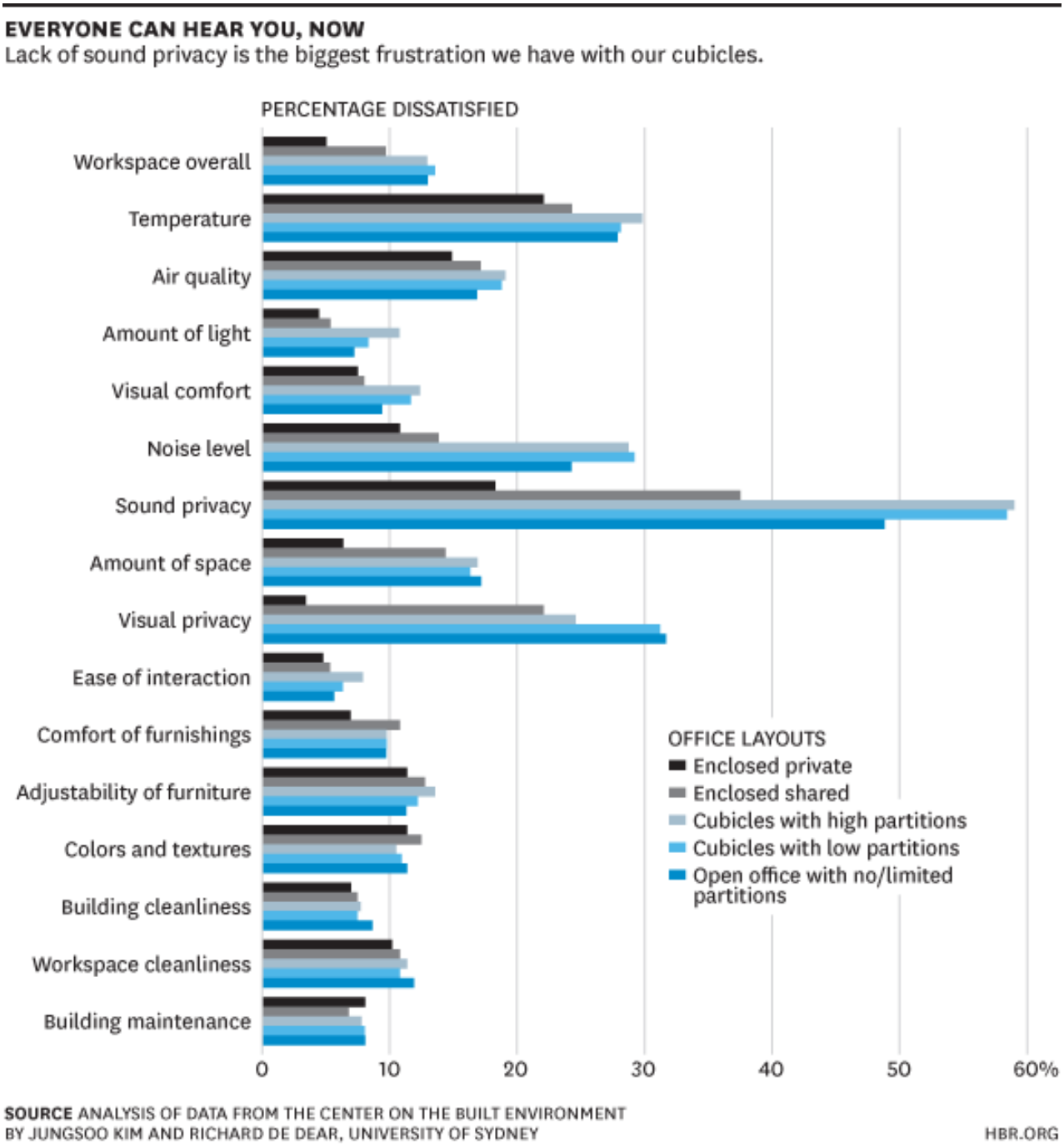
Light Pollution

Lights will be equipped with an innovative new sensor called “time-of-flight” sensors which are being developed by university researchers (The Brink). These sensors “measure location by emitting a brief pulse of light and timing how long it takes that light to reach the people and objects in the room…it is possible to differentiate between people, pets, and furniture, and to classify actions such as sitting, standing, or writing at a whiteboard.”

This lighting data will allow lighting systems to “detect people and objects in a room and change lighting intensity, turn lights on and off, and even adjust color.” Not only does this kind of lighting set up improve disorders like “depression, such as seasonal affective disorder, and circadian rhythm disorders,” but as a future consideration it can also anticipate tenant behaviors and save energy by lighting certain corridors. Also, with these sensors, tenants can use body motions to tell the “time-of-flight” sensors to change the light settings.

Sound Interference

Sound privacy is one of the major concerns for office workers as cited in a University of Sydney study and by the website Parterre. About 49% of workers are not able to concentrate effectively and can lose up to 86 minutes per day being distracted. Below are a few techniques to reduce sound interference and create sound privacy.



Absorb Strategy: vinyl flooring with rubber underlayment will be installed which has great noise reduction properties and is easier to maintain compared to carpet. Also, furniture, especially high-backed couches, will be strategically placed to absorb noise. In addition, acoustic wall panels, sound insulation and green walls will greatly help absorb noise.

Block Strategy: glass encased sound-proof private rooms will be designed to block noise and create privacy. Beacon sensors can send notifications to tenant phones notifying them if someone else has reserved the room or not. In addition, creating innovative, but beautiful partitions between desks can block unwanted noise.

Steel Case Quiet Space

Cover or Sound Masking Strategy: speakers will play soft ambient noise like white noise to mask unwanted office noise. Such sounds could be waves on the beach and can be controlled via smartphone or computer.

Other Technological Innovations

Green Roof

A green roof will be installed for its multitude of benefits according the NYC Parks. They can "reduce the amount of storm water run-off by 50 to 90 percent and reduce the peak flow rate of run-off" and also "filter out 95% of the cadmium, copper, and lead and 30% of the nitrogen and phosphorous in storm water." Green roofs also reduce the transmission of noise levels by 5 to 45 decibels, sequester carbon and produce oxygen to breath.

In addition, they reduce the heat island effect. They "cool the surrounding air and thereby reduce the temperature of the mass of hot air that hovers over cities during the summer." Not only do they reduce carbon dioxide and pollutants, they also help to conserve energy because they "insulate the upper floors of buildings and in the summer they cool buildings through shading and the process of evapotranspiration by plants." This cooling effect also makes solar panels run more efficiently.

Passive House Design

Passive house strategies and techniques will be utilized to achieve great benefits according to the PHIUS website. These benefits include a comfortable environment for tenants, superb air quality, a resilient building, and a path to net zero or net positive by “minimizing the load that renewables are required to provide.”

To execute this, the building will have a major retrofit of its envelope to insure continuous insulation and no thermal bridging. The building envelope will also be airtight to not lose any heating or cooling (thus saving energy). The windows will be “high-performance windows (double or triple-paned windows depending on climate and building type) and doors - solar gain is managed to exploit the sun's energy for heating purposes in the heating season and to minimize overheating during the cooling season.” These energy savings will be passed onto tenants which will entice them to renew.

Appliances

Energy Star appliances for the restaurants and office kitchens will be purchased to save energy. Another objective is to limit the amount of natural gas needed for restaurants and instead offer them an alternative which is inductive cooking. According to PBS, inductive cooking “employ magnetic technology to heat only pans made specifically for induction cooking.”

Innovation Differentiates this Project from Others

This building will be a smart building compared to other buildings built almost a century ago. It will have an integrated cloud-based system that connects with IoT sensors providing real-time information. With this information, these systems can automatically conserve energy, money and reduce waste. The combination of this data allows for better insights and future considerations so management never has to guess what can be improved. Management can also quickly identify problems and respond to them quickly.

The cutting-edge technology that is not used in many other buildings are algae bioreactors in the HVAC system and net-zero elevators. Algae bioreactors have the power of an acre of trees and the net-zero elevator system greatly reduces energy expenditure.

How These Innovations Appeal to Target Audience

Service and uniqueness will be at the heart of attracting tenants who value sustainable practices and amenities that can attract worker talent. Tenants will have convenient access to the integrated building systems and can tailor it to their own personal needs whether it be lighting or sound. Or, if they are too busy, the building's systems will automatically configure systems to predict their needs and provide such things like mood lighting or temperature comfort. In addition, the clean and healthy environment of the building, the concierge, bicycle storage/sharing program and other amenities will help tenants attract talent.

Since the smart building will save on energy, it will save on money. Tenants who are also sustainable will be rewarded with reduced maintenance bills, giving them more money in their pockets. The efficiency of the building will also allow it to adapt quickly to tenant needs and uses. All these things considered, tenants will find it necessary to do business at 235 Park Ave.

Financial Analysis

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

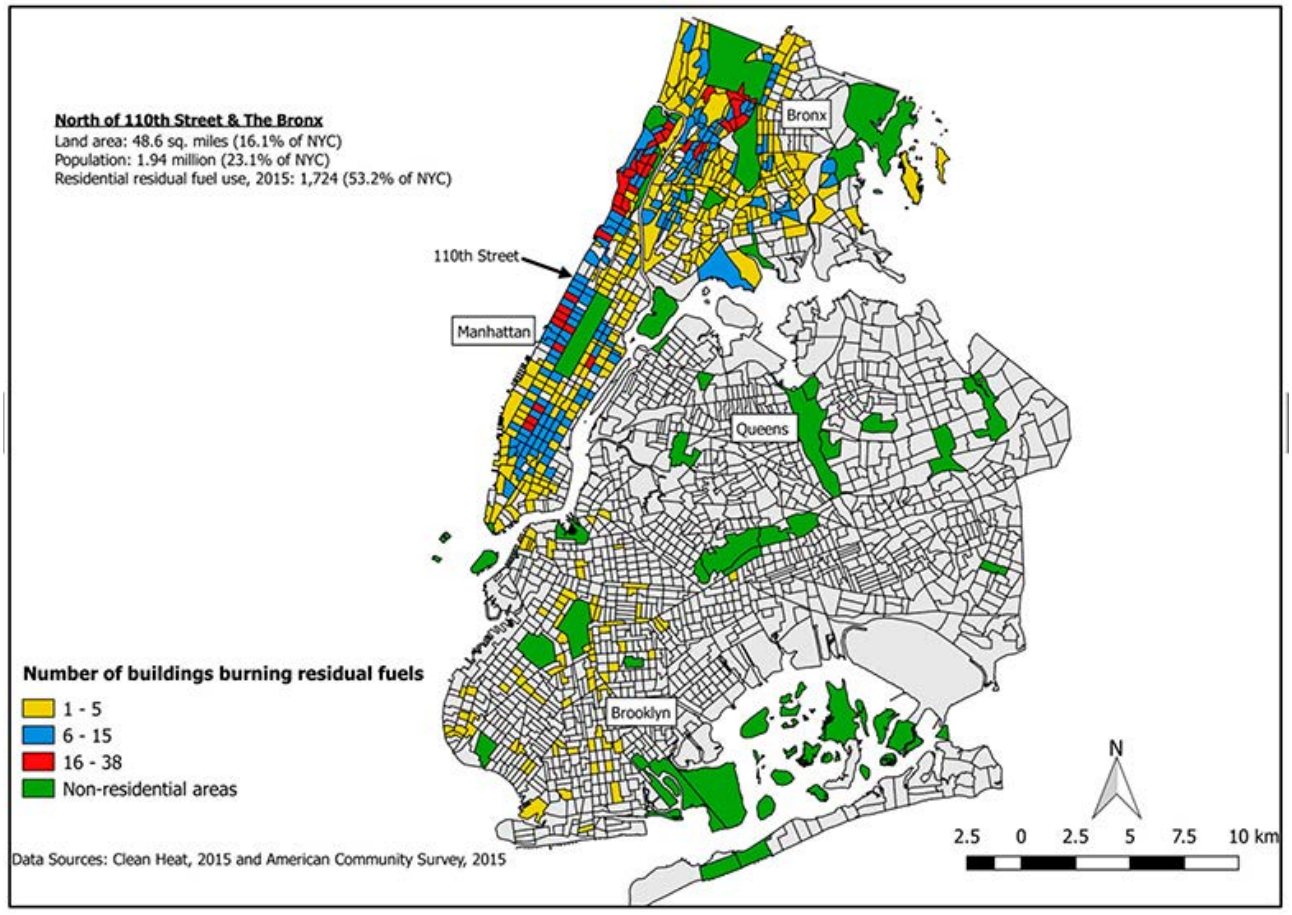
Lot Size: 1 Acre

BBL: 1008750001

Introduction

An energy retrofit is not only required by law but will also benefit the wallets of the property owner and tenants. According to New York Engineers, NYC has made it mandatory to replace all fuel oil #4 burners with cleaner fuel by January 1, 2030. It is said that fuel oil #4 and other related fuels “produce large amounts of particulate matter below 2.5 microns (PM2.5), associated with around 3,000 annual deaths in NYC at the time when the DEP published the new rule.” So, it is the lawful and social responsibility of this renovation to upgrade burning fuel oil #4 to a cleaner alternative.

This section will focus on the financial benefits and return of replacing fuel oil #4 with a heating and cooling system that uses electricity. This is not meant to provide a valuation of the entire renovation, but is an example that will have one of the highest benefits, and is meant to be representative of how changes to just one aspect of the building can have great returns. Assumptions, incentives, operating expenses, curtailment revenue, and other considerations will be discussed to support this decision.



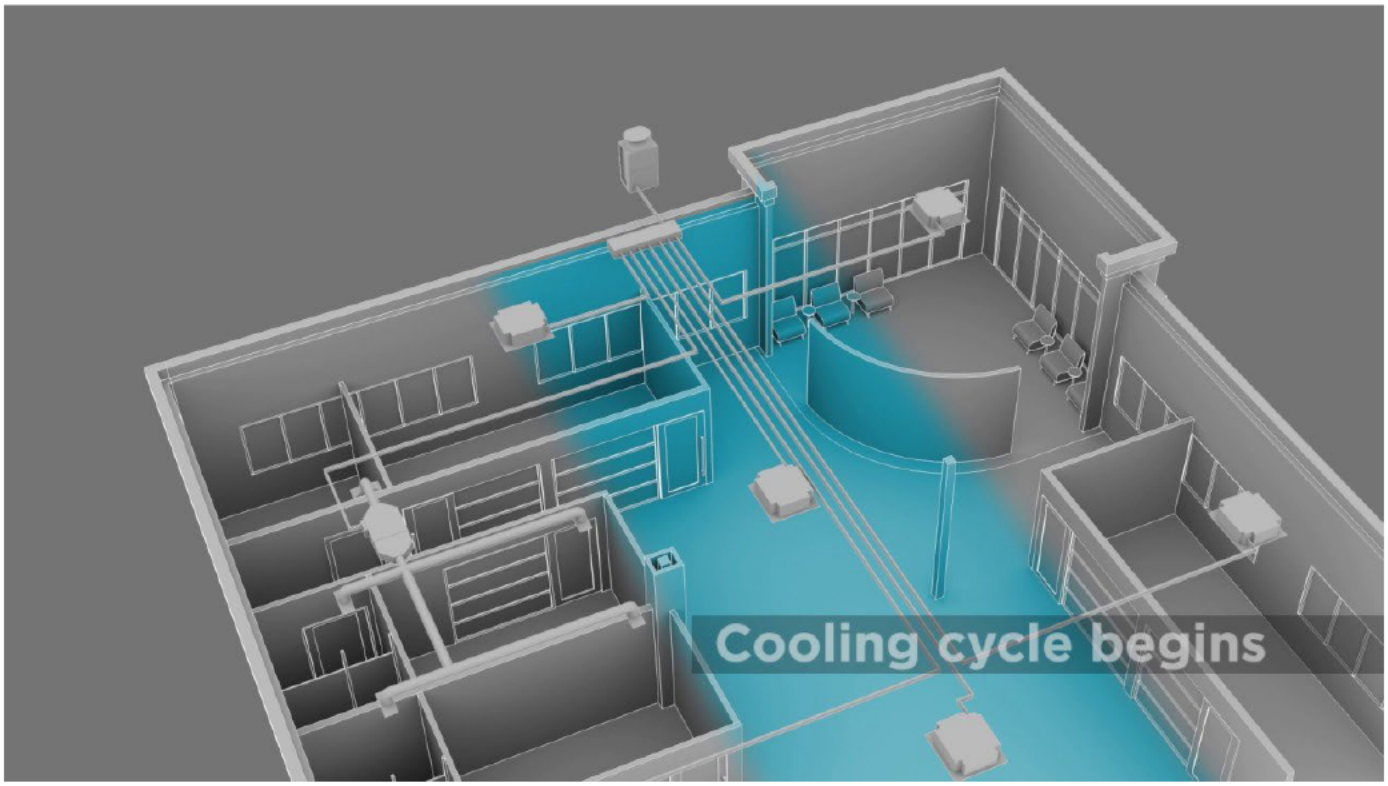
Energy Efficiency Project

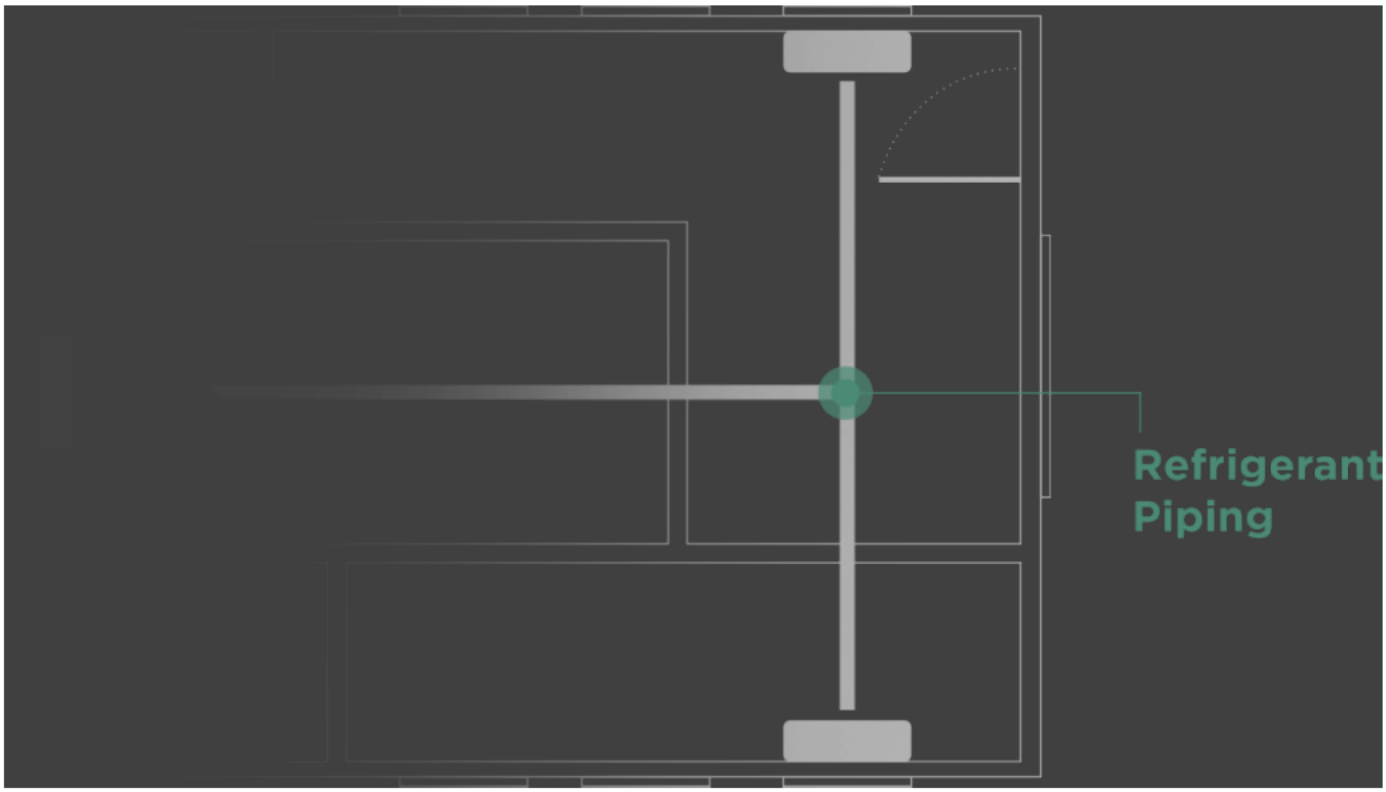
Unitary AC and Heat Pump Systems – Air Source Heat Pump

Using the High Seer Load Capacity Calculator and an industry estimation measure, it was calculated that the building needs at least 1,964,140 Btu for an HVAC cooling and heating system. Therefore, the total size of the Air Source Heat Pump Mini-Split Ductless system would need to have approximately 164 tons of air conditioning with the planned passive house style insulation and upgraded windows. There will be a multi-zone configuration with multiple handlers on each floor (possibly 6) and the condenser units on the roof. A ductless configuration can save up to 30% in energy loss used in space conditioning (energy.gov). These renovations would replace the current Fuel Oil #4 furnace.

Some challenges would be replacing any old air duct equipment and doing the work in shifts (possibly during the night) to prevent circulation of pollutants and other dangers to tenants. The Massachusetts government also advises, “Construction sites should be isolated and depressurized compared with occupied areas to control for renovation pollutants.” In addition, according to the City of New York, the project needs to follow the 2016 NYC Energy Conservation Code which applies to HVAC projects. However, energy.gov cites that “ductless mini-split systems are easier to install than some other types of space conditioning systems. For example, the hook-up between the outdoor and indoor units generally requires only a three-inch hole through a wall for the conduit. Most manufacturers of this type of system can provide a variety of lengths of connecting conduits.” They also have a “small size and flexibility for zoning or heating and cooling individual rooms. Many models can have as many as four indoor air-handling units (for four zones or rooms).”

The investment strategy is to invest and hold the property for the long-term for at least 15 years (the lifetime of the ASHP). The financial model will support this strategy with a 36% IRR over 15 years, but with a payback period of just under 1.5 years. The forecasted 15-year resale value would likely increase due to the increased future cash flows from reducing operation costs associated with this ASHP project.





Mitsubishi Air-Source Heat Pump N Series

Assumptions

- Life Expectancy of Heat Pump: **15 years**
  - (reference to Termo Heat Pumps website)
- Peak Occupancy Approximately: **173 People**
  - (based on 2.5 workers for every 1000 SF)
- Unit Cost of Electricity: **.16/kWh**
- Unit Cost of Fuel Oil: **$2.50/gallon**
- ASHP COP Rating: **3**
- Greenhouse Gas Coefficient of Electricity: **0.000288962 tCO2e / kWh**
- Greenhouse Gas Coefficient of Fuel Oil #4: **0.00007529 tCO2e per kBtu**
- # of Windows: **240**
- # of Kitchens: **2**
- # of Total SF: **69,000 SF**
- # of Tons Needed for HVAC: **164 Tons**
  - (using HVAC Industry Estimation noted by AirFixture):
  - 69,000/500=138(12,000)=1,656,000+380(173 people)+1000(240 windows)+1200(2 kitchens)=1,964,140/12,000=164 tons (rounding up)
- Total Cost of Parts and Installation for ASHP: **$330,095.10**
  - Cost of Single Package 2-ton ASHP (R.S. Means): $3,800
  - Cost of Pads (R.S. Means): $200.50
  - Cost of 6'' Stand (R.S. Means): $25.05
  - 164 tons / 2 = 82 * $4,025.55 = $330,095.10
- New ASHP Annual Energy Usage (kWh): **1,684,220 kWh**
  - 164 tons*12,000 Btu=1,968,000 Btu *24(hrs in a day)=47,232,000 Btu *(365 days in yr)=17,239,680,000 Btu / 3412 = 5,052,661 kWh / 3 COP = 1,684,220 kWh
- Old Fuel Oil Annual Energy Usage: **118,812 gallons or 17,239,680 kBtu**
  - 17,239,680,000 Btu / 145,100 Btu = 118,812 gallons
  - 17,239,680,000 Btu / 1000 kBtu = 17,239,680 kBtu
- Hurdle Rate: **4%**

Credit Overview

- Con Ed Commercial and Industrial Energy Efficiency Program: (164 tons*$200/ton) = **$32,800**
- NYSERDA had ASHP incentives but eliminated it, leaving it to NYS Electric Utilities.
- According to Energy Star, the federal tax credit for ASHP has expired.

Demand Response Curtailment Revenue

The project will enroll in Con Ed's Smart Usage Rewards Program. The air source heat pumps will curtail 100 kW during the summer months of May to September under DLRP ($18/kW/month) and CSRP ($18/kW/month) for Tier 1, with a performance payment rate during demand events of $1/kW (in one event that lasts 4 hours).

Referring to Con Ed Demand Response Forum
CSRP: $18/kW x 100 kW x 5 months = $9,000
DLRP: $18/kW x 100 kW x 5 months = $9,000

Performance Payment: 100 kW x 4 hours x $1/kWh = $400

Referring to NYISO Emergency Demand Response Program
$500/MWh => $.50/kW => .5*12 months = $6 x 50 kW = $300

Total Annual DR Revenue from Air Source Heat Pump Energy Curtailment: **$9,700**

Operating Expenses

According to the website Freshhome, ASHPs "are generally easy to maintain with regular cleaning and filter changes." Also, according to NYSERDA and Advanced Comfort Systems, ASHP Mini-Split Ductless Systems have the following operation and maintenance routines:

- Clean or change filters once a month during peak usage times
- Have a qualified contractor service the heat pump at least once a year
- Clean condensate pans and drain hose
- Wash and sanitize evaporator coils and condenser and clean fan blades
- Check for blockages in condenser lines
- Remove any mold, dust, and debris

According to the website Freshhome, you must “regularly clean your furnace to avoid a buildup of soot and debris. In addition, you “must schedule oil deliveries throughout the heating season.” NYSERDA adds the following:

- Clean air filters monthly and replace them regularly with properly sized filters
- Keep air vents unobstructed
- Seal and insulate furnace ducts to improve the efficiency of the system
- Have your furnace serviced yearly by a qualified contractor
- When having your furnace serviced, ask your contractor to check for and remove dirt, soot, or corrosion from the furnace and to clean the heat exchanger to maintain heating levels

Major Expenses a Mini-Split Ductless ASHP would save compared to a Fuel Oil Furnace or using Conventional Central or Unit Air Conditioning. Operational costs savings are provided by Synapse Energy.

- Scheduling oil deliveries during heating season
- Seal and insulate furnace ducts to improve the efficiency of the system
- Annual Operational Savings Switching from Oil to ASHP: $255
- Annual Operational Savings Switching from A/C to ASHP: $200
- Total Annual Operational Savings of Switching to ASHP: **$455**

Financial Analysis Model

Conversion to Ductless Mini-Split Air Source Heat Pump		
Size	164	Tons
Useful Life	15	Years
Cost	$330,095.10	
After Renovation: ASHP Annual Consumption	1,684,220	kWh
Unit Cost:	$ 0.16	/kWh
Annual Cost:	$ 269,475	
ASHP Annual Consumption (Carbon)	486.68	
Before Renovation: Fuel Oil #4 Consumption	118,812	gallons
	17,239,680	kBtu
Unit Cost:	$ 2.50	per gal
Annual Cost:	$ 297,030	
Fuel Oil #4 Annual Consumption (Carbon)	1297.975507	
Annual Cost Savings	$ 27,555	
Con Edison Energy Efficiency Incentive	$ 32,800.00	
Con Edison Demand Response Revenue	$ 18,400	
NYISO EDRP Revenue	$ 300	
Total Annual DR Revenue	**$ 18,700**	
Carbon Reduction (tons CO2e)	811.30	
Penalty Reduction (@ $268/ton)	$ 217,428	

Year	Investment (Cost)	Energy Savings ($)	DR Curtailment Revenue	Carbon Penalty Reduction	Total cash Flow
0	**$ (297,295)**				**$(297,295)**
1		$ 27,555	$ 18,700		**$ 46,255**
2		$ 27,555	$ 18,700		**$ 46,255**
3		$ 27,555	$ 18,700		**$ 46,255**
4		$ 27,555	$ 18,700		**$ 46,255**
5		$ 27,555	$ 18,700	$217,428	**$ 263,683**
6		$ 27,555	$ 18,700	$217,428	**$ 263,683**
7		$ 27,555	$ 18,700	$217,428	**$ 263,683**
8		$ 27,555	$ 18,700	$217,428	**$ 263,683**
9		$ 27,555	$ 18,700	$217,428	**$ 263,683**
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12		$ 27,555	$ 18,700	$217,428	**$ 263,683**
13		$ 27,555	$ 18,700	$217,428	**$ 263,683**
14		$ 27,555	$ 18,700	$217,428	**$ 263,683**
15		$ 27,555	$ 18,700	$217,428	**$ 263,683**
NPV	$1,774,225				
IRR	36%				
Simple Payback	1.45				

Carbon Tax Credit

Without any energy efficiency project like the ASHP, the building would not be LL 97 compliant due to its current energy efficiency problems demonstrated by its Energy Star Score of 8. However, assuming the building was already LL97 compliant before the ASHP project, this project would have reduced 811.30 tons of CO2e below the LL97 carbon cap, which could have been used to create 811.30 carbon tax credits.

Conclusion

With a projected NPV of $1,774,225 and IRR of 36%, the air source heat pump is a highly valuable investment not only for the property owners and management but also for tenants. This project will save tenants a total of $27,555 (annually) which will lower their maintenance expenses and entice them to renew.

However, this energy efficient project is also great for the environment. With over 811 tons of carbon being reduced (annually) with this project, that is the equivalent of planting 116 trees every year (assuming one tree can sequester 7 tons of CO2 according to medium.com). This also matters to tenants who are socially conscious and seek buildings that are taking initiatives like this one.

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NPV	$1,774,225				
IRR	36%				
Simple Payback	1.45				

Covid-19 Impact

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

Introduction

According to MIT Technology Review and a Harvard Study, some researchers speculate that “prolonged or intermittent social distancing may be necessary into 2022.” However, this is under the assumptions (in a model) that “ immunity that lasts about a year would result in annual outbreaks of covid-19” and that “everyone is either susceptible, exposed, infectious, or recovered.” In addition, the model used in this one study assumes that no vaccine or progress in treatment is created.

This section will go over the impact of Covid-19 on the design and operation of the building going into 2022 and the solutions to mitigate its impact in terms of economics, health, and safety. It is important to consider the worse-case scenario to make the building truly resilient to the full magnitude of this pandemic and future pandemics.

Going Touchless Avoids Contamination & Boosts Security

According to the World Health Organization, “When someone who has COVID-19 coughs or exhales they release droplets of infected fluid. Most of these droplets fall on nearby surfaces and objects - such as desks, tables, or telephones. People could catch COVID-19 by touching contaminated surfaces or objects – and then touching their eyes, nose or mouth.” Therefore, it is imperative that office and restaurant surfaces/objects remain clean to mitigate health and safety risks.

To minimize the amount of “touching,” the building’s integrated system of sensors, RFID, geofencing, beacon and Bluetooth readers will be utilized to allow users to manipulate settings without touching buttons or displays. Instead these technologies can be accessed through user’s mobile phones to control personal settings. Gensler supports this by stating users “already understand the interaction patterns on their mobile devices and it’s much easier to learn how to control the environment around them.”

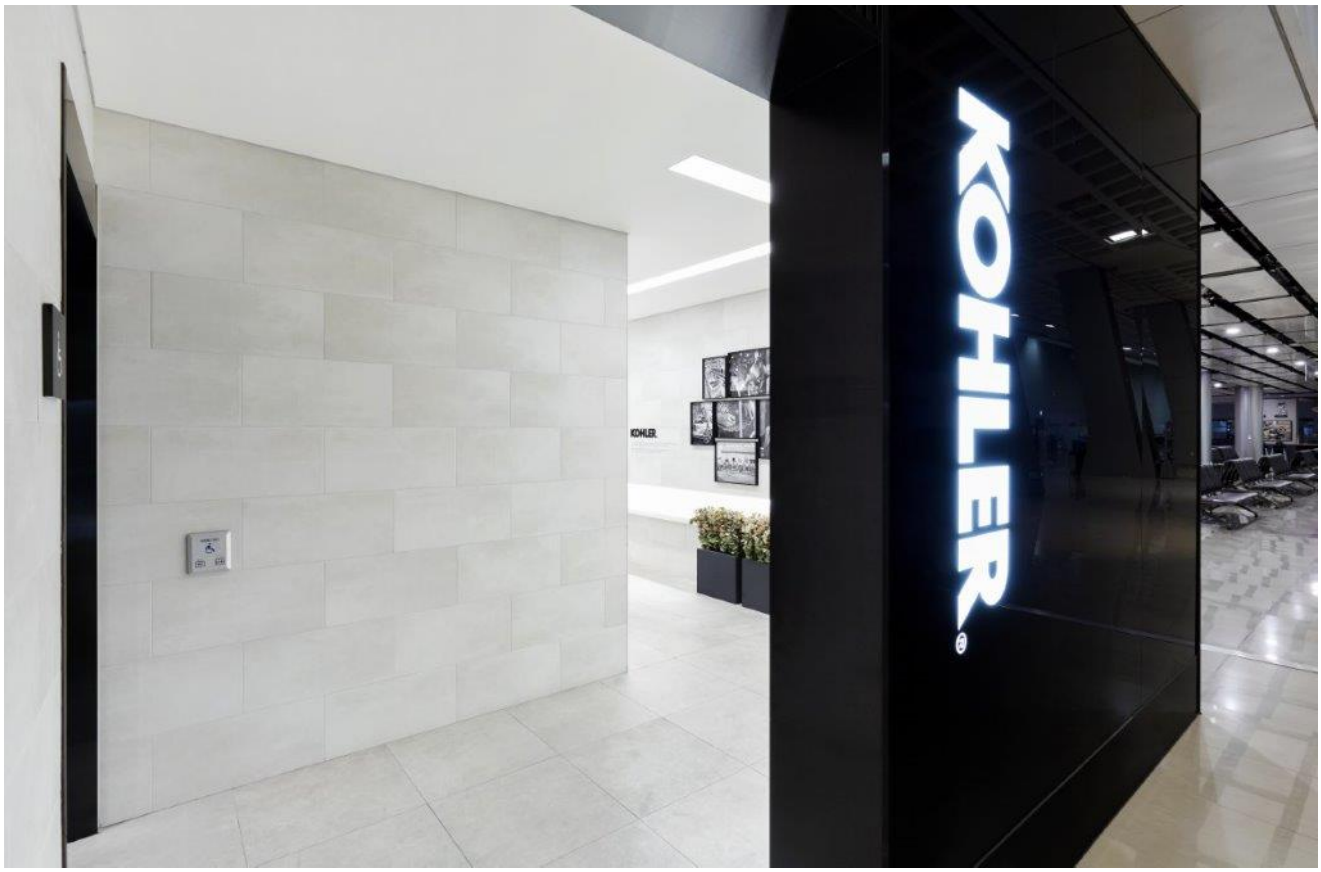
Other technologies can utilize voice activation, automation, and facial recognition to discourage users from touching surfaces. For example, the building’s integrated system can adjust lighting and shade settings without the user even touching their smartphone. In addition, doors and elevators can be open or closed using Bluetooth, voice, or gesture, adding to the number of sensor or gesture devices such as toilets and sinks (Gensler). These systems replace “less sanitary manual or kiosk check-ins for guests and biometric for some employees” (Gensler). Also, such dispensers like water fountains, soap dispensers, and sanitizer dispensers will use motion activated technology as well.

Touchless technologies can also improve the building's security as well, mitigating safety risks. Harvard Business states that "building security will involve monitoring not just who enters and what they are physically carrying, but also what they might be carrying internally." This can be done by "Infrared Fever Screening Systems (IFSS) [which can] screen travelers for the coronavirus…A visitor arriving at a client's office building could be screened for elevated body temperature ahead of a meeting" (Gensler). While there are other symptoms and factors for detecting coronavirus, this system could quickly and efficiently screen visitors and tenants in the lobby without physical contact or a person holding a thermometer.

IFSS

The renovation will also follow Gensler's recommendation of "designing a door-free entry point that relies on intuitive wayfinding to navigate an employee or visitor through an office building….[this] greatly reduces the need to touch foreign surfaces, like door handles, which could transmit bacteria or viruses." This is already used in airports where travelers can easily move their luggage to bathroom stalls and do not have to open doors.

Smart materials can also help to notify which surfaces are touched frequently or in need of cleaning. Making it easier for management to monitor those surfaces and clean them more frequently.

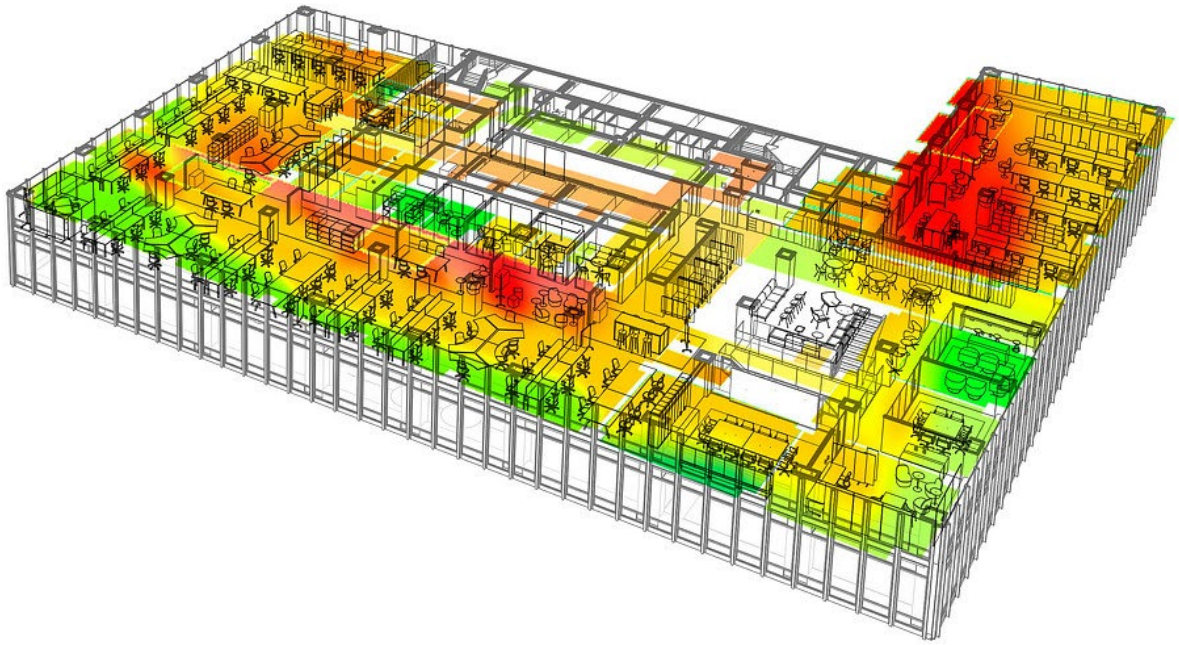


Door-Free Entry Point for Bathroom

Data Can Inform Physical Layout and Distancing in Offices

Another concern over COVID-19 is social distancing. According to WHO, “If [you] are standing within one meter of a person with COVID-19 [you] can catch it by breathing in droplets coughed out or exhaled by them.” This is not unlike the flu, and government organizations like the CDC urge people to stay at least 6 feet away from other people. The challenge is how to optimize space in the office to prevent transmission while also adapting to the behaviors of employees used to remote working.

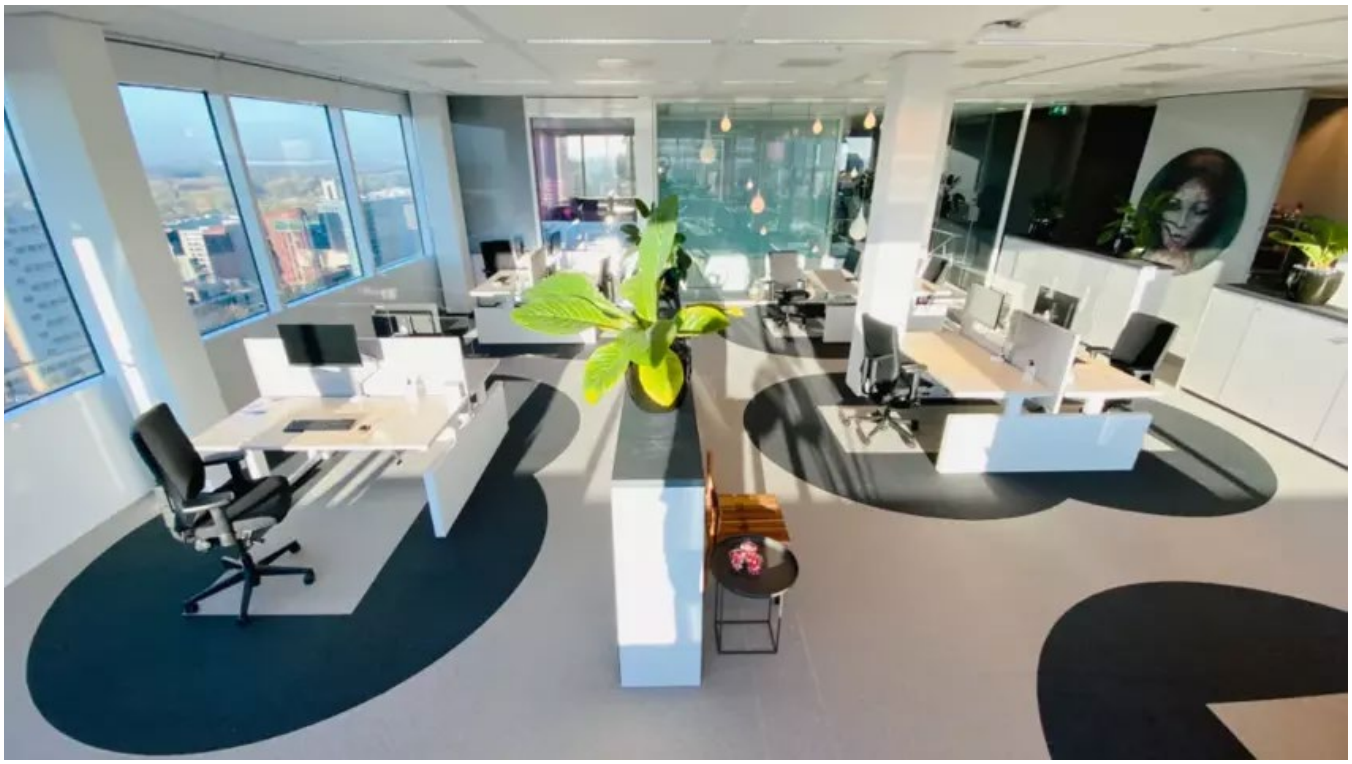
The renovation will follow Gensler's suggestion that "sensor and data collection can map patterns of adoption rates of healthy habits, strategically optimize floorplans, and measure the success of virtual tools to allow for physical distancing." Responsible use of this data can then be disseminated through online portals where tenants "can access health data, updated policies, and relevant health and travel advisories."



Sensor and Data Collection

Spatial analytics is one aspect which can incorporate "design interventions focused on viral transmission risk. This might include understanding flows and pinchpoints" (Gensler). Once this data is analyzed, considerations can be made such as the Six Feet Office proposed by Cushman & Wakefield as noted in World Economic Forum. This layout would have workstations that would observe the 6-foot rule enforced by the CDC. The renovation will look closely at creating a closed layout (as opposed to open) where employees have their own healthy personal space, without being too close to another person. In addition, the renovation will also look at the data to incorporate "wider corridors and doorways, more partitions between departments, and a lot more staircases" (World Economic Forum).

Six-Foot Office



Closed Layout

Another aspect is how COVID-19 will affect working habits. When many employees come back to the office, they will have gotten used to working at home. Therefore, sensor and smart systems can "collect data on emerging behavioral patterns of collaboration and consider how we can translate them to physical spaces…the relationship between remote, or virtual space, and real, or physical space, is organically shifting, and this can alter the centralization of communications, for instance, or inform new floorplan designs" (Gensler). The private noise reduction rooms in the tech analysis section could be one possibility for employees who are used to working by themselves. Data can inform management whether more privacy rooms are needed.

Furthermore, data and sensors can help make offices "environments that offer the opportunity to learn about behavior so that they can bend the curve towards positive outcomes, including a healthier workplace" (Gensler). For example, the renovation will include one floor meant for experimentation (with a tenant agreeing to be the test subjects). This experimental floor will learn behaviors and test what solutions can be implemented throughout the whole building. For example, there will be sensors of how long someone washes their hands and the frequency. This might inform the accessibilities of sinks or bathrooms throughout the building to encourage hand washing (a powerful tool to fight COVID-19).

Good Air Quality & Humidity Can Contain the Spread

Indoor air quality and humidity levels can impact how COVID-19 spreads. According to Medical News Today, dry air with relative humidity levels of 10-20% could be linked to easier transmission of airborne viral particles like COVID-19. However, higher relative humidity levels (like those found in tropical areas) could cause "airborne droplets that contain the virus [to] fall on indoor surfaces, where the virus can survive for longer periods." Both Medical News Today and Gensler recommend relative humidity levels of 40 to 60%.

Medical News Today says that these levels are ideal to contain the virus and have a "good viral clearance and an efficient immune response." Gensler comments that "pathogens have a difficult time surviving at higher relative humidity levels. However, indoor relative levels above 60% humidity can have negative effects in certain environments, such as facilitating the growth of mildew."

In addition, Forhealth.org (conducted by Harvard researchers) outlines in the table below that "in offices, studies have demonstrated relationships between lowered ventilation rates and higher instances of short-term sick leave, asthma, and respiratory infection among building occupants." Therefore, 40-60% relative humidity and good ventilation are important for containing COVID-19 in the office environment, mitigating health risks.

Table 1. Health impacts of ventilation rate in medium office prototype building#

Reference	Outcome	Ventilation Rate (cfm/person)		Relative Risk
		Low	High	
Milton et al. 2000[19]	Short term sick leave	12.9	25.8	1.5
Brundage et al. 1988[20]	Illness all years	4.5	30	1.5
Brundage et al. 1988[20]	Illness 1983 data	4.5	30	1.9
Drinka et al. 1996[21]	Illness	48	120	2.2
Drinka et al. 1996[21]	Influenza	48	120	4.7
Knibbs et al. 2011[22]	Influenza	15	45	3.1
Knibbs et al. 2011[22]	Rhinovirus	15	45	2.1
Knibbs et al. 2011[22]	TB	15	45	3.3
Hoge et al. 1994[15]	Pneumonia	20.4	30	2.0
Stenberg et al. 1994[23]	SBS symptoms	8.5	42.4	5.0

#adapted and updated from Fisk et al, 2003[18]

Taken from forhealth.org

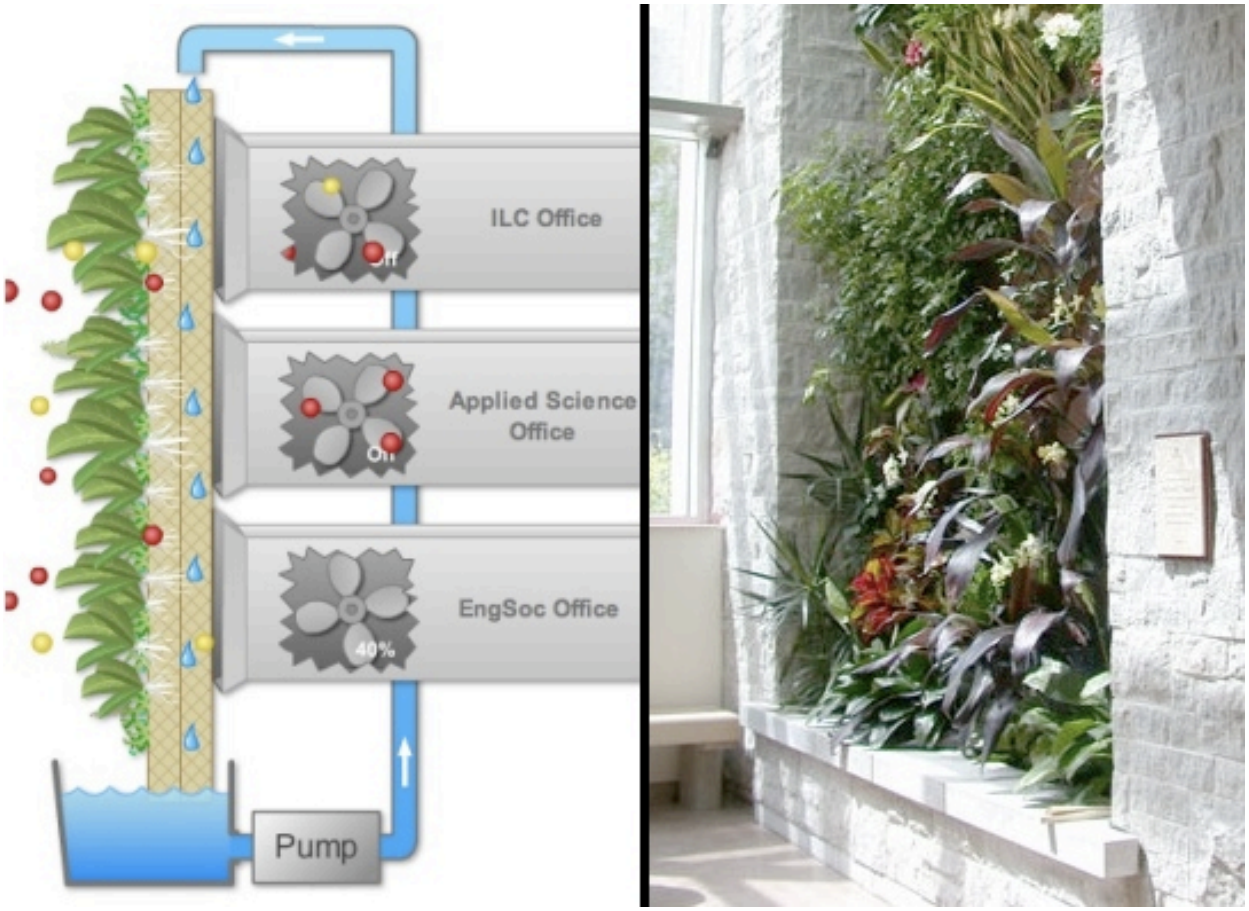
As cited from Harvard Business Week, Gensler and Medical News Today, the following will be implemented to ensure good air quality and humidity levels in a building.

- Increase ventilation rate minimum 30 cubic feet per minute / person.
- Monitor CO2 levels in real-time and verify ventilation performance.
- Using demand control ventilation, run the air-handling system during hours the building or space is occupied.
- Selecting a hospital grade air filter for the building (MERV 17).
- Maintain relative humidity levels of 40-60% with sensor monitoring.

As discussed in the tech analysis portion, the mini-split air source heat pump system allows for isolated “zone control” of the building. This not only minimizes energy cost, but also enables more exact control of the building’s ventilation and air quality.

Additionally, Gensler provides insights for the “mechanical system: trap it (filtration), kill it (disinfection), or flush it (ventilation).”

- Trap It (Filtration)
    - Replacing the building’s air filters with hospital grade MERV 17 filters will improve filtration. In addition, using the data collected from the building’s sensors, individual air filter units will be placed in hot spot zones such as lobbies, restrooms, etc. Also, a filter replacement program will be implemented “that considers the potential contamination of the replaced filters” (Gensler).
    - In addition, the algae bio-reactor and the wall of living plants can be integrated to act together as a building air-filter, removing CO2 and replacing it with oxygen.



Living Plant Wall Air Filter System

- Kill It (Disinfection)
    - If ductwork is needed in some areas, UVC light will be installed to kill any viruses. Also, “bipolar ionization and photocatalytic oxidation. These systems charge the existing air to kill pathogens, and they don’t require more outside air” (Gensler).
- Flush It (Ventilation)
    - Increasing the amount of fresh outdoor air and the air change rate will be a high priority. How this can be done is by “shifting [the] system into full air economizer mode, increasing outdoor air damper positions, and adding air changes by night-flushing the system” (Gensler).
    - Natural ventilation: in addition to the having an adjustable and automatic HVAC system, the renovation will include adding more windows for tenants to let fresh outdoor air inside (World Economic Forum). This will be based on Gensler’s idea of a “permeable building skin” where users can “can open up buildings to let in fresh air when conditions are right. A building can operate in a state of zero energy heating and cooling demand, generally throughout the shoulder seasons, for about one-third to half of the year, depending on the current climate zone.”

Active Engagement with Health Protocols and Community

Under a worse case scenario of COVID-19 going into 2022, it is important that the building, its tenants, the restaurants, and the surrounding community work together to mitigate health and safety risks. The following has been compiled using guidelines taken from the International Council of Shopping Centers, the WHO and Smith Group.

Planning

- Consult with local stakeholders like health officials, tenants, landlords, community, etc., to create a plan with clear objectives and priorities of how to re-open safely for everyone who might visit the building or neighborhood.
    - Re-consider optimal operation hours to mitigate risk of spread.
- Train janitorial staff and employees of the property how to manage customer concerns, do proper sanitation procedures, and commit to proper social distancing standards.
- Prepare a quarantine zone or area where people can be tested or isolated if they show symptoms of an illness. This could include symptom checks, temperature checks, virus/antibody testing.

- Plan with health officials to transfer ill visitors or employees to nearby hospitals.

Communication

- Will create a property website, and work with local community services to notify the community of virtual meetings (like through Zoom) to discuss the development of the project and how they can add their input. The following will be included in the meetings: recordings, transcriptions, surveys, self-guided tours, etc. In the U.S. Census of Gramercy Park, a vast majority of residents (94%+) have access to broadband internet and computers, so virtual meetings would be an effective method to engage the community.
- Paper bulletins or newsletters would also be posted in community centers to reach those who do no have access to that technology. The goal is to create a collaborative and safe environment where that does not create barriers to participation like (pre-registration). Emphasis will be made on showing the community and local stakeholders how their input is being used in the building's health and safety protocols/development.
- Display important rules and guidelines from local health authorities and the CDC in highly visible areas of the property (entrances, lobbies, etc.).
    - These guidelines will also be distributed to the tenants daily.

ZOOM Video SMART Meetings

Landlords/Center Management

- Remove lobby furniture or adjust common areas to enforce social distancing.
- Increase visibility of janitorial staff and upgrade cleaning and hygiene procedures to include multiple cleanings throughout the day of high traffic areas like entrances, doorknobs, restrooms, etc.
- Have 70% alcohol sanitizer dispensers and tissue dispensers which are motion activated in convenient locations on all floors.
- Invest in PPE like face masks which will be required for visitors and tenants.
- Determine staffing levels based on appropriate operating hours and anticipated occupancy levels.
- Occupancy will not have more than 50 people in the building at any one time.
- Install an electronic notification system for tenants to notify them of immediate updates, risks, or dangers.
- Make one section of the curb outside the two ground level restaurants available for curbside pickup or delivery.
- There will be a strict policy of restricting access to groups greater than 4 at a time. Visitors or tenants who show symptoms of COVID-19 will be denied entry. Employees will be encouraged to self-isolate if they feel ill.
    - Building employees will be allowed to count their time away as sick leave.
- Place floor stickers to enforce social distancing or plexiglass barriers for the concierge or other services.
- Increase security staff and presence to handle visitors who are non-compliant to health procedures like wearing a face covering. This will mitigate safety risks to tenants who are already in the building.
- Visitors must provide their name, email, telephone, and address in case they are involved in a medical emergency. Information will be stored on the cloud.
- Display instructional posters on how to wash hands properly and wear face masks correctly.
- Conference rooms will be restricted to just four people.

Technical Systems

- Fire Safety
    - Have regular checks of the fire safety system.
    - Make sure emergency and escape routes are easily accessible and unimpeded.

- Security Systems
    - Make sure alarm systems are working properly.
    - Make sure that camera systems are working properly.
- Other
    - Prepare HVAC and mechanical systems.
    - Make sure the potable water system is flushed.
    - Inspect grease traps and check sewage functionality.
    - Inspect the restrooms and test for performance.
    - Check that the elevators are running properly.

Retail Tenants

- Work with tenants to anticipate temporarily storing delivery and other goods. Also inquire about how they will disinfect inventory and deliveries, and how they will handle shipments going out.
- Make sure tenants display and enforce maximum occupancy levels.
- Encourage a one-way pathway through the retail space if possible.
- Create a plan on how tenants will handle returns or exchanges.
- The integrated building systems will notify tenants to pick up deliveries in the downstairs lobby from the concierge. There will be no deliveries to individual offices.
- Encourage the adoption of RFID cards or other touchless payment methods. In addition, encourage the delivery or pick up of goods using curbside pick-up/delivery.
- Make tenants reconsider their staffing levels to minimize the amount of people who must come into work.

Restaurant Tenants

- For each employee, conduct a pre-shift health check.
- With a certified supervisor on duty for every shift, certify each staff member in safety of food handling/preparation.
- Until the pandemic is over, use disposable utensils or have a strict and efficient sanitation process for plates and utensils.
- Enforce handwashing and hand sanitizer usage.
- Enforce that all surfaces be disinfected every hour.
- Like other retail tenants, encourage the adoption of RFID cards or other touchless payment methods. In addition, encourage the delivery or pick up of goods using curbside pick-up/delivery.
- Display the exact occupancy of the restaurant and enforce it.
- Enforce social distancing guidelines from health officials.

Assistance Programs Create Financially Healthy Tenants

For most kind of retail tenants (as indicated in the graph above), the COVID-19 pandemic is a difficult time financially. For the building to have sustainable cash flows and mitigate economic risks, the building must work with tenants to make them financially healthy enough to pay a reasonable amount of rent. The building will create a Tenant Assistance Program similar to Kimco as outlined on ICSC's website.

This program will be free and provide professional legal help for tenants. This will help them to navigate funding options from the government or other sources. Communication with tenants will take place either through email or through an online portal. The program will follow Kimco CEO Conor Flynn's idea that long term success of tenants depends on them receiving immediate access to capital, critical for their survival, especially in the coming months (ICSC).

An example of a lending program is the Main Street Lending Program as noted in below.

Main Street Lending Program Loan Options	New Loans	Priority Loans	Expanded Loans
Term	4 years	4 years	4 years
Minimum Loan Size	$500,000	$500,000	$10,000,000
Maximum Loan Size	Lesser of $25M or 4x 2019 adjusted EBITDA	Lesser of $25M or 6x 2019 adjusted EBITDA	Lesser of $200M, 35% of outstanding and undrawn available debt, or 6x 2019 adjusted EBITDA
Risk Retention	5%	15%	5%
Payment (year one deferred for all)	Years 2-4: 33.33% each year	Years 2-4: 15%, 15%, 70%	Years 2-4: 15%, 15%, 70%
Rate	LIBOR + 3%	LIBOR + 3%	LIBOR + 3%

Conclusion

COVID-19 should not be taken lightly. According to the WHO, “While COVID-19 is a mild disease for most people, it can make some very ill. Around 1 in every 5 people who catch COVID-19 needs hospital treatment.” Therefore, taking steps to mitigate health, safety and economic risks is important moving forward into 2022.

How the building can mitigate these risks is by providing tenant assistance programs to tenants, communicating and planning health protocols with local stakeholders, improving air quality (ventilation and humidity), making physical considerations through data collection and analysis, and having touchless accessibility of building services and amenities. Together we can all ensure everyone’s well-being and be prepared for a future after COVID-19.

Conclusion

235 Park Ave S

New York, NY 10003

(Alternative Address 101 E.19th St.)

Gramercy Park

Gross Floor Area: 69,000 ft²

Lot Size: 1 Acre

BBL: 1008750001

Conclusion

The building 235 Park Ave S will outshine its peers for its shining example of sustainability during the COVID-19 pandemic and afterward. It will not only be more resilient to physical, regulatory, and other risks, but it will also be a beacon of well-being in the neighborhood of Gramercy Park.

By utilizing an integrated building wide system that collects data from IoT sensors and stores data on the cloud, the building will be smart enough to save energy and money. It will also allow tenants to have the power of controlling their own personal environments. Innovative technology will separate this building from its peers like algae bio-reactors which will change the game of clean air indoors.

The targeted audience of sustainably minded tenants will be enticed to rent and enjoy the fact they reside in a building that share their values and the designation of LEED platinum. For them, it will be like planting an acre of trees every year.

Post-Renovation of 235 Park Ave S Based on "Skanska's 88 M Street NE Project in Washington"

Investors in the project will be excited by the great returns on investing in this sustainable renovation, with one of the building's largest energy efficiency projects paying for itself (air source heat pump) in less than 2 years.

Most importantly, this renovation will provide jobs and growth to the neighborhood of Gramercy Park. Bringing a sense of community where people can live, work, play, and be well.

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