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CENTRAL NEW YORK SOCIETY FOR HEALTHCARE ENGINEERS

NYU Langone Kimmel Pavilion: Integration of Infection Prevention & Design

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October 7, 2019
11:00am-12:00pm

CONTINUING EDUCATION AIA

JBB
JAROS BAUM & BOLLES

NYU Langone Health

nbbj | ennead architects

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

A general overview of integration of infection prevention as a primary driver in the design process which guided decision making, and shaped the planning, programming and design of the recently opened 830,000 GSF NYU Langone Health Kimmel Pavilion. A general overview of the integrated design and infection prevention approach taken. Technical engineering overview of the project.

Learning Objectives

1. Understand how NYU Langone Health established infection prevention as a priority in the design of its new building

2. Broad understanding of a systems approach taken in the design of a new inpatient and surgical tower with infection prevention being a primary focus.

3. Overview of the planning, adjacencies, circulation and flows within the building.

4. Overview of the technical MEP systems deployed to establish a new base minimum for infection prevention within the new facility

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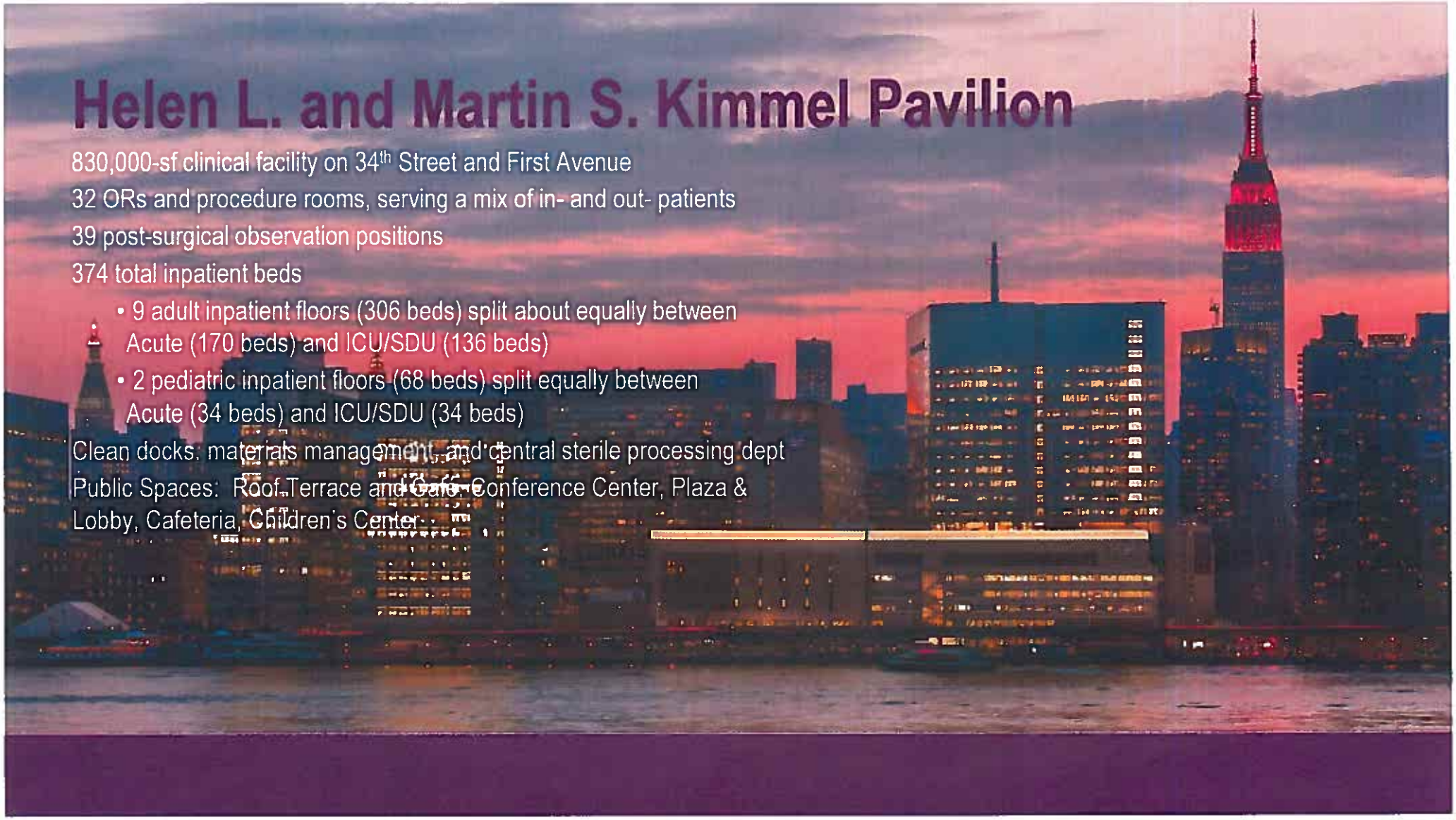


Helen L. and Martin S. Kimmel Pavilion

830,000-sf clinical facility on 34th Street and First Avenue

32 ORs and procedure rooms, serving a mix of in- and out- patients

39 post-surgical observation positions

374 total inpatient beds

- 9 adult inpatient floors (306 beds) split about equally between Acute (170 beds) and ICU/SDU (136 beds)
- 2 pediatric inpatient floors (68 beds) split equally between Acute (34 beds) and ICU/SDU (34 beds)

Clean docks, materials management, and central sterile processing dept

Public Spaces: Roof Terrace and Gala, Conference Center, Plaza & Lobby, Cafeteria, Children's Center

NYU Langone Health

Recognition & Honors

#3 Best Medical School for Research

#15 Best Hospital and Nationally Ranked in 12 Adult Specialties

5 Investigators for the Howard Hughes Medical Institute (HHMI)

10 Members of the National Academy of Sciences

11 Members of the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine

18 Fellows of the American Association for the Advancement of Science

11 Members of the American Academy of Arts & Sciences

Represents September 2017–August 2018

Mission 2008: A World-Class Patient-Centered Integrated AMC

World-Class:

- Excellence across all missions (patient care, education, research)
- Destination medical center
- Ranked top 10 in strategic areas

Integrated:

- Promoting synergies between the three missions
- Fostering translational research (bench to bedside)
- Embedding students within the clinical and research environments

Patient-Centered:

- Prioritizing the patient and family experience
- **Focus on constantly improved patient outcomes**

Campus Growth: Original Vision 1949 to 1977

1949 SOM Masterplan **940,000 gsf**

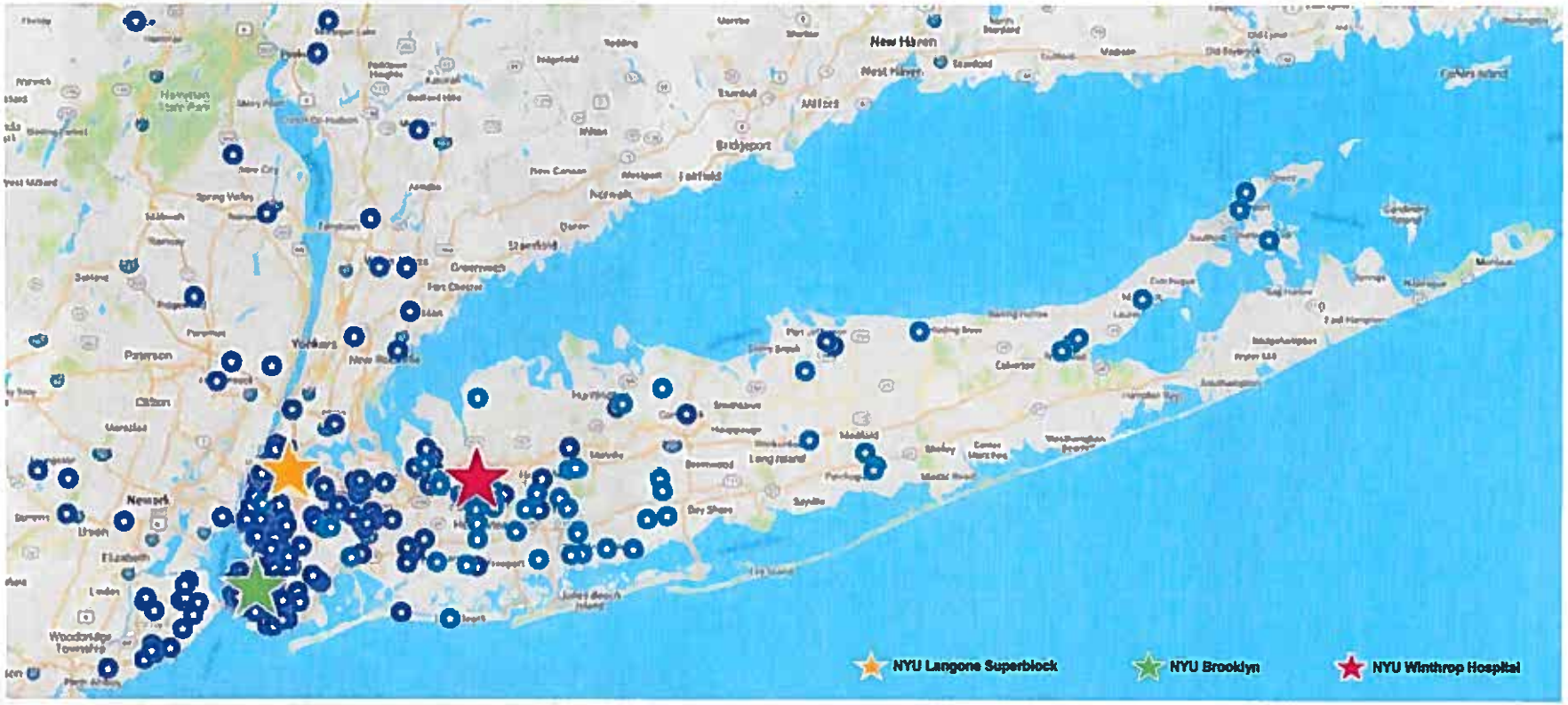
1977 **1,260,000 gsf**

Campus Growth: 2010 to 2019

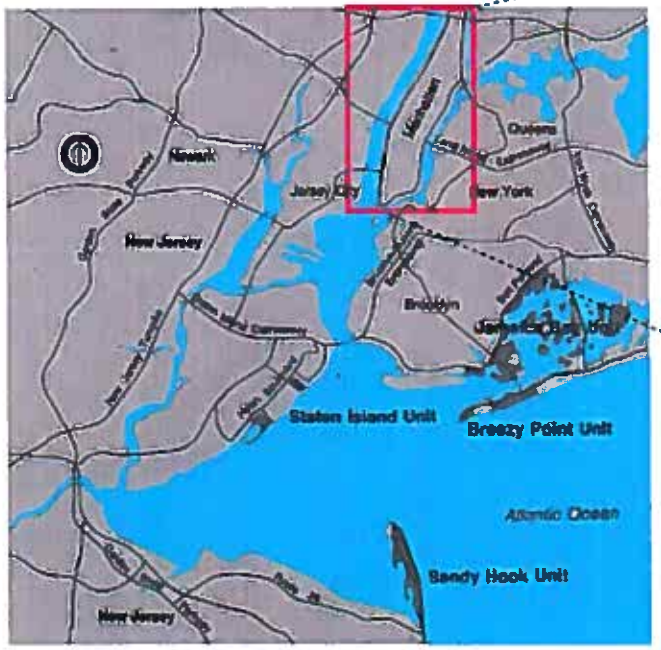
2010 **2,460,000 gsf**

2019 **3,840,000 gsf**

Campus Growth: Beyond the Main Campus



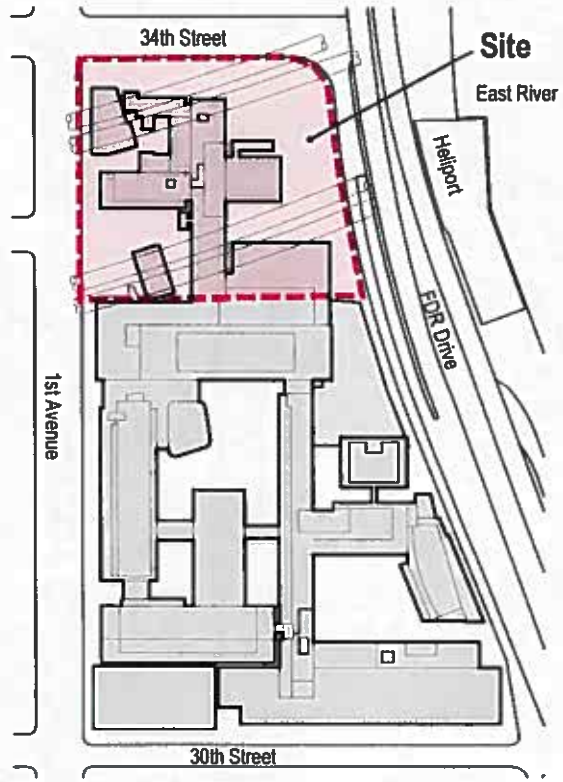
Kimmel Pavilion: Site Context



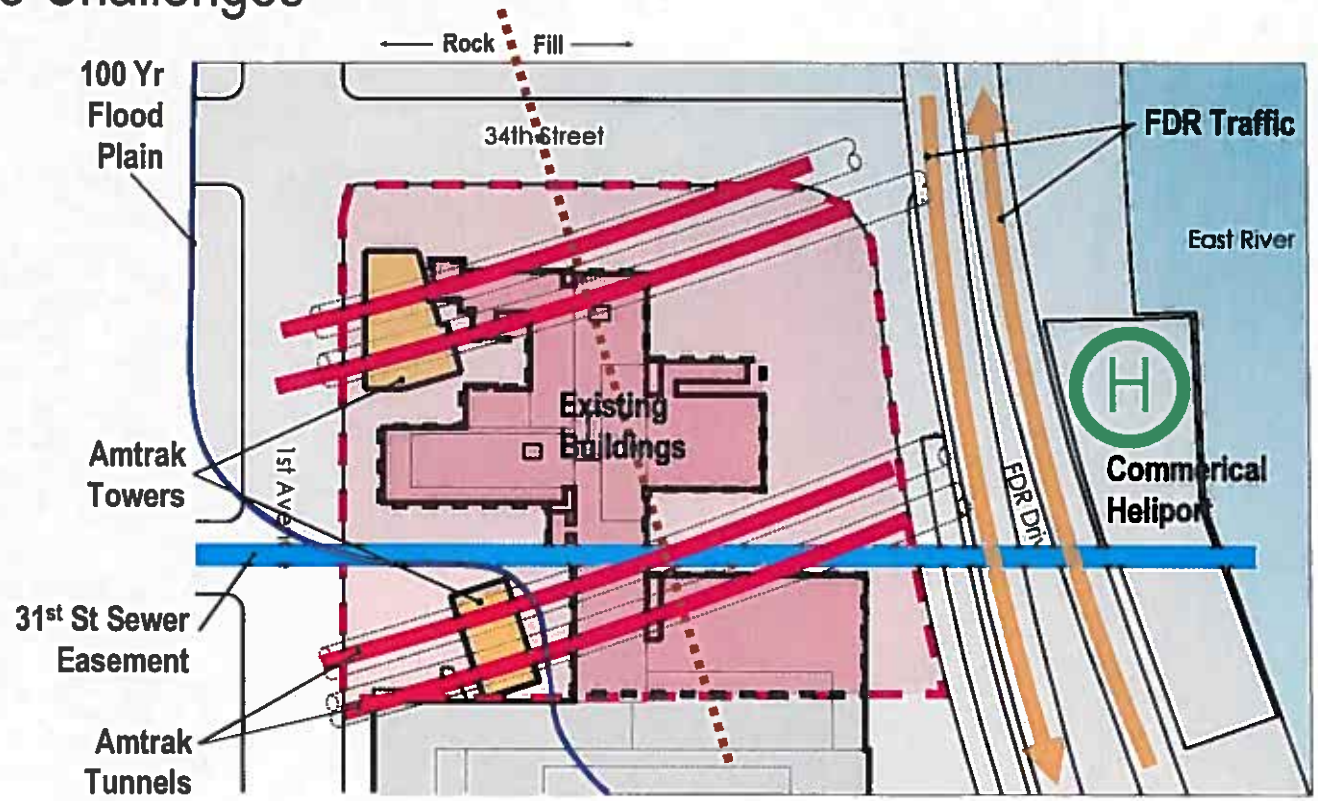
New York City Area

Manhattan

Kimmel Pavilion: Site Challenges



Superblock



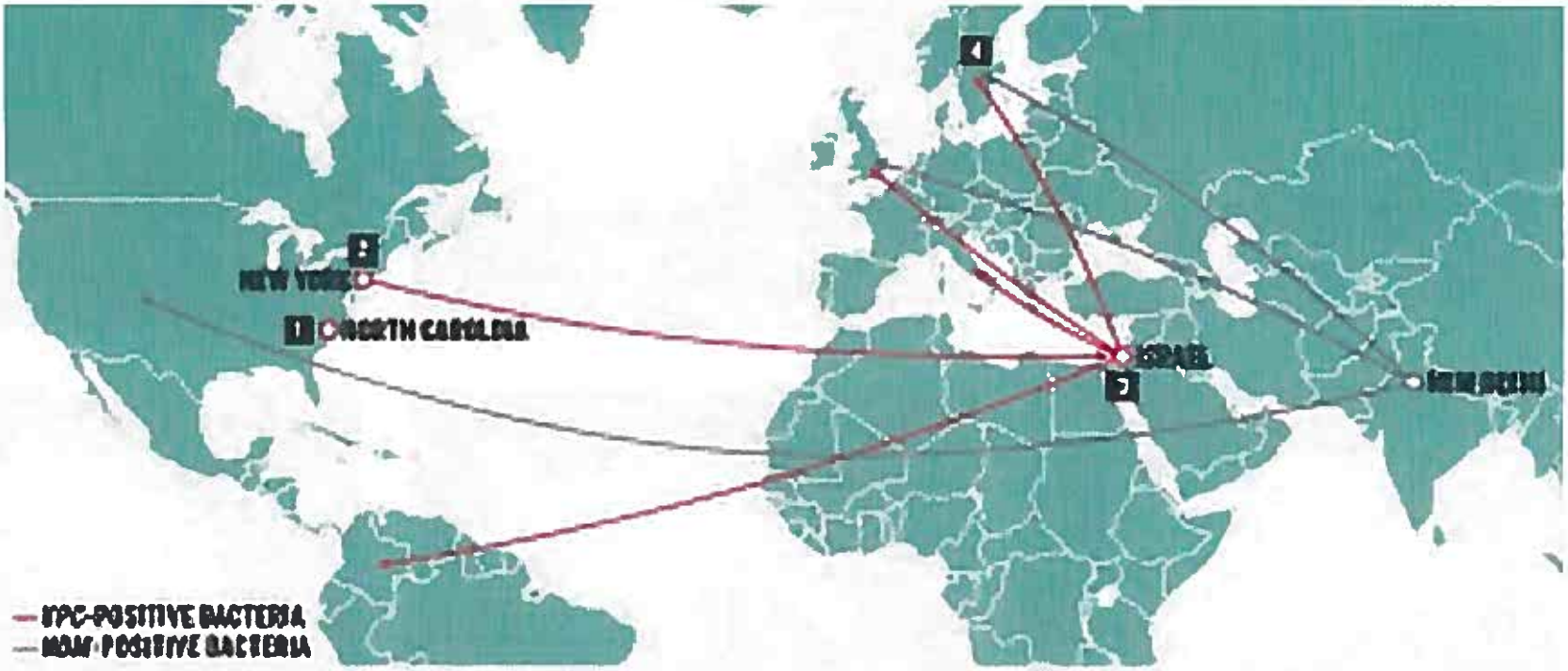
Site

Infection Prevention & Design

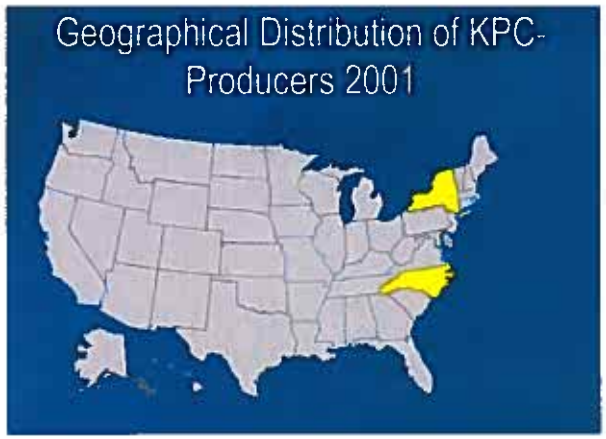
Welcome to New York City! ***Take 1***

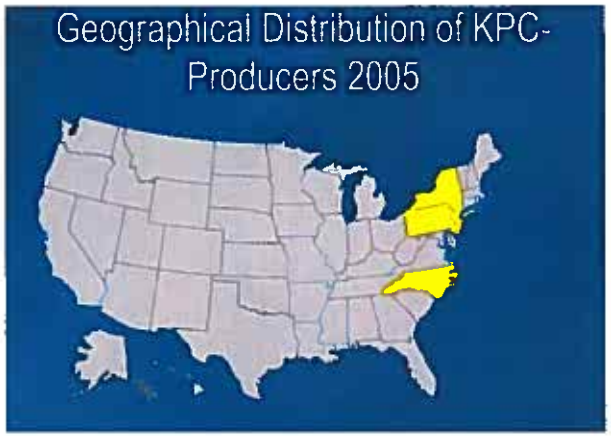
Welcome to New York City! ***Take 2***

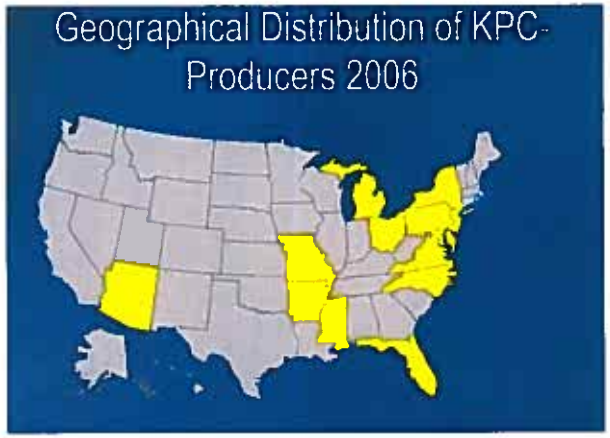
Movement of *Carbapenem-resistant Enterobacteriaceae*

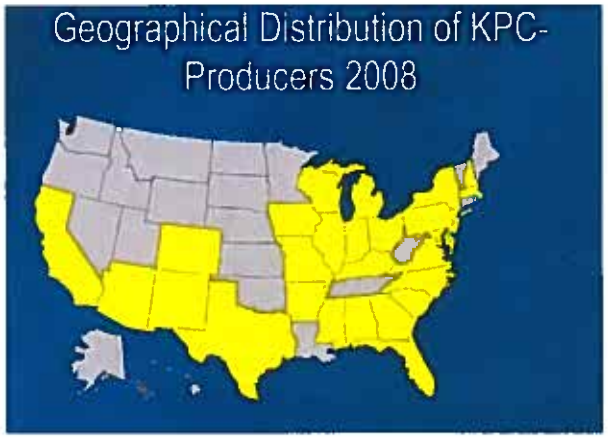


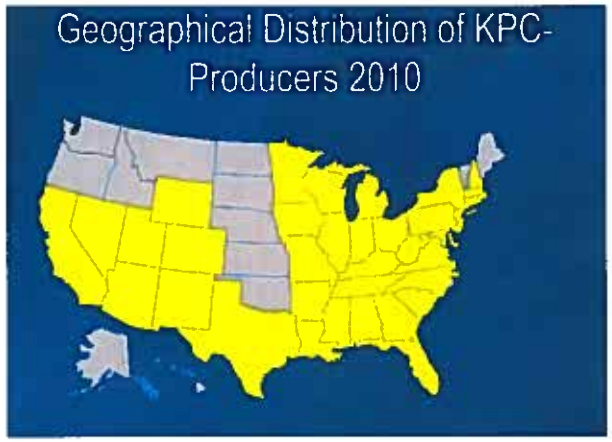
Nature, July 2013

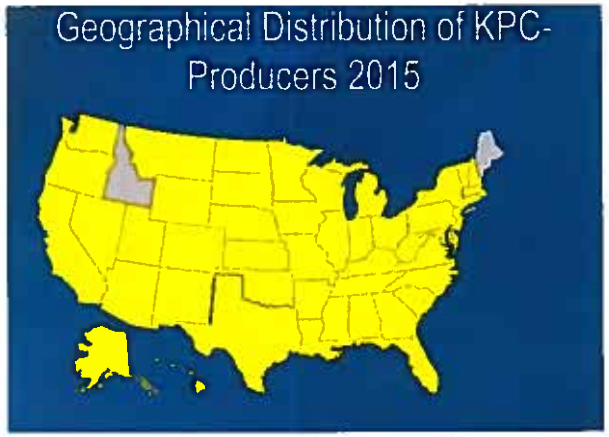






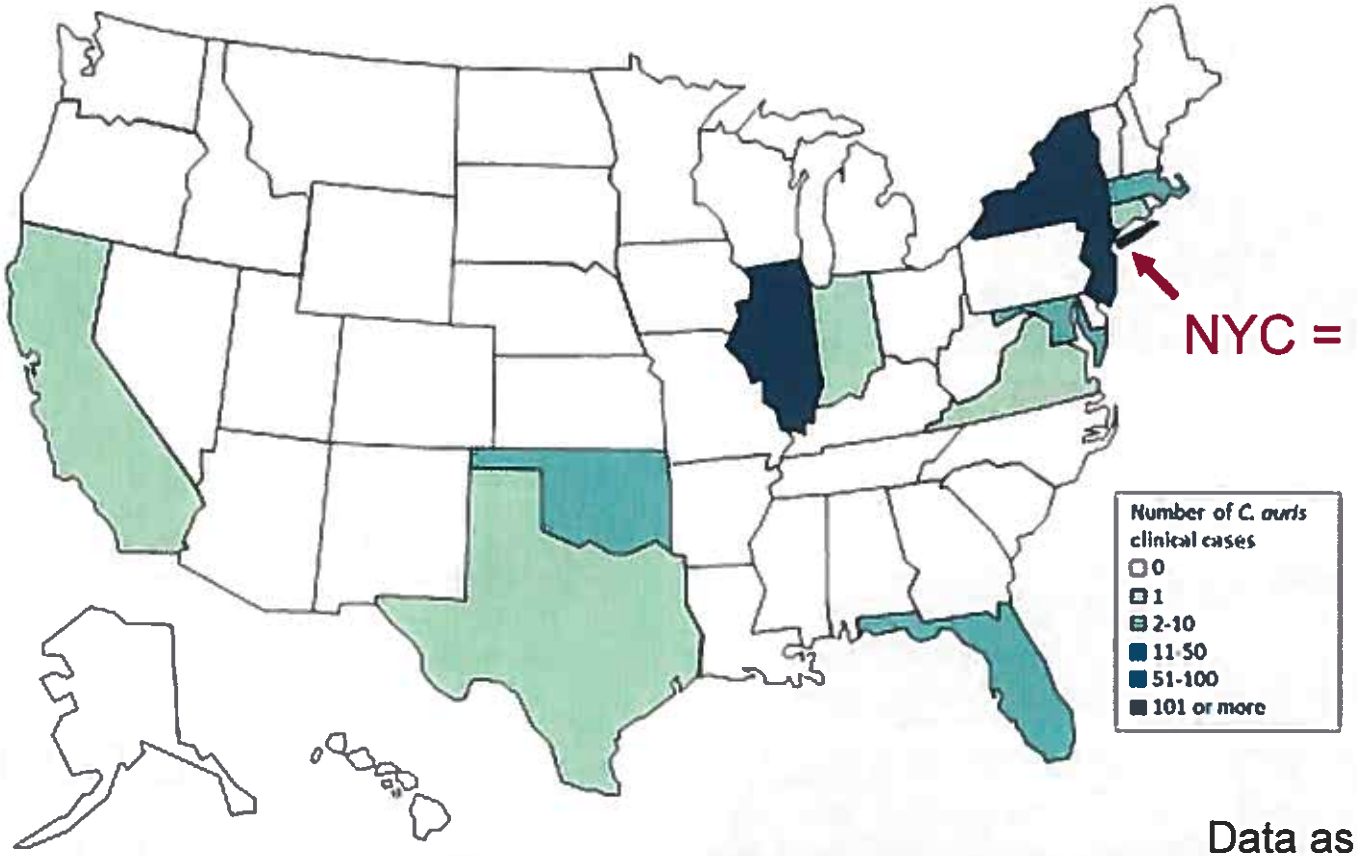






California Department of Public Health

Candida auris – the next "superbug"

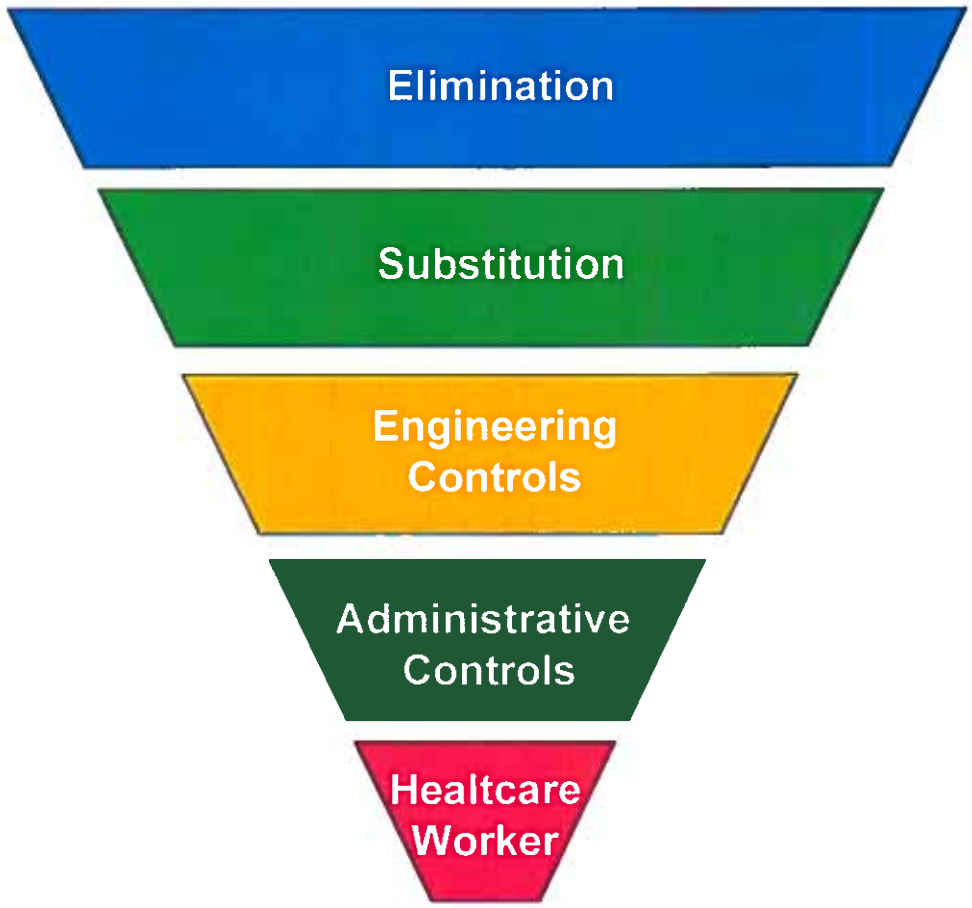


NYC = 50% of cases!

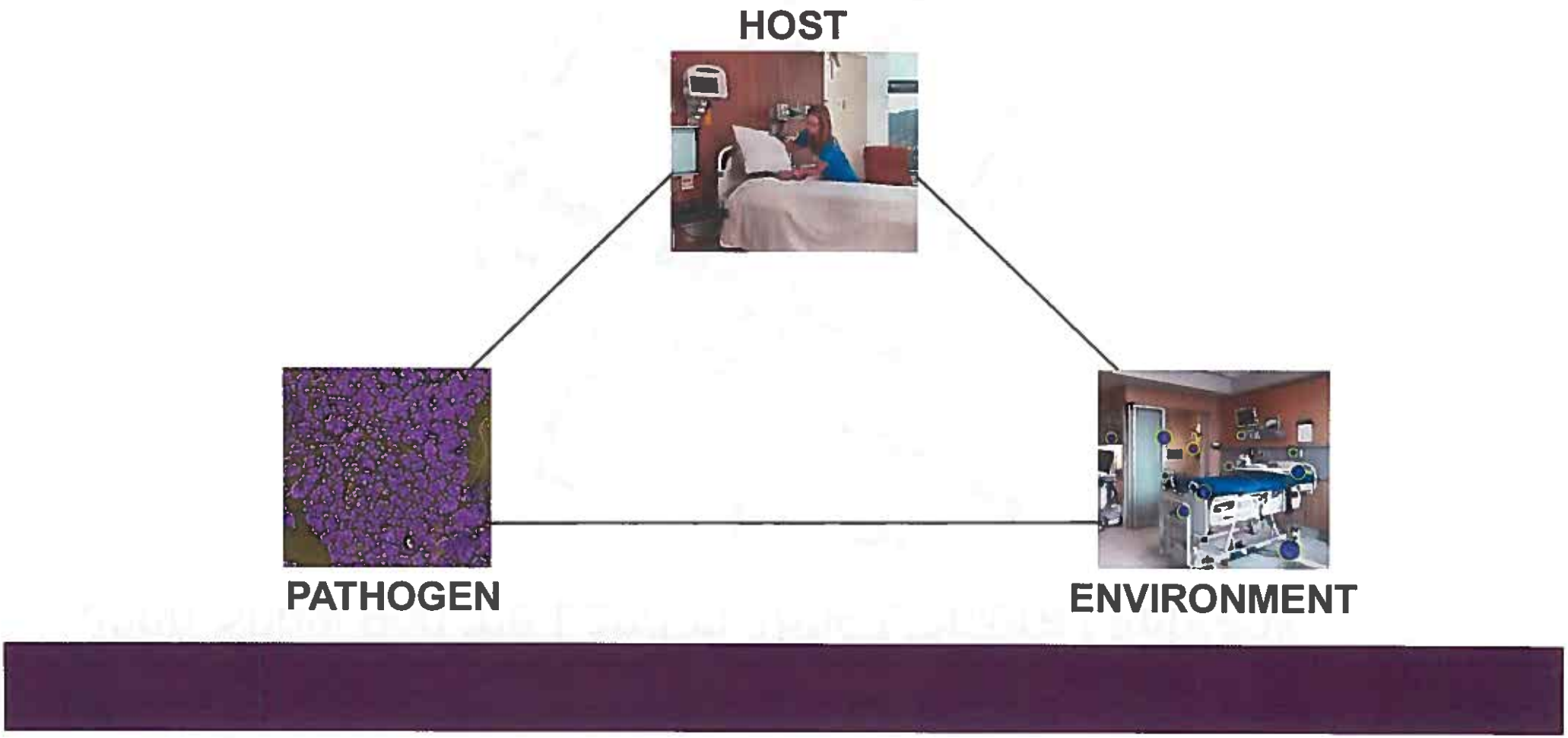
Data as of 12/31/18; Source: CDC

Prevent Pathogen Transmission:

Hierarchy of Controls

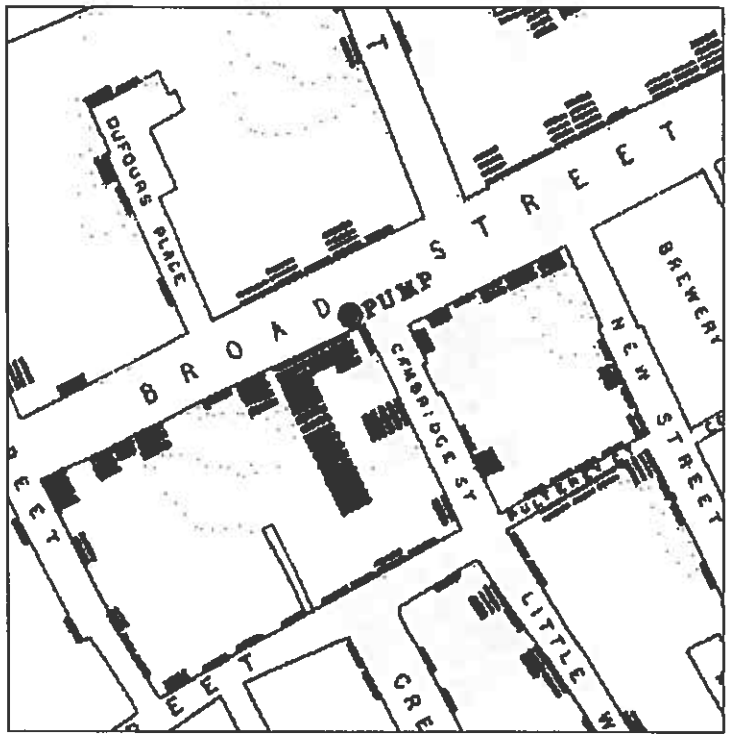


Epidemiologic triangle



John Snow and the London 1854 Cholera Outbreak

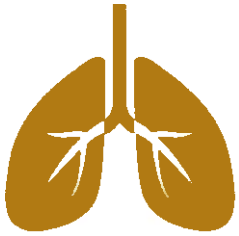
John Snow and the London 1854 Cholera Outbreak



Pathogen transmission

Contact

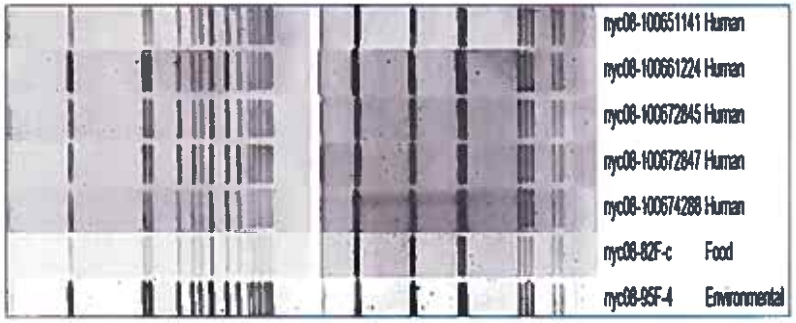
Water



Air

	Contact	Water	Air
Methicillin-resistant Staph aureus "MRSA"			
Enterococcus			
Klebsiella, Enterobacter, E. coli			
Serratia			
Acinetobacter			
Pseudomonas			
Listeria	?	?	?
Clostridium difficile			
Legionella			
Aspergillus			
Respiratory virus			
Mycobacteria, including M. tuberculosis			
Measles			

History repeats itself....



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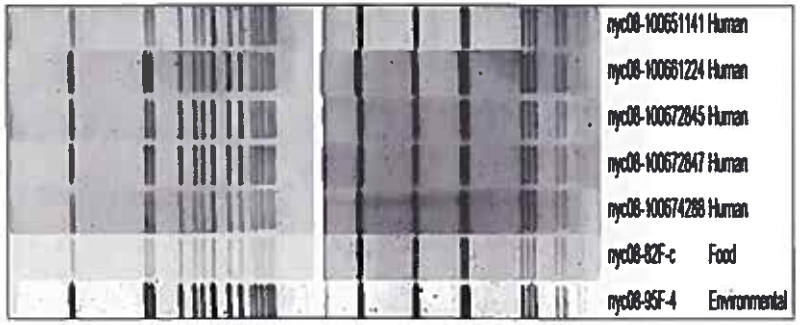

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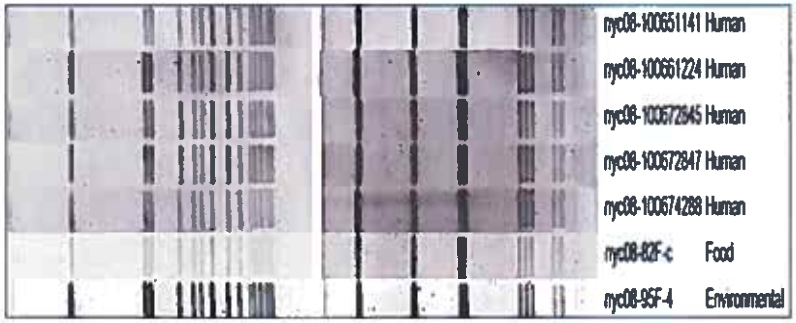

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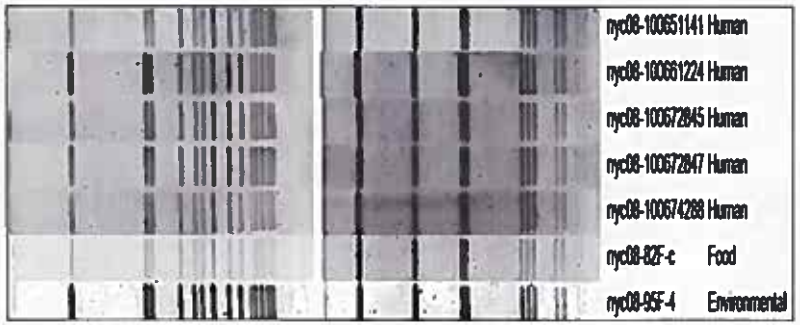


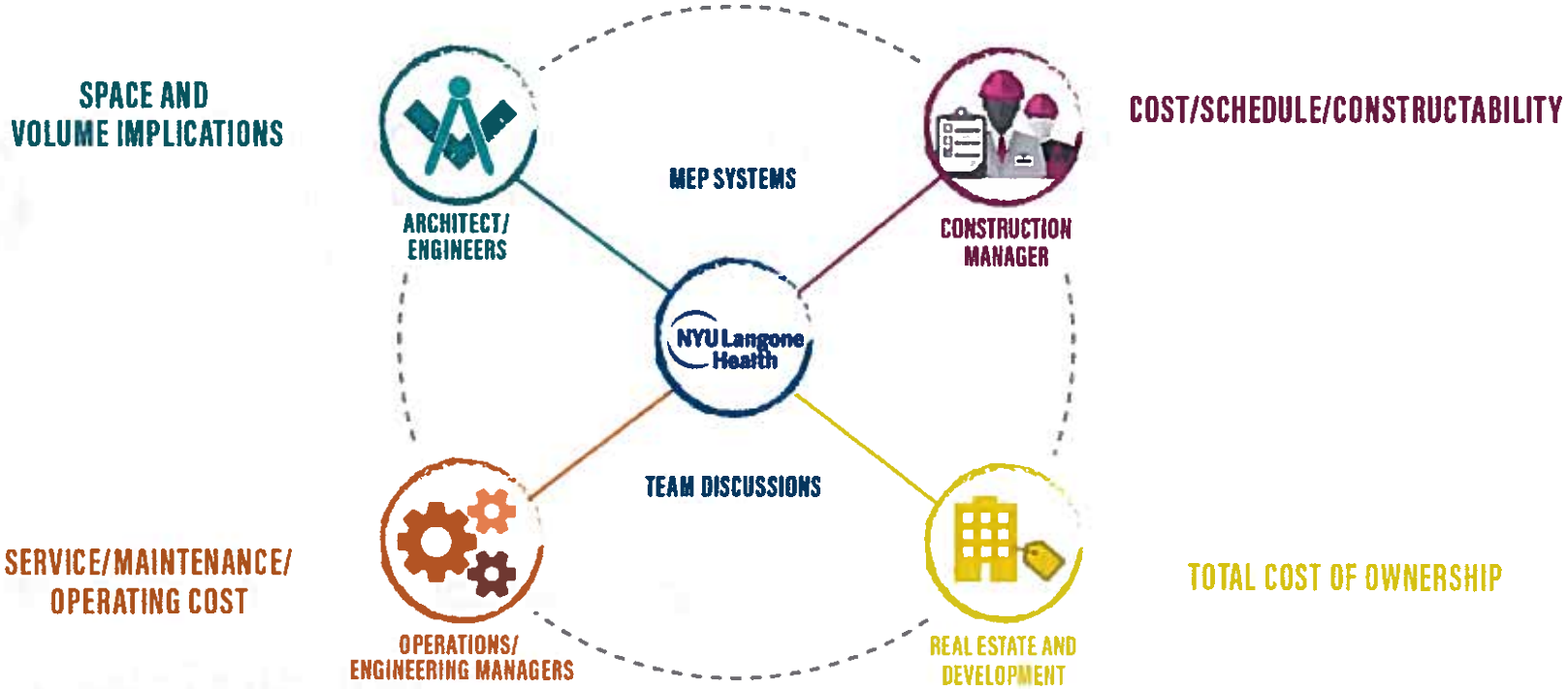
Infection Prevention & Design

Infrastructure

Mechanical, Electrical & Plumbing

Team Collaboration

Campus Transformation Infrastructure (CTI)



Team Collaboration

Owner/Real Estate and Development Team

- Understand intended use of facility in normal and emergency conditions
- Understand MEP systems first cost and total cost of ownership
- Emergency preparedness/redundancy and resiliency

- Define clinical MEP needs
- Understand future flexibility needs
- Communication of special requirements with MEP design consultants

- Mechanical/electrical systems selections
- Scalable/flexible/maintainable
- Energy efficiency

Team Collaboration

Design Team

ARCHITECT

- Program adjacencies, circulation and flow
- Early identification of fire-rated partitions/life safety plan, MEP systems massing and coordination
- Early device coordination and diffuser/grille coordination in clinical spaces

INFORMATION TECHNOLOGY

- IT program requirements and intended functionality
- Right-sizing IDF closets for present applications and future needs
- Early coordination of device locations and quantity of cables per room

MEDICAL EQUIPMENT PLANNER

- Medical equipment program requirements
- Early identification of mechanical and electrical utility requirements
- Placeholders for equipment not selected

Team Collaboration

Construction and Operations Team

OPERATIONS MANAGER

- Early involvement in Design Phase
- MEP equipment is serviceable and maintainable
- Minimize downtime

CONSTRUCTION MANAGER

- Early involvement in Design Phase for constructability and logistics input
- Design team involvement in equipment and contractor bid leveling
- Heightened communication with design team during CA Phase

COMMISSIONING AGENT

- Design team participation in developing Cx plan and schedule
- Progress milestones during construction
- Burn-in period prior to move-in

How Do Infections Occur?

Source: Places where germs live

- Sinks, surfaces, human skin

Susceptible person

- With a way to enter the body

Transmission: A way germs are moved to the susceptible person

- Contact, water, air

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Infection Control: Design Criteria

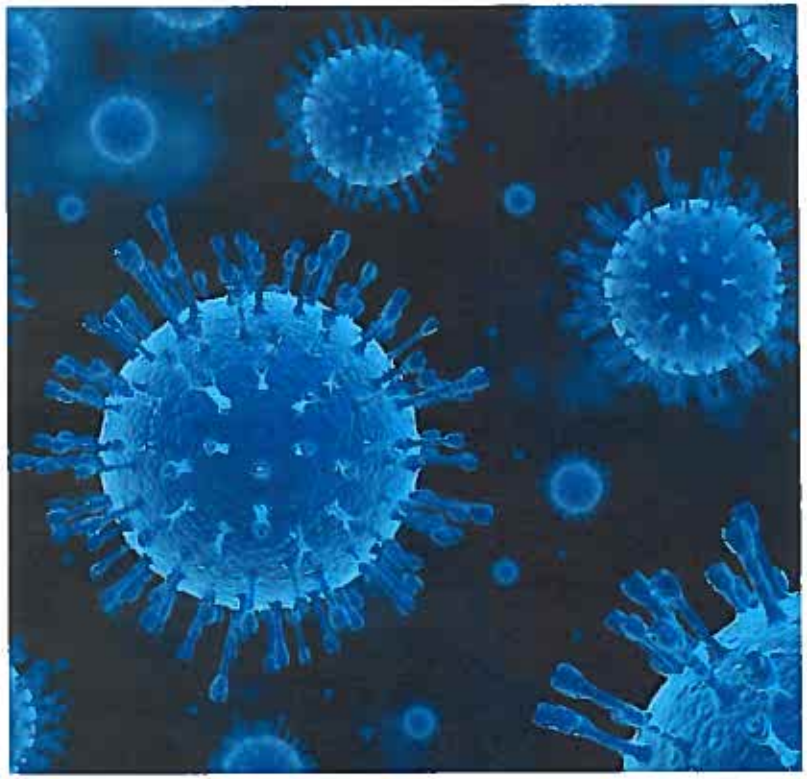
Air Quality (filtration, air change rates)
- Focus on Central Air Handling Systems

Containment (pressurization, isolating "dirty" item)
- Focus on Distribution Systems

Water Quality (filtration, disinfection, distribution)
- Focus on Legionella control

Resiliency (maintenance, emergency power)
- Redundancy, Serviceability, Maintainability

External Factors
- Pollutants, particles and fumes



Urban Campus: Design Considerations

Vehicular traffic
- Buses, cars, trucks

Heliport/Ferry
- Exhaust fumes

Vibration
- Amtrak train tunnels

Ambient Acoustics
- Buses, cars, trucks, helicopters

Flood Zone
- Elevate Infrastructure

Adjacencies
- Residential, research

Vertical Considerations
- Elevators, stack effect

MEP System Design for Infection Control

Air Filtration

MERV 8

- 30 - 35% efficiency for particles 3.0 - 10 microns range
- Mold, spores, cement dust

MERV 15

- 90 - 95% efficiency for particles 0.3 - 1.0 microns range
- Bacteria, most tobacco smoke, droplet nuclei, most smoke, paint pigments

HEPA

- MERV 17 99.97% efficiency for particles 0.3 microns and larger
- Virus, carbon dust, sea salt, combustion smoke

Gas-Phase Filtration

- Chemisorption process to render pollutants harmless by converting them to safe compounds
- Dry chemical adsorbents (activated carbon, sodium and potassium permanganate
- Effective on helipad odors, automobile odors, VOC's

Ultraviolet Germicidal Irradiation (UVGI)

- Low-pressure mercury vapor lamps to generate UV-C wavelengths
- Effective in killing tuberculosis and influenza

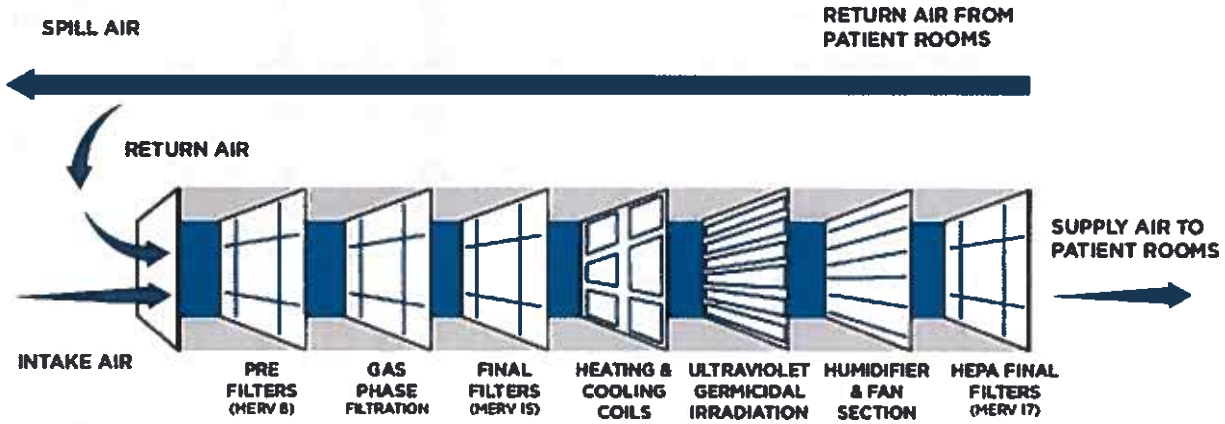
MEP System Design for Infection Control

Air Quality

Air Handling System Attributes

- Mixed-Air System (capable of 100% outside air)
- Enhanced air filtration

	FGI	Design
Pre-Filters	MERV 7	MERV 8
Gas Phase	NR	Carbon
Final Filters	NR	MERV 15
UVGI	NR	Yes
Stage 2 Filters	MERV 14	HEPA



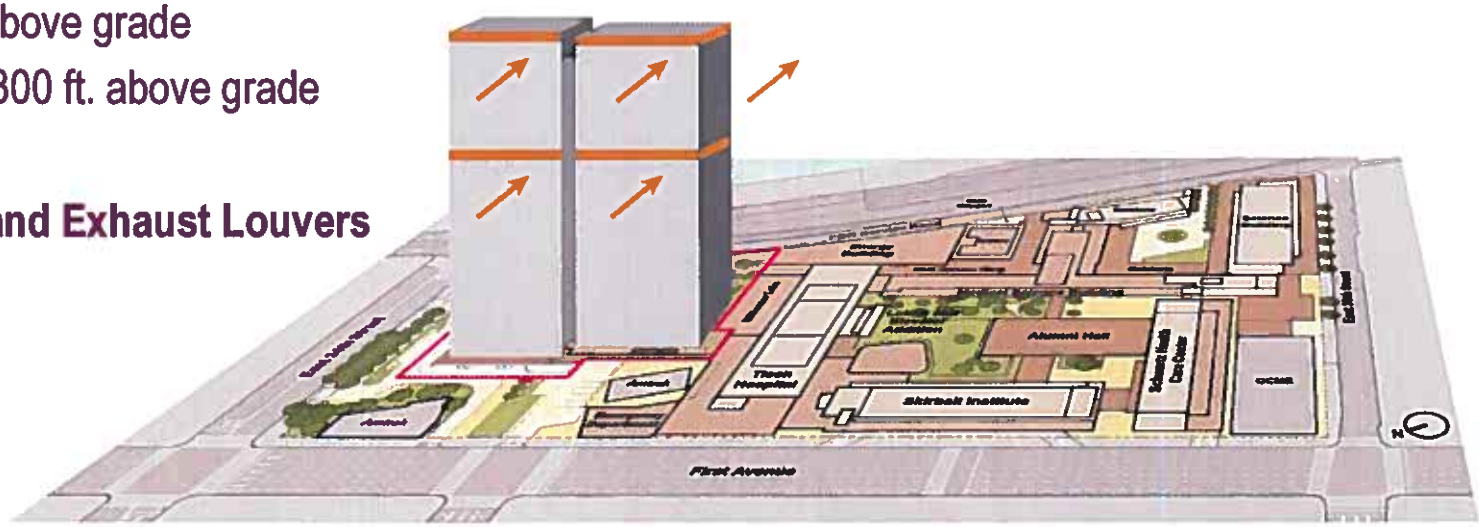
MEP System Design for Infection Control

Air Handling Systems

Location of AHU's

- 6th Floor – 90 ft. above grade
- 19th/20th Floor – 300 ft. above grade

Separation of Intake and Exhaust Louvers

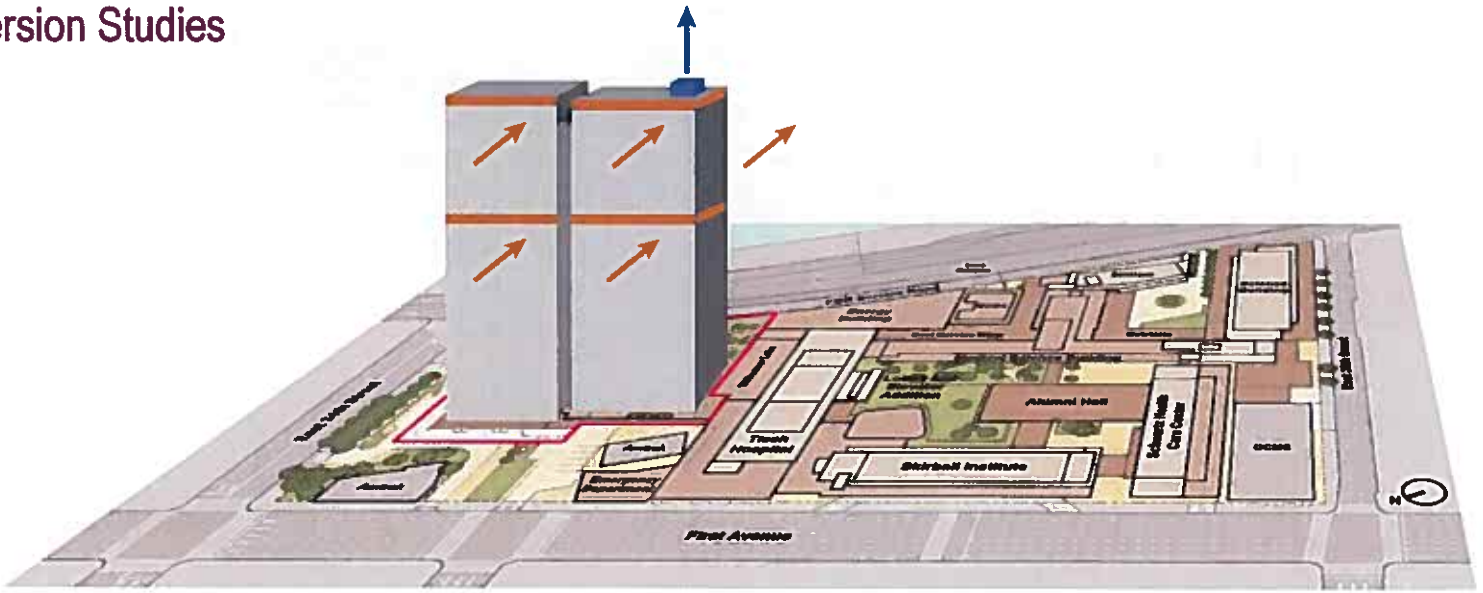


MEP System Design for Infection Control

Air Entrainment

CFD Modeling/Air Dispersion Studies

Generator Exhaust



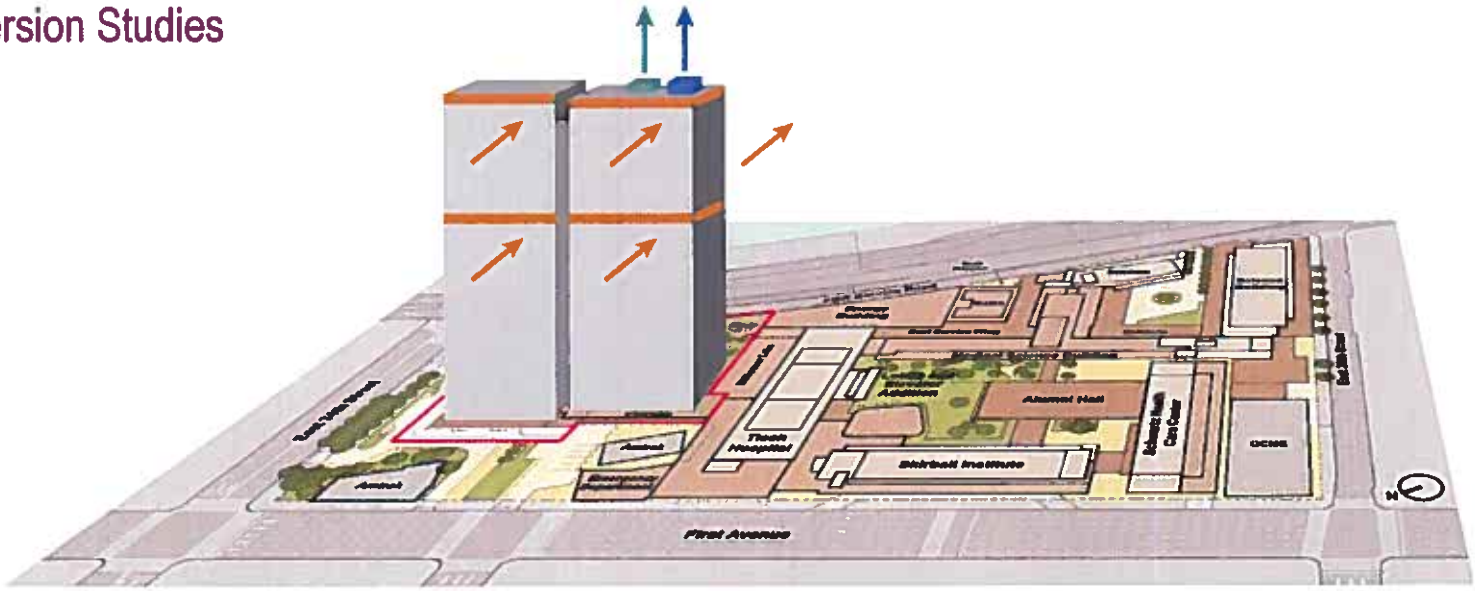
MEP System Design for Infection Control

Air Entrainment

CFD Modeling/Air Dispersion Studies

Generator Exhaust

Cooling Towers



MEP System Design for Infection Control

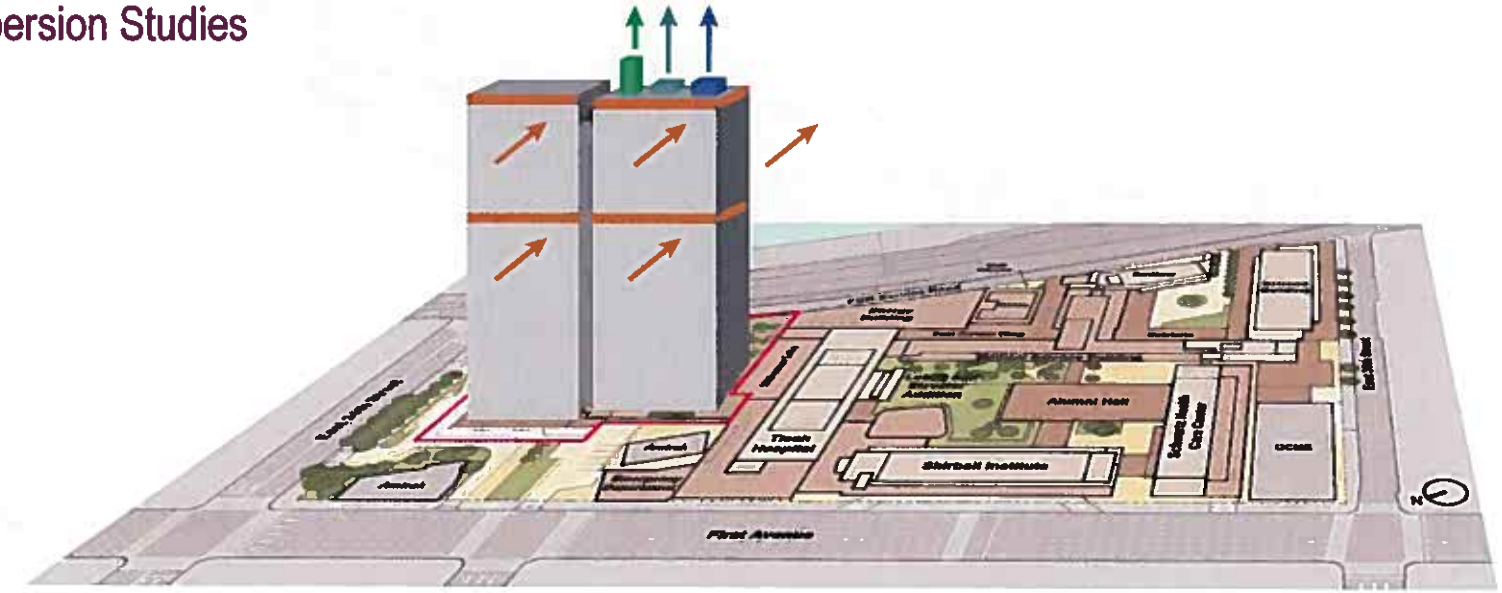
Air Entrainment

CFD Modeling/Air Dispersion Studies

Generator Exhaust

Cooling Towers

Cogen Stack



MEP System Design for Infection Control

Air Entrainment

CFD Modeling/Air Dispersion Studies

Generator Exhaust

Cooling Towers

Cogen Stack

All Exhaust Fans