



NEW YORK  
BUILDING  
CONGRESS

# NYC CHECKUP

AN EXAMINATION OF

HEALTHCARE & LIFE SCIENCE

CONSTRUCTION



JULY 2020

# TABLE OF CONTENTS

Letter from the Chair and President & CEO .....	2
COVID-19 Pandemic: New York City’s Response .....	3
Daily Counts .....	4
Timeline .....	5
Responding to a Crisis .....	13
Surge Beds in New York City .....	15
Beginning to Recover .....	17
Envisioning the Next Normal .....	18
Healthcare .....	19
Leading the Way .....	20
Expanding Influence .....	21
Building for the Future .....	23
Construction Review and Outlook ...	25
Life Sciences .....	29
Setting the Stage .....	30
Gaining Momentum .....	31
Sustaining Growth .....	33
New York Fusion .....	35
Construction Review and Outlook .	37
Life Science Landscape .....	39
Recommendations .....	41
Sponsors and New York Building Congress Leadership .....	Back Cover

## RESEARCH CONTRIBUTIONS:

Dodge Data & Analytics, Nancy J Kelley & Associates, New York City Economic Development Corporation, New York Building Congress Healthcare and Life Sciences Committee, Partnership Fund for New York City, Urbanomics

# LETTER FROM THE CHAIR AND PRESIDENT & CEO



Over the past 99 years, the New York Building Congress and our members have been committed to promoting the growth and success of the building industry in New York City, focusing on economic and infrastructure investment, job creation and professional exchange. After every disaster our region has faced, including September 11 and Superstorm Sandy, the building industry has rushed to those in need and helped rebuild communities.

Once the global epicenter of this pandemic, New York City has emerged as a model for cities across the world. Through it all, the building industry relied on our spirit of collaboration and the roll-up-our-sleeves attitude that is engrained in the city and our workers.

Moving forward, we must address the ways the pandemic is disproportionately affecting communities of color in New York City and across the country. Black and Latino residents in the United States have been three times as likely to become infected as their white neighbors and nearly twice as likely to die. The systemic racism and socioeconomic disadvantages that plague our society continue to be manifested with this virus. Our industry should devote significant effort to solve the pervasive issues regarding access to and delivery of health care.

As we continue to grapple with this devastating pandemic, we must also look toward our recovery. That begins with significant investment in 21st century infrastructure. More than ever, our essential infrastructure extends beyond roads, bridges and mass transit networks and encompasses our hospitals, emergency centers, healthcare facilities, laboratories and other highly specialized sites that are critical to serving New Yorkers in their times of need. These spaces are the front line of world-renowned healthcare delivery and cutting-edge science, serving as an economic engine for the entire city.

Prior capital investments are paying off. New York City hospitals are recognized as among the best in the country. The most recent U.S. News & World Report rankings included three private New York City institutions among the 15 best

hospitals in the nation – more than any other city. New York City’s fledgling life sciences sector is growing rapidly, funding new incubators, constructing additional lab space and building a pipeline of companies that will empower New Yorkers to access the jobs of the future.

In both sectors, New York City is leveraging its key assets of talent, space and capital to remain a global leader. To understand the changes taking place, the New York Building Congress, working with our Healthcare and Life Sciences Committee, conducted extensive research of New York City’s healthcare and life science industries, including surveys and interviews with the design, construction, building and real estate professionals in the field. This report is an update to our *Healthy City: Inside New York City’s Hospital Building Boom*, published in 2016.

As the leading voice of our industry, the Building Congress is enormously proud of all the work taking place in two of the city’s most critical and rapidly developing sectors. The construction industry is woven into the fabric of New York, and working together, we will build a better New York for all!

Very truly yours,

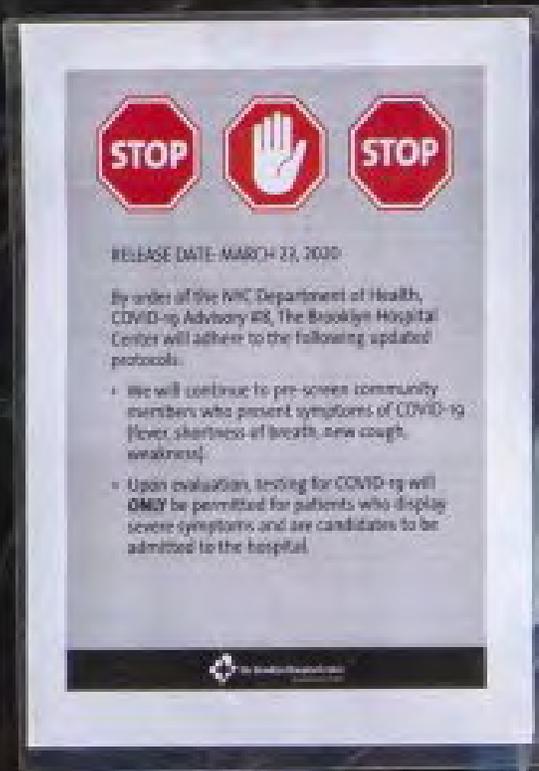
Elizabeth Velez

Chair  
New York Building Congress

President  
Velez Organization

Carlo A. Scissura, Esq.

President & CEO  
New York Building Congress

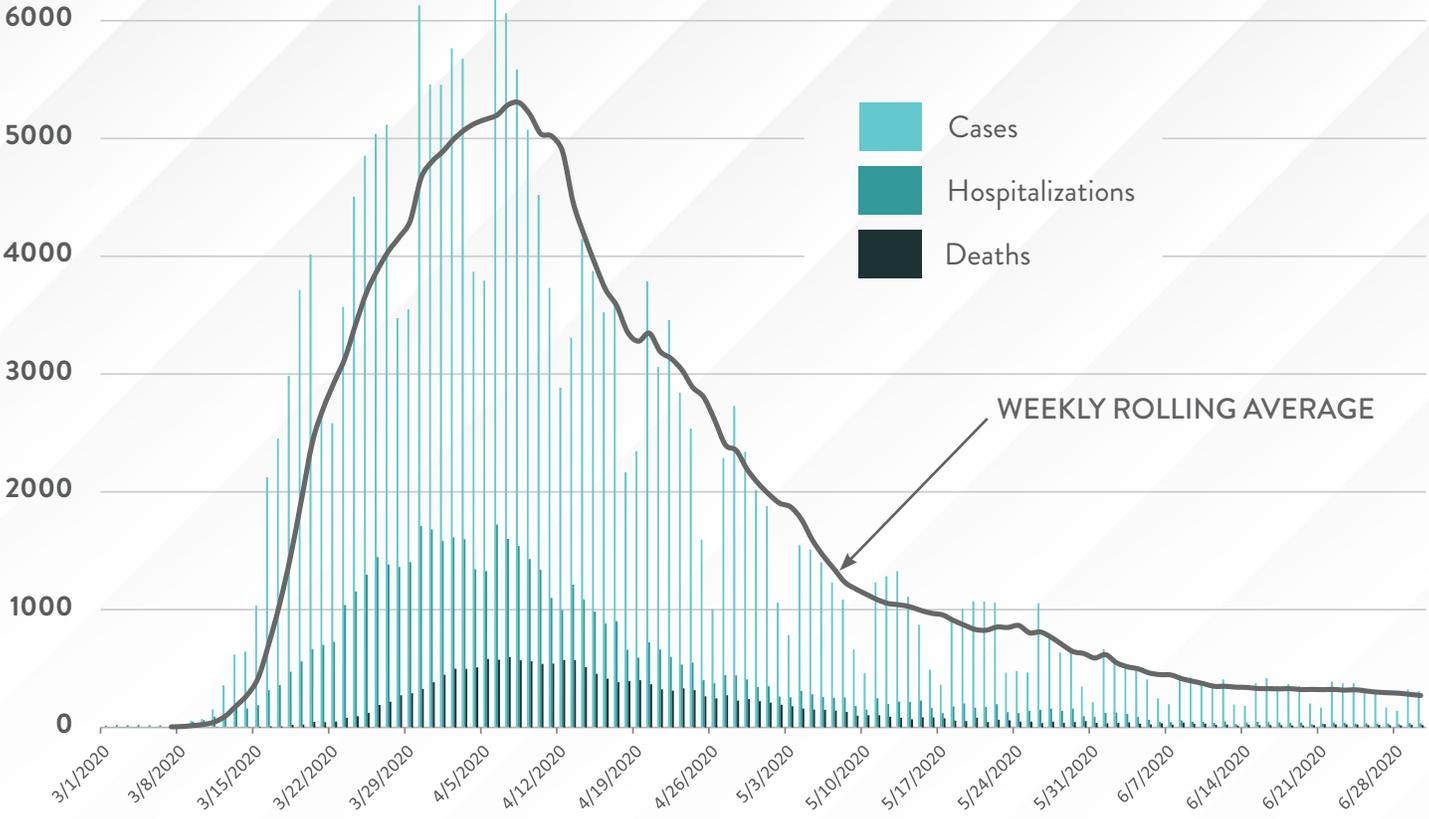


# COVID-19 PANDEMIC: NEW YORK CITY'S RESPONSE

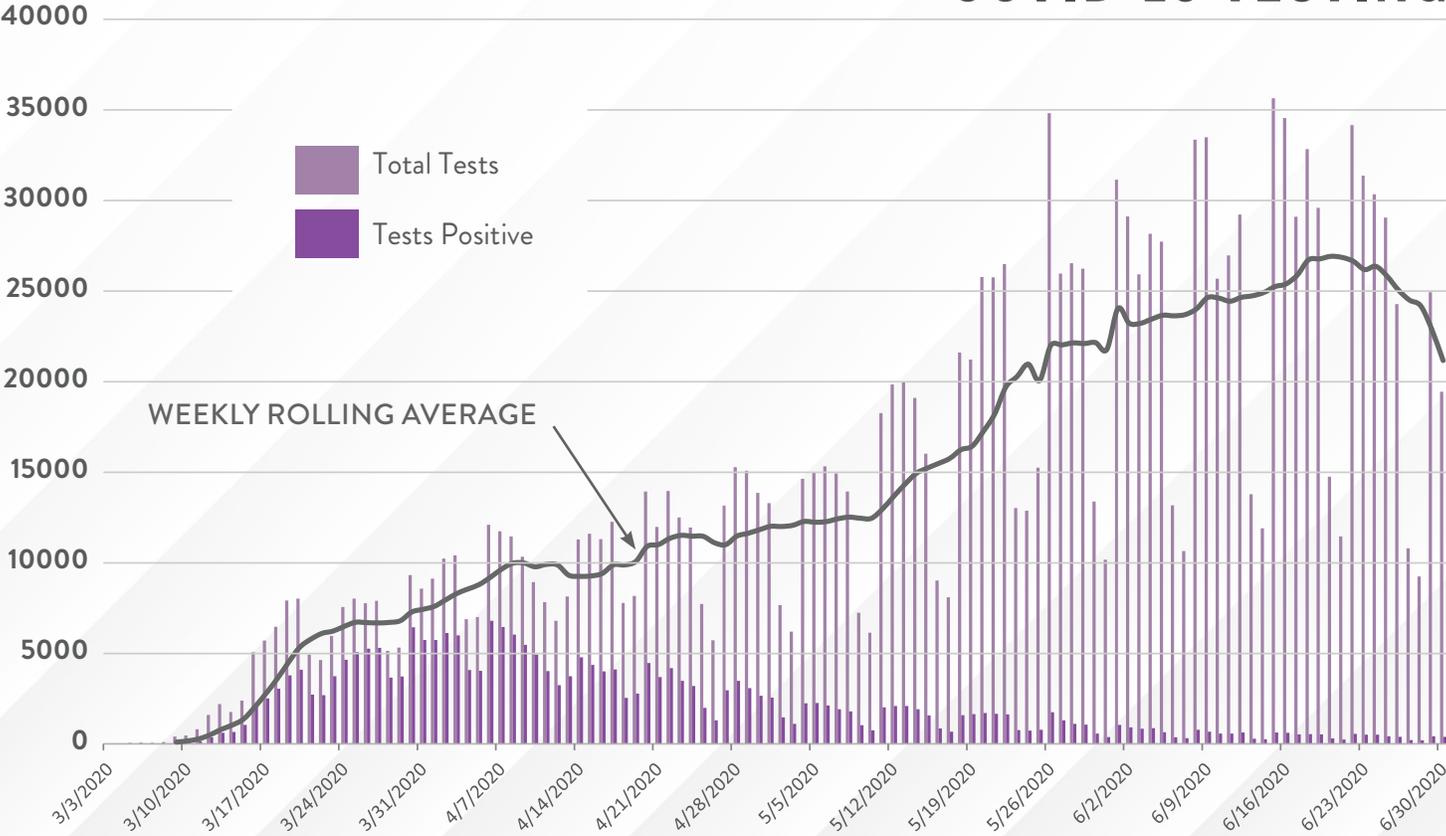
The COVID-19 pandemic has put unprecedented stress on the city's healthcare system and on society as a whole. In only four months, New York City has seen over 200,000 confirmed cases, treated more than 55,000 patients in hospitals and lost over 18,000<sup>1</sup> New Yorkers. While the beginning weeks of the crisis were bleak, the city has weathered the storm and proven its resilience. Worst-case scenarios were avoided, stay-at-home orders and social distancing curbed transmission and testing capacity continues to improve. Now, alongside the healthcare, life science and building industries, New York is in the recovery phase – analyzing response efforts, preventing a resurgence and reopening cautiously – and beginning to re-envision the next normal.

*Credits: Mary Altaffer for AP*

# COVID-19 MORTALITY



# COVID-19 TESTING



Source(s): New York City Department of Health and Mental Hygiene

# COVID-19 TIMELINE: **MARCH**

DAY

1

New York State's (NYS) first positive case of COVID-19 is confirmed in New York City (NYC).

3

NYS's second positive case is confirmed in New Rochelle, Westchester County.

4

NYS's number of cases increases to 11, including nine in NYC.

6

NYC receives its first emergency procurements of masks and hand sanitizer.

7

Governor Andrew Cuomo declares a state of emergency after 89 cases have been confirmed.

8

NYC issues new commuter guidelines asking those who are sick to avoid public transit and all others to avoid packed buses and trains.

9

NYC's number of cases exceeds 100.

12

- Mayor de Blasio declares a local state of emergency.
- A containment zone in the city of New Rochelle goes into effect until March 25.
- Governor Cuomo implements restrictions on mass gatherings, directing events with more than 500 people to be canceled or postponed and any gathering with fewer than 500 people to cut capacity by 50 percent. Broadway theaters close.
- All major league sports suspend their seasons.

13

The state's first two coronavirus-related fatalities occur in the downstate area.

14

NYC Health + Hospitals and NewYork-Presbyterian cancel elective surgeries.

16

NYS limits all visitors at hospitals and group homes.



DUE TO THE  
COVID-19 PANDEMIC  
NO VISITORS  
ALLOWED

## ALTERNATIVE CARE SITE: **JACOB K. JAVITS CONVENTION CENTER**

Within nine days, the U.S. Army Corps of Engineers and the National Guard led construction and opened a temporary hospital at the conference center. During this period, between 1,000 and 1,500 people were onsite converting the 470,000-square-foot facility into one of the city's largest hospitals, with 1,900 beds, nursing stations, an x-ray unit, testing lab and pharmacy. The Javits Center was particularly well suited for quick adaptations because of its large floor plates with electrical and piping every 10 feet, which allowed features like sinks in the middle of convention halls. Between April 11 and May 1, the facility saw 1,050 patients.



## MARCH CONTINUED

18

NYC schools, restaurants and bars close.

19

City University of New York and State University of New York move classes online for the remainder of the spring semester.

22

- The statewide stay-at-home order, also known as the NYS on PAUSE Program, begins with a mandate that all non-essential workers work from home.
- President Donald Trump announces the Federal Emergency Management Agency will provide four large medical stations with 1,000 beds.

23

Governor Cuomo mandates hospitals increase capacity by at least 50 percent with the goal of a 100 percent increase. To make more beds available, all elective surgeries and procedures are canceled.

25

- Service on buses, subways and commuter rail is reduced due to decreased ridership.
- Medical schools at Columbia University, Weill Cornell Medicine, New York University, Hofstra University and Icahn School of Medicine at Mount Sinai begin announcing qualified students will graduate early to enter the NYC hospital workforce.

26

Governor Cuomo announces two patients will be allowed to share a ventilator.

27

Empire State Development issues updated guidance halting non-essential construction, which suspends most residential and commercial construction, but permits crucial work on infrastructure, hospitals, affordable housing and emergency repairs.

29

NYC's number of cases exceeds 30,000 and number of fatalities is over 670.

30

As part of federal efforts, USNS Comfort, a U.S. Navy medical ship with 500 beds, docks in Manhattan to assist overwhelmed communities with acute care.

## HOSPITAL SYSTEM: NYU LANGONE

At Kimmel Pavilion, NYU Langone took advantage of the building's private patient rooms to quickly admit and safely place the first waves of COVID patients. When the building first opened, NYU Langone ensured that entire floors could be converted from conventional medical surgical rooms to intensive care unit (ICU) rooms. This design, along with sealing off rooms for negative air pressure, allowed for seven COVID-only floors.

Nearby, at the medical center's emergency room, NYU Langone reconfigured the space to screen and assess potential COVID patients separately from general users. Within 10 days, it added an 18,000-square-foot field tent with emergency power, HEPA filtration, working sinks and sprinklers and isolation rooms. As cases slowed, NYU Langone also constructed a permanent two-story expansion with 14 beds, 10 treatment bays, four isolation rooms and a nurse's station.



Credit: NYU Langone



Credit: NYU Langone

# HOSPITAL SYSTEM: NYC HEALTH + HOSPITALS

NYC Health + Hospitals announced it would add 2,475 standard beds, 760 ICU beds and 2,500 healthcare workers. The agency has since then accomplished these goals, increasing standard bed capacity by 50 percent and ICU bed capacity 200 percent.

As a part of this plan, NYC Health + Hospitals with Skanska and others renovated 70,000 square feet of vacant space at North Central Bronx Hospital. The resulting \$65 million, 120-bed ICU unit can eventually be used for COVID patients needing long-term acute care. On unused parts of the Coler Hospital campus, NYC Health + Hospitals and the LiRo Group added a \$5 million, 350-bed temporary hospital. The Roosevelt Island Medical Center took three weeks to complete and saw its first 100 patients the last week of March. Meanwhile, at Coney Island Hospital, NYC Health + Hospitals with Turner Construction, NBBJ, Perkins Eastman and E-J Electric Installation Co. added nearly 200 beds, including some in a low acuity tent.



Credit: Miriam Quinones

## COVID-19 TIMELINE: APRIL

1

- NYC contracts with 20 hotels to provide 10,000 hospital beds, which are ultimately used as rooms for healthcare workers and recovering patients.
- After being constructed in three days, the Central Park temporary hospital with 68 beds sees its first patient.
- NYC playgrounds close.



2

The design of the Javits Center temporary hospital shifts from non-COVID patients to exclusively coronavirus patients.

6

NYC reaches the peak of confirmed daily cases with 6,374 cases, and nearly 100,000 in total.

7

NYC experiences the deadliest day of the pandemic with 590 fatalities, and over 5,750 in total.

8

- NYS extends unemployment benefits an extra 13 weeks and makes an additional \$600 payment to those who file unemployment.
- NYC landmarks, including One World Trade Center, LaGuardia Airport, Kosciuszko Bridge and Governor Mario M. Cuomo Bridge, are lit blue to honor healthcare workers.

14

New York City adjusts COVID-19 death toll reporting to include presumed or probable cases.

16

NYS begins sending supplies, including ventilators, to other states.

17

NYS mandates all residents wear masks in public spaces where social distancing is not possible.

## APRIL CONTINUED

20

- All summer events in June, including the Puerto Rican Day Parade, Celebrate Israel Parade and the Pride March, are canceled.
- Mayor de Blasio releases the Executive Budget plan with significant cuts.

22

NYS, in coordination with New Jersey and Connecticut, launches a contact tracing program.

25

Governor Cuomo announces independent pharmacies are granted testing privileges and extends the qualifications needed to get a test to essential workers, including healthcare workers, bus drivers and grocery store clerks.

26

The MTA completes L train tunnel repairs three months ahead of schedule.



27

NYC's number of cases exceeds 200,000.

28

Thunderbirds and Blue Angels fly over NYC to honor those working on the frontline.



30

USNS Comfort departs the city after treating less than 200 patients.

31

Mayor de Blasio identifies the Brooklyn Cruise Terminal, Aqueduct Racetrack, College of Staten Island and New York Expo Center as sites for 4,000 surge beds. The sites are ultimately unnecessary.

## ALTERNATIVE CARE SITE: BILLIE JEAN KING NATIONAL TENNIS CENTER

At the Indoor Training Center, NYC Department of Design and Construction (DDC) alongside a company specializing in disaster relief converted 12 courts into 453 standard beds and 22 ICU beds. Within a week, DDC laid down flooring, assembled “rooms” with pipes and drapes, installed respiratory equipment and oxygen pipes and set up a pharmacy and lab. The temporary hospital saw patients from April 4 to May 9 before being disassembled, sanitized and returned to original use.

Nearby, at the Louis Armstrong Stadium, suppliers for the US Open established a food commissary to package and distribute meals to patients, healthcare workers, school children and first responders. The commissary produced 150,000 meals per day and ended production on May 22.



*Credits: Bryan R Smith, AFP, Getty*

# COVID-19 TIMELINE:

## MAY

New York, Connecticut, New Jersey, Pennsylvania, Rhode Island and Delaware begin purchasing medical supplies together.



The MTA begins shutting down the subway overnight for cleaning.

NYC's deaths per day drops below 100.

The first five regions in NYS enter Phase 1 of reopening, including construction, manufacturing and wholesale supply chain and select retail for curbside pickup.

NYS allows some hospitals, including nine in NYC, to resume visitation hours under a pilot program.

NYS permits groups of up to 10 people to gather for non-essential purposes.

1

- Mayor de Blasio announces the first wave of Open Streets to be closed to vehicular traffic and opened to socially distanced recreation. The City commits to up to 100 miles of Open Streets.
- The Javits Center temporary hospital discharges its remaining patients. The facility is not fully disassembled in the case of a second wave of infections.

3

The Central Park temporary hospital closes after treating 190 patients.

5

6

Governor Cuomo says counties will be allowed to open as early as May 15th if they reach certain benchmarks related to hospitalizations and capacity for treatment, testing and contact tracing.

7

9

Mayor de Blasio creates the Construction and Real Estate Advisory Council to help guide the city's re-opening strategy.

11

15

17

- NYC reaches its 20,000 daily test goal one week early.
- The City announces a partnership with urgent care provider CityMD to create 123 diagnostic testing sites across the five boroughs.

20

22

Governor Cuomo announces the New York Forward Loan Fund, an economic recovery loan program aimed at supporting small businesses, nonprofits and small landlords as they reopen.

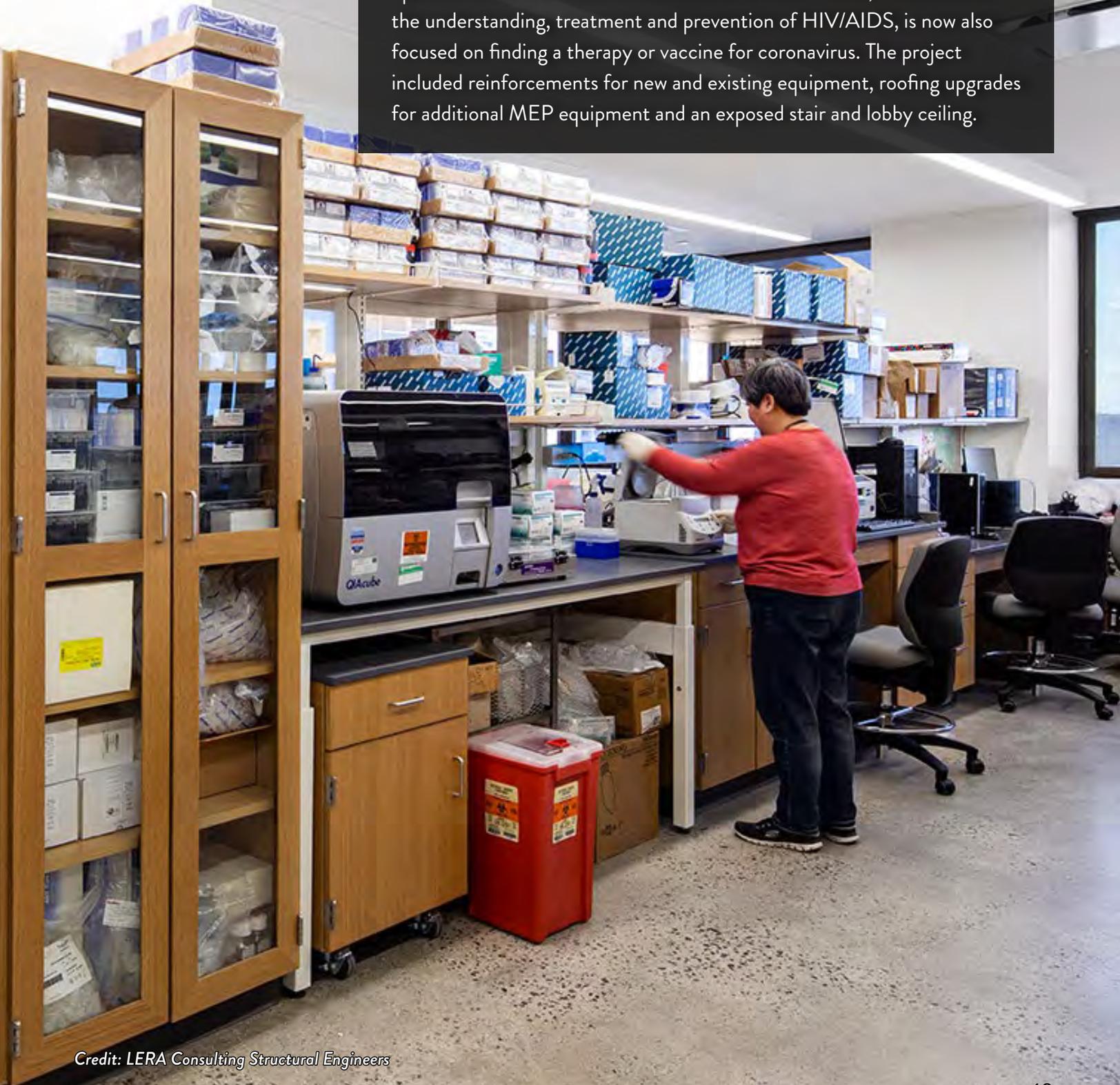
23

26

Governor Cuomo states plans to help restart the economy by investing in infrastructure, including fast-tracking Empire Station at Penn and the new LaGuardia Airport. He also emphasizes the need for federal funding to support critical projects like AirTrain LGA, Gateway Program and Second Avenue Subway.

# RESEARCH AND TESTING SITE: COLUMBIA UNIVERSITY MEDICAL CENTER

LERA Consulting Structural Engineers helped renovate the recently opened Aaron Diamond AIDS Research Center. The lab, dedicated to the understanding, treatment and prevention of HIV/AIDS, is now also focused on finding a therapy or vaccine for coronavirus. The project included reinforcements for new and existing equipment, roofing upgrades for additional MEP equipment and an exposed stair and lobby ceiling.



*Credit: LERA Consulting Structural Engineers*

# COVID-19 TIMELINE: JUNE

- NYC enters Phase 1 of reopening, which includes over 30,000 construction sites.



- Elective surgeries and ambulatory care are eligible to resume.
- The MTA begins regular subway and bus service and ridership increases by 17 and 13 percent respectively compared to the previous week.

NYS allows hospitals and group homes to accept visitors at their discretion.



2

NYC expands testing to all New Yorkers.



8

NYC's mobile testing program begins with two testing trucks placed in Queens and the Bronx. By July, plans are to have 10 trucks across the city.

9



16

22

NYC enters Phase 2 of reopening, which includes real estate and commercial building management.

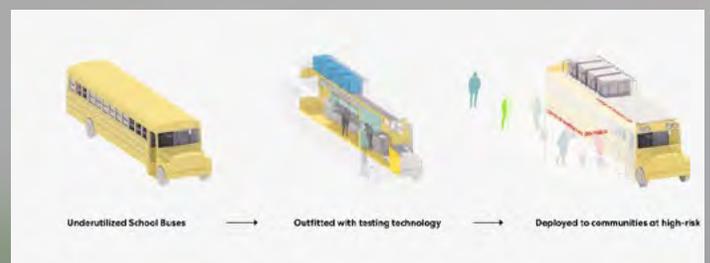
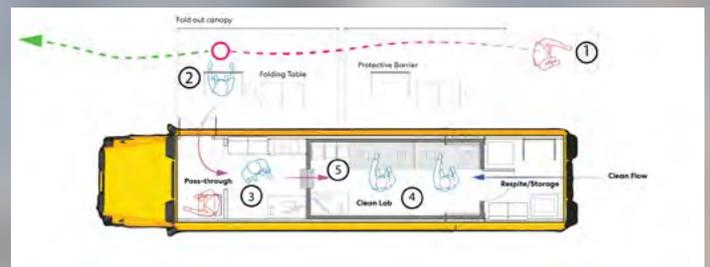


Credit: HOK

## RESEARCH AND TESTING SITE: MOBILE LAB

To complement testing done at static sites like hospitals and clinics, HOK, Perkins + Will and Arup have designed mobile testing labs, which can be fabricated and deployed quickly across campuses and in underserved communities. HOK, in collaboration with Germfree Laboratories, conceived a modular lab with one module dedicated to sample collection and another to testing. The two can be reconfigured depending on the available site. The current model is targeted towards large institutions such as universities and office parks, but a second concept is in the works for smaller groups.

Perkins + Will, Arup and Schmidt Hammer Lassen Architects have re-envisioned the standard yellow school bus as inexpensive and easily replicated labs for dense neighborhoods without adequate healthcare facilities. People will check in below a canopy attached to the vehicle, a technician will take a sample from behind plexiglass barrier and the lab within the bus shell will return the results within minutes. As more people return to work, and eventually school, this type of continuous testing with rapid results will be critical. Moreover, both designs favor accessibility, flexibility, speed and scalability.



Credit: Perkins + Will

# RESPONDING TO A CRISIS

In late February and early March, it was not known how the COVID-19 pandemic would unfold. On March 1, New York City had one confirmed case. By April 6, the city had nearly 100,000 total cases and over 5,000 deaths.<sup>1</sup> In this time, the healthcare and building industries prepared for worst-case scenarios and adapted to a rapidly changing situation. Directed by Governor Cuomo to increase capacity by 50 to 100 percent, hospitals acted with wartime speed and determination to increase the number of beds, supplies and trained workers. Hospitals were the first line of defense.

With patient volumes doubling on a daily basis and facilities expanding to keep pace, hospitals across the city deployed an all-hands-on-deck approach for both labor and materials. According to Jonathan Cogswell, Assistant Vice President, Facilities Services & Engineering at Northwell Health, “our team in Manhattan began rapidly ordering materials and turned a large auditorium space into an onsite warehouse, where everything from sheetrock to ductwork to filters could be sourced at a moment’s notice for any of our facilities.”

Over a weekend in early March, Lenox Hill prepared for the first flow of patients by creating a seclusion zone covering half of the emergency department. The entire department quickly became inundated with likely COVID patients. As elective surgeries were canceled and other non-essential functions of healthcare were shut down, Northwell began leveraging other facilities, including an ambulatory Post Anesthesia Care Unit (PACU) as another emergency department and the ambulance entrance as a triage room. With the flow of patients doubling and tripling on a daily basis, the capital team used a system-wide view to identify surge spaces and to consolidate non-COVID operations into a single facility.

Given the relentless pace of the pandemic, hospitals faced new challenges every few days. At the beginning of the pandemic, the emphasis was on building negative pressure rooms, where infected air is rerouted away from other patients and hospital staff. Then, the focus was on converting patient units

to provide ICU-level care with ventilators and other oxygen delivering machines. For Lenox Hill, patients’ consumption of oxygen increased 400 percent over a four-day period, requiring the hospital to install a backup system in case of failure. After ventilators were used more sparingly, the next immediate concern was installing the plumbing for dialysis machines for patients with declining kidney function.

“When the COVID-19 pandemic hit the New York area, oxygen became the only thing on my mind, worrying about everything from the capacity in our client’s bulk oxygen plant to how many ventilators our clients’ facilities could handle,” explained Adam C. Zuar, Associate at Jaros, Baum & Bolles (JB&B). “Perhaps the biggest challenge, though, was reacting to the rapid-fire changes clinicians were making regarding the type of oxygen equipment used to support a COVID patient. Understanding how each piece of equipment operates, and knowing how much oxygen the equipment utilizes proved to be critical in analyzing the medical gas infrastructure for a facility.”

Beyond these efforts, the healthcare and building industries were establishing alternative care sites to ease the pressure on hospitals, which were not designed to accommodate a surge of this unprecedented size. According to HKS Architects, spaces best suited for rapid deployment included vacant hospitals, post-acute care facilities, college dorms, hotel rooms, medical ships, sports arenas, convention centers and schools. The City and its health system ultimately announced a dozen surge facilities, which would add approximately 18,000 beds, almost doubling the city’s existing 23,000-bed capacity.

In less than two weeks, sites like the Javits Center, National Tennis Center, East Meadow in Central Park and Baker Athletics Complex at Columbia University transitioned from their original uses to providing services for approximately 1,500 patients. Meanwhile, due to stay-at-home orders and social distancing measures, other sites, including the Brooklyn Cruise Terminal, Aqueduct Racetrack, College of Staten Island, New York Expo Center, Van Cortland Park, various hotels, and college dormitories were called upon but never needed.



*Credit: Misha Friedman*

# SURGE BEDS IN NEW YORK CITY

The number of beds is based on publicly available sources and does not include the majority of efforts by private hospitals to expand capacity. *Sources: New York State Department of Health, New York City Health + Hospitals, Office of Governor Andrew Cuomo, Office of Mayor Bill de Blasio*



USNS Comfort entering New York Harbor



Jacob K. Javits Convention Center  
Credit: Major Patrick Cordova, NY National Guard



Billie Jean King National Tennis Center  
Credit: Ashley Marshall, USTA

# BEGINNING TO RECOVER

By May, the peak was over. Confirmed daily cases were in the hundreds, deaths per day in the tens and the percentage of people testing positive in the single digits. With the surge ended, healthcare facilities were able to prepare for a potential resurgence. The healthcare, life science and building industries are together developing a playbook for the future by analyzing their crisis response efforts, determining what worked and what did not work and planning appropriately.

At Turner Construction, this means virtually collaborating with healthcare institutions to understand their infrastructure needs and assembling an appropriate team of tradespeople, designers and vendors. The company is also increasing inventory levels and making its supply chain more resilient to ensure a project can be quickly mobilized. “It’s critical today more than ever, that we increase our ability to collaborate effectively with our design and trade partners,” said Rich Alvarez, Vice President & Construction Executive, Turner Construction. “By utilizing technology and our collective experience, we can work that much more effectively as a team.”

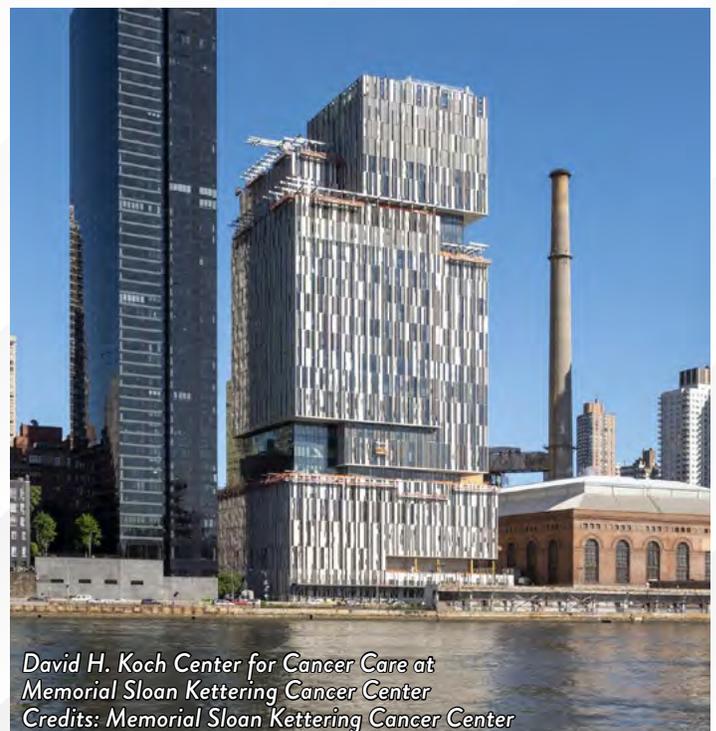
The recovery period is also exposing the economic impact of COVID suppression efforts. Health systems have been experiencing higher staffing, supply and construction costs, while losing critical revenue from postponed procedures. The Greater New York Hospital Association estimates the city’s academic medical centers lost between \$350 and \$450 million in April, more than what is earned in an entire year.<sup>2</sup> While it is still unclear to what extent the backlog of elective surgeries will lead to higher revenue later in the year, some patients may further postpone or even skip nonurgent care. Moreover, federal aid has largely been unaccounted for in preliminary financial analyses.

As of the end of June, New York City hospitals and healthcare providers on the frontlines have received \$3.2 billion from the federal Provider Relief Fund, accounting for nearly half of the state’s payments and over five percent of the country’s payments. When considering all COVID financial assistance, institutions in the city received \$4.2 billion from emergency appropriations in the Coronavirus Preparedness and Response Supplemental Appropriations Act; the Families First Coronavirus Response Act; the Coronavirus Aid, Relief, and Economic Security Act (CARES) Act; and the Paycheck Protection Program and Health Care Enhancement Act (PPP & HCE).<sup>3</sup>

Even with this infusion of funds, hospitals and health systems still have a long road to recovery. NewYork-Presbyterian’s (NYP) first quarter showed an operating loss of \$129 million, compared to a profit of \$29 million during the same period last year. In addition to expenses for personnel, PPE, transportation, housing and childcare, the 10-hospital system postponed procedures, transferred patients to make beds available for a surge, increased the total number of beds and created six field hospitals. Consequently, NYP spent \$250 million more than expected on operations and \$175 million on capital improvements.<sup>4</sup> Although NYP received \$567 million in April and May from the CARES Act, the funds will not be reflected until the second quarter.

Similarly, as of mid-May, NYC Health + Hospitals spent \$127 million on staff, \$36 million on infrastructure and equipment, \$41 million on PPE and \$9 million on testing. Its COVID-19 response included adding 4,000 nurses, 500 doctors and hundreds of other staff, as well as expanding ICU-bed capacity from 320 to 1,500 beds.<sup>5</sup>

The financial struggles of the region’s most financially stable private systems and the City’s public hospital system are a sign of the strain COVID-19 has placed on all hospitals in New York City. The crisis period is largely over, but healthcare institutions continue to need support as they ramp up testing, install preventative infrastructure and prepare for a potential resurgence. For NYC Health + Hospitals, this means significant expenditures in the near-term and more conservative spending in the future. The City allocated \$931.6 million for the agency’s fiscal year 2021 capital budget, a 400 percent increase from last year, and \$668 million for 2022-2024, half of the previous three-year budget.<sup>6</sup>



*David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center  
Credits: Memorial Sloan Kettering Cancer Center*

# ENVISIONING THE NEXT NORMAL

The lasting impact of COVID-19 on hospital design will likely lead to the construction of more beds with ICU capabilities and flexible patient capacity, such as larger medical gas connections, additional power and emergency power. Hospitals will also want to separate different populations. This may mean renovating medical bays into cubicles or cubicles into rooms. For projects in the design and construction phases, additional entrances and exits could help divert flow and isolate triage or surge areas. In the same vein, building management and mechanical systems will be designed to create negative pressure clinical areas and will exceed current standards for ventilation and air filtration.

Hospitals like Memorial Sloan Kettering Cancer Center (MSK) are already adapting to address the crisis. “MSK is moving forward in the COVID-19 era with a number of strict safety measures including enhanced and improved telemedicine capabilities, patient screenings, reduced density in facilities, staff health checks and testing, curbside check-in and virtual express check-out, and increased efforts to maintain a clean and safe environment,” said David Geller, Director, Design + Construction at Memorial Sloan Kettering Cancer Center and Co-Chair of the New York Building Congress Healthcare and Life Sciences Committee. “Cancer care is essential care and MSK is urging patients not to put off treatments or screenings as the long-term toll of missed diagnoses and delayed treatments could be devastating for patients and their loved ones across the region and the country.”

Within and outside of medical facilities, the design of research laboratories is also subject to change. Demand for life sciences space remained strong and even grew during the pandemic. As more people return to work, existing labs will need to install protective measures and future labs may be designed for more flexible uses. Design interventions include increased use of equipment and robotics, monitoring air flow and controlling sanitization to maintain sensitive environments.

On the ambulatory side, telehealth should see an increase in usage. In a 2019 survey by American Well, although the majority of the U.S. population was willing to use telehealth services, only eight percent had had a virtual visit.<sup>7</sup> During the pandemic, the number of healthcare providers and patients

who experienced telehealth services drastically increased as in-person services had to be replaced and insurance providers expanded coverage to telehealth visits. NYC Health + Hospitals reported over 120,000 virtual visits by mid-May. NYU Langone Health saw the number of non-urgent video doctor visits in March and April grow over 4,000 percent and Virtual Urgent Care visits increase by nearly 700 percent.<sup>8</sup>

Although this extreme rate of adoption will slow, the rise of telehealth will continue. The service has proven to be an indispensable tool for healthcare delivery, and the only question is at what point its growth rate will level off. To accommodate this shift, clinics may also see the conversion of exam rooms into multiuse spaces that combine a doctor’s office, exam room and telehealth room. A doctor may spend less time in an open office and instead work out of a single room.

Virtual communication may also be improved within hospitals, allowing medical staff, patients and loved ones to stay connected. In four New York City hospitals, a system for COVID-19 patients was installed on tablets so that patients could talk and share health updates with friends and family, and doctors and nurses could perform virtual rounds. The software helps preserve PPE and limits unnecessary exposure between patients and staff. It also provides virtual translation services, reducing the need for in-person translation and the stress associated with miscommunication.

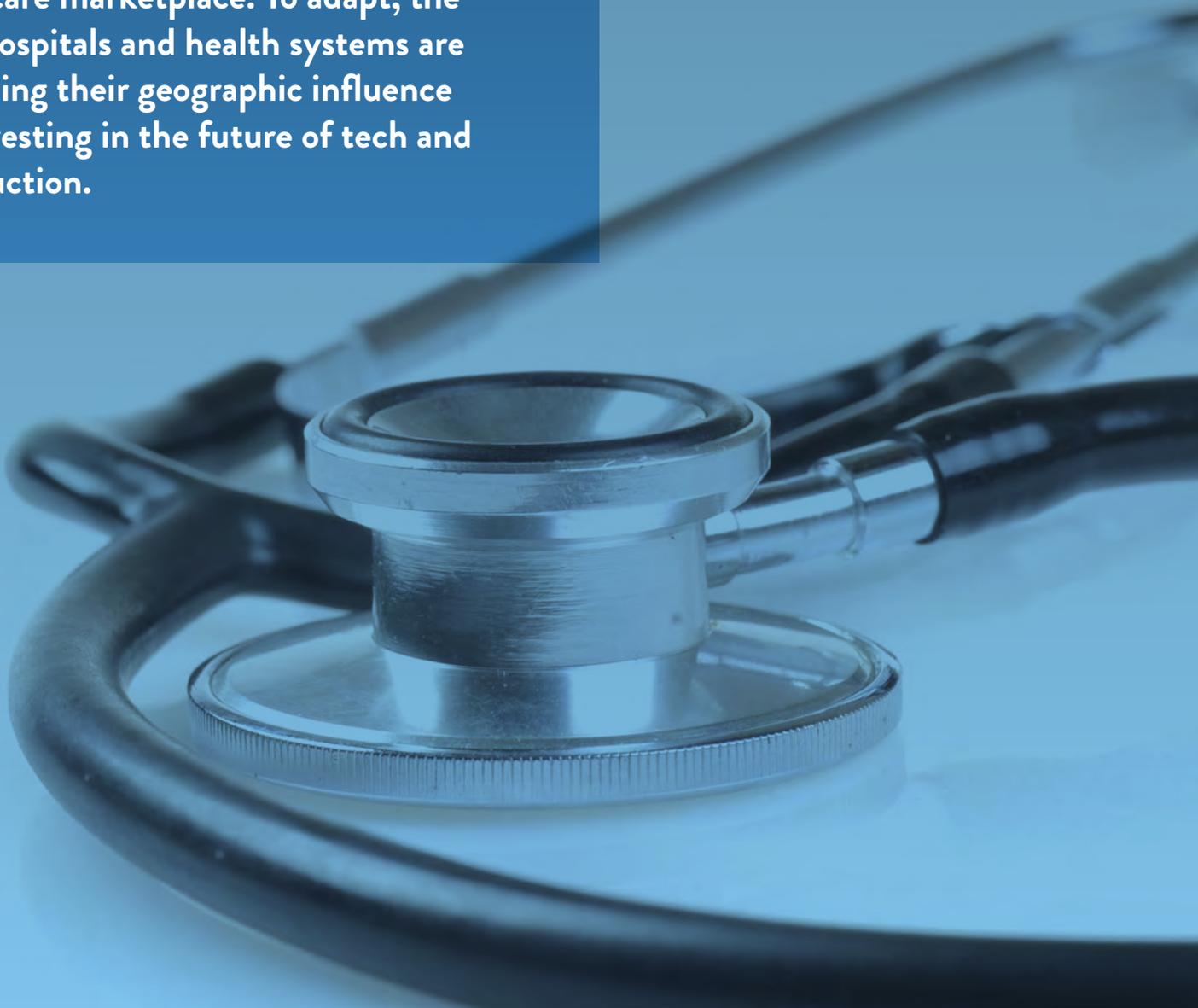
All these approaches and more will need to be incorporated into New York City’s healthcare universe in order to adapt and address future crises. According to Bryan Langlands, AIA, FACHA, EDAC, LEED GA, Principal, NBBJ, “It’s critical to talk about a networked approach to resiliency, as the strength of our institutions lies in the collective, especially in protection from future possibilities. As they say, a rising tide lifts all boats.”

Over the following weeks and months, there will be continued innovation in the delivery of healthcare. Underlying these interventions are the key themes of resiliency, flexibility and scalability. While no one could have predicted the shock COVID-19 has had on society, the healthcare, life science and building industries are navigating the aftermath and adapting for the future.

In particular, the city’s hospitals, as the first line of defense against COVID-19, are learning how to better manage a sudden surge in patient volume and perform in-person and virtual care during a health crisis. Not every shift in how healthcare facilities are constructed or how technology is used will be adopted permanently, but this moment of experimentation will set the stage for the next normal.

# HEALTHCARE

A critical source of health and wellness for all New Yorkers, the healthcare industry has a large physical and economic presence. It encompasses over a thousand ambulatory healthcare centers, hospitals and residential care facilities that provide over half a million jobs and countless services for residents and visiting patients. As such a vital component of the city, the industry must remain flexible and responsive to a competitive and changing healthcare marketplace. To adapt, the city's hospitals and health systems are expanding their geographic influence and investing in the future of tech and construction.



# LEADING THE WAY

Healthcare is one of New York's premier industries and plays an indispensable role in communities and in the economy. Annually, the city's hospitals and health systems provide care for 24 million outpatients, over one million people admitted to hospitals and over four million people treated in emergency rooms.<sup>9</sup> The healthcare industry contributes \$57 billion to a Gross City Product of \$993 billion, with more than 40 general medical hospitals generating nearly half the total output for all healthcare spending.<sup>10</sup> In its entirety, the healthcare industry includes over 1,265 facilities with a total market value of \$18.8 billion.<sup>11</sup>

In 2018, the private healthcare industry employed 557,700 workers who earned \$32.7 billion in wages, making it the city's largest private employer - comparable in size to all government employment and nearly double that of financial services or private education employment.<sup>12</sup> New York City's healthcare industry has consistently shown strong job growth. Healthcare is the only employment sector in New York City to add jobs every year since 1990. The industry accounted for 18 percent of job gains between 2009 and 2018 and added the most jobs of any sector in 2018.<sup>13</sup>

One example of the magnitude of New York's healthcare industry is Northwell Health, the state's largest healthcare provider and private employer. The health system sees more than two million patients a year and has over 70,000 employees, including over 24,500 residing in New York City.

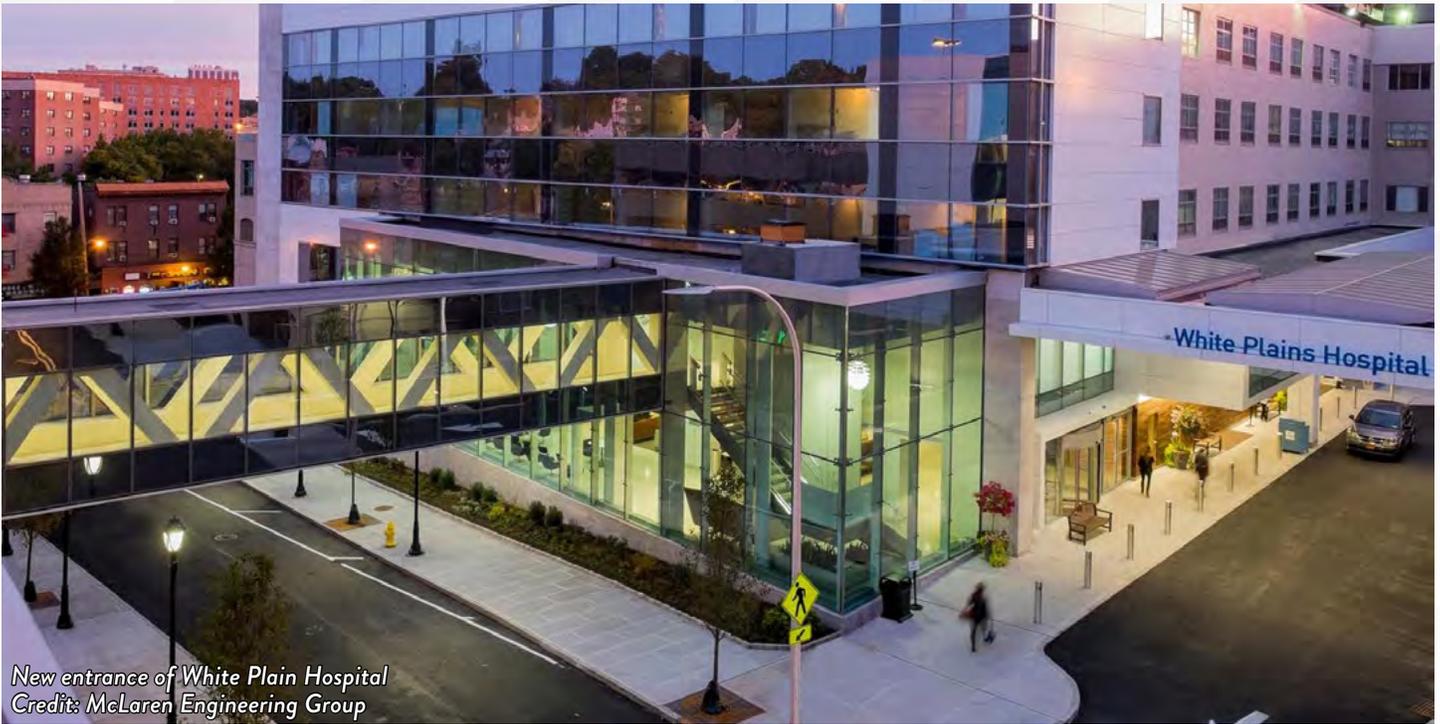
Among its 23 hospitals, Lenox Hill Hospital on the Upper East Side stands out as one of the top five hospitals in the state and one of the top 50 hospitals in the nation for six specialty practices. To remain a leader in clinical care, the institution has begun planning and outreach for a new, \$2 billion hospital with all private patient rooms, expanded operating rooms and emergency department and a dedicated "mother-baby" hospital.

In New York, "It is vital that we create hospitals that are built to house exciting medical innovations and meet modern healthcare standards," said Joshua Strugatz, Vice President of Manhattan Redevelopment at Northwell Health. "To achieve today's healthcare programmatic needs, hospitals need single-bedded patient rooms, which give greater privacy to patients and their families, reduce the risk of infections and improve staff workflow. In addition, hospitals need properly sized operating rooms, clinical spaces and emergency departments that can accommodate new and emerging technologies and equipment. By designing future-focused hospitals, we can improve the care and patient experience we deliver for generations to come."

The city's healthcare landscape is further strengthened by its more than 10 academic medical centers, including Columbia University Irving Medical Center (CUIMC), the largest medical research enterprise in New York City and one of the largest medical practices in the Northeast. CUIMC has four professional schools and two major teaching hospital affiliates. In the past three years, the university opened a new 16,000-square-foot Center for Precision Dental Medicine and 68,000-square-foot School of Nursing. It also has several active renovation projects to continue improving its facilities and services.



Single-bed patient room at the NYU Langone Helen L. and Martin S. Kimmel Pavilion  
Credit: Jeff Goldberg/Esto



New entrance of White Plain Hospital  
Credit: McLaren Engineering Group

On the other side of Manhattan, New York University (NYU) Langone Health is one of the nation's premier academic medical centers, ranking in the top 10 for overall hospitals and for five specialty practices. The institution has also received top awards for patient safety and quality of care. With six inpatient centers and outpatient locations throughout the New York metropolitan region and Florida, NYU Langone has focused on transforming its main campus and beyond. In 2018, it opened the new, \$1.4 billion, 830,000-square-foot Helen L. and Martin S. Kimmel Pavilion, which offers over 370 single-bedded rooms and houses the 160,000 square foot Hassenfeld Children's Hospital with nearly 70 single-bedded rooms.

According to Vicki Match Suna, AIA, Executive Vice President and Vice Dean for Real Estate Development and Facilities (RED+F) at NYU Langone Health, "Our researchers now have state-of-the-art laboratories and technologies at their disposal, in facilities that encourage new levels of collaboration and put us at the forefront of discovery. Our students and faculty benefit from modern educational spaces outfitted with the latest technological capabilities to advance learning. And most importantly, our clinical facilities, including the new Kimmel Pavilion and Hassenfeld Children's Hospital, and expanding ambulatory portfolio, enable us to deliver care at an unprecedented level, along with superb amenities that enhance the patient experience."

Beyond New York's world-class private medical centers, including three of the top 15 hospitals in the nation,<sup>14</sup> the city is home to the country's largest municipal healthcare system. NYC Health + Hospitals provides services for more than one million New Yorkers annually. It oversees over 70 facilities

including 11 hospitals and five long-term care facilities. NYC Health + Hospitals employs over 36,500 people<sup>15</sup> who earned \$2.8 billion in wages in 2018.<sup>16</sup> Over the next four years, Health + Hospitals has also committed \$3.2 billion in capital spending, with \$1.1 billion expected in 2020 alone.<sup>17</sup>

In the midst of this tremendous growth, New York City's healthcare industry is responding to rapid changes in healthcare delivery. Traditionally, healthcare has centered around hospitals, reactive care and blockbuster drugs, but today's model is focused on patients, preventative care and genomic diagnostics. As technology becomes an increasing part of daily life, hospitals and health systems are making capital investments to allow physicians and patients to better monitor and manage care at home, on the go and on site.

## EXPANDING INFLUENCE

Although some aspects of healthcare delivery can be digitized, the industry is still largely location based. Therefore, to make healthcare more accessible, flagship institutions are expanding beyond the Manhattan core – establishing satellite facilities, increasing ambulatory care and locating in mixed-use developments. In some cases, hospitals are expanding services by constructing state-of-the-art facilities, and in others, they are consolidating into broad-based healthcare systems invested in small private practices and local healthcare centers. In both instances, the secondary facilities have access

to the staff and resources necessary to provide top care to patients, who no longer have to travel as far for follow-up services, general care and some specialty treatment.

New York's healthcare industry, as a result, is now more easily viewed through a citywide and even tri-state lens. For example, in the past several years, MSK has acquired what is now MSK Ralph Lauren Center in East Harlem and opened five new locations – MSK Westchester, MSK Monmouth, MSK Bergen, MSK Nassau, and the David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center on the Upper East Side. By focusing on locations that patients from across the region can easily access, MSK now has 18 New York City locations and seven across Long Island, New Jersey and Westchester.

The Bronx-based Montefiore Health System has also bolstered its presence through a multi-phase modernization, beginning construction last year on a White Plains Hospital expansion, expected to open in 2021. “McLaren Engineering Group has been providing ongoing engineering and survey services to help transform the 32-acre campus into an accessible, state-of-the-art healing environment centered on the patient-experience,” said Jeremy D. Billig, P.E., President of the McLaren Engineering Group. “Major reconstruction components have included construction of a new lobby along with additions to the main hospital, two glass-enclosed pedestrian bridges, along with surface and streetscape improvements around the perimeter of the campus. Most recently, our team completed utility relocation for the soon-to-be 9-story medical office building and will continue additional services as White Plains Hospital ramps up its \$272 million expansion efforts to create a modern, patient-centered hub for advanced care in the region.”

At the neighborhood level, healthcare providers are making it even more convenient to access care with locations in retail centers and near transit hubs. In 2017, Mount Sinai opened a new Union Square Urgent Care Center that allows patients to receive acute care services without an emergency room visit or a hospital stay. Meanwhile, in Downtown Brooklyn, NYU's College of Dentistry has begun construction on a new dental care facility in City Point, a mixed-use residential complex. The practice is expected to open in 2020 and see 20,000 to 25,000 patients a year, supplementing its main facility in Kips Bay.

Additionally, health systems are positioning new locations in medically underserved communities. EmblemHealth's East New York Health Hub offers 160,000 square feet of outpatient medical services and is strategically located near Broadway Junction. The facility is expected to receive over 100,000 patient visits annually. NYU Langone also opened a new location of the Perlmutter Cancer Center in

Sunset Park that enables patients to receive both radiation and chemotherapy in one 22,000-square-foot location. Previously, patients had to travel to two separate facilities.

Beyond physical expansions, healthcare providers are improving the patient experience through enhanced digital accessibility. They now offer mobile platforms for people to manage their personal health on demand by scheduling appointments, preregistering for hospital stays, storing health records, and interacting with healthcare professionals through messaging or videos. On the physician's side, artificial intelligence (AI) and robotic process automation have reduced time spent on manually recording information and increased doctor-patient face time.

The new locations and technologies are facilitating, as Christopher Prochner, Partner at Jaros, Baum & Bolles (JB&B) and Co-Chair of the New York Building Congress Healthcare and Life Sciences Committee said, “a shift towards ‘the greater good,’ making the exciting developments in healthcare accessible to the general public. Community outreach facilities and ambulatory care centers are making top-notch care available, while also keeping costs down. Now as medical technologies and treatment options continue to improve, we are able to bring them to more and more people.”

The NewYork-Presbyterian David H. Koch Center exemplifies how ambulatory care services can be reimaged around the patient experience, operational efficiency and seamless integration of technology. The \$1.1 billion, 734,000-square-foot structure is located at the NewYork-Presbyterian/Weill Cornell Medical Center campus and opened in 2018. Before patients even enter the building, they fill out paperwork remotely on the NYP app, which is later used to access discharge instructions, test results and video calls for follow-up appointments. At the center, they receive a smart band with real time updates for their visit and directions to their private preparation/recovery room. On the operational side, procedural floors follow a template design to make it easier for clinicians to navigate and also include small staff stations located directly outside patient rooms.

# BUILDING FOR THE FUTURE

Complementing the evolving nature of healthcare delivery, the building industry is applying innovative practices to healthcare construction to ensure quality care.

In New York, building innovation starts with a collaborative approach to project delivery. “Despite all the different names and approaches to developing a successful project, the approach that has proven most effective is a collaborative effort of the project team,” says Joseph C. Chin, Senior Vice President at LF Driscoll Healthcare and Co-Chair of the New York Building Congress Healthcare and Life Sciences Committee. “This is a unified effort of the client, the consultants, the architect, the engineers and the construction manager, working together to bring in a successful project. The IPD process is difficult to execute in a legal contract in the New York environment. The traditional Design/Bid/Build takes time and leaves gaps that ultimately turns into added costs.” This collaborative approach with the engagement of the entire team from the start through pre-construction and into construction documents, delivers a more cost-controlled and schedule-driven approach to the design.

Innovation also comes in other forms; increasingly, modular construction is used to shorten build time, reduce construction costs and minimize disruption to active hospital operations. “While a project’s superstructure is being erected, the mechanical space, building envelope and standardized elements, such as patient rooms, operating suites and bathrooms, can be simultaneously built offsite,” explains Craig Miller, Healthcare Practice Leader at Jacobs. “Significant cost saving advantages are realized due to the increased productivity, reduced material waste and lower safety risks. Overall quality also improves since fabrication is typically performed indoors at climate-controlled facilities along with well-organized production lines, areas, and supply chain.”

“Modular construction has been making a mark in healthcare, proving to be an effective method of both shortening construction schedules without compromising quality and reducing costs,” says Michael Giaramita, CEO of Group PMX LLC. “Prefabrication off-site also helps minimize disruption



Top two frames:  
EmblemHealth's Health Hub in East New York  
Credit: Array Architects

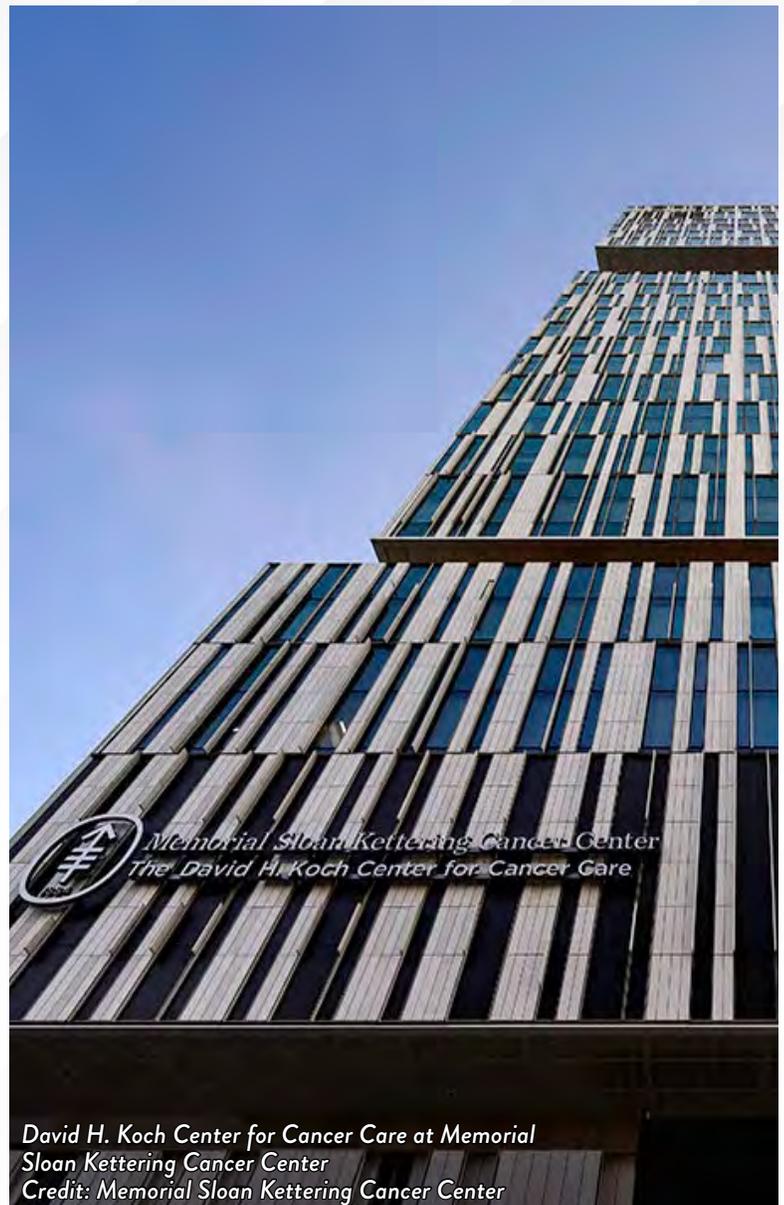
Third Frame:  
NYU Langone's Perlmutter Cancer Center in Sunset Park  
Credit: Array Architects

to active hospital operations and construction impacts on patients, key benefits as hospitals place even greater focus on improving the patient experience. Group PMX has successfully used modular construction on various healthcare projects, including a 2,800 GSF trauma center and 2,500 GSF mechanical equipment room, and found that, for the right spaces, it can produce better project performance outcomes – something both healthcare providers and our industry seek to achieve.”

Nevertheless, New York City’s building industry is limited in the use of modular construction because of licensing and jurisdictional issues. Multiple municipal agencies, such as the Department of Buildings and the Department of Transportation, must approve the movement of prefabricated units on city streets. Construction sites must also have enough space to stage the modules before placing them on the superstructure. Under the right circumstances, modular construction should be explored and used to improve project performance outcomes, benefitting both the building and healthcare industries.

The two industries are also collaborating on how to prepare new and existing healthcare facilities for an uncertain climate future. In terms of resiliency, healthcare institutions have the responsibility of maintaining services under extreme conditions, and therefore, must have adequate flood protection and storm mitigation measures. “Resiliency remains a vital part of healthcare facilities priorities and planning,” according to Douglas P. Gonzalez P.E., Associate Partner at LERA Consulting Structural Engineers, who have helped a number of institutions accomplish flood protection and develop robust storm mitigation preparations. “The next natural incident will inform a resiliency 2.0 of sorts, by informing the effectiveness of current systems throughout the industry and country.” This “Resiliency 2.0” requires a fundamental shift towards building with the impact of climate change and severe weather events in mind.

Moreover, as New York City has moved to the forefront with its efforts to reduce the environmental impact of energy consumption in dense urban environments, the healthcare industry is challenged to achieve carbon neutrality without compromising critical care and sensitive environments. With current design strategies and existing operating procedures already in place to reduce carbon emissions, healthcare providers and building professionals need creative solutions to further reduce energy consumption and recover waste energy.



The recently opened David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center sets a strong precedent for how resiliency and sustainability can be integrated into healthcare facilities. Located adjacent to the East River, the \$1.5 billion, 750,000-square-foot facility is designed to reduce energy consumption and withstand a 500-year flood event. There are automatic flood barriers at the property line, microturbines on the rooftop, mechanical spaces on higher floors, a waterproofed generator in the basement and a water runoff system that uses rainwater in cooling systems.

# CONSTRUCTION REVIEW AND OUTLOOK

From 2016 to 2019, New York City spent over \$6.8 billion on healthcare construction with over half going to the renovation and new construction of Manhattan hospitals. Except for Staten Island, spending in the boroughs outside of Manhattan was primarily focused on clinics, medical offices and nursing centers.

Between 2020 and 2023, the New York Building Congress forecasts total spending to increase by 38 percent, exceeding \$9.4 billion. Capital expenditures are expected to increase in every borough, except for Staten Island, where there are fewer projects in the pipeline. While Manhattan is anticipated to lead in total growth, Brooklyn and the Bronx are expected to have the greatest relative growth, more than doubling their healthcare construction spending.

Although construction spending is subject to a myriad of factors, the Building Congress anticipates spending will increase as hospitals and healthcare providers adapt to the next normal and prepare for a potential resurgence of COVID-19. Exact investment levels through 2023 will vary depending on the distribution of additional federal aid, the strength of the local and regional economy, the financial outlook of individual healthcare institutions and the development of COVID-19 transmission rates.

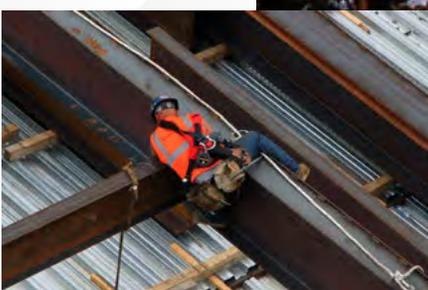
In the first half of 2020, existing facilities were quickly renovated to handle an influx of infected patients, and surge sites were deployed to help ease pressure on hospitals. In the following months, healthcare projects already in the pipeline will be built, and new ones focused on pandemic preparedness will form.

Notably, the Lenox Hill Hospital expansion accounts for \$2 billion of future spending, although it is unclear when the project will break ground and those investments will be made. Also, in Manhattan, Mount Sinai will continue work on its \$1 billion Downtown plan. Work has already begun on the institution's \$140 million Mount Sinai Comprehensive Behavioral Health Center. Additionally, the Hospital for Special Surgery plans to begin work on a \$300 million River Building that will house doctors' offices and patient rooms above the FDR Drive.

Meanwhile, in Brooklyn, NYC Health + Hospitals is undergoing a \$922 million renovation of its Coney Island Hospital campus to replace and repair buildings damaged during Superstorm Sandy. It hopes to complete the first building – a new, 11-story, storm-resistant hospital – by 2022 and the campus upgrades by 2023.



*Rendering of new NYC Health + Hospitals/Coney Island building  
Credit: NYC Health + Hospitals*

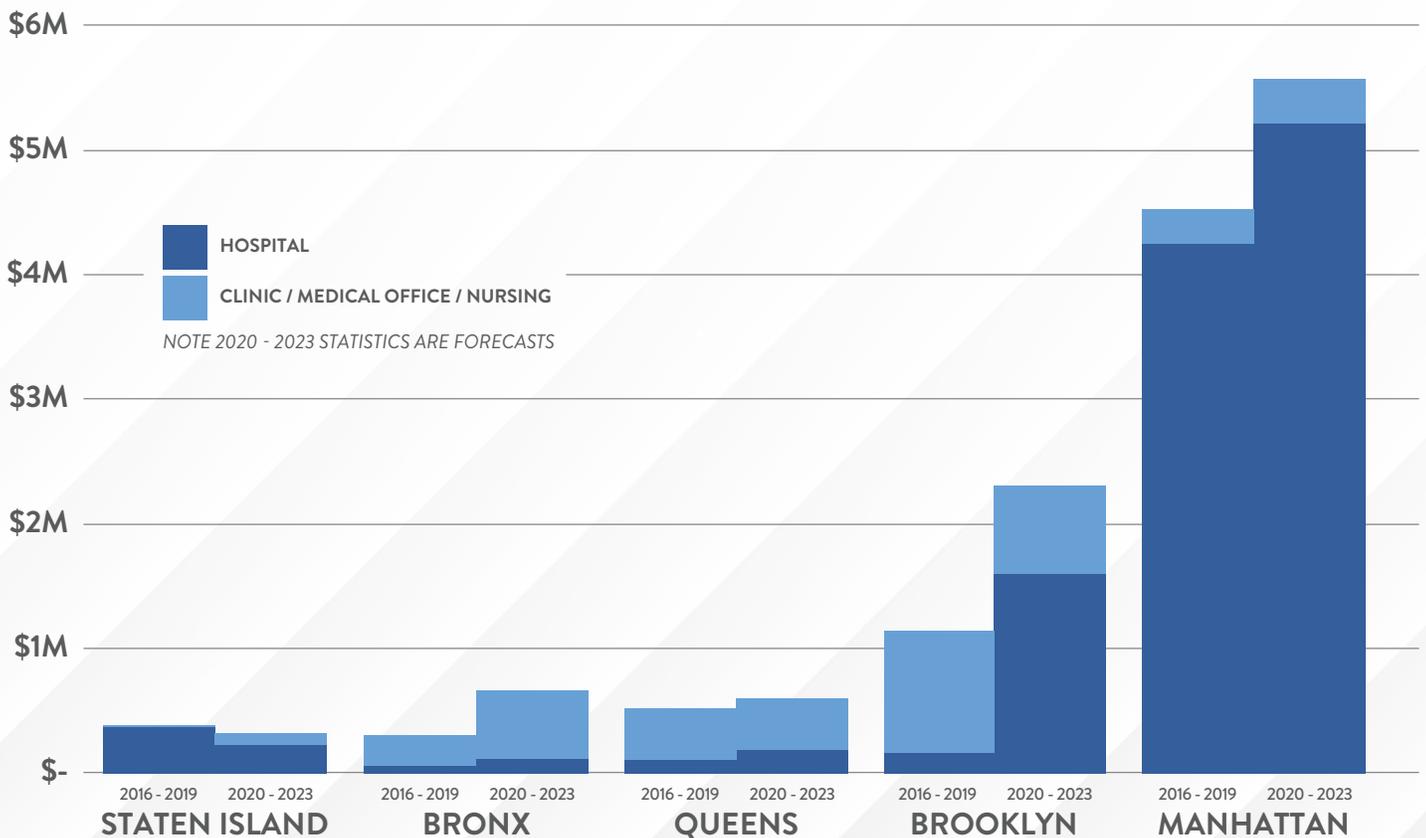


Above: Rendering of new NYC Health + Hospitals/Coney Island building  
Credit: NYC Health + Hospitals  
Left: Progress photos of the facility  
Credit: Holly Koffler, Turner Construction and McKissack and McKissack

# NEW YORK CITY CONSTRUCTION SPENDING & FORECAST

## New York City Construction Spending & Forecast

	2016-2019			2020-2023 Forecast			
	Hospital	Clinic / Medical Office / Nursing	All Healthcare	Hospital	Clinic/ Medical Office/Nursing	All Healthcare	
Bronx	\$ 63,800,000	\$ 236,500,000	\$ 300,300,000	\$ 129,500,000	\$ 533,000,000	\$ 662,500,000	
Brooklyn	\$ 182,000,000	\$ 956,000,000	\$ 1,138,000,000	\$ 1,597,600,000	\$ 708,100,000	\$ 2,305,700,000	
Manhattan	\$ 4,248,800,000	\$ 276,300,000	\$ 4,525,100,000	\$ 5,220,200,000	\$ 349,200,000	\$ 5,569,400,000	
Queens	\$ 115,700,000	\$ 398,500,000	\$ 514,200,000	\$ 207,400,000	\$ 383,300,000	\$ 590,700,000	
Staten Island	\$ 364,600,000	\$ 11,400,000	\$ 376,000,000	\$ 251,800,000	\$ 59,200,000	\$ 311,000,000	
<b>Total</b>	<b>\$ 4,974,900,000</b>	<b>\$ 1,878,700,000</b>	<b>\$ 6,853,600,000</b>	<b>\$ 7,406,500,000</b>	<b>\$ 2,032,800,000</b>	<b>\$ 9,439,300,000</b>	
<b>Average Spending Per Year</b>			<b>\$ 1,713,400,000</b>	<b>Average Spending Per Year</b>			<b>\$ 2,359,825,000</b>



Sources: Dodge Data & Analytics, Urbanomics, New York Building Congress Survey



*Rendering of the Hospital for Special Surgery's River Building*  
Credit: EwingCole

# LIFE SCIENCES

The life sciences are a collection of industry segments that create a continuum beginning with basic research on human disease and ending in the delivery of services connected to human health.

The chain begins with the scientific research and discovery conducted by the federal government, academic institutions and independent research institutes. This research is translated into products and services by the biotechnology, medical device, pharmaceutical and bioinformatics industries. These products and services are, in turn, distributed and sold by the pharmaceutical companies, tested and delivered to patients by the clinical teaching hospitals and community healthcare networks and financed and reimbursed by the health care insurance companies. All these industry segments are interrelated by a common commitment to improving human health, each with their own unique requirements for the built environment.



# SETTING THE STAGE

New York City, as a center of research and medicine, has long been primed to excel in the life sciences, but it has taken a strong push by the public sector for the industry to come to the forefront. At the heart of the northeast corridor, New York City is home to the nation's largest concentration of academic institutions, academic medical centers, including Columbia University Medical Center, NYU Langone, and Weil Cornell Medical, and clinical teaching hospitals such as Memorial Sloan Kettering Cancer Center, NewYork-Presbyterian Hospital, and Lenox Hill Hospital/Northwell Health.

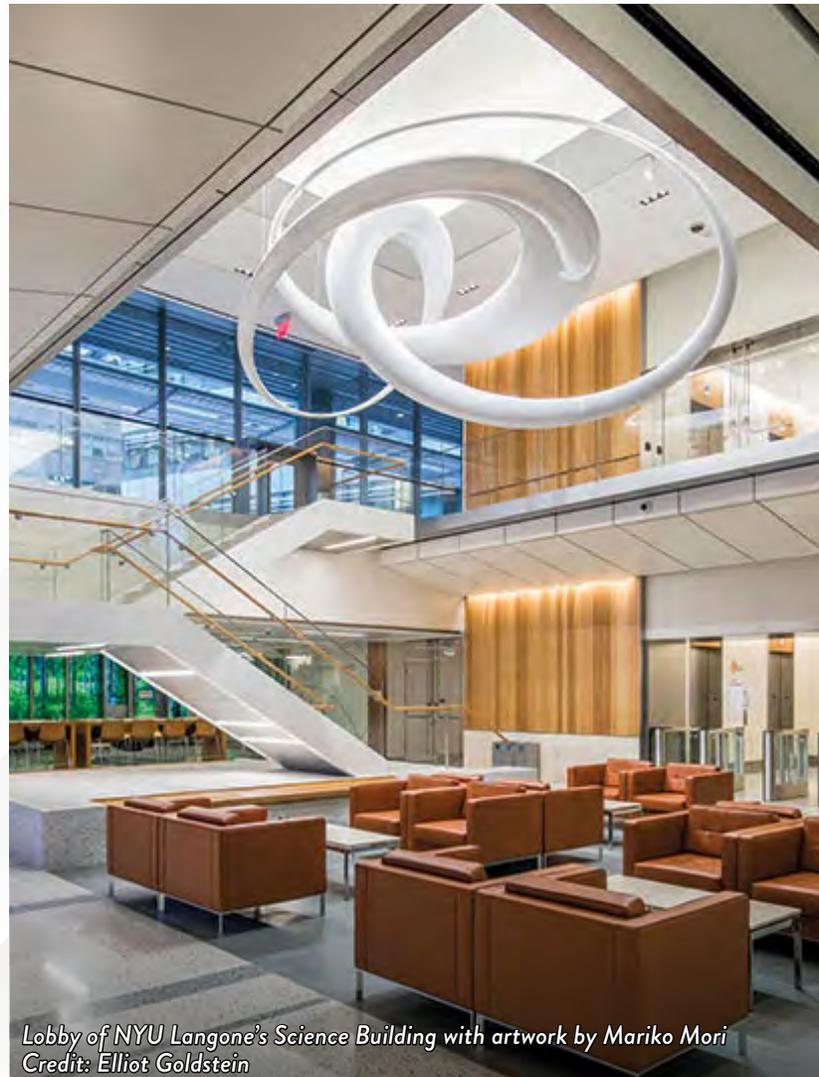
In 2019, these institutions, along with others in the city, received approximately \$2.2 billion from the National Institutes of Health (NIH), second only to Boston-Cambridge and accounting for seven percent of all NIH funding. During the past decade, New York's NIH funding increased by 62 percent, the fastest growth of the top 10 life science markets and well above Boston-Cambridge's 23 percent increase.<sup>18</sup> This public funding primarily goes to research projects, training programs, and research and development contracts. Nevertheless, depending on a specific grant's stipulations, recipients can use the funds for new construction, modernization and major alterations and repairs.<sup>19</sup>

Facilities like NYU Langone's new, state-of-the-art Science Building are part of the institutional ecosystem that helps support nearly 7,800 graduate students and postdoctoral researchers working in biomedical engineering, biochemistry, biophysics and chemistry in New York City.<sup>20</sup> The 365,000-square-foot building houses 800 researchers and staff and includes wet lab space, core facilities and a vivarium, and features communal spaces and shared equipment that provide opportunities for collaborations.

New York City's employment in life sciences has grown from under 9,000 jobs at the beginning of the century to over 14,000 jobs in 2018. Moreover, since 2010, the life sciences sector grew by 3.6 percent annually compared to the city's overall private job growth of 2.7 percent.<sup>21</sup> This fast-growing workforce is predominately composed of those in research and development, medical and diagnostic laboratories and medical equipment and supplies manufacturing. Making up 90 percent of life science jobs, these subsectors all require the use of office and lab space.<sup>22</sup>



*Typical lab space in NYU Langone's Science Building  
Credit: Aislinn Weide/Ennead Architects*



*Lobby of NYU Langone's Science Building with artwork by Mariko Mori  
Credit: Elliot Goldstein*

# GAINING MOMENTUM

Historically, New York's life science sector has been constrained by the limited availability of institutional office and lab space, but since 2016, public and private support have rapidly increased the supply of potential life science space. In 2016, the New York City Economic Development Corporation (NYCEDC) introduced a \$500 million, 10-year life science initiative called LifeSci NYC, which included a \$100 million investment in the creation of a new Applied Life Sciences Hub. The NIH also selected the New York Genome Center to create a Center for Common Disease Genomics, and the Tri-Institutional Therapeutic Discovery Institute launched the drug discovery company Bridge Medicines. The following year, the State of New York launched its own \$620 million life science initiative to grow the state's research cluster and expand its ability to commercialize this research.

Prior to these actions, there was more limited involvement by City and State programs targeted towards life science

companies and individual projects. In 1992, Columbia University with the help of New York City and New York State opened the city's first biotech incubator, the Audubon Center. Seven years later, NYCEDC and NYC Health + Hospitals selected Alexandria Real Estate Equities to develop and operate a three-tower life science campus along the East River, resulting in the Alexandria Center for Life Science. Alexandria completed construction of the first two towers in 2010 and 2013, which are now fully occupied. The third building, called the North Tower, is starting construction this year and is expected to be completed by 2022. Once finished, the entire campus will provide 1.3 million-square-foot of first-class office and laboratory space.

In 2011, NYCEDC and New York State supported the launch of the New York Genome Center, a collaboration between 11 academic institutions. In 2013, NYCEDC also helped launch Harlem BioSpace, a biotech incubator founded by a Columbia professor with space for 20 companies, and Empire State Development began funding the SUNY Downstate Biotech Incubator in South Brooklyn with space for 20 to 30 tenants. Since 2016, increased public funding helped launch three additional incubators – Alexandria LaunchLabs, BioLabs@ NYULangone and Johnson & Johnson's JLABS. The first two opened with the help of LifeSci NYC and the third with the



*Alexandria Center for Life Science  
Credit: Evan Joseph*

help of New York State's Life Science Initiative. These five incubators are now poised to graduate nearly 100 companies that will then require step-out space.<sup>23</sup>

At the same time, venture capital in New York's life sciences is critical to translating research and discovery into established companies. As a whole, New York is well behind comparable states when attracting venture investment relative to public research funding. In 2014, for every \$1 of NIH funding, New York's life science industry only raised \$.03 in venture capital funding, while California earned \$1.30 and Massachusetts \$.75. Four years later, New York's ratio increased to \$.30 as California's reached \$2.12 and Massachusetts' \$2.19.<sup>24</sup>

Boosting the state's overall ratio, venture capital in New York City's life sciences increased by 800 percent in that same period, skyrocketing from \$74 million in 2014 to \$672 million in 2018. In 2015, NYCEDC established the NYC Early-Stage Life Sciences Funding Initiative with venture capitalists to deploy at least \$120 million over the following years. Versant Ventures, a leading healthcare and life sciences investment firm, also established a New York City office. While this dramatic growth bodes well for the industry, New York must continue growing its share of private investment.

Venture capital allows early-stage companies to move out of academic medical centers and incubators into larger, private commercial spaces. It is ever more important as programs help startups grow, such as Mount Sinai's i3 Asset Accelerator focused on commercializing discoveries made in the health system and IndieBio's upcoming accelerator with space for 30 businesses each year. With adequate funding, small companies can hire more employees, make capital investments, support new construction and ultimately contribute more to the local economy.

According to George Leventis, P.E., Managing Principal in Langan's New York City office and Managing Director of Langan International, "Langan views the Life Science market as poised for rapid growth in the region and is proud to be working on the city's premier Life Science projects with our clients King Street Properties, Deerfield Management, Taconic Investment Partners, and the NYCEDC."



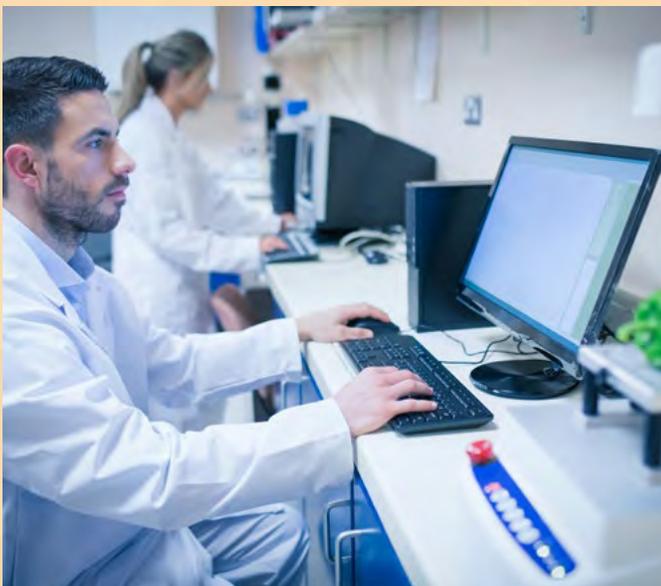
Lab space at BioLabs@NYULangone  
Credit: NYU Langone

## Wet vs. Dry Labs

The issue of space is particularly challenging as life science production requires a variety of facilities, ranging from traditional offices to more complex and costly wet labs:



**Wet Labs:** Where chemicals, drugs and other biological matter can be tested and analyzed. These labs must be designed with proper plumbing, ventilation, chemical storage and waste disposal in mind, which in turn leads to building specifications such as higher slab-to-slab heights, advanced air handling equipment and robust electrical infrastructure. Wet labs will have fume hoods, biological safety cabinets, benches, refrigerators and freezers, safety showers, dark rooms and other specialized equipment.



**Dry Labs:** Focused on computational work, fitted out with electronic equipment used in analyzing and evaluation of bio-data; normally designed with HVAC controls to support cooling and humidity levels.

# SUSTAINING GROWTH

As more life science companies vie for New York real estate, the already constrained market must continue expanding. Historically, the City has restricted lab uses such as chemical compounding and packaging, the creation of pharmaceutical products and medical appliances, laboratories and research, experimental and testing facilities to manufacturing districts (M Zone) on the outer edges of the city. Although the City granted some variances for areas near academical medical institutions such as NYU and Columbia, companies were largely discouraged from moving to more attractive business districts. Therefore, to expand the life sciences, the City issued a memo in 2016 permitting lab use in certain commercial districts (C2, C4, C5, C6, C8 Zones).

Given the requirements for wet-lab space, including additional electricity, back-up generation, plumbing and venting, as well as loading areas, it can cost \$450 per square foot to upgrade and deliver a pre-built lab from raw space. As a comparison, traditional office space can be delivered for around \$125 per foot. Even if the base building already has extra electricity, plumbing and venting installed, it could still cost \$250 to \$300 per foot to create lab-specific spaces. For companies seeking to rent these spaces, life science facilities generally rent at a 20 percent markup compared to traditional commercial office space in New York City.

With growing capital and buildable space, New York's life sciences are now on track to more than triple lab space from less than one million square feet in 2013 to over three million by 2022. Moreover, 70 percent of the city's lab stock is currently located in Manhattan. As more projects come through the pipeline, the industry is expected to continue growing in Harlem and the Bronx as well as gain traction throughout the city, including in Long Island City, "Academic Alley," Midtown East, Hudson Square and Midtown West.

Stephen Szycher, P.E., a Senior Principal at Thornton Tomasetti is excited for the future growth of New York's life science industry, noting "the life science market is expanding rapidly in the New York metropolitan area. There are a number of unique challenges and specific needs inherent to these

specialized spaces. Thornton Tomasetti's portfolio of recent and current projects (both new build and extensive renovations/change of use) are representative of the dedicated expertise and demanding solutions our clients need to meet the integrated structural, façade and sustainability requirements of life science facilities, along with the ever increasing demand for resilience and security solutions."

With a still fledgling commercial life science sector, New York's real estate industry must also grapple with a range of companies entering the market, many of which are startups coming out of incubation. Many early-stage firms have limited time and space when occupying another institution's facilities, so they prefer step-out spaces ready to be moved into immediately. Additionally, these companies are unwilling to commit to conventional leases that may last five or more years. With funding in flux and the potential for rapid growth, these companies need flexible and scalable spaces. To provide this, New York must offer turnkey solutions, affordable spaces, short-term leases, expandable square feet and customizable interiors.

As companies grow and the life science market diversifies, buildings will have to evolve to meet the demands of more established tenants. Companies like BlackRock Therapeutics, Kallyope, Prevail Therapeutics, Petra Pharma at the Alexandria Center, HiberCell and OpenTrons are examples of early to mid-sized companies that 'graduated' from smaller spaces and now require larger footprints.



NY Genome Center  
Credit: Shane Young Photo

# NEW YORK FUSION

Rapid technological change in the life sciences is driving a “fourth industrial revolution” characterized by a fusion of technologies that is blurring the lines between the physical, digital and biological realms. Increasingly, fields like synthetic biology, in which scientists “write” genomes in silico, then produce DNA using automated synthesis and assembly techniques, are opening up new markets for biological innovation in life sciences, such as agriculture, chemicals, bioremediation, energy, advanced materials, fashion and direct to consumer healthcare.

“In addition to what we traditionally think of as life sciences, in 50 years, many of the products we use, as varied as apparel, footwear, interiors, automotive and architecture, will have a biological component,” notes Nancy J Kelley, President and CEO of Nancy J Kelley & Associates and a Founding Member of NYC Builds BIO+. “These changes will significantly influence where life science is located as well as the nature of employment over the next century, giving New York City the opportunity to regain ground on the powerhouse life science clusters of Boston and San Francisco. New York City has the enviable position of pairing world-class academic and medical centers as well as established and emerging life science companies, with leading institutions in the fields of design, finance, food, media, and technology, like no other geographic location.”



345 Park Avenue South, site of Deerfield's Life Sciences Innovation Campus  
Credit: RFR Realty

# CONSTRUCTION REVIEW AND OUTLOOK

## EXISTING COMMERCIAL LIFE SCIENCE FACILITIES

New York City's existing commercial life science facilities have predominately developed near medical and research institutions, including the Alexandria Center near NYU Langone. Since 2010, total construction spending on the commercial life sciences reached approximately \$877 million. There are now over 1.3 million square feet of new and renovated commercial life science facilities.

NEIGHBORHOOD	FACILITY NAME	TYPE	SQ. FT	YEAR COMPLETE	CONST. SPENDING	OWNER	DETAILS
Harlem	Harlem BioSpace	Incubator	5,000	2013	\$1M	Janus Property Group	Harlem BioSpace opened with the support of LifeSci NYC and now houses 20 tenants.
Hudson Square	BioLabs@NYU-Langone	Incubator	50,000	2019	\$22M	Olmstead Properties	The biotech co-working facility opened with the support of LifeSci NYC and currently houses 22 tenants with capacity for 35.
	JLABS	Incubator	30,000	2018	\$17M	Edward J. Minskoff Equities	Johnson & Johnson opened JLABS with the support of the NYS Life Science Initiative and now houses 35 tenants.
	New York Genome Center	Lab/Office	175,000	2012	\$57M	Edward J. Minskoff Equities	In combination with JLABS, 101 Ave of the Americas has 170,000 sq ft of lab space.
Midtown East	Alexandria Center	Lab/Office	730,000	2010, 2013	\$700M	Alexandria Real Estate Equities	The Alexandria Center, between its East and West Towers, has more than 50 tenants including Eli Lilly, Bristol-Meyers Squibb and Pfizer's Center for Therapeuti Innovation.
	Alexandria LaunchLabs - NYC	Incubator	15,000	2017	N/A	Alexandria Real Estate Equities	The incubator housed at the Alexandria Center offers office and lab space as well as access to Alexandria's Seed Capital Platform.
Midtown West	Hudson Research Center	Lab/Office	120,000	2012	\$20M	Silverstein Properties, Taconic Investment Partners	The facility houses tenants such as the New York Stem Cell Foundation (NYSCF), the Manhattan Surgery Center and the Rogosin Institute West Side Dialysis Center. In 2017, NYSCF renovated 40,000 square feet for its new headquarters and research center.
South Brooklyn	BioBAT	Lab/Office	205,000	2014	\$60M	NYCEDC	Created by NYCEDC and SUNY Downstate, BioBAT is located in the Brooklyn Army Terminal in Sunset Park and houses tenants such as the International Aids Vaccine Initiative and Brooklyn Immuno Therapeutics.
	SUNY Downstate Biotechnology Incubator	Incubator	50,000	2004	\$34M	SUNY Downstate	The incubator is adjacent to SUNY Downstate Medical Center and can accommodate 20 to 30 tenants.



SUNY Downstate Wet Lab  
Credit: NIK Architects

## FUTURE COMMERCIAL LIFE SCIENCE FACILITIES

Over the next three years, new life science facilities are expected to locate near existing facilities and a hub will be created in Long Island City, a neighborhood that offers relatively affordable space and former warehouses appropriate for conversion. Based on the following sites, New York City can expect to see over \$1.9 billion in construction spending and more than 2.4 million square feet of new commercial life science facilities.

NEIGHBORHOOD	FACILITY NAME	TYPE	SQ. FT	YEAR COMPLETE	CONST. SPENDING	OWNER	DETAILS
Harlem	Alexandria LaunchLabs @ Columbia	Incubator	14,000	2020	N/A	Alexandria Real Estate Equities	In 2019, Alexandria announced its second LaunchLabs location will be housed in Columbia's Lasker Biomedical Research Building.
	Factory District -Taystee Building	Lab/Office	600,000	2020	\$360M	Janus Property Group	Janus Property began renovating the former bakery in 2019.
Long Island City	Alexandria Life Science Hub	Lab/Office	100,000	TBD	\$75M**	Alexandria Real Estate	Alexandria purchased the 53,000 sq ft building in 2019 with the potential to expand it to over 100,000 sq ft.
	Bindery Building	Lab/Office	175,000	TBD	\$75M*	Alexandria Real Estate	In 2018, Alexandria purchased the former warehouse.
Midtown East	InnoLabs	Lab/Office	267,000	2021	\$240M	GPF, King Street Properties	In 2019, GPF and King Street began redeveloping the 160,000 sq ft office building.
	Alexandria Center North Tower	Lab/Office	550,000	2022	\$700M	Alexandria Real Estate Equities	Alexandria is expected to start construction in 2020 on the Center's last of three towers.
	Life Sciences Innovation Campus	Lab/Office	300,000	2021	\$635M	Deerfield Management	In 2019, Deerfield purchased the property and NYCEDC announced MATTER, the healthcare incubator and innovation accelerator, would be the campus' operator. Two-thirds of the building will be dedicated wet lab space.
	Pfizer Conversion	Lab/Office	350,000	TBD	\$200M*	Alexandria Real Estate Equities	Alexandria purchased Pfizer's office in 2018 and will lease it back until the company moves in 2022. Alexandria will then convert the building into a life science hub.

\*property acquisition only



# LIFE SCIENCE LANDSCAPE

New York's emerging life sciences industry does not have a single center of gravity, but rather distinct sub-clusters of academic, medical and commercial facilities. These nodes that connect across the city include Midtown East, Hudson Square and Morningside Heights. Moreover, following the City's zoning memo clarification in 2016, as-of-right life science developments are permitted not only in manufacturing districts, but also some commercial districts. Now, as life science companies grow and move to New York, they can easily locate in central business districts, such as Downtown Brooklyn and the Financial District.

"The biomedical research at New York's academic medical centers is one of the largest untapped assets for job creation and economic activity," says Maria Gotsch, President and CEO of the Partnership Fund for New York City. "The public sector's \$1.1 billion commitment to the sector has spurred momentum in venture funding and real estate development in life sciences and there has never been a better time for the industry in New York. Life sciences venture investment in New York is up six-fold since 2010 and over 16 companies have each raised more than \$20 million of venture funding over the last two years. On the real estate front, new incubator facilities for young companies have opened and step-out space to accommodate growth-stage companies is underway in four of the boroughs."

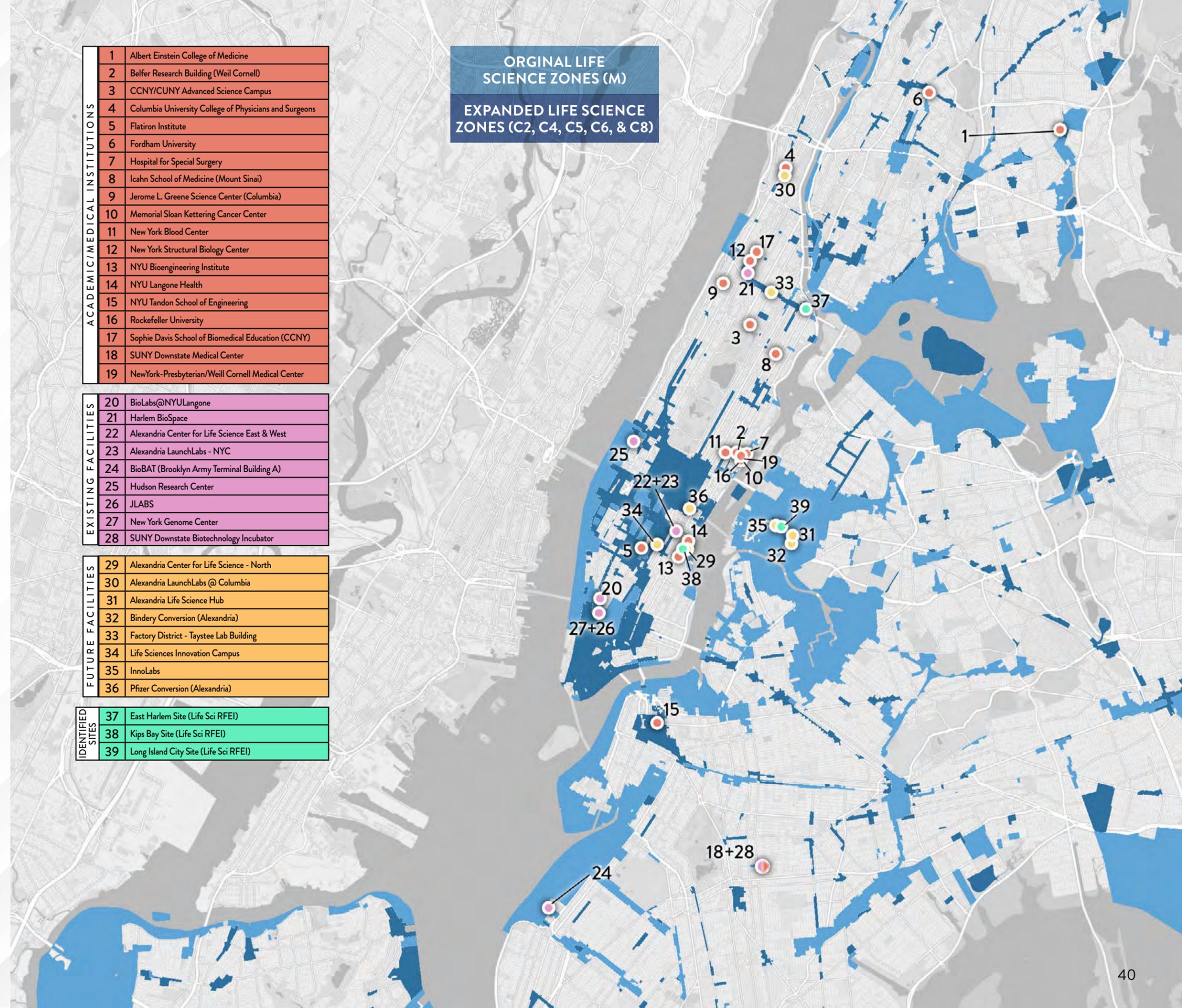
ACADEMIC/MEDICAL INSTITUTIONS	
1	Albert Einstein College of Medicine
2	Belfer Research Building (Weil Cornell)
3	CCNY/CUNY Advanced Science Campus
4	Columbia University College of Physicians and Surgeons
5	Flatiron Institute
6	Fordham University
7	Hospital for Special Surgery
8	Icahn School of Medicine (Mount Sinai)
9	Jerome L. Greene Science Center (Columbia)
10	Memorial Sloan Kettering Cancer Center
11	New York Blood Center
12	New York Structural Biology Center
13	NYU Bioengineering Institute
14	NYU Langone Health
15	NYU Tandon School of Engineering
16	Rockefeller University
17	Sophie Davis School of Biomedical Education (CCNY)
18	SUNY Downstate Medical Center
19	NewYork-Presbyterian/Weill Cornell Medical Center

EXISTING FACILITIES	
20	BioLabs@NYULangone
21	Harlem BioSpace
22	Alexandria Center for Life Science East & West
23	Alexandria LaunchLabs - NYC
24	BioBAT (Brooklyn Army Terminal Building A)
25	Hudson Research Center
26	JLABS
27	New York Genome Center
28	SUNY Downstate Biotechnology Incubator

FUTURE FACILITIES	
29	Alexandria Center for Life Science - North
30	Alexandria LaunchLabs @ Columbia
31	Alexandria Life Science Hub
32	Bindery Conversion (Alexandria)
33	Factory District - Taystee Lab Building
34	Life Sciences Innovation Campus
35	InnoLabs
36	Pfizer Conversion (Alexandria)

IDENTIFIED SITES	
37	East Harlem Site (Life Sci RFEI)
38	Kips Bay Site (Life Sci RFEI)
39	Long Island City Site (Life Sci RFEI)

ORIGINAL LIFE SCIENCE ZONES (M)  
EXPANDED LIFE SCIENCE ZONES (C2, C4, C5, C6, & C8)





# RECOMMENDATIONS



## HEALTHCARE

**CAPITAL SPENDING:** Increase capital support for NYC Health + Hospitals to allow it to continue to make improvements to aging facilities and expand access to primary and other vital public health services.

**MODULAR CONSTRUCTION:** Consider a streamlined process for modular construction projects to reduce the red tape associated with transporting and staging the units.

**PROJECT DELIVERY:** Institutions should continue to adopt collaborative project management practices in order to streamline construction work and reduce overall construction costs.

**FACILITIES MANAGEMENT:** Hospitals should recruit and train qualified facilities management professionals to ensure projects are maintained efficiently and cost-effectively, particularly at a time of increased investment.

**ZONING:** Consider zoning as a tool to encourage investment in outer-borough, community-based healthcare services and in smaller, aging hospitals.

## LIFE SCIENCE

**SPACE:** The City and State should supplement their current industry-focused programs with municipal land, buildings, grants and tax abatements.

**ZONING:** Consider revised zoning for commercial life science districts to allow institutions to have predictable building guidelines that account for the complex design challenges for wet and dry lab space.

**LOCAL LAW 97:** Provide alternative compliance options for life science facilities given the unique energy composition on site while maintaining citywide building emissions goals.

**REAL ESTATE:** Commercial owners must offer turnkey solutions, affordable spaces, short-term leases, expandable square feet and customizable interiors to help many early-stage firms grow.

**PRIVATE EQUITY:** Early-stage companies and researchers should continue to take advantage of New York's unique connection to diverse industries to drive innovation and attract more private investment.

# SOURCES

- 1 New York City Department of Health and Mental Hygiene. COVID-19: Data. 2020.
- 2 Greater New York Hospital Association. Letter to US Department of Health and Human Services Secretary. 2020.
- 3 US Department of Health and Human Services. COVID-19 Funding. 2020.
- 4 Crain's New York. New York Presbyterian Health System Los \$128 Million. 2020.
- 5 NYC Health + Hospitals. Note on the Fiscal Year 2021 Executive Budget. 2020.
- 6 NYC Mayor's Office of Management and Budget. Adopted Capital Budget. 2020.
- 7 American Well. Telehealth Index: Consumer Survey. 2020.
- 8 Journal of the American Medical Informatics Association. COVID-19 Transforms Health Care Through Telemedicine: Evidence from the Field. 2020.
- 9 Healthcare Association of New York State. New York City Regional Report. 2020.
- 10 US Bureau of Economic Analysis. GDP by County and Metropolitan Area. 2018.
- 11 NYC Department of Finance. Property Valuation and Assessment Data. 2018.
- 12 Bureau of Labor Statistics. Quarterly Census of Employment and Wages. 2018.
- 13 NYS Comptroller. New York City Employment Trends. 2019.
- 14 US News and World Report. 2019-2020.
- 15 NYC Mayor's Management Report. 2020.
- 16 NYC Health + Hospitals. Summary of Statements of Net Position. 2018.
- 17 NYC Mayor's Office of Management and Budget. FY 2020 Adopted Capital Commitment Plan. 2019.
- 18 National Institute of Health. NIH Awards by Location and Organization. 2009-2019.
- 19 NIH. Grants Policy Statement.
- 20 CBRE. U.S. Life Sciences Clusters: Markets Positioned for "Century of Biology." 2019.
- 21 CBRE. NYC Life Sciences: Enabling Discovery. 2019.
- 22 JLL. Life Sciences Outlook. 2019.
- 23 JLL. Life Sciences Outlook. 2019.
- 24 Partnership for New York. New York's Next Big Industry: Commercial Life Sciences – Update. 2019.

**PRESENTING SPONSOR:**

---

**LANGAN**

**CO-HOSTS:**

---



**PATRON SPONSORS:**

---



**SUPPORTER SPONSORS:**

---

MCLAREN ENGINEERING GROUP

RXR

TEAMSTERS LOCAL 282

**NEW YORK BUILDING CONGRESS HEALTHCARE AND LIFE SCIENCES COMMITTEE CO-CHAIRS**

---

Joseph C. Chin

Senior Vice President - Healthcare  
LF Driscoll Healthcare | Structure Tone

David Geller

Director, Design + Construction  
Facilities Management Division  
Memorial Sloan Kettering Cancer Center

Christopher J. Prochner, P.E.

Partner  
Jaros, Baum & Bolles

**NEW YORK BUILDING CONGRESS EXECUTIVE COMMITTEE**

---

**CHAIR**

Elizabeth Velez

**VICE-CHAIRS**

John J. Cardoni, Louis J. Coletti, Cheryl McKissack Daniel, Peter DiMaggio, P.E., SECB, Sabrina Kanner, Richard Kennedy, Eli R. Khoury, P.E., Gary LaBarbera, Anthony Mannarino, Charles F. Murphy, Edward V. Piccinich, Frances A. Resheske, Jonathan D. Resnick

**PRESIDENT & CEO**

Carlo A. Scissura, Esq.

**TREASURER**

Cyrus J. Izzo, P.E.

**SECRETARY**

Carl Galioto, FAIA

**GENERAL COUNSEL**

Michael S. Zetlin

**PAST CHAIR AND NEW YORK BUILDING FOUNDATION CHAIR**

Milo E. Rivero, Ph.D., P.E., CCM

**NEW YORK BUILDING CONGRESS STAFF**

Jeanine M. Badalamenti, Senior Vice President, Development; Alanna Draudt, Vice President, Programming & Foundation; Michael Papagianakis, Vice President, Public Affairs; Ilan Z. Stern, Vice President, Operations; Robert Chapman, Director, Administration; Justin Pascone, Director, Policy; George Quan, Creative Director, Events & Marketing; Giancarlo Sapio, Director, Membership; Anasa Welch, Director, Finance; Sarah Moore, Executive Assistant to the President & CEO; Maria Free, NYU Research Fellow