# Sustainable Urban Campus Planning in New York City

Course Number  FR104

June 22, 7:00AM

100LU, HSW, GBCI, RIBA

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

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# Speakers List

- Nilda Mesa, Director, Urban Sustainability and Equity Planning, CSUD Earth Institute; Adjunct Professor, SIPA, Columbia University
- Marcelo Velez, Vice President, Columbia University Manhattanville Development
- Serge Drouin, Associate Architect, Renzo Piano Building Workshop
- Nico Kienzl, Director, Atelier Ten

# Course / Learning Objectives

- Examine how campus planning principles have changed to advance a more inclusive academic community that engages the surrounding neighborhood.
- See how a 21st-century urban university campus can become a catalyst to revitalize a previously underused brownfield site by leveraging architectural invention and open spaces to welcome the surrounding community.
- Discover how to meet the evolving energy and performance demands for educational facilities while simultaneously integrating the facility into an existing urban fabric.
- Explore how sustainability can play a leading role in an urban development and how sustainability aspirations can act as a guide throughout a project's development.

# Nilda Mesa

## Director, Urban Sustainability and Equity Planning, Earth Institute, Columbia University

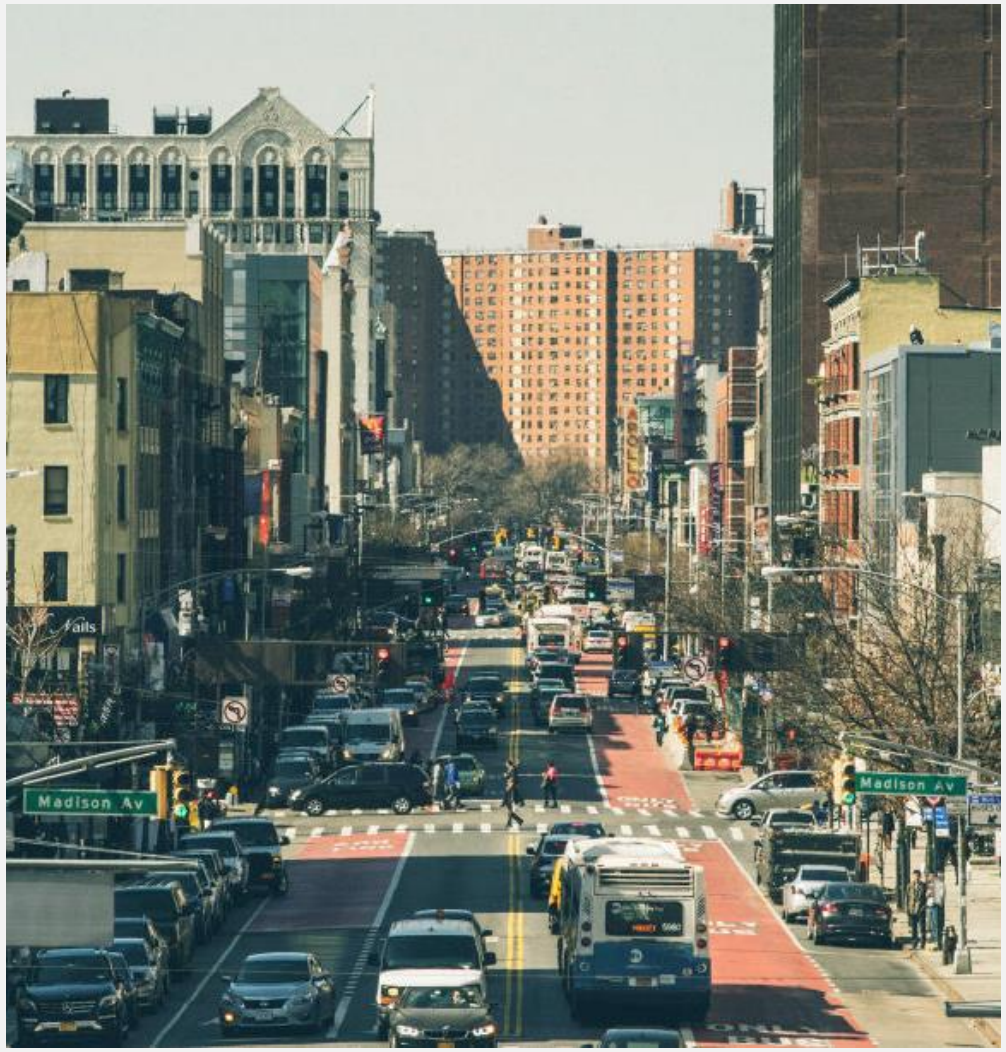
# Context

- Long running issues in Harlem:
  - Air quality/asthma
  - Gentrification/housing availability
  - Jobs/income level

- Representation/Rezoning

- History of conflict between community and University – trust issues

- Process: Engaged community, many meetings, use of LEED-ND pilot



# New Columbia Manhattanville campus

- Work with USGBC:
  - Lab, provided feedback - aimed for LEED ND Platinum
- Transportation Oriented Development
  - Shuttle, enhanced 125th street MTA access
- Neighborhood amenities + community benefits agreement
- Jobs office
- Commitment to educational exchange, inclusion, programs
- Community access to campus

# New York City

Bigger picture: OneNYC

2015 – NYC's long term sustainability plan

Included equity and economic development – a first

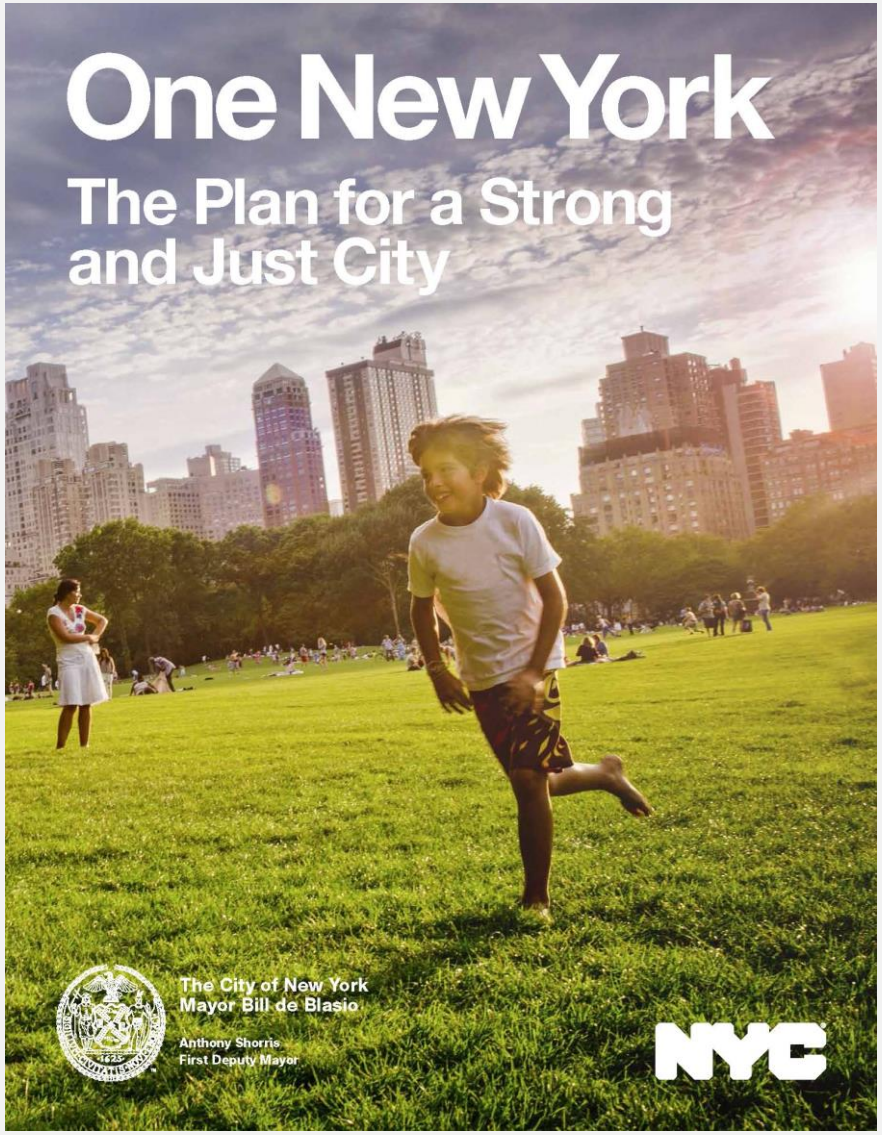
Influences other cities today

Tied to United Nations Sustainable Development Goals (SDGs)

Manhattanville lessons = Big influence

Neighborhood scale – it's all connected

Same with City scale



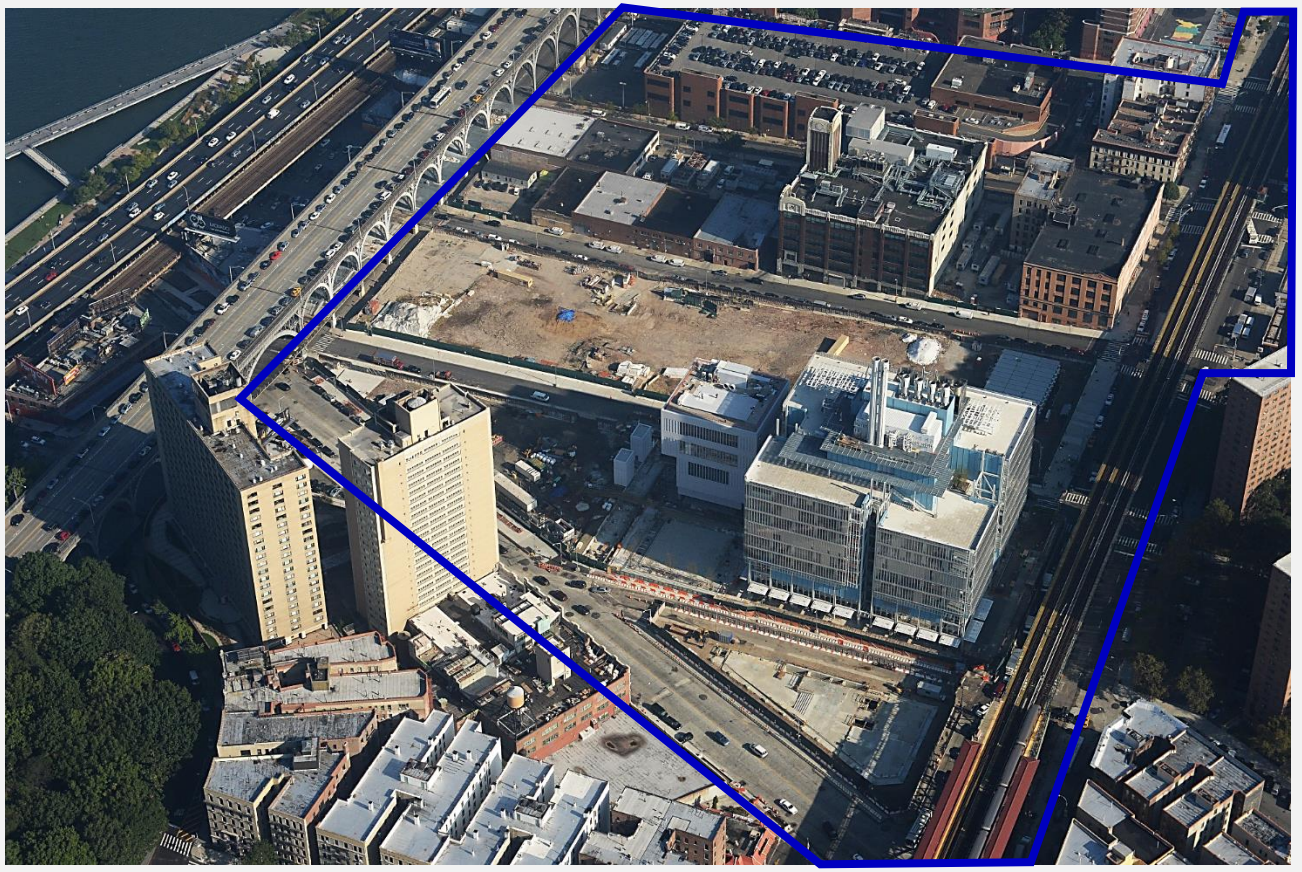
# OneNYC: Four Visions

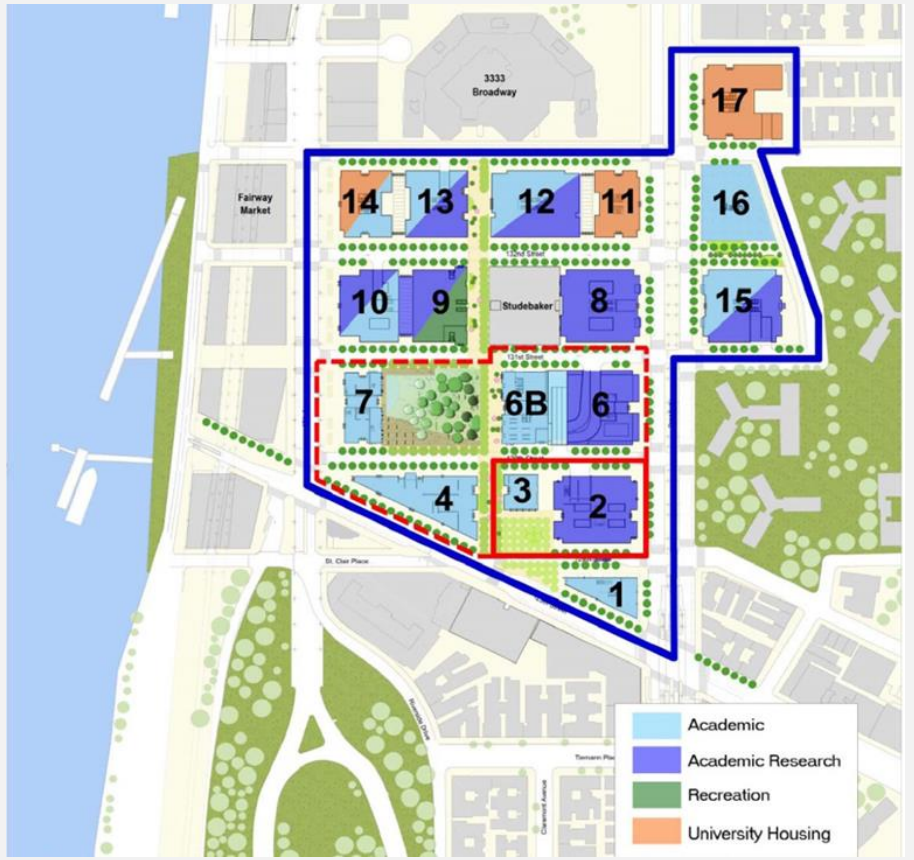
# Marcelo Velez

## Vice President, Columbia University, Manhattanville Development

# Columbia University Manhattanville - New Vision for Urban Campus


# Manhattanville Campus in West Harlem

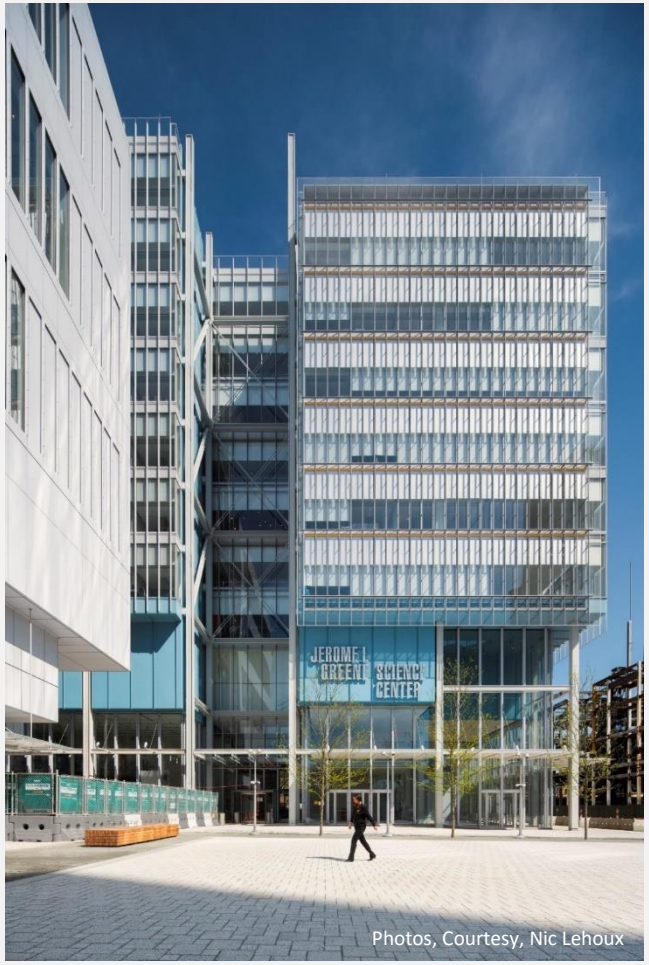




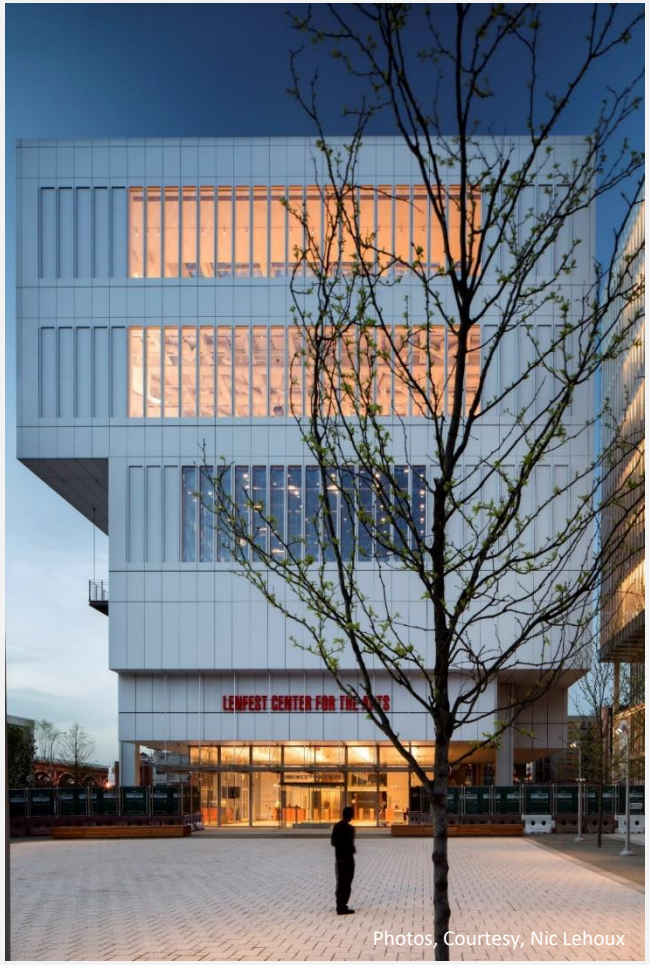
# Key Campus Design Principles

- Transparency in Building Form
- No Gates or Walls
- Active Ground Floor Uses and Revitalization of Streets
- Contiguous Below Grade Services
- Network of Open Spaces and Waterfront Linkages

# Transparency in Building Form



Photos, Courtesy, Nic Lehoux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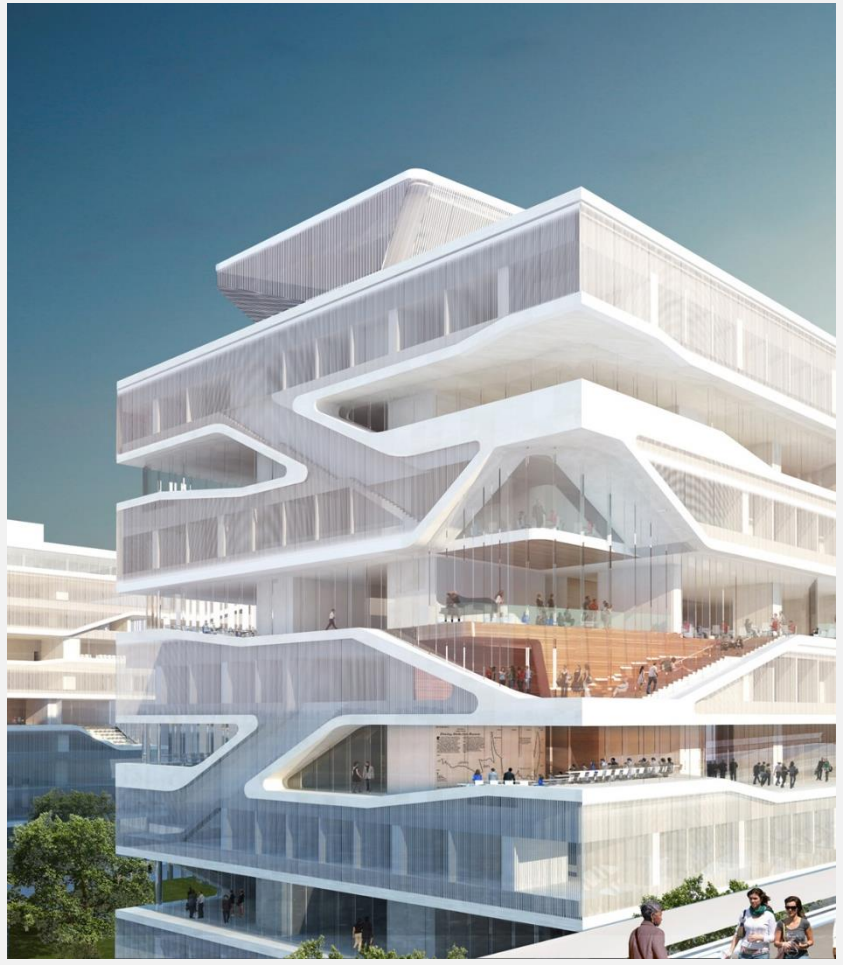
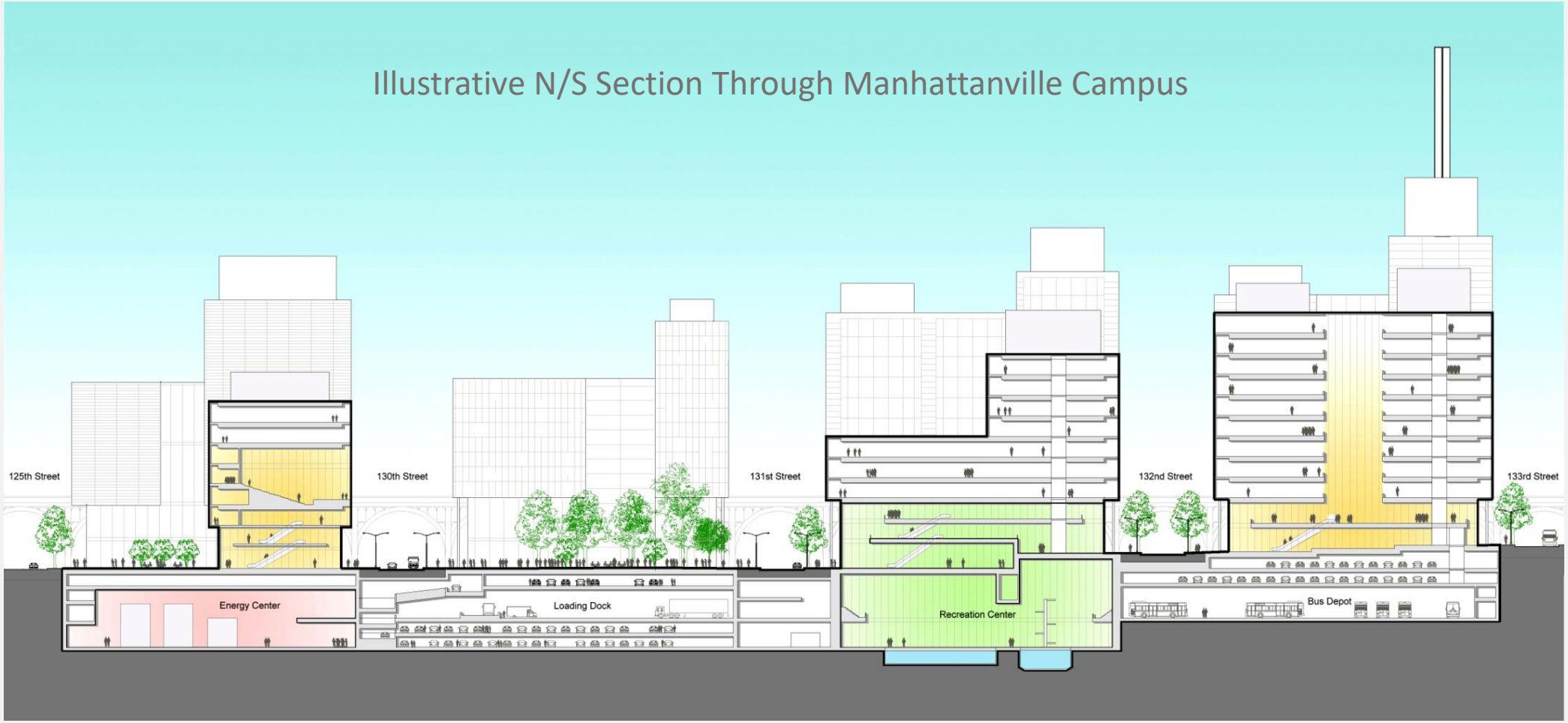


# No Gates or Walls

Photos, Courtesy, Tiffany Williams

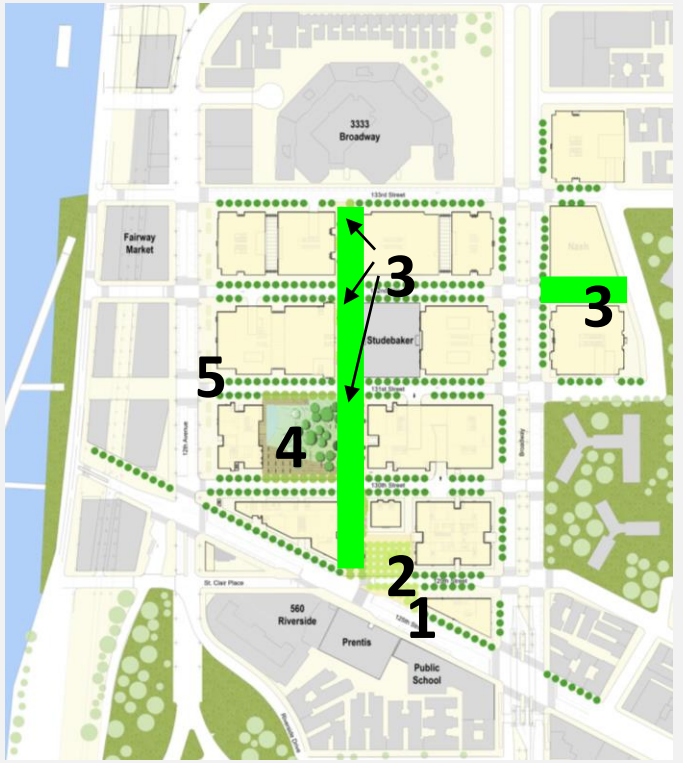
# Active Ground Floor Uses and Revitalization of Streets


# Contiguous Below Grade Services



# Network of Open Spaces and Waterfront Linkages

Conceptual Design; Axonometric View of Manhattanville Campus

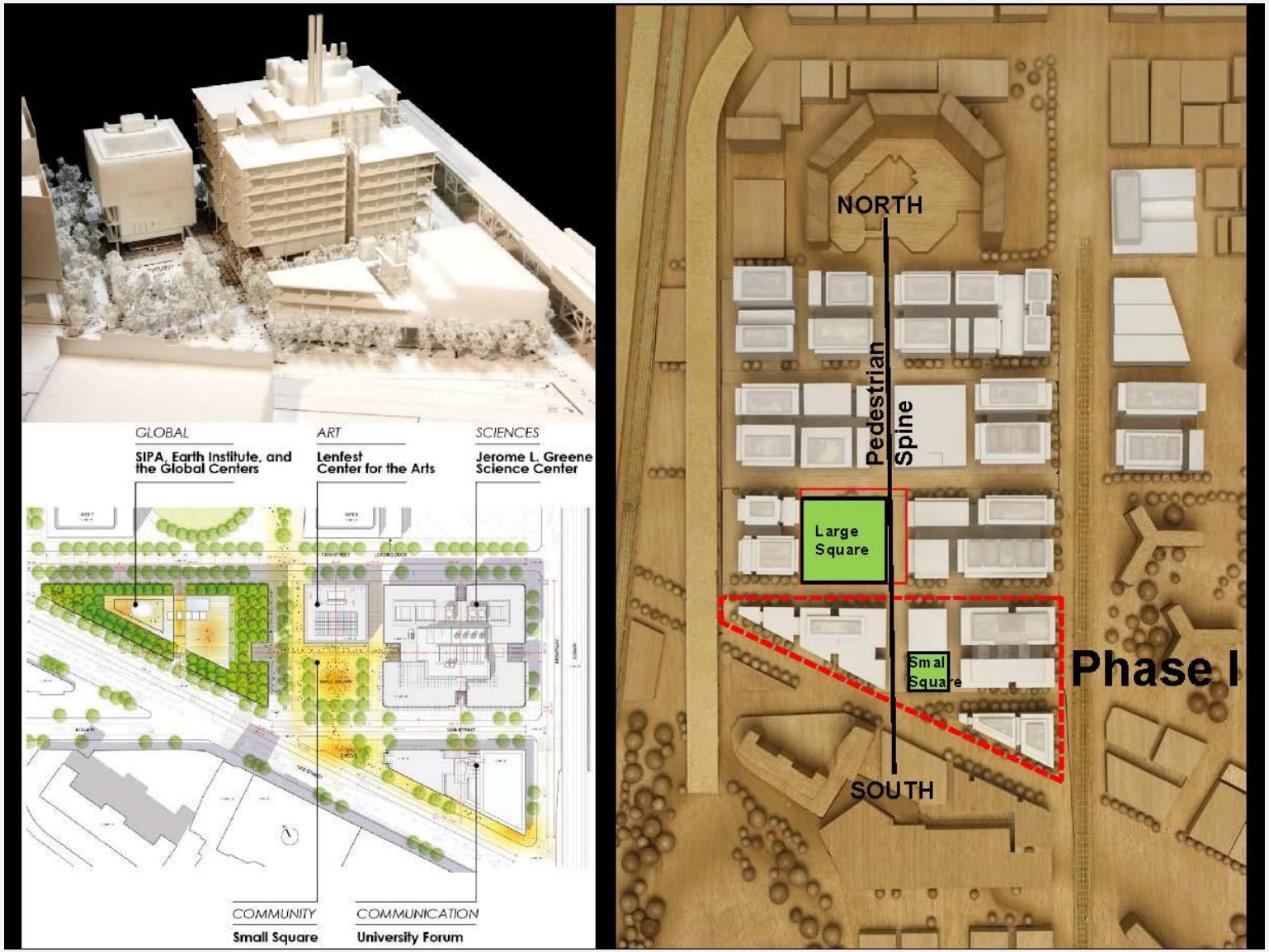



1. The Grove
2. The Small Square
3. Mid-block Open Area
4. The Square
5. 12th Ave Market Zone

# Serge Drouin

## Associate Architect, Renzo Piano Building Workshop

# Columbia Univ. Manhattanville Phase 1

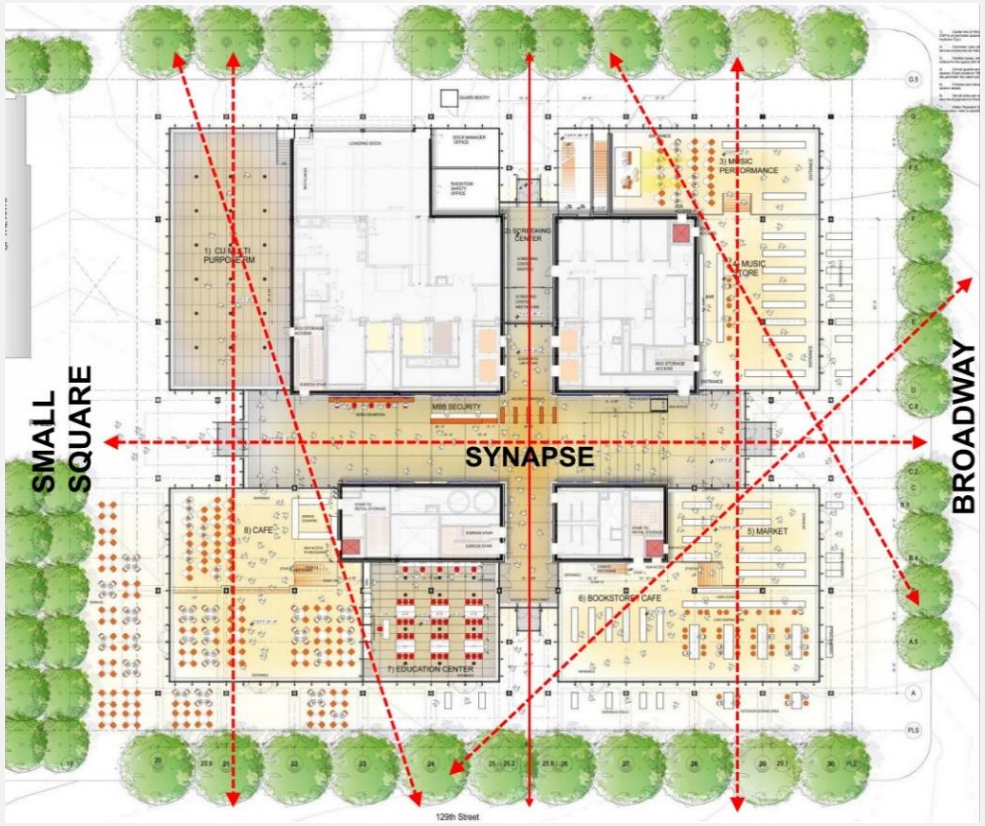


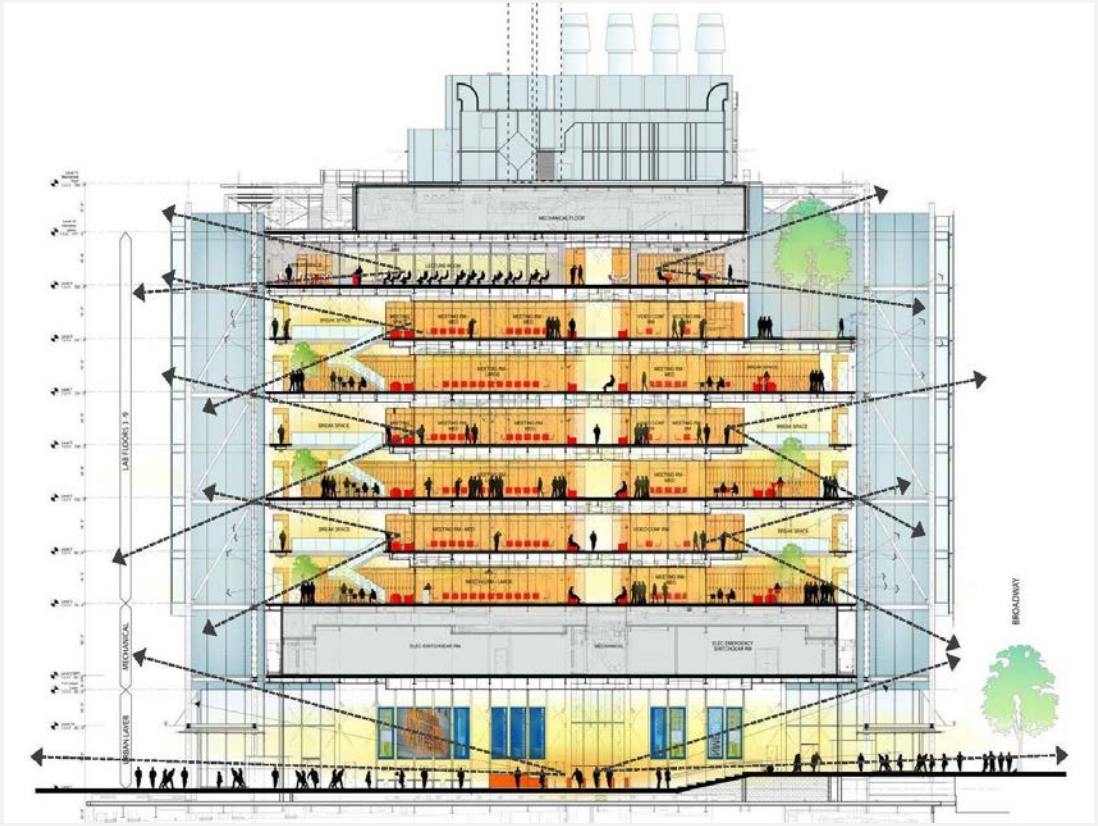
# Projects

Jerome L. Greene Science Center and Lenfest Center for the Arts


University Forum

# Jerome L. Greene Science Center



# Jerome L. Greene Science Center

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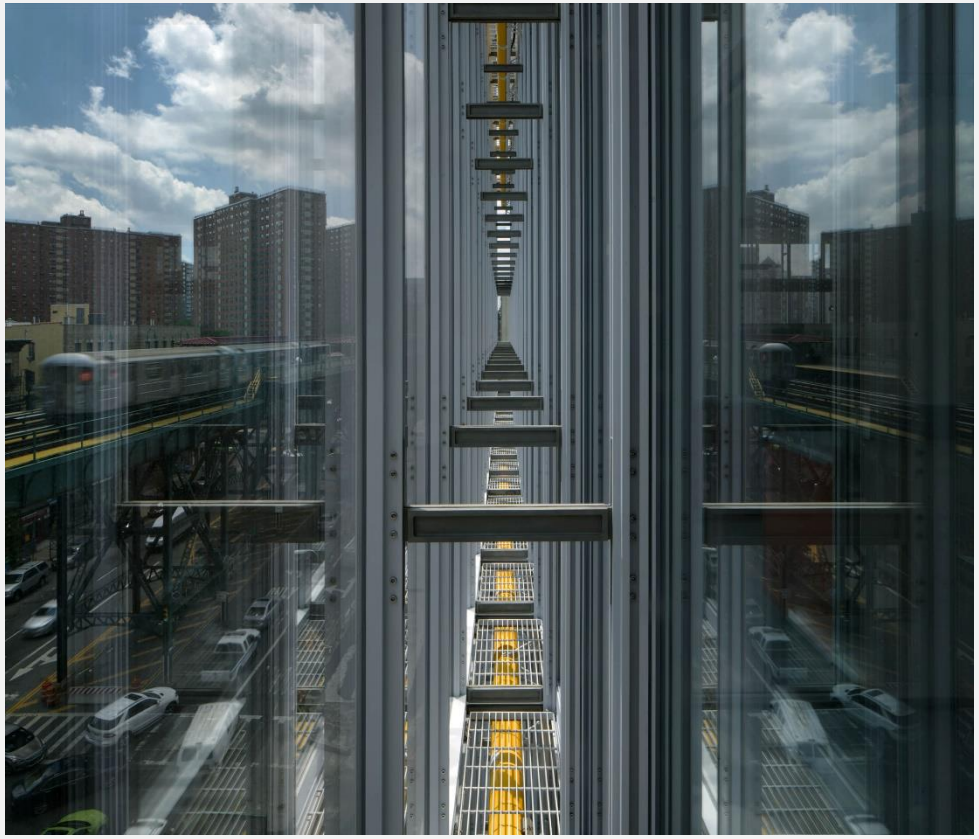
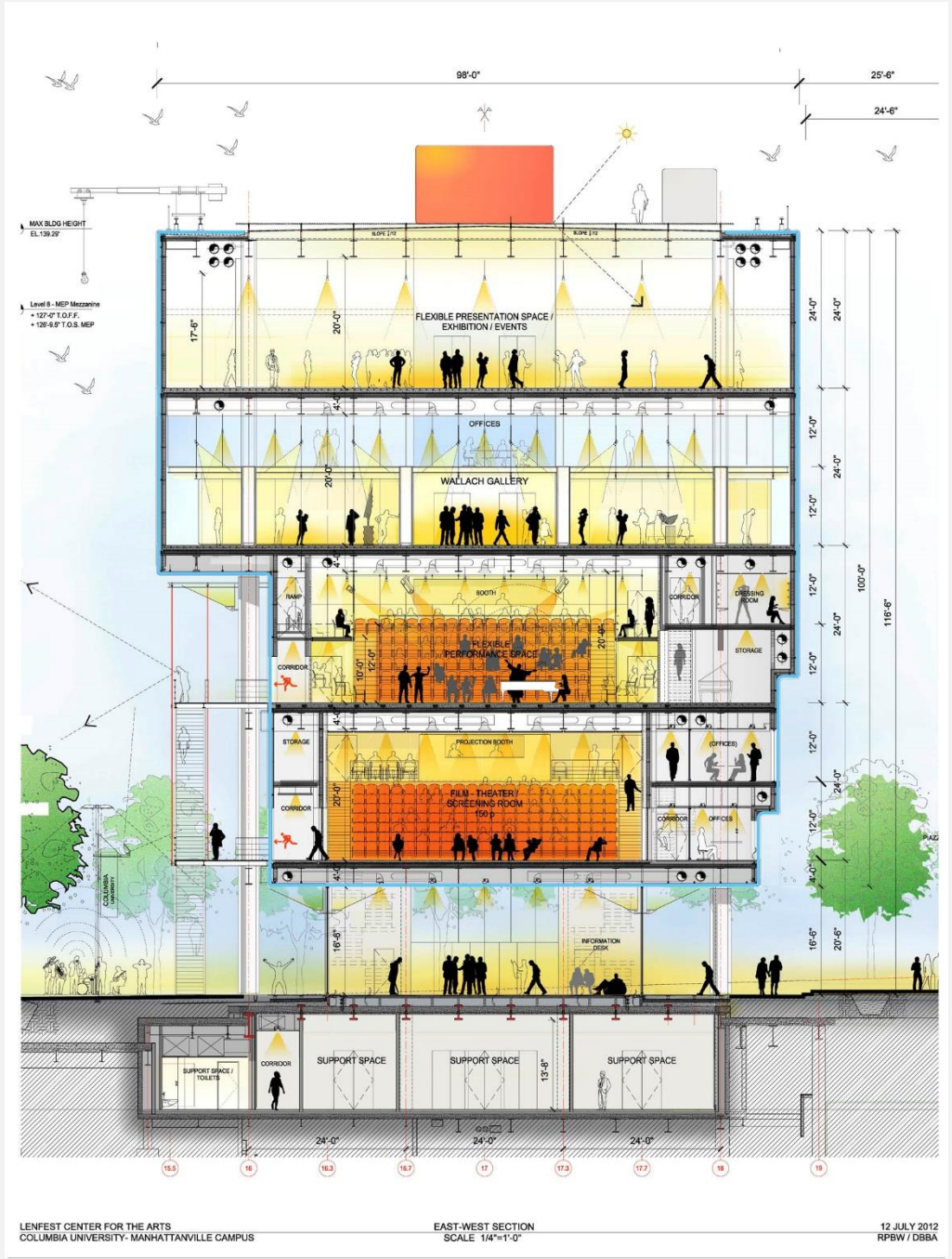


# Jerome L. Greene Science Center

# Lenfest Center for the Arts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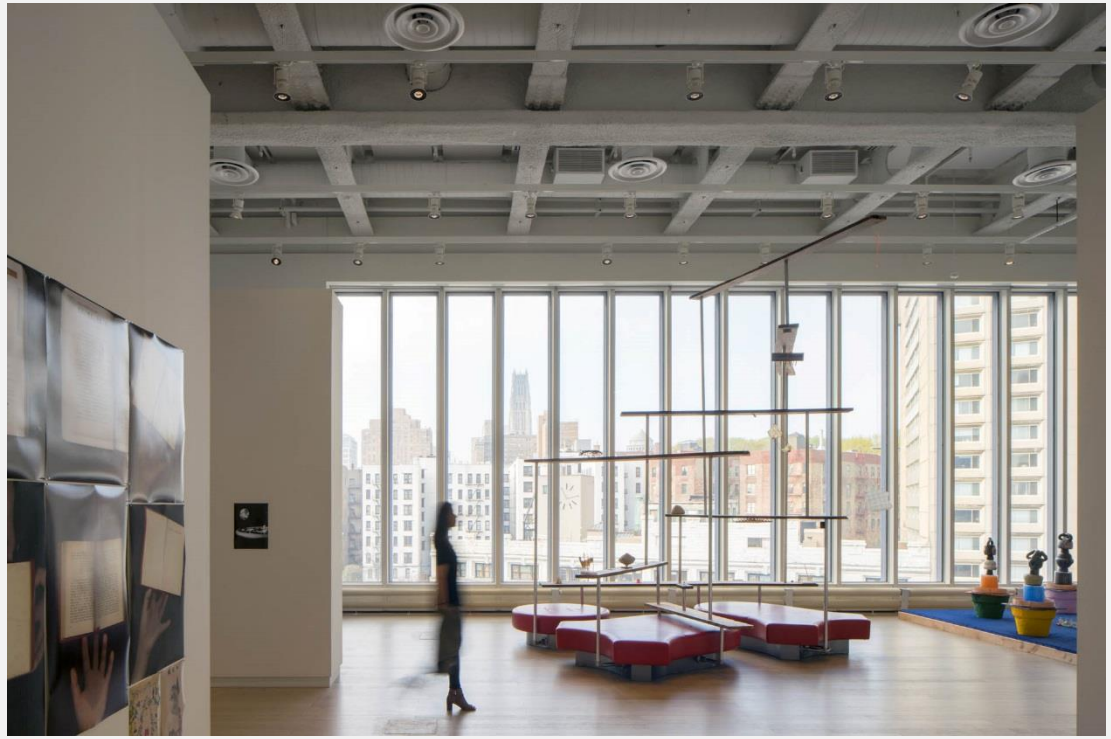
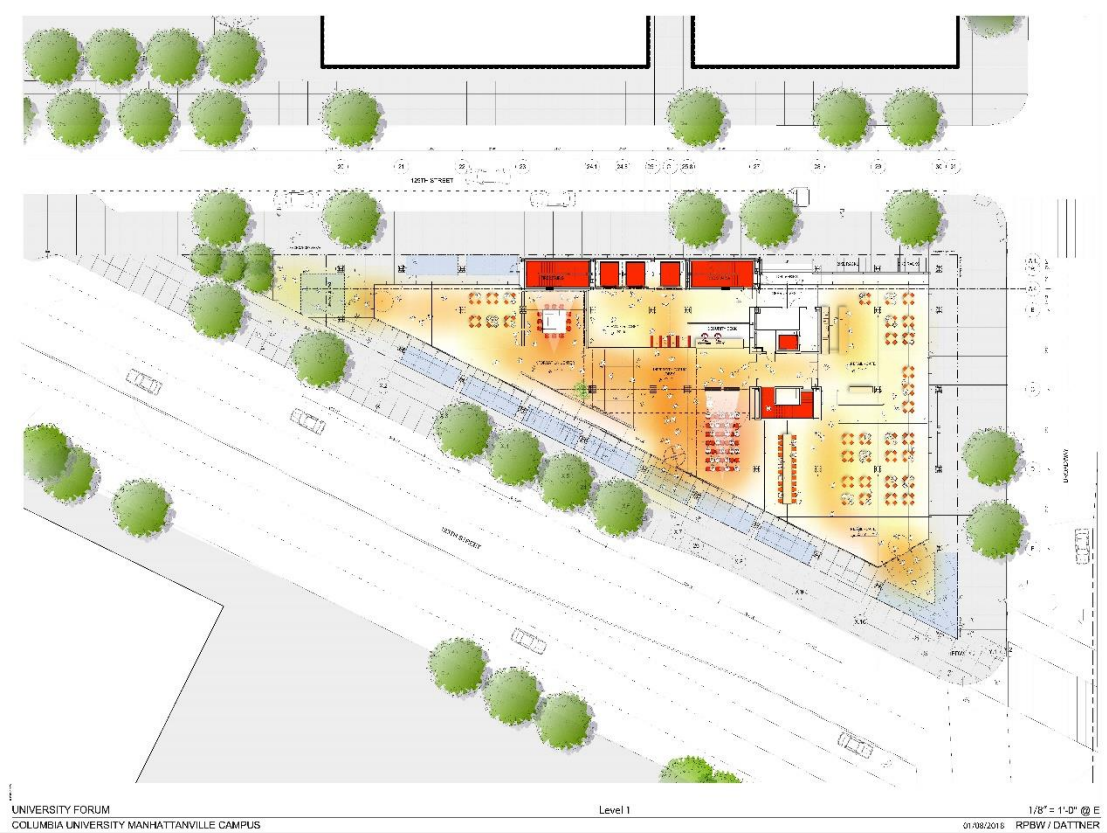
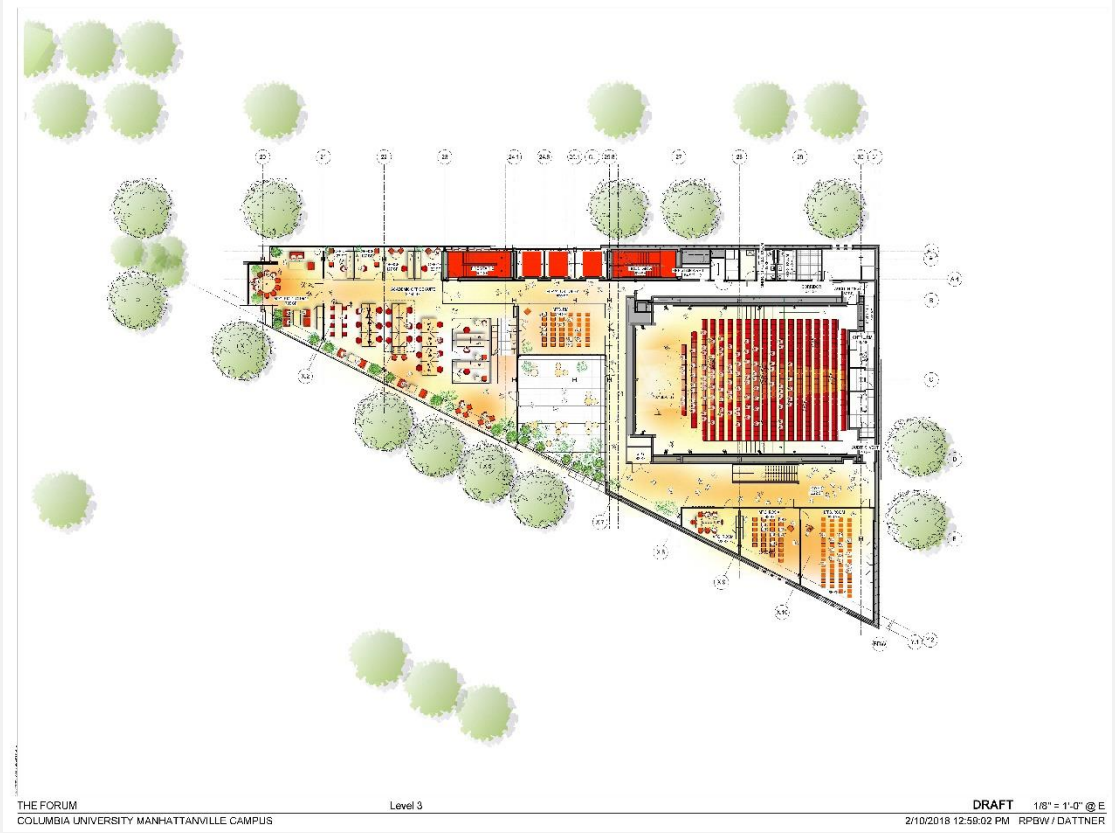


# University Forum



# University Forum


# University Forum


# Nico Kienzl

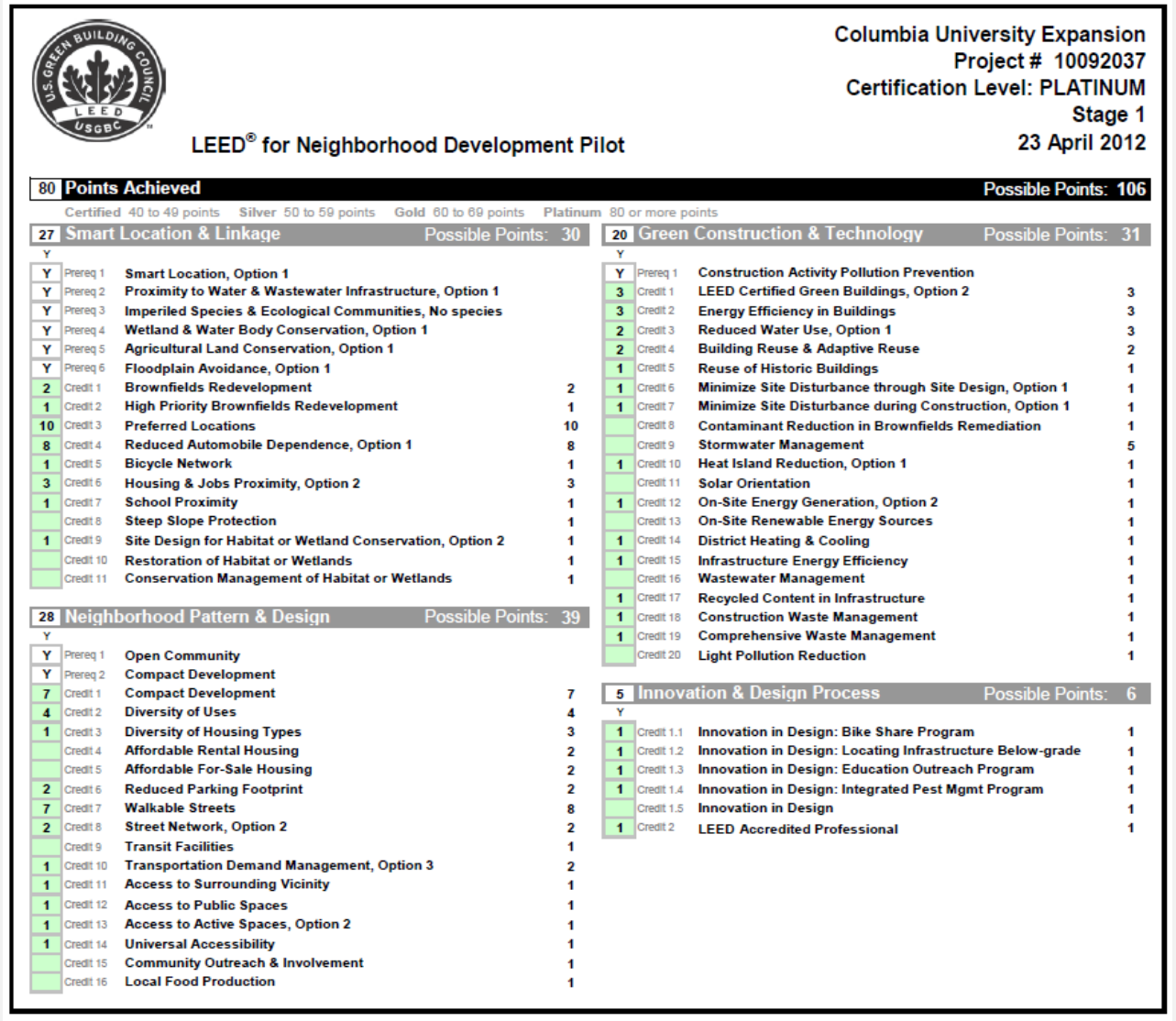
## Director, Atelier Ten

# Sustainable Design - Masterplan

- Sustainability commitment as part of public process
- 30 year development timeline
- Development in phases
- Buildings and infrastructure both support the overall sustainability mission

# LEED ND Platinum
## Pilot Stage 1 certified plan

- First LEED ND Platinum for university campus in the U.S.
- Collaboration with the USGBC to improve credit calculation methods (e.g. SLLc3 Preferred Locations credit)
- Challenges for large developments with extended project schedules



Columbia University Expansion
Project # 10092037
Certification Level: PLATINUM
Stage 1
23 April 2012

LEED® for Neighborhood Development Pilot

**80 Points Achieved** — Possible Points: 106

Certified 40 to 49 points | Silver 50 to 59 points | Gold 60 to 69 points | Platinum 80 or more points

**27 Smart Location & Linkage** — Possible Points: 30

| Y | | | |
|---|---|---|---|
| Y | Prereq 1 | Smart Location, Option 1 | |
| Y | Prereq 2 | Proximity to Water & Wastewater Infrastructure, Option 1 | |
| Y | Prereq 3 | Imperiled Species & Ecological Communities, No species | |
| Y | Prereq 4 | Wetland & Water Body Conservation, Option 1 | |
| Y | Prereq 5 | Agricultural Land Conservation, Option 1 | |
| Y | Prereq 6 | Floodplain Avoidance, Option 1 | |
| 2 | Credit 1 | Brownfields Redevelopment | 2 |
| 1 | Credit 2 | High Priority Brownfields Redevelopment | 1 |
| 10 | Credit 3 | Preferred Locations | 10 |
| 8 | Credit 4 | Reduced Automobile Dependence, Option 1 | 8 |
| 1 | Credit 5 | Bicycle Network | 1 |
| 3 | Credit 6 | Housing & Jobs Proximity, Option 2 | 3 |
| 1 | Credit 7 | School Proximity | 1 |
| | Credit 8 | Steep Slope Protection | 1 |
| 1 | Credit 9 | Site Design for Habitat or Wetland Conservation, Option 2 | 1 |
| | Credit 10 | Restoration of Habitat or Wetlands | 1 |
| | Credit 11 | Conservation Management of Habitat or Wetlands | 1 |

**28 Neighborhood Pattern & Design** — Possible Points: 39

| Y | | | |
|---|---|---|---|
| Y | Prereq 1 | Open Community | |
| Y | Prereq 2 | Compact Development | |
| 7 | Credit 1 | Compact Development | 7 |
| 4 | Credit 2 | Diversity of Uses | 4 |
| 1 | Credit 3 | Diversity of Housing Types | 3 |
| | Credit 4 | Affordable Rental Housing | 2 |
| | Credit 5 | Affordable For-Sale Housing | 2 |
| 2 | Credit 6 | Reduced Parking Footprint | 2 |
| 7 | Credit 7 | Walkable Streets | 8 |
| 2 | Credit 8 | Street Network, Option 2 | 2 |
| | Credit 9 | Transit Facilities | 1 |
| 1 | Credit 10 | Transportation Demand Management, Option 3 | 2 |
| 1 | Credit 11 | Access to Surrounding Vicinity | 1 |
| 1 | Credit 12 | Access to Public Spaces | 1 |
| 1 | Credit 13 | Access to Active Spaces, Option 2 | 1 |
| 1 | Credit 14 | Universal Accessibility | 1 |
| | Credit 15 | Community Outreach & Involvement | 1 |
| | Credit 16 | Local Food Production | 1 |

**20 Green Construction & Technology** — Possible Points: 31

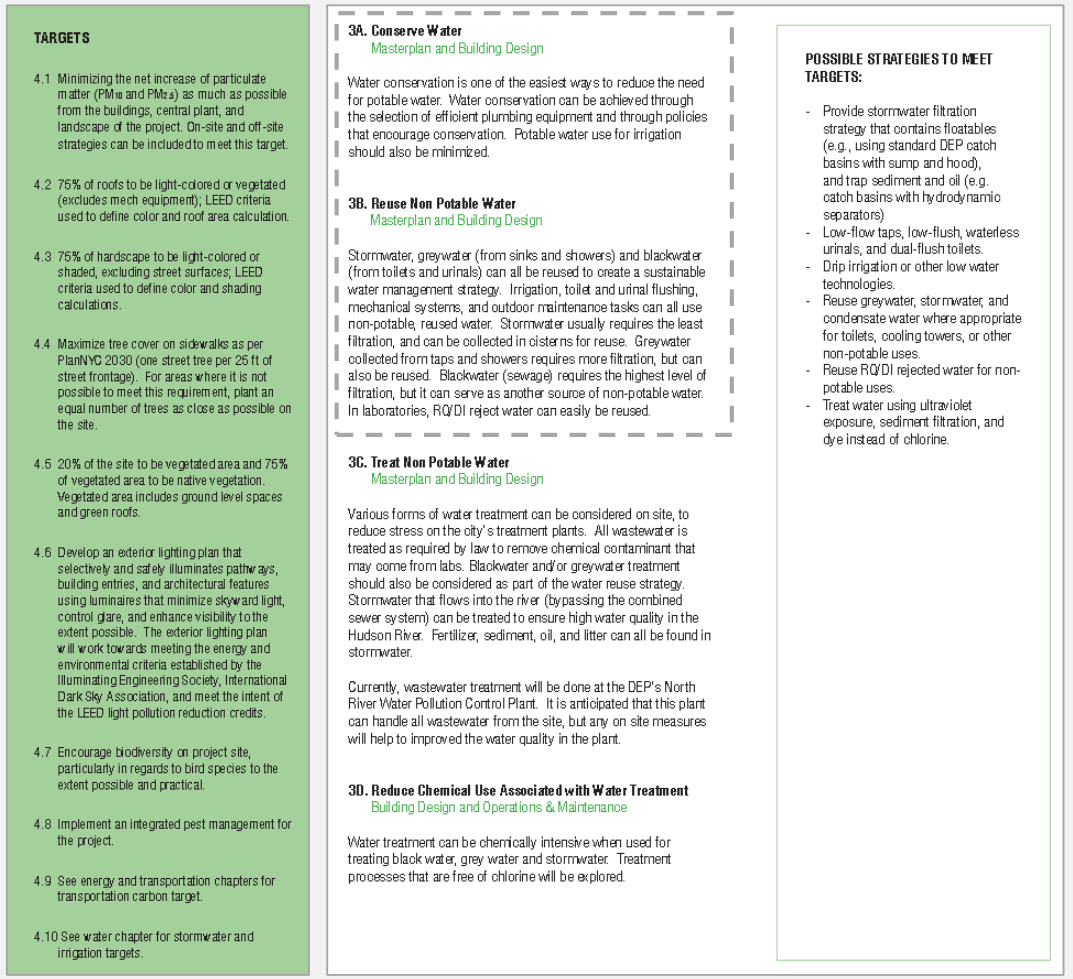
| Y | | | |
|---|---|---|---|
| Y | Prereq 1 | Construction Activity Pollution Prevention | |
| 3 | Credit 1 | LEED Certified Green Buildings, Option 2 | 3 |
| 3 | Credit 2 | Energy Efficiency in Buildings | 3 |
| 2 | Credit 3 | Reduced Water Use, Option 1 | 3 |
| 2 | Credit 4 | Building Reuse & Adaptive Reuse | 2 |
| 1 | Credit 5 | Reuse of Historic Buildings | 1 |
| 1 | Credit 6 | Minimize Site Disturbance through Site Design, Option 1 | 1 |
| 1 | Credit 7 | Minimize Site Disturbance during Construction, Option 1 | 1 |
| | Credit 8 | Contaminant Reduction in Brownfields Remediation | 1 |
| | Credit 9 | Stormwater Management | 5 |
| 1 | Credit 10 | Heat Island Reduction, Option 1 | 1 |
| | Credit 11 | Solar Orientation | 1 |
| 1 | Credit 12 | On-Site Energy Generation, Option 2 | 1 |
| | Credit 13 | On-Site Renewable Energy Sources | 1 |
| 1 | Credit 14 | District Heating & Cooling | 1 |
| 1 | Credit 15 | Infrastructure Energy Efficiency | 1 |
| | Credit 16 | Wastewater Management | 1 |
| 1 | Credit 17 | Recycled Content in Infrastructure | 1 |
| 1 | Credit 18 | Construction Waste Management | 1 |
| 1 | Credit 19 | Comprehensive Waste Management | 1 |
| | Credit 20 | Light Pollution Reduction | 1 |

**5 Innovation & Design Process** — Possible Points: 6

| Y | | | |
|---|---|---|---|
| 1 | Credit 1.1 | Innovation in Design: Bike Share Program | 1 |
| 1 | Credit 1.2 | Innovation in Design: Locating Infrastructure Below-grade | 1 |
| 1 | Credit 1.3 | Innovation in Design: Education Outreach Program | 1 |
| 1 | Credit 1.4 | Innovation in Design: Integrated Pest Mgmt Program | 1 |
| | Credit 1.5 | Innovation in Design | 1 |
| 1 | Credit 2 | LEED Accredited Professional | 1 |

# Framework

- Project specific guidelines and implementation plans
- Explain rational of measures, strategies and targets
- Establish building, site, infrastructure and operation targets



**TARGETS**

4.1 Minimizing the net increase of particulate matter ($PM_{10}$ and $PM_{2.5}$) as much as possible from the buildings, central plant, and landscape of the project. On-site and off-site strategies can be included to meet this target.

4.2 75% of roofs to be light-colored or vegetated (excludes mech equipment); LEED criteria used to define color and roof area calculation.

4.3 75% of hardscape to be light-colored or shaded, excluding street surfaces; LEED criteria used to define color and shading calculations.

4.4 Maximize tree cover on sidewalks as per PlanNYC 2030 (one street tree per 25 ft of street frontage). For areas where it is not possible to meet this requirement, plant an equal number of trees as close as possible on the site.

4.5 20% of the site to be vegetated area and 75% of vegetated area to be native vegetation. Vegetated area includes ground level spaces and green roofs.

4.6 Develop an exterior lighting plan that selectively and safely illuminates pathways, building entries, and architectural features using luminaires that minimize skyward light, control glare, and enhance visibility to the extent possible. The exterior lighting plan will work towards meeting the energy and environmental criteria established by the Illuminating Engineering Society, International Dark Sky Association, and meet the intent of the LEED light pollution reduction credits.

4.7 Encourage biodiversity on project site, particularly in regards to bird species to the extent possible and practical.

4.8 Implement an integrated pest management for the project.

4.9 See energy and transportation chapters for transportation carbon target.

4.10 See water chapter for stormwater and irrigation targets.

**3A. Conserve Water**
Masterplan and Building Design

Water conservation is one of the easiest ways to reduce the need for potable water. Water conservation can be achieved through the selection of efficient plumbing equipment and through policies that encourage conservation. Potable water use for irrigation should also be minimized.

**3B. Reuse Non Potable Water**
Masterplan and Building Design

Stormwater, greywater (from sinks and showers) and blackwater (from toilets and urinals) can all be reused to create a sustainable water management strategy. Irrigation, toilet and urinal flushing, mechanical systems, and outdoor maintenance tasks can all use non-potable, reused water. Stormwater usually requires the least filtration, and can be collected in cisterns for reuse. Greywater collected from taps and showers requires more filtration, but can also be reused. Blackwater (sewage) requires the highest level of filtration, but it can serve as another source of non-potable water. In laboratories, RO/DI reject water can easily be reused.

**3C. Treat Non Potable Water**
Masterplan and Building Design

Various forms of water treatment can be considered on site, to reduce stress on the city's treatment plants. All wastewater is treated as required by law to remove chemical contaminant that may come from labs. Blackwater and/or greywater treatment should also be considered as part of the water reuse strategy. Stormwater that flows into the river (bypassing the combined sewer system) can be treated to ensure high water quality in the Hudson River. Fertilizer, sediment, oil, and litter can all be found in stormwater.

Currently, wastewater treatment will be done at the DEP's North River Water Pollution Control Plant. It is anticipated that this plant can handle all wastewater from the site, but any on site measures will help to improved the water quality in the plant.

**3D. Reduce Chemical Use Associated with Water Treatment**
Building Design and Operations & Maintenance

Water treatment can be chemically intensive when used for treating black water, grey water and stormwater. Treatment processes that are free of chlorine will be explored.

**POSSIBLE STRATEGIES TO MEET TARGETS:**

- Provide stormwater filtration strategy that contains floatables (e.g., using standard DEP catch basins with sump and hood), and trap sediment and oil (e.g. catch basins with hydrodynamic separators)
- Low-flow taps, low-flush, waterless urinals, and dual-flush toilets.
- Drip irrigation or other low water technologies.
- Reuse greywater, stormwater, and condensate water where appropriate for toilets, cooling towers, or other non-potable uses.
- Reuse RO/DI rejected water for non-potable uses.
- Treat water using ultraviolet exposure, sediment filtration, and dye instead of chlorine.

**3A. Conserve Water**
Masterplan and Building Design

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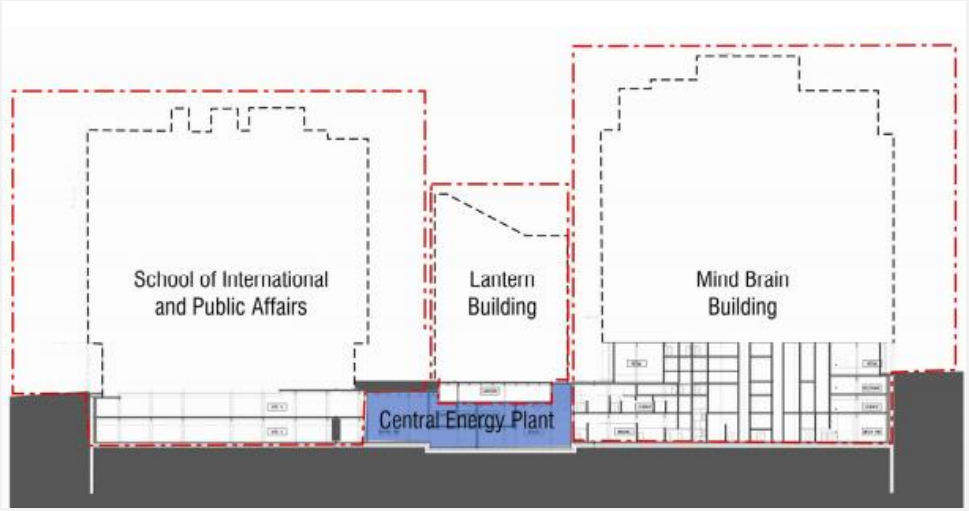
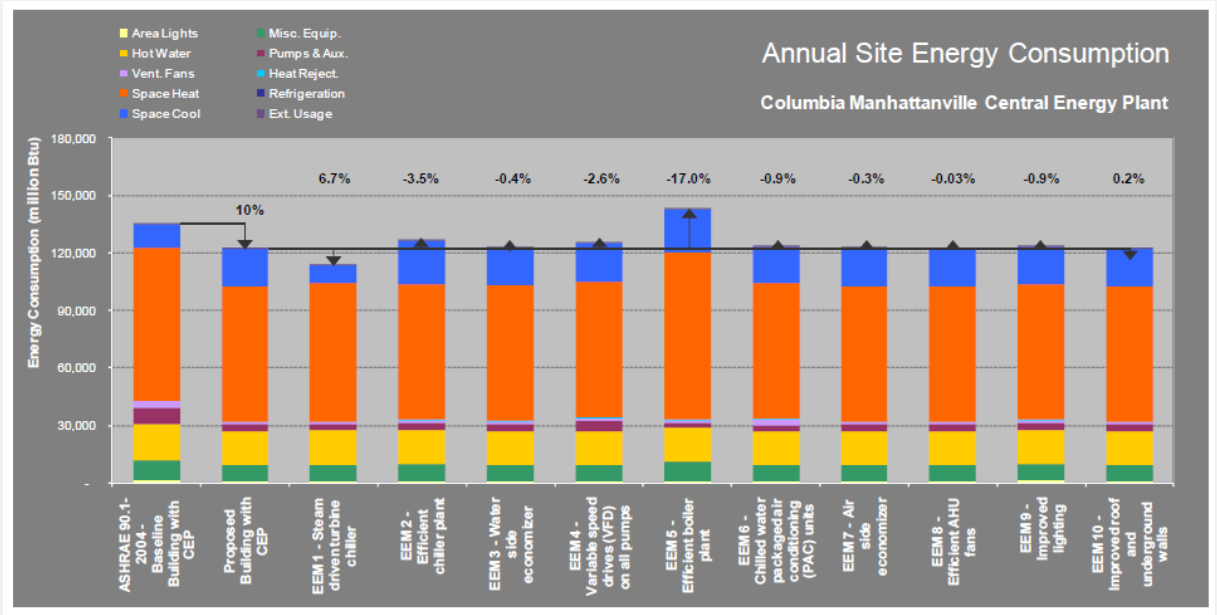
# Energy Infrastructure

- Below grade infrastructure serves all buildings
- Reduced curb cuts and consolidates loading
- Central energy planning improves efficiency and earned utility incentives

# Projects

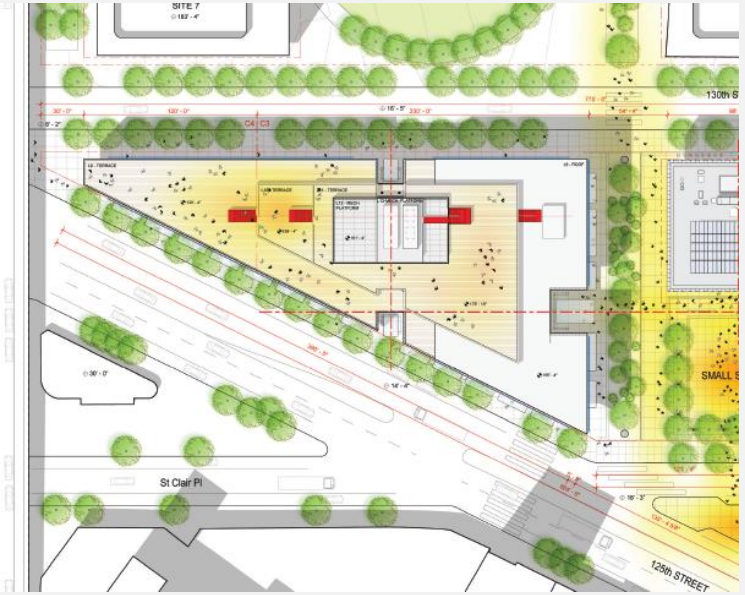

Jerome L. Greene Science Center
LEED Gold certified

Lenfest Center for the Arts
LEED Gold certified

# Projects


University Forum
LEED Gold target

Business School
LEED Gold target

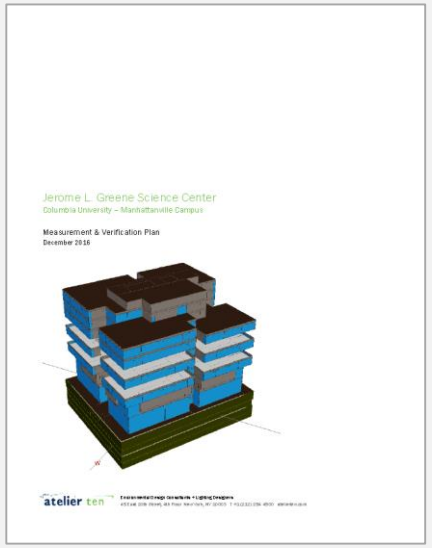



Site 4
LEED Gold target

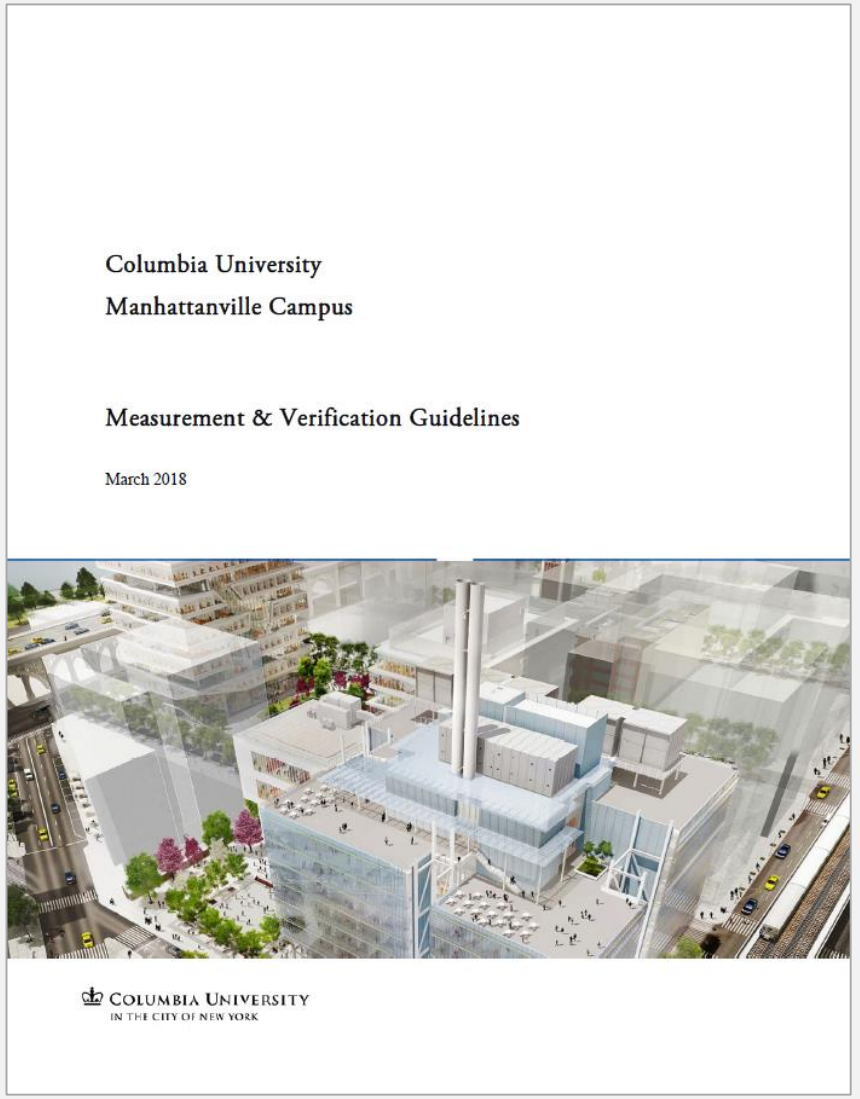
# Implementation Process

After Construction

- M&V plans for all the current construction projects
- Continuous measurement and tracking of building performance
- Continuous commissioning effort







# Current Status

# Thank you!