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*Centre for Buildings, Infrastructure & Public Spaces*

# NYC Housing Authority

*Under the guidance of*

**Prof. Feniosky Pena Mora** & **Prof. Fredric Bell**


- Vignesh Nandha
- Pavan Kantharaj
- Rain Li
- Vijay Mallangi
- Tanushri Ganesh
- Haigang Gui
- Misha Mohan
- Felipe Paniagua
- Daili Peng


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**“Tear down the old, build up the new. Down with rotten antiquated rat holes. Down with hovels, down with disease, down with fire traps, let in the sun, let in the sky, a new day is dawning, a new life, a new America.”**

- **Mayor Fiorello H. LaGuardia**

Mayor Fiorello H. LaGuardia speaking at the dedication of the Harlem River Houses in 1937. The development had 577 apartments. N.Y.C. Housing Authority

# Agenda

1. What is the problem?
2. What has been done?
3. What could be done?

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# NYCHA - New York City Housing Authority


- Provides affordable housing for 600,000 residents of NYC
  - Through leasing
  - Section 8 vouchers
- 8% of the rental housing stock in NYC is owned by NYCHA
- 60% of NYCHA's buildings were built before 1970s
- NYCHA has as a vacancy rate of 0.6% and a waiting list of over 200,000 families.

# A Snapshot of NYCHA's portfolio

**Units**
177,666

**Total Square Footage**
175,174,242

**Buildings**
2,553

**Acreage**
2,473


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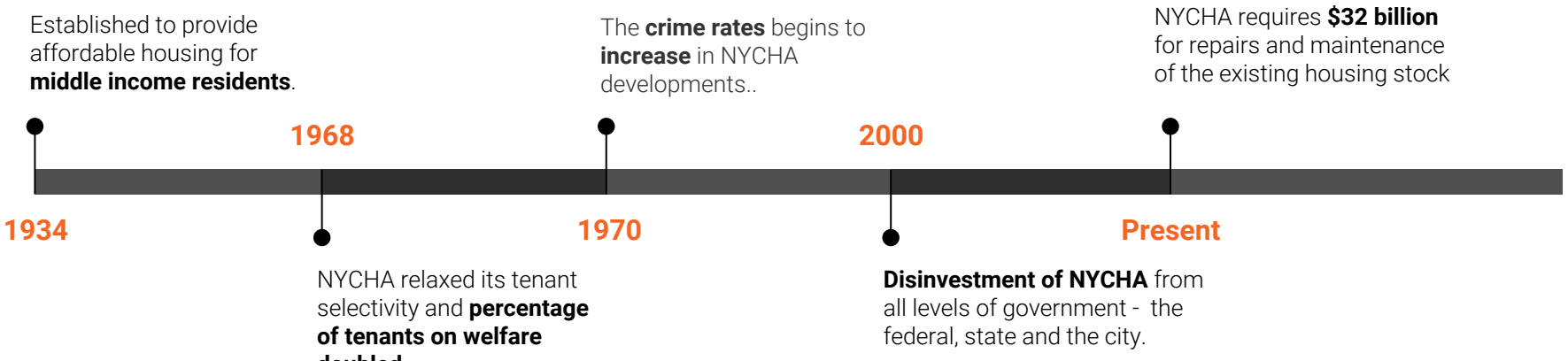
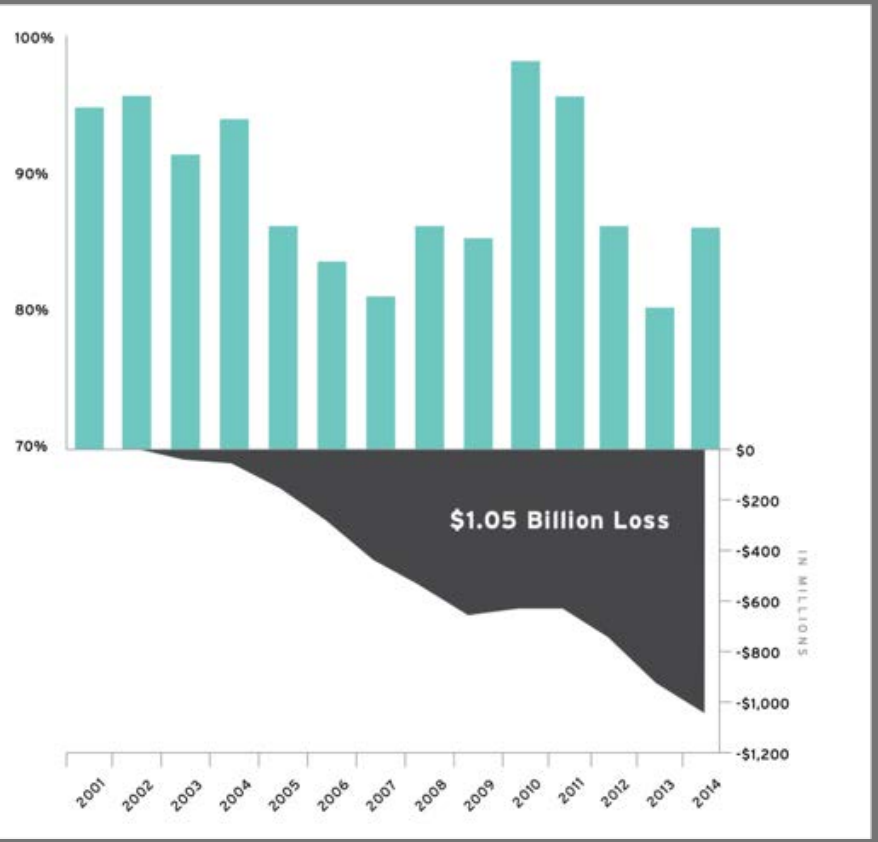
# 1. What is the problem?

# Timeline of NYCHA

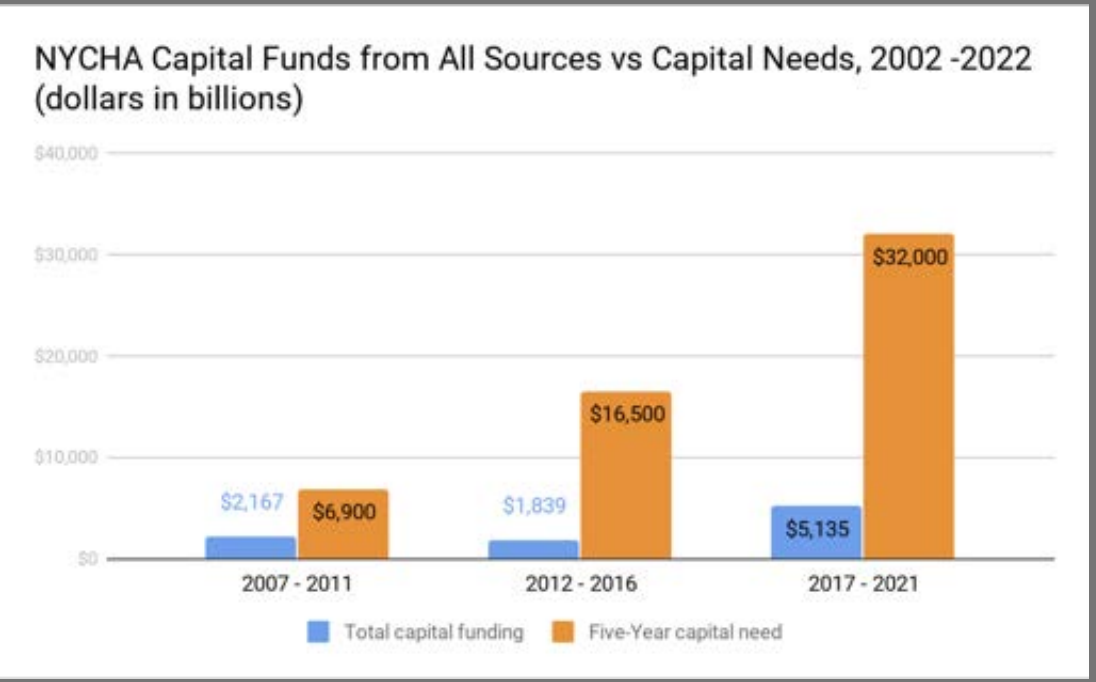





*Federal Operating Funding Cumulative Loss since 2001*
*Source :- NextGeneration NYCHA*

# Financial

- Chronic underfunding in both operational and capital subsidies over past two decades.
- Operating funding loss of $1.05 billion
- Capital funding loss of $1.5 billion




*Source:- Budget for FY 2018 And The Four Year Financial Plan FY 2019-2022, 2017 Physical Needs Assessments, 2011 Physical Needs Assessments.*

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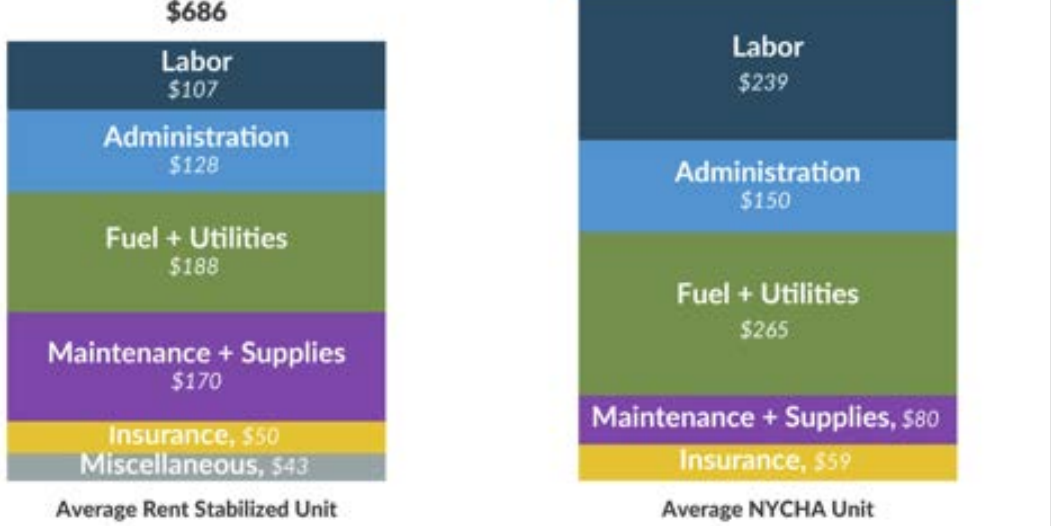
# Financial

- NYCHA conducts Physical needs assessment every 5 years.
- Only a small portion is addressed, this has caused the capital needs balloon to unsustainable levels.

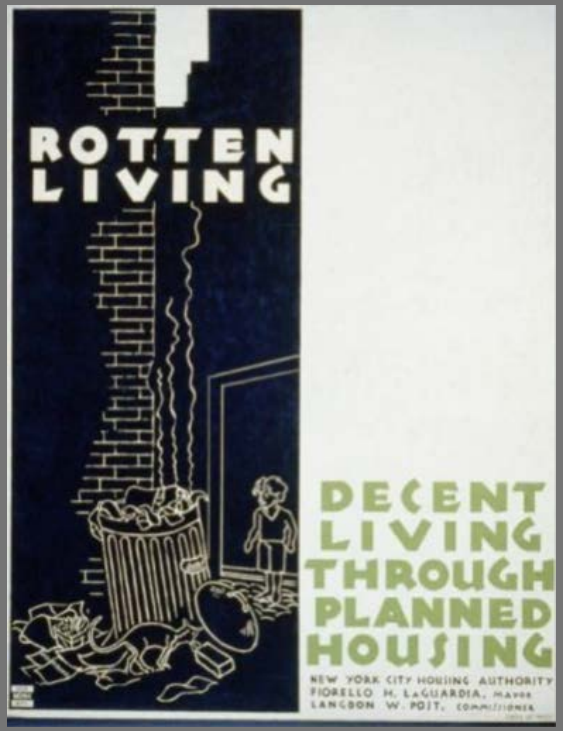
# Operational

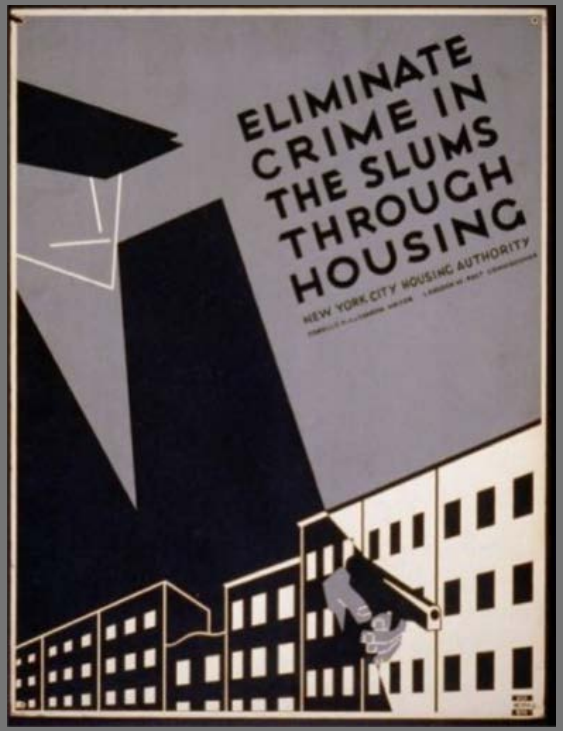



Sources: New York City Housing Authority, *Comprehensive Annual Financial Report for the Years Ended December 31, 2015 and 2014* (October 2016); New York City Rent Guidelines Board, *2017 Income and Expense Study* (March 2017).

- Inefficient procurement process - “Two-step” sealed bidding
- High cost of operations

# PAST → PRESENT ???



**The Colberg family apartment in 1965**
Robert Walker/The New York Times

**Patricia Elcock, 59, used an open oven to heat the apartment she shares with her grandson Michael this winter**
Sam Hodgson for The New York Times

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**The Frasier family in their living room in King Towers in Harlem in 1972**
Chester Higgins Jr./The New York Times

**In this apartment in the Bronx, sewage flows into the apartment when it rains and water leaks from the roof**
Ángel Franco/The New York Times

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# 2. What has been done?

# NextGen NYCHA

- In **May 2015,** Mayor Bill de Blasio announced NextGeneration NYCHA
- **10-year strategic plan** to improve NYCHA housing and operations

# NYCHA 2.0

- Announced on **December 12, 2018** to accelerate NYCHA NextGen plan
- 10-year plan to resolve **$24 billion** need for vital repairs
- Renovations of **175,000 units**
- Launch new strategies for lead paint, mold, elevator, heat and vermin issues



Source: NYCHA 2.0 Part 1

# Objectives

1. Pact to preserve
2. Build to preserve
3. Transfer to preserve

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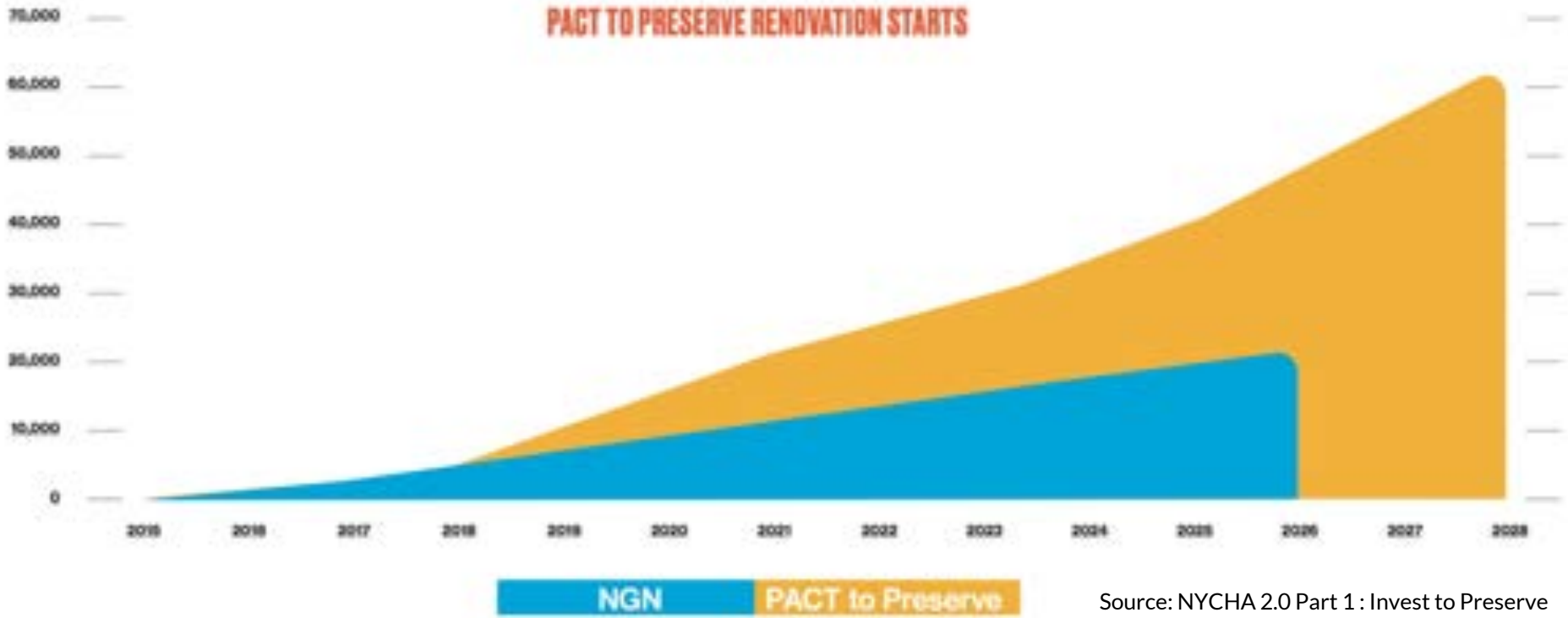
# Pact to Preserve

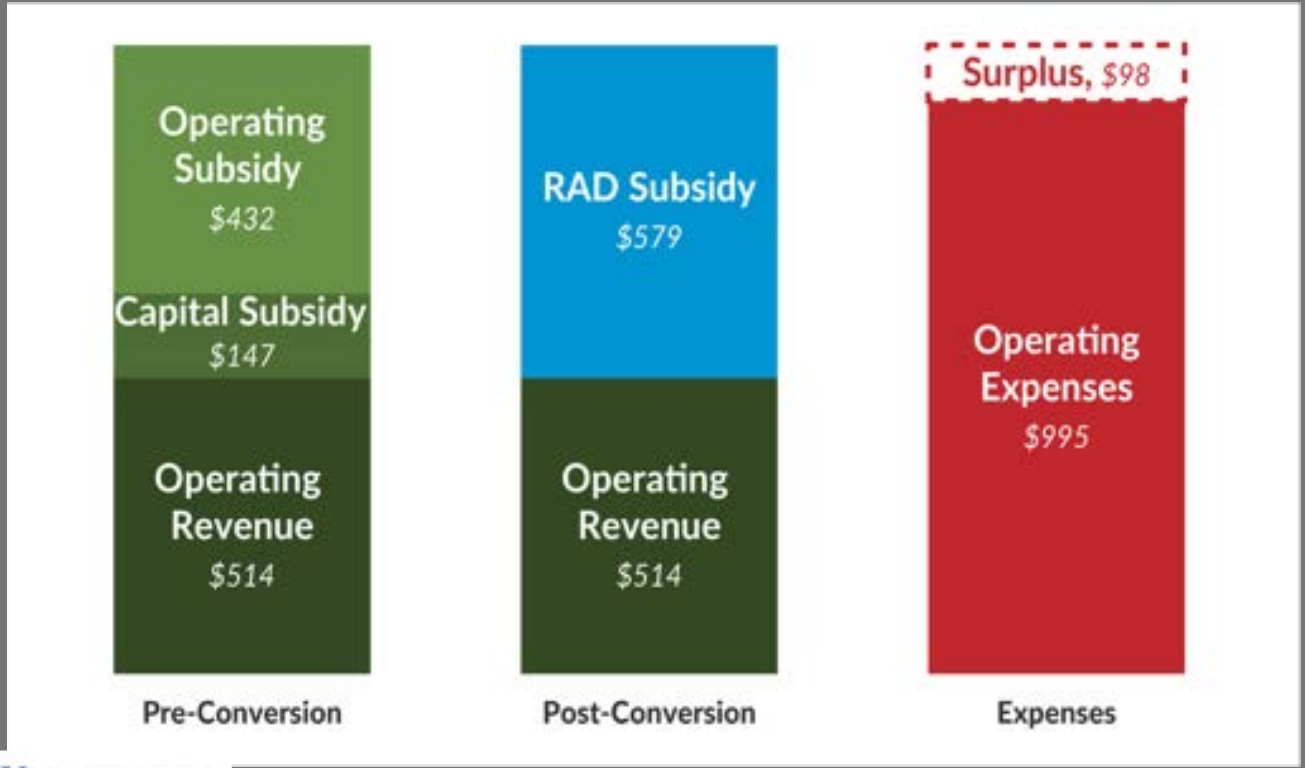



Source: NYCHA 2.0 Part 1 : Invest to Preserve

# PACT & Rental Assistance Demonstration (RAD)

- Conversion of Public Housing to Section 8 vouchers
- Done via Public Private Partnerships
- All the capital needs in the PNA are covered while renovating
- Residents have the same rights as in public housing with the advantages of private firm managing the building.

## NYCHA Average Monthly Per-Unit Rents, Subsidies, and Expenses, Pre- and Post-Conversion Under RAD, 2016

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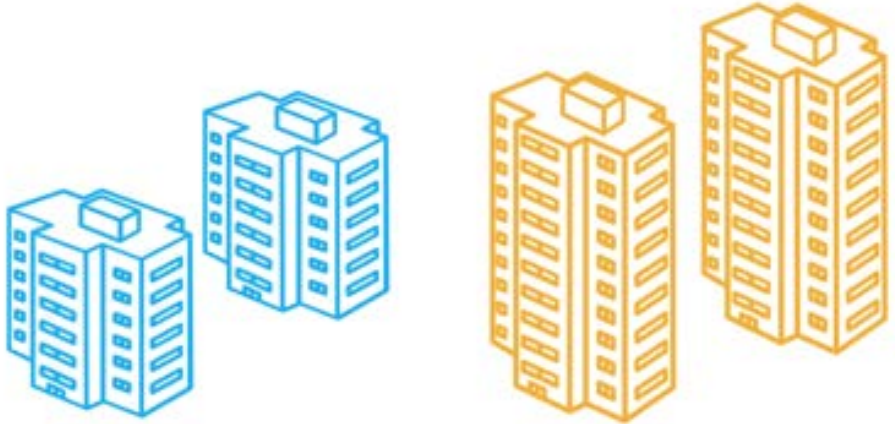
Source: Stabilizing the foundation - Citizens Budget Foundation

# Build to Preserve

## NEW CONSTRUCTION AT TULIP TOWERS SITES



| | SCENARIO 1: CURRENT ZONING | SCENARIO 2: UPZONING TO ALLOW TALLER BLDGS. |
|---|---|---|
| NYCHA Public Housing Apartments Preserved | 500 | 750 |
| Total New Apartments | 430 | 650 |
| New Affordable Apartments (30%) | 130 | 195 |
| New Market-Rate Apartments (70%) | 300 | 455 |
| Results | Full renovations completed at Tulip Towers | Full renovations completed at Tulip Towers & Daisy Gardens |

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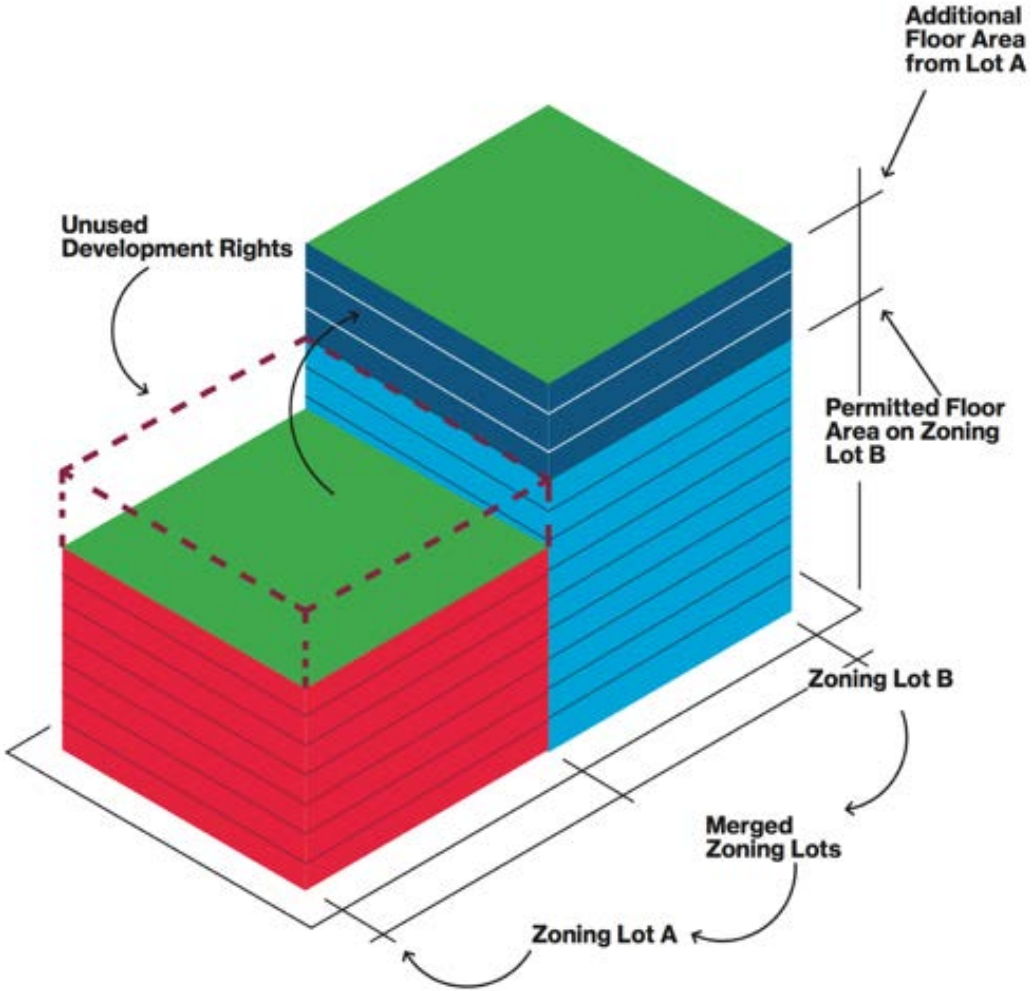
Source: NYCHA 2.0 Part 1 : Invest to Preserve

# Transfer to Preserve

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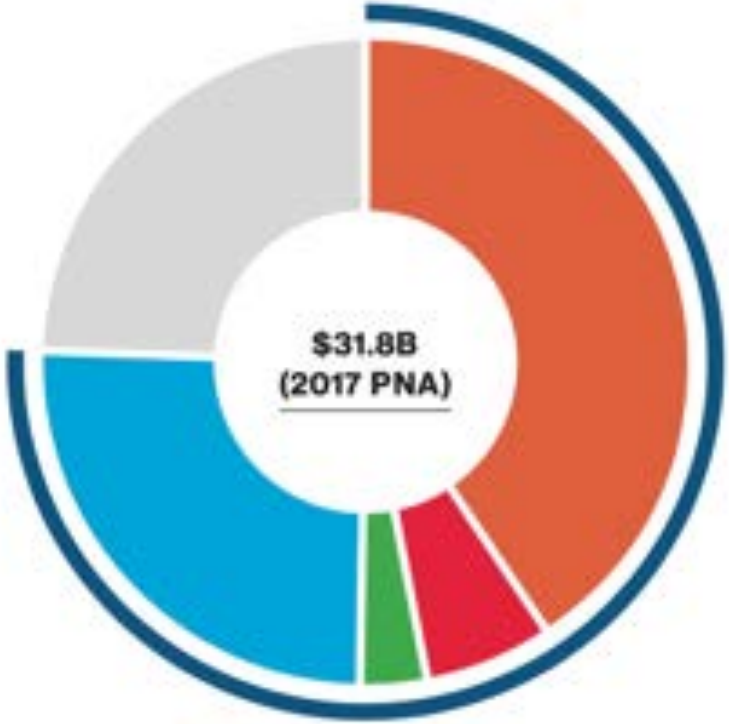
Source: NYCHA 2.0 Part 1 : Invest to Preserve

| NYCHA 2.0 INITIATIVE | NEED ADDRESSED | TIMING |
|---|---|---|
| I. PACT to Preserve | $12.8B | 10 Years |
| II. Build to Preserve | $2B | 10 Years |
| III. Transfer to Preserve | $1B | 10 Years |
| Existing Funding | $7.9B | |
| City (Mayor's Initiative + City Capital) | $1.4B | 5 Years |
| State | $450M | ** |
| Federal (Capital Plan + FEMA + EPC) | $3.6B*** | 10 Years |
| City (Consent Decree) | $2.2B | 10 Years |
| Total NYCHA 2.0 | $23.8B | |
| Remaining Need | $8B | |




* Exact PNA reduction will likely range between 75% and 82% depending on the rate of PNA growth. Pie chart assumes that PNA grows at inflation (3% per year).

** Exact timeline to be determined.

*** 5-year funding is $2.1B. $3.6B is a forward-looking estimate assuming current annual funding rate.

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Source: NYCHA 2.0 Part 1 : Invest to Preserve

# Physical Needs Assessment(PNA)

- In 2016, NYCHA engaged a joint venture of STV Incorporated (STV) and AECOM USA to perform a Physical Needs Assessment (PNA) of all NYCHA buildings
- Collected data for 10 months, May 2016 - Feb 2017, 325 developments, representative sample of over 20000 apartments
- PNA data was gathered using a software application called Mobile Validity® on iPads

# Concern Areas Identified

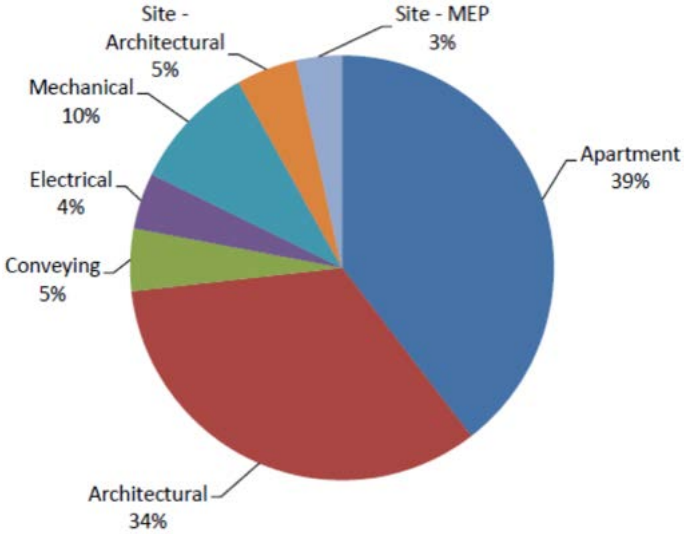


**Table ES-1. Total Costed Actions in First 5 Years by Discipline and Rank Order**

| Discipline | Cost[1] ($000,000) | Percentage | Included Components |
|---|---|---|---|
| Apartment | $12,579 | 39.6 | Kitchen, Bathroom, Floor, Doors, etc. |
| Architectural | $10,711 | 33.7 | Exterior (Roofing, Parapet, Entry Doors, etc.) and Interior (Common Areas, Interior Stairs, etc.) |
| Mechanical | $3,058 | 9.6 | Boilers, piping, radiators, etc. |
| Conveying | $1,510 | 4.7 | Elevators |
| Site - Architectural | $1,471 | 4.6 | Fencing, playgrounds, sidewalks, etc. |
| Electrical | $1,358 | 4.3 | Lighting, panelboards, generators, etc. |
| Site - Mechanical and Site - Electrical | $1,114 | 3.5 | Site lighting, underground piping, etc. |
| Total | **$31,801** | **100.0** | |

Note: 1. $000,000 = $ million. $12,759 in the table above = $12,759,000,000, or roughly $12.8 billion

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# 3. What could be done?

# Proposal Outline

- Need 1: Apartments
- Need 2: Architectural
- Need 3: Mechanical Systems
- Need 4: Conveying system
- Need 5: Site-Architectural
- Community Development
- Logistics & Phasing

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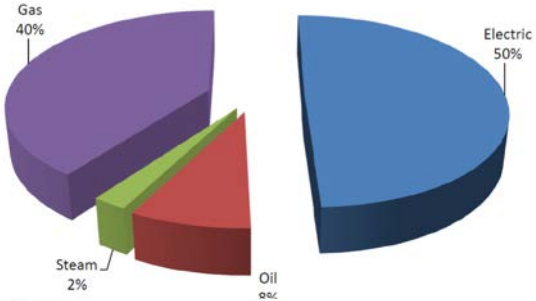
# Need No.1 : Apartments(40%)

**Aging appliance**

Low energy efficiency
(high cost)

Poor using experience




**Ceiling/wall damage**

**Aging piping system**

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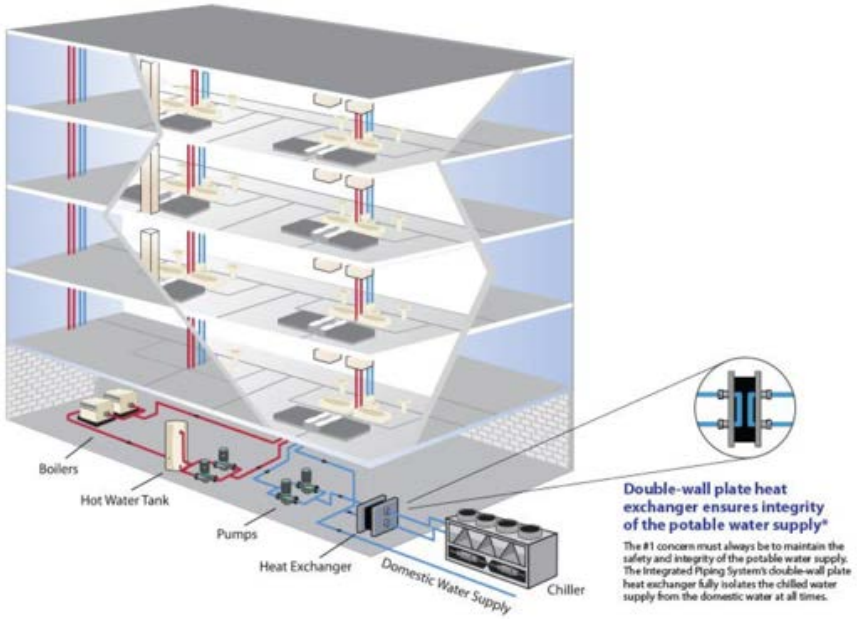
# Solution

## Upgrade to IPS ( Integrated Piping System)

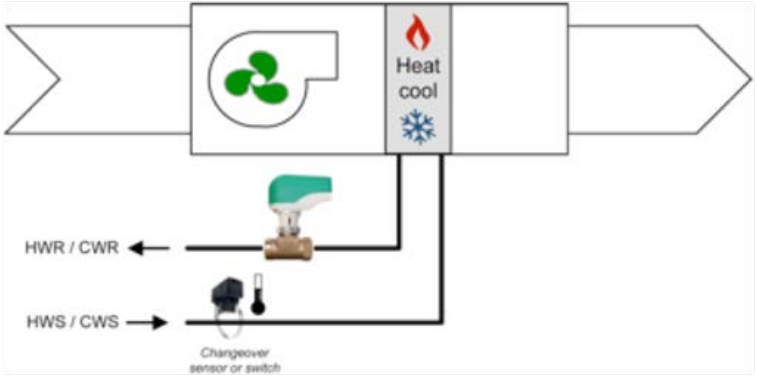


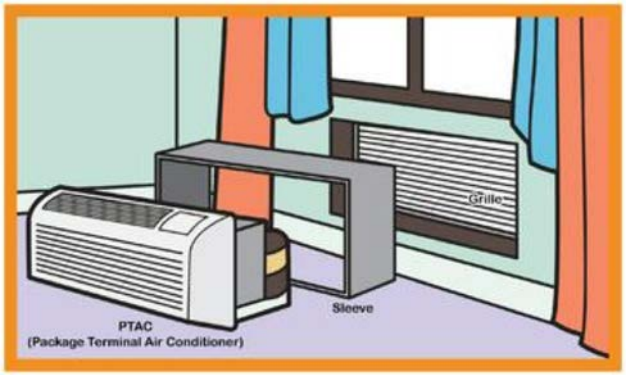

- Resolve the aging problem once and for all.
- Use domestic water system to achieve heating and cooling of the building at the same time.

# Solution

## Existing Solution of NYCHA

Two pipe fan coil system + PTAC (Packaged Terminal Air Conditioner)

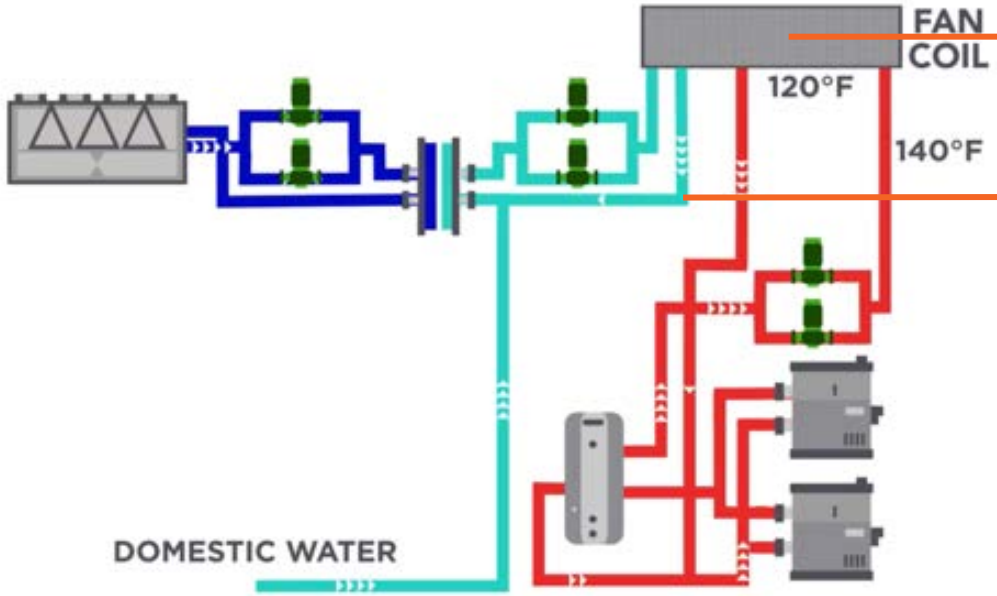



- Not cheap enough ( Two more pipes+fan coil unit+PTAC);
- High maintenance difficulty;
- Low energy efficiency (high operating cost).

# Solution

## Upgrade to IPS ( Integrated Piping System)




Integrate domestic water pipe and coil

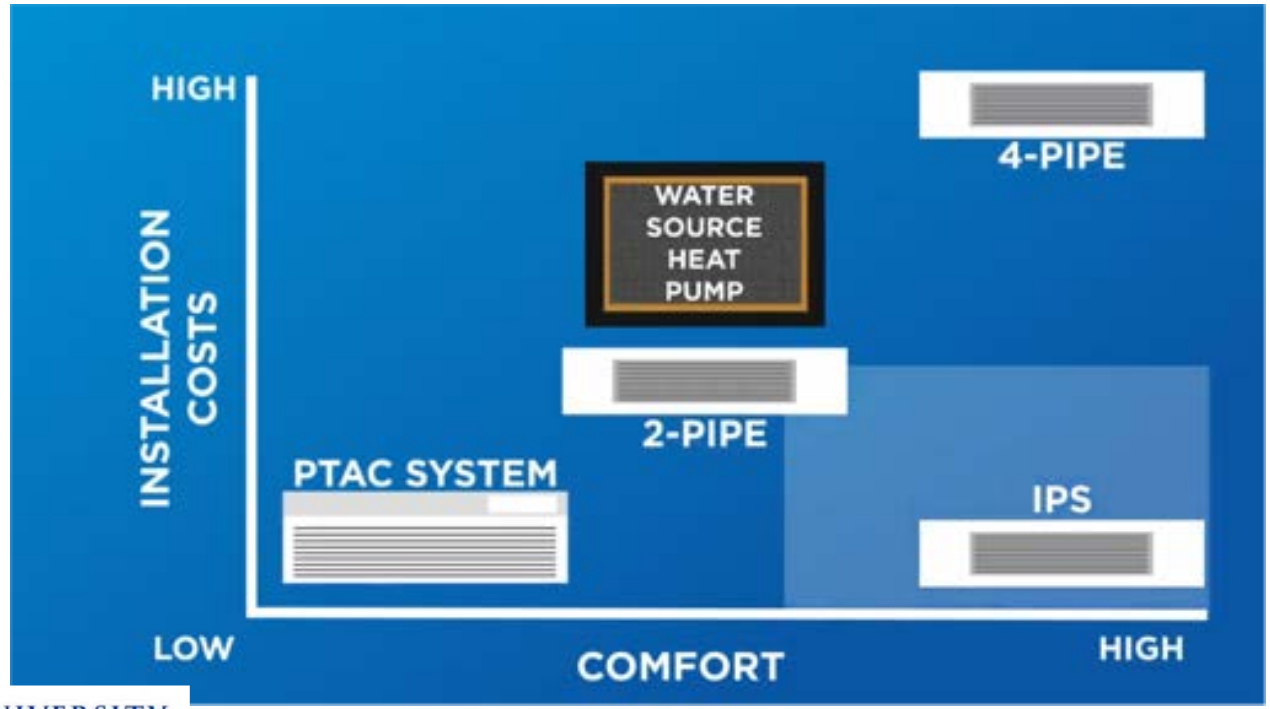
Only one more pipe in addition to basic domestic water system



Based on Integrated Piping System
https://www.williamscomfortprod.com/integrated-piping-system/

# Solution

## Upgrade to IPS ( Integrated Piping System)

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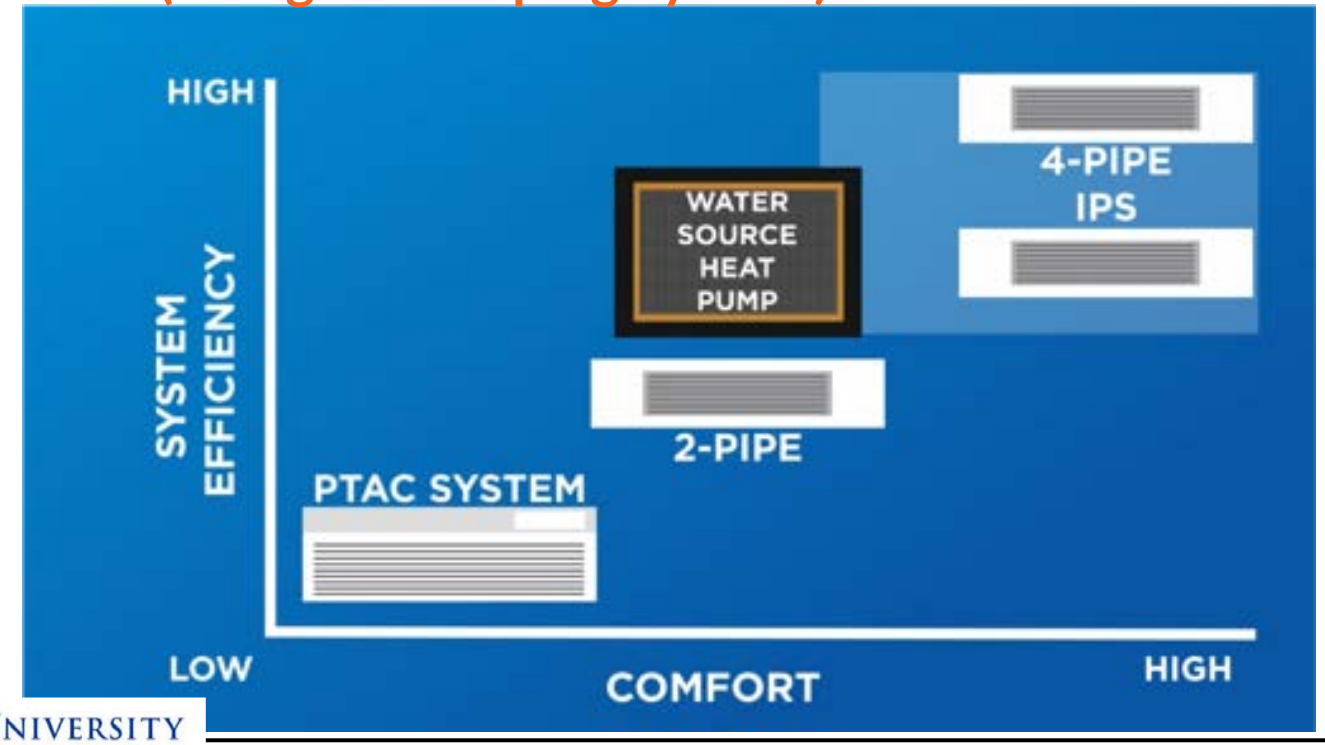


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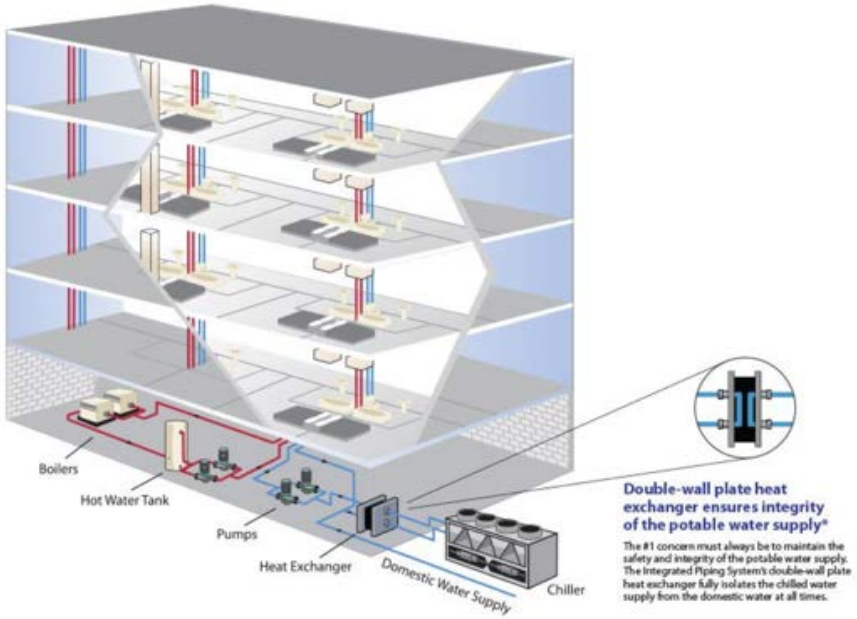
Based on Integrated Piping System
https://www.williamscomfortprod.com/integrated-piping-system/

# Solution

## Upgrade to IPS ( Integrated Piping System)




- Low installation and operating cost
- High comfort
- High energy efficiency
- The disruption of this upgrade will be minimized during a renovation project.

# Solutions

## New refrigerator(Haier)

- Basic Cost: $448
- Energy Cost: 0.6 kWh per day (+/- 15%)

| Savings | Energy (MMBtu/year) | Money ($000/year) |
|---|---|---|
| Refirgerator replacement | 122,823 | $14,064 |

Based on NYCHA PNA 2017

## Integrated design of bathroom/kitchen


| Save/year | Before | After |
|---|---|---|
| Water | 40.15 m^3 | 25.55 m^3 |
| Cost | 60 dollars | 38 dollars |

# Need No.2 : Architectural


- NYCHA's 2nd largest need, estimated at **$10.7 Billion**
- **Roofs** are the major concern area which require about $ 1.4 Billion
- Repairs to/replacement of exterior components (roofs, parapets, chimneys, windows, awnings, main front doors) and interior components (lobby and corridor floors, walls and ceilings)

# Interior Renovation

Proposed guideline:

- Meeting with community and building staff
- Surveying and presenting design option to the community
- Community reviewing and deciding
- IJC creating plans and specification
- Weekly field meeting

(IJC, 2015)

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# Roof Replacement

Coal Tar Roof

Metal Standing Seam

*The Best Roof for Solar Panels - 5 Common Materials
*Design Guidelines

# Metal Roofing

- Allow rain water to flow
- Water resistant
- Reduce energy consumption
- With standing seam, compatible with solar panels

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# Need 3: Mechanical

- NYCHA's 3rd largest need, estimated at **$ 3.1 Billion**
- **Heating plants** are the major concern area which require about $ 1.33 Billion
- Heating plants and related components (boilers, burners, gauges, pumps and so forth); radiators; air conditioners; heating and ventilating fans; hot water heaters; potable water, drain, sewer and gas piping
- **744 boilers** have Remaining Useful Life (RUL) of 5 years or less

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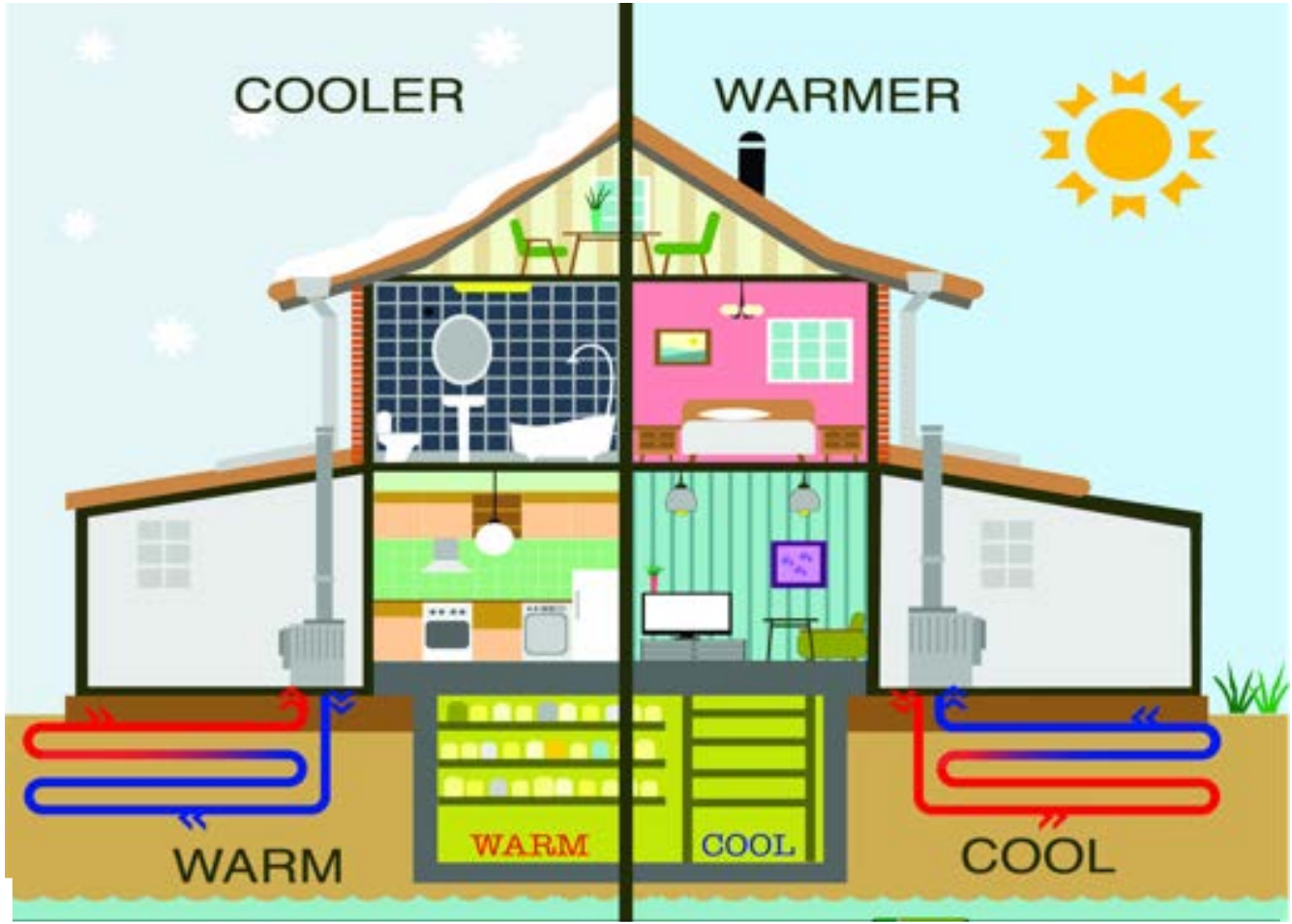
Reference: Physical Needs Assessment - STV & AECOM (JV) - 2017

# Proposed solution: Geothermal System for Heating and Cooling

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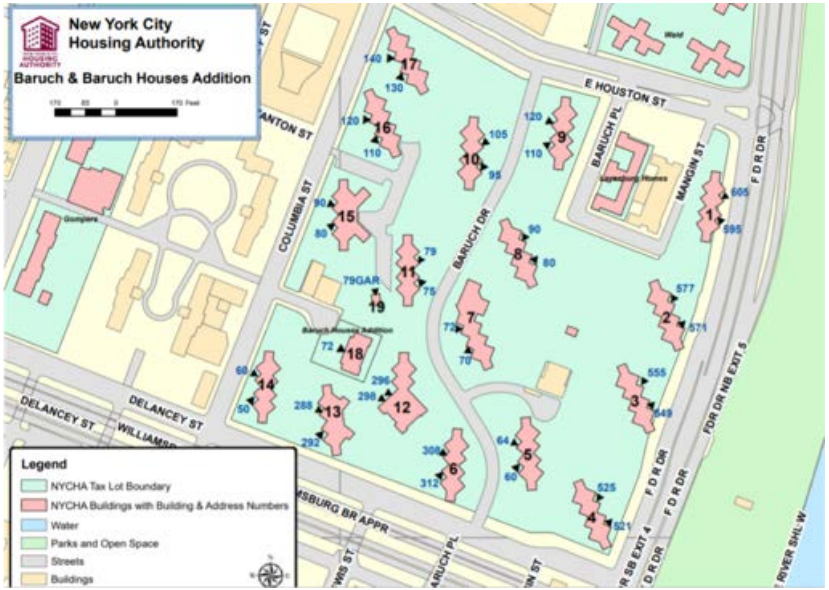
Reference: https://energync.org/wp-content/uploads/2017/03/Geothermal_Heat_Pump_House_Infographic.jpg

# Proposed solution: Geothermal System for heating and cooling




Reference: Climate Master - Geothermal heating and Cooling

# NYC Geothermal Pre-feasibility Tool




## Baruch Campus

| Geothermal System | Standing Column Well | Closed Loop | Open Loop** |
|---|---|---|---|
| Geological and Technical Suitability (Yes/No) | Yes | Yes | Yes |
| Potential Capacity (Tons) | 13,980 | 7,534 | 4,194 |
| Full System Feasible (Yes/No) | Yes | Yes | No |
| Hybrid System Feasible (Yes/No) | N/A | N/A | No |
| Carbon Footprint Reduction (Tons CO2e) | 5,339 | 5,385 | |
| Annual Cost of Carbon ($) | 726,065 | 732,306 | 0 |
| Annual Potential Savings with Geothermal System ($) | 1,503,196 | 1,525,660 | 0 |
| Projected Incremental Payback with Carbon Credit (Years) | 21 | 7 | |
| Projected Incremental Payback without Carbon Credit (Years) | 30 | 10 | |

NOTE: The City's critical infrastructure, such as water tunnels, shafts, or appurtenant facilities are regulated by the New York City Department of Environmental Protection ("DEP"). DEP is in the process of promulgating rules to require that any boring, drilling or excavation to a depth of 50 feet in the borough of the Bronx or north of 135th Street in the borough of Manhattan or to a depth of 100 feet in any other location / borough in New York City first be reported to DEP. Please send written notification of intention to drill or excavate to: Chief of Site Connection and Plan Review, Bureau of Water and Sewer Operations, 9605 Horace Harding Expy, 3rd Floor, Flushing, NY 11368-4100

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Reference: https://www1.nyc.gov/assets/ddc/geothermal/index.html

# NYCHA Campuses

Baruch
Dyckman
Fulton
Johnson
King Towers
Manhattanville
Rangel
Vladeck
Wagner
Washington

- Annual potential savings with closed loop geothermal system **$4,679,137**
- Reduction in **carbon footprint 16,913 tons of CO2** is reduced
- On average, incremental payback time **with carbon credit is 7 years and without is 10 years**

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Reference: https://www1.nyc.gov/assets/ddc/geothermal/index.html


# Need No.4 : Elevators

- NYCHA's 4th largest need, estimated at **$ 1.5 Billion**
- Roughly 50 % of NYCHA residential buildings are 7 stories or more, and about 9 % are buildings of 17-31 stories

# Elevator Malfunctions

## Issues Reported:

- 70 East 108th Street - Elevator breakdown at least four times a month
- Brooklyn 177 Sands Street - Elevators out of service for 6 days
- 400,000-plus public housing residents at greater risk of elevator accidents.

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# Reasons for Elevator Malfunction

- Fundings - NYCHA's elevator requires $1.5 billion for repair and replacement
- 10 mechanics - inspect 3000 plus elevators - unskilled mechanics

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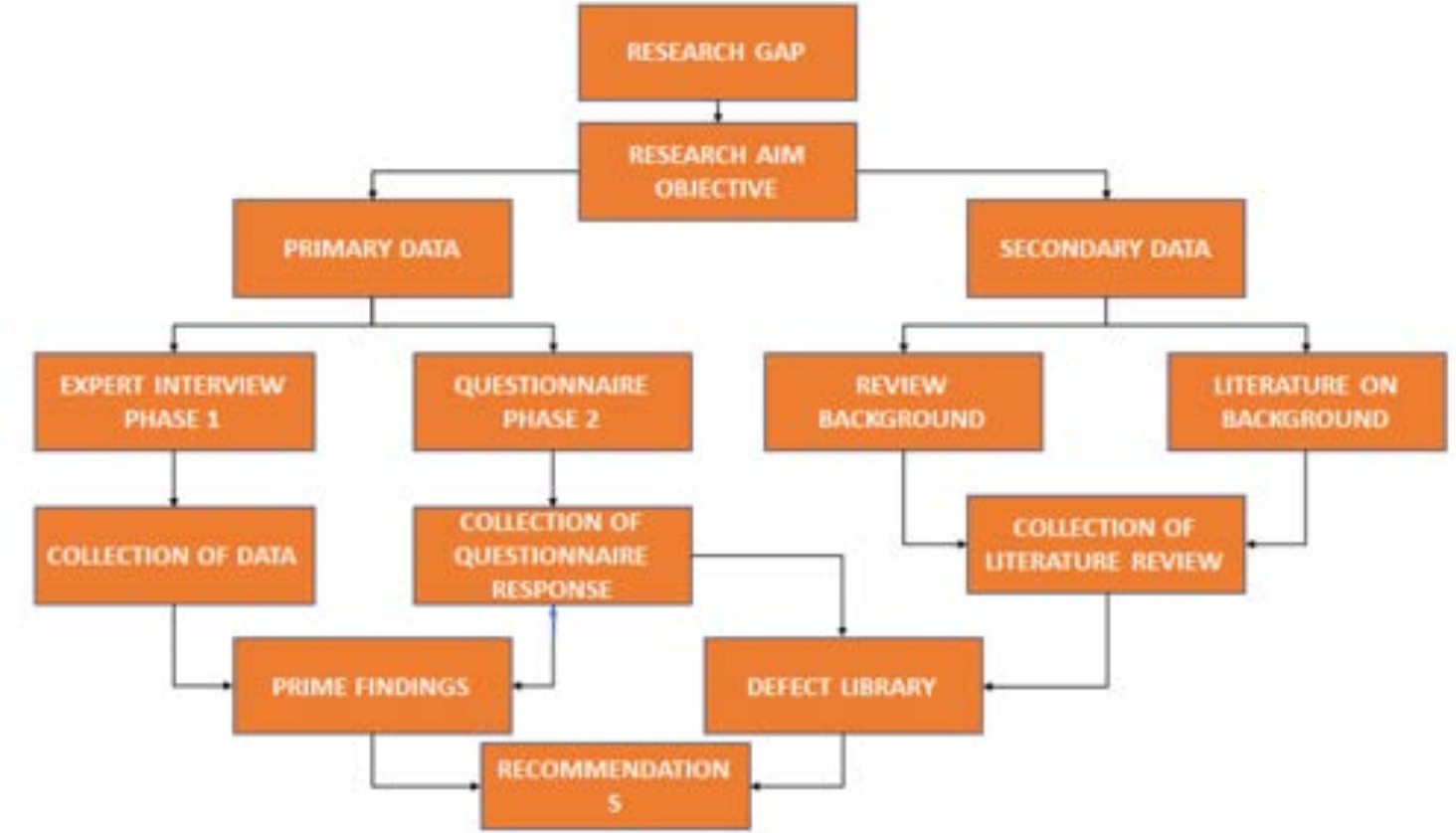
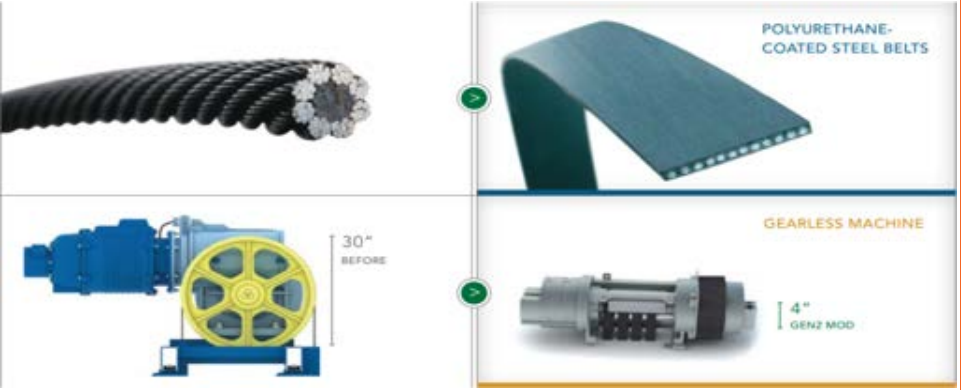
# Research Analysis






Reference: Based on Singapore Research Methodology

# Technical Modifications

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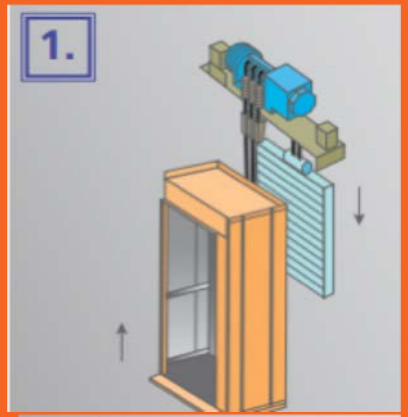
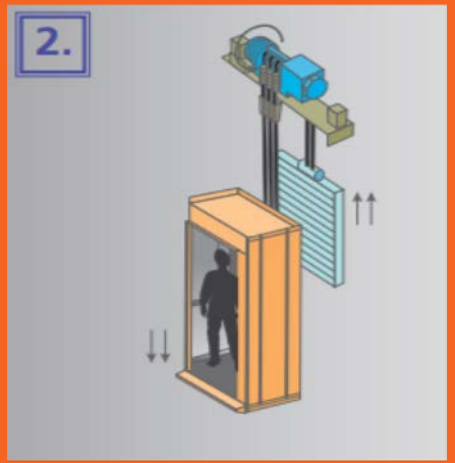
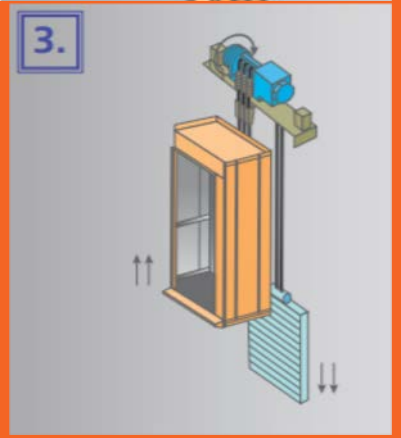
# Conceptual Modifications



# Staircase Revamp

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# Need 5: Architectural & Site / Site - MEP

- Architectural & Site / Site - MEP represent 8% of the total needs.
- $2,6B investment needed to cover this needs.
- Includes parks, landscaping, fencing, sidewalks, streets, parking lots.
- Site Mechanical consists primarily of underground piping (installed during the construction of development)
- Site Electrical consists of site lightning

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# Architectural & Site

- Floodable parks, can help us to improve landscape and resiliency.
- Efficient use of land.

Landscape resilient project Yanweizhou park in the city of Jinhua City, China. (Landezine, 2015)

# Architectural & Site

- Bioswale/Sidewalk as shown in the picture.
- Sidewalks is one of the main needs in the Architectural & Site category.

Landscape resilient project in the city of Jinhua City, China.(Landezine, 2015)

# Electrical & Site

- Smart post.
- LED touchscreen for public information and “panic button”.
- Wifi connection
- Security Camera
- Independent of the current electrical system.
- Reduces carbon footprint

(Municipality of Grecia, 2019)

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Smart posts donated by Kaist University of South Korea.Grecia, Costa Rica.

# Adopt a NYCHA development program

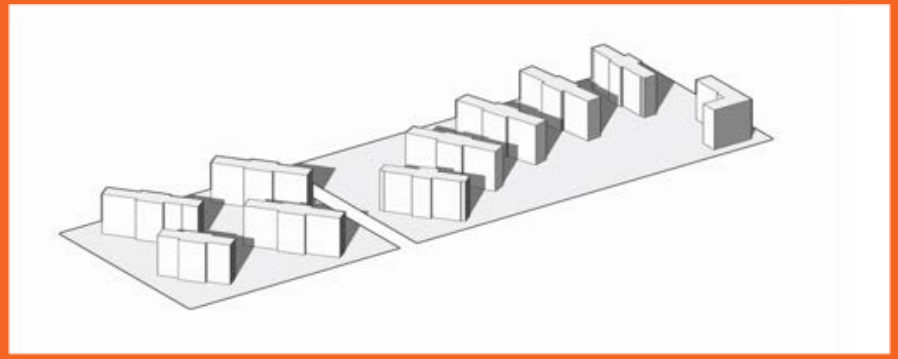
- No money involved.
- Improvement of NYCHA landscape
- Private firms obtain the opportunity to show off their work and promote themselves.
- PPP?

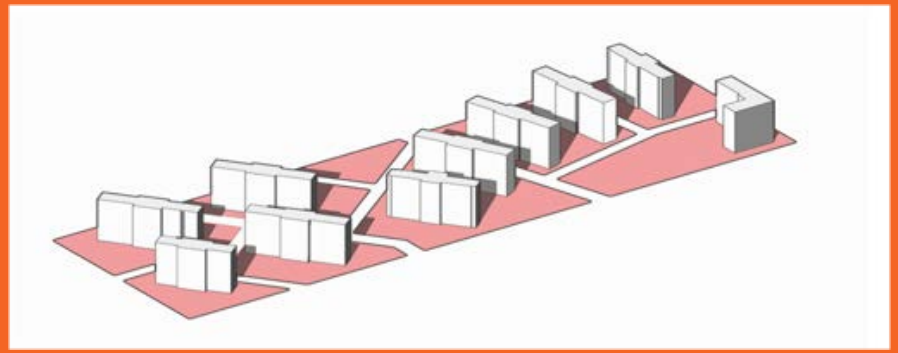
NYCHA Johnson Project, taken from the corner of 112th St & Lexington Ave.

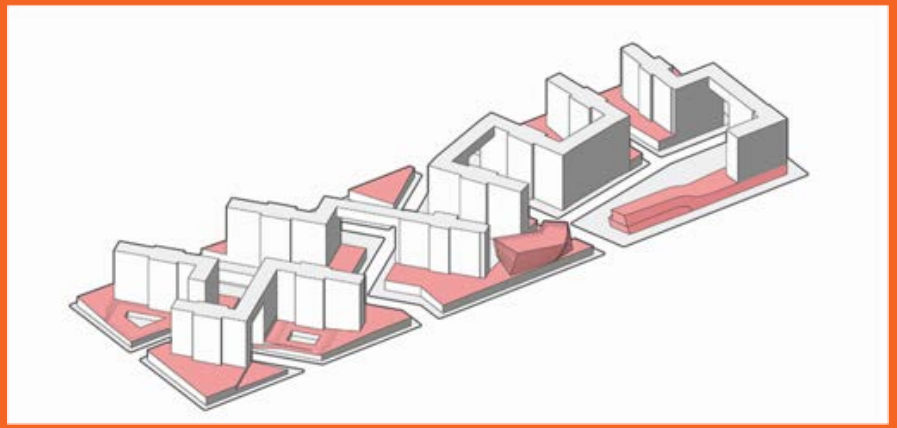

Members of Lambda Chi Alpha Fraternity at Tarleton State University participate in the Texas Department of Transportation's Adopt-a-Highway program

# Disrupting the Super Block

- NYCHA developments are towers-in-the-park superblocks, where buildings cover less than one-quarter of the site
- Integrating the isolated campuses into the neighborhood fabric
- Creating more dynamic public spaces, adding new housing units
- Activating the street edge to repair the disconnection of the isolated block housing







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Based on :Infill development would occur based on historic lot patterns, resulting in significant new density | Carly McQueen and Maryanne Barone (Pratt)

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Based on: The proposed landscape mitigates flooding and provides an enhanced public space | Nishant Samir Mehta, Ziyang Zeng, and Fei Xiong (Columbia)

# Phasing & Logistics

Two options proposed:

1. Tenant in place
2. Tenant shifted to adjacent buildings

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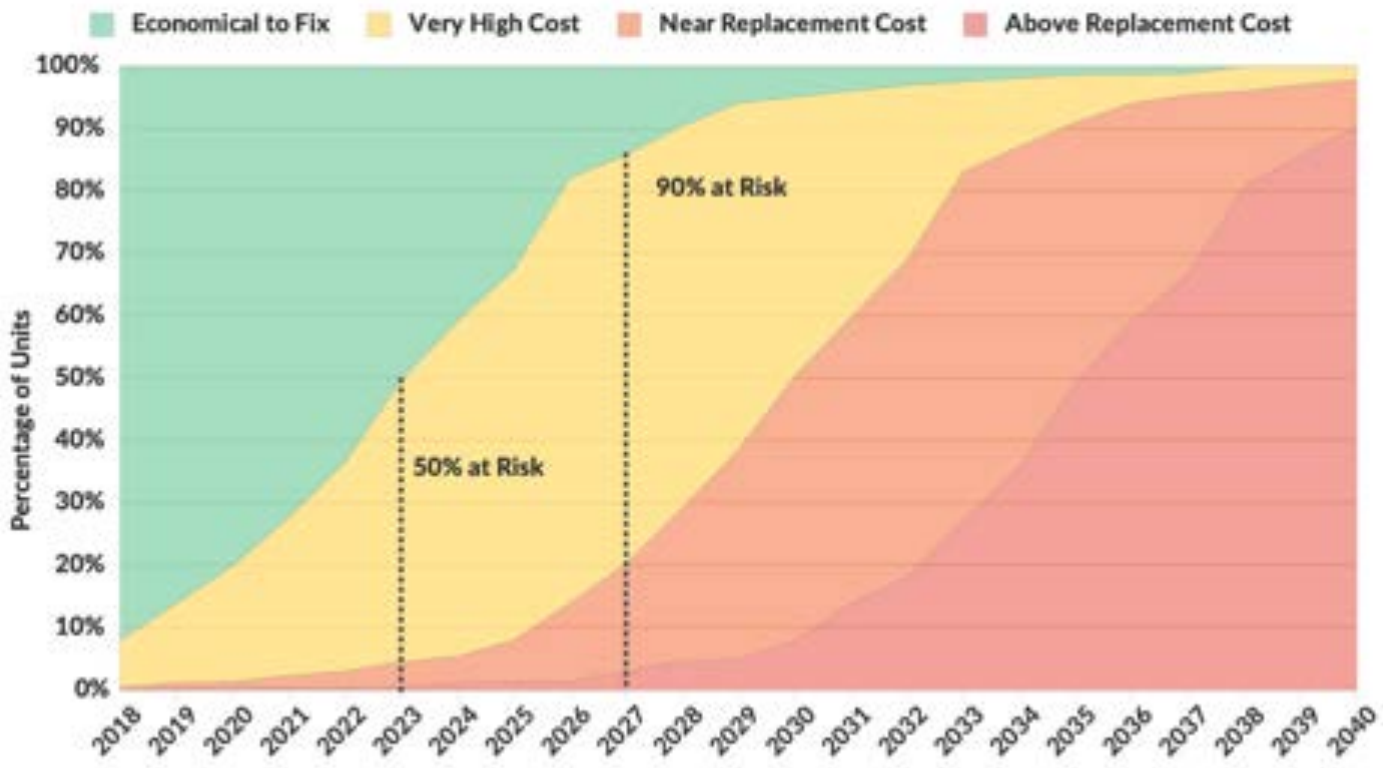
# Projection of NYCHA Capital Needs if They Continue to Grow at Current Rate, 2018-2040




Note: Assumes construction costs and replacement costs grow at 4 percent annually and capital needs grow at an average annual rate of 10.6 percent, which was the annualized rate of growth between the 2011 and 2017 physical needs assessments.

Sources: CBC staff analysis of New York City Housing Authority, *2017 Physical Needs Assessment* and *Development Data Book 2017* (December 2017).

# Gaining Public Trust

- Develop good faith among residents
- First renovate common spaces such as corridors, lobby, porch, elevator’s, etc, to gain the trust of people
- Develop proof of concept to test the market

# 1. Tenant In Place

1. Renovate empty apartments first and then move people batch wise
2. Dividing apartments with kitchen & toilet on one side and other rooms on the other
    - Create a common hospitality space to serve food to people (lobbies, basement,etc)
    - In Case of space shortage food trucks can be used
    - Makeshift pantries on each floor
    - Makeshift toilets provided at regular intervals

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# 2. Tenant Shifted To Adjacent Building

- NYCHA 2.0 - private developers to develop new towers in empty NYCHA sites
- Towers to consist of both affordable and market rate houses
- Old residents can be shifted to these new apartments
- Old apartments can then be renovated and allocated to others
- Skepticism of NYCHA residents eliminated by providing them with new apartments within the same complex

# Thank You!

# Any Question?

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