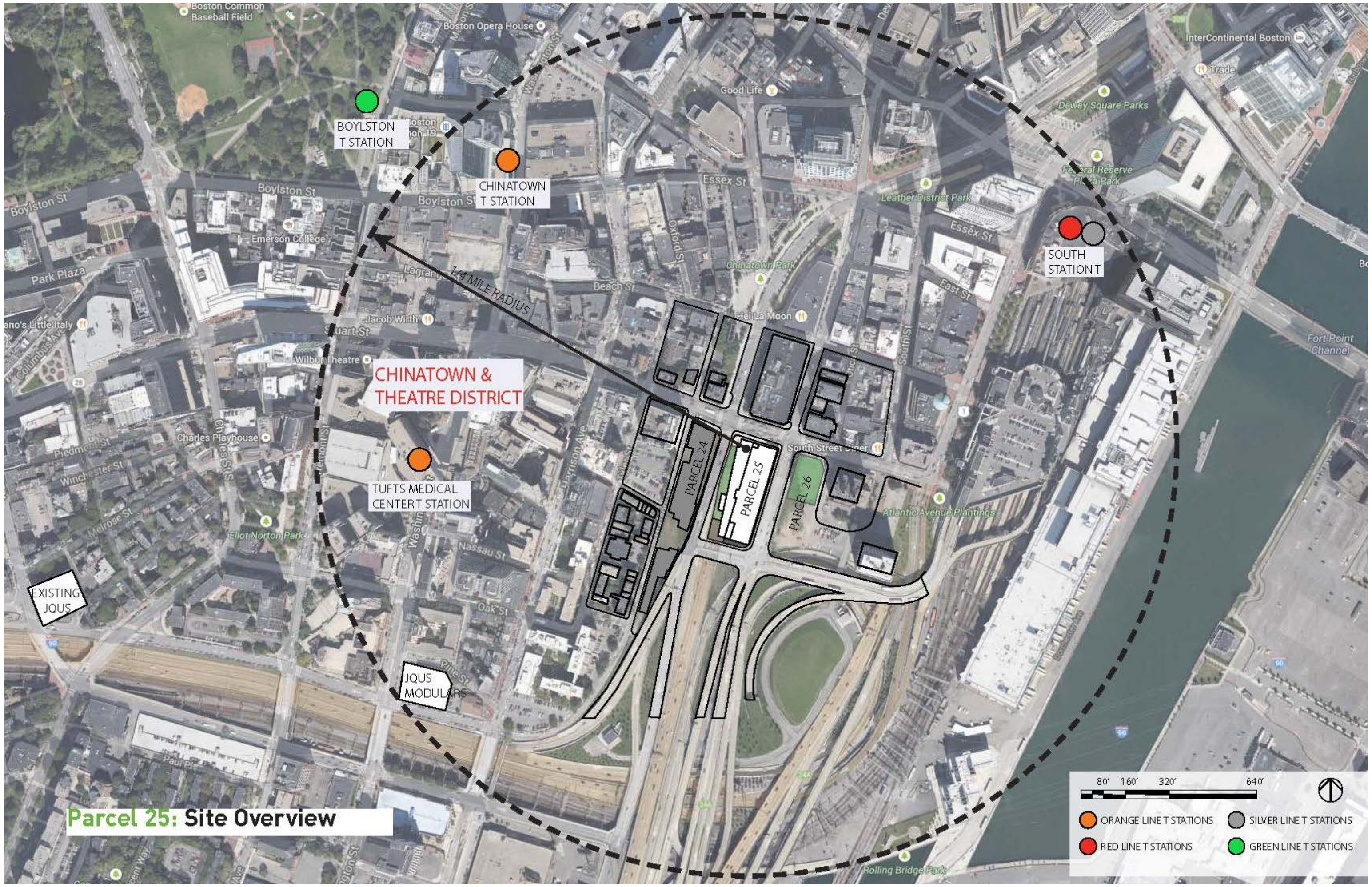
Josiah Quincy Upper School - Boston Arts Academy Project Site

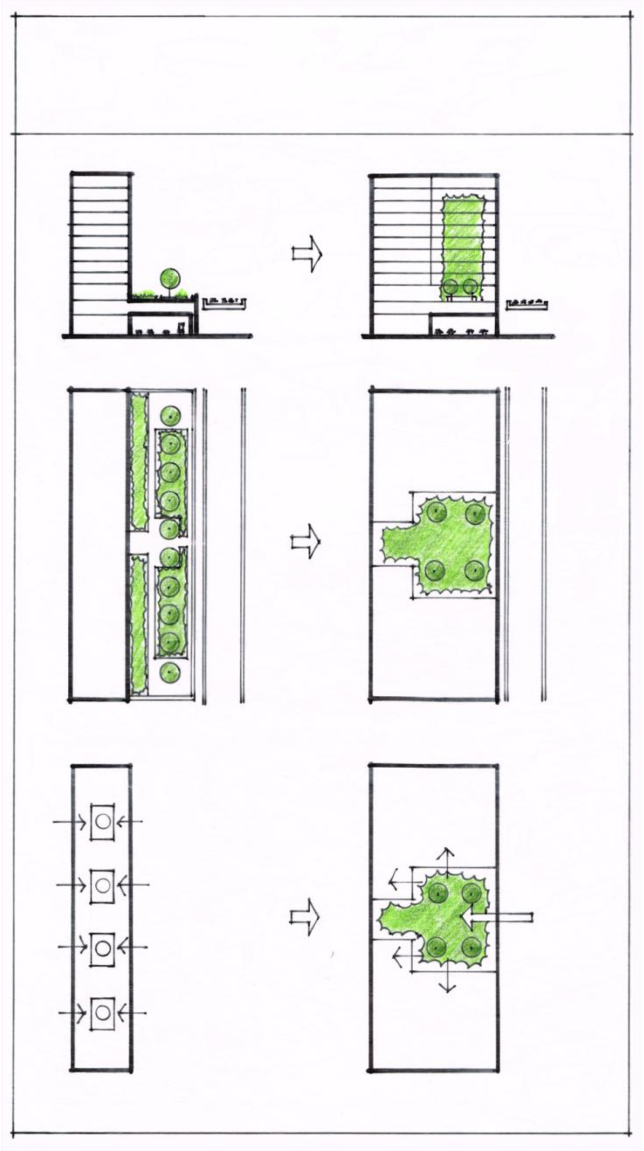


Josiah Quincy & Boston Arts academy Mitigation:

Two site strategies:

1. Use building to shield open space from highway
2. Create indoor atrium space with clean air

Parcel 25: Aerial View



Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

The 'Green Lung' Concept - Natural Interior Atrium

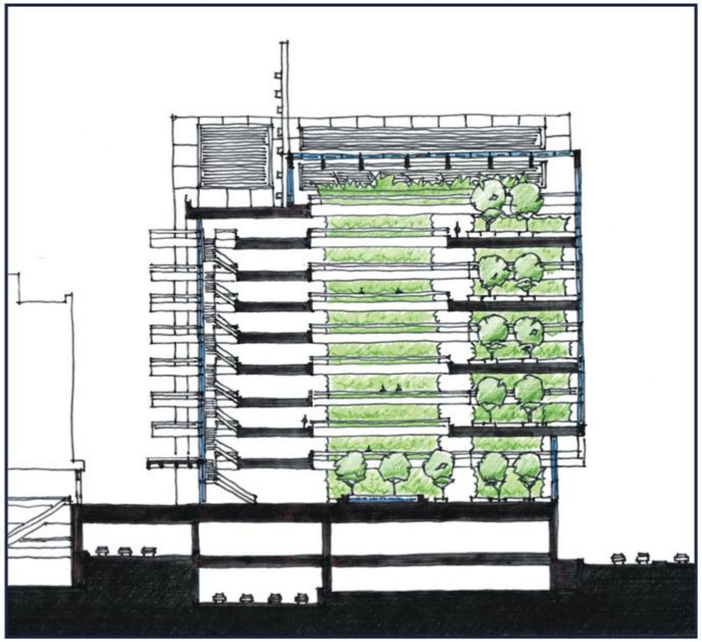
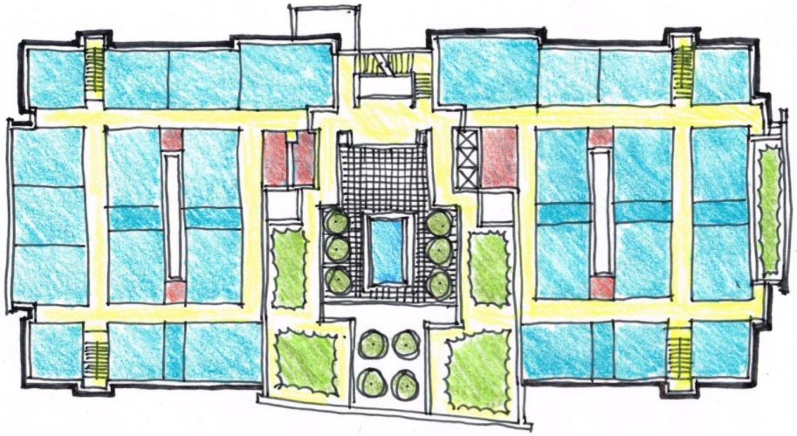


Figure 52: The "green lung" concept is shown with an atrium full of vegetation and trees. The building is shown incorporating plants and natural light throughout. A pedestrian bridge is shown connecting the school building to the rest of Chinatown.



Drawings by Giamportone Design

by: Brad Bellows

COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

Building a Green Lung

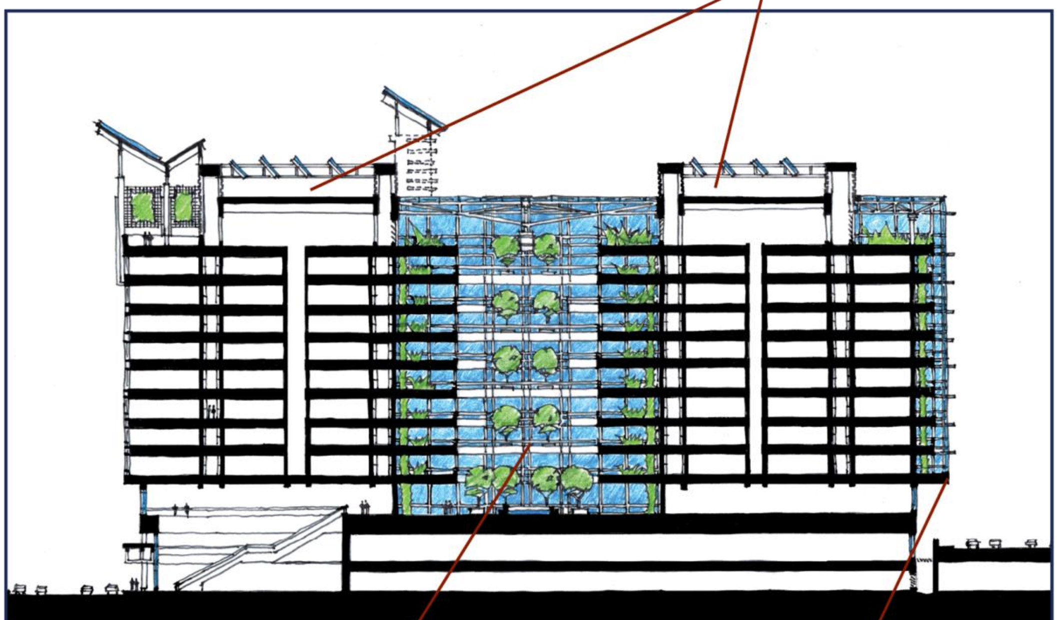
- Atrium divides two schools
- Provides “outdoor” common space

Tactics Utilized:

- Air Inlet locations
- Filtration
- Tight envelop
- Vegetation in atrium
- Decking over highway

Ventilation and Filtration with Atrium

Filtered Air Intakes



Conditioned Atrium

Tight Exterior Envelope

Interior open space inspired by Ford Foundation Building

Drawings by Giamportone Design

Chinatown Neighborhood Mitigation Strategies

- Increase highway decking
- Expand vent system to reduce end-of-tunnel plume

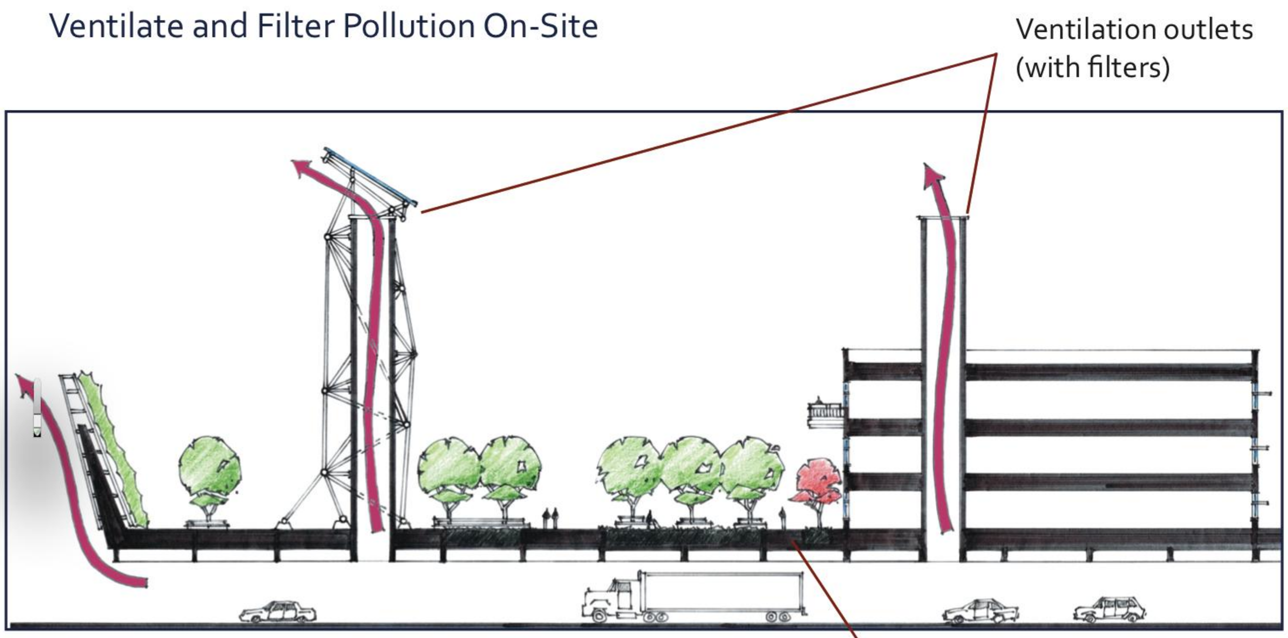
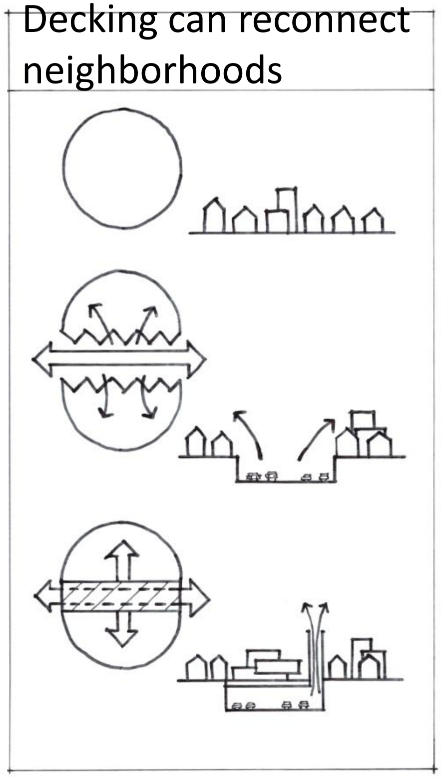


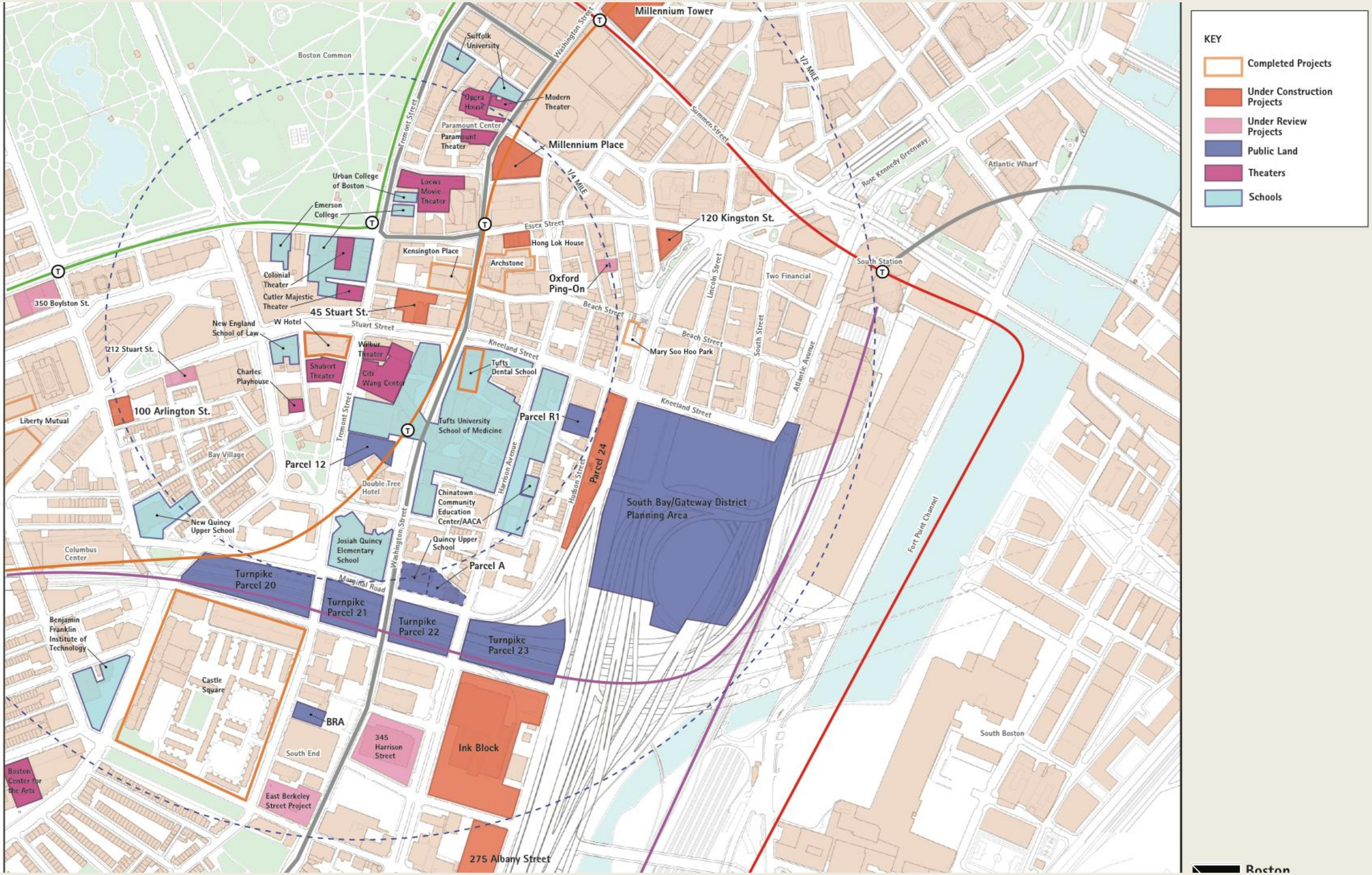
Figure 51: Natural and powered ventilation and filtering could be integrated into buildings as well as stand-alone ventilation shafts.



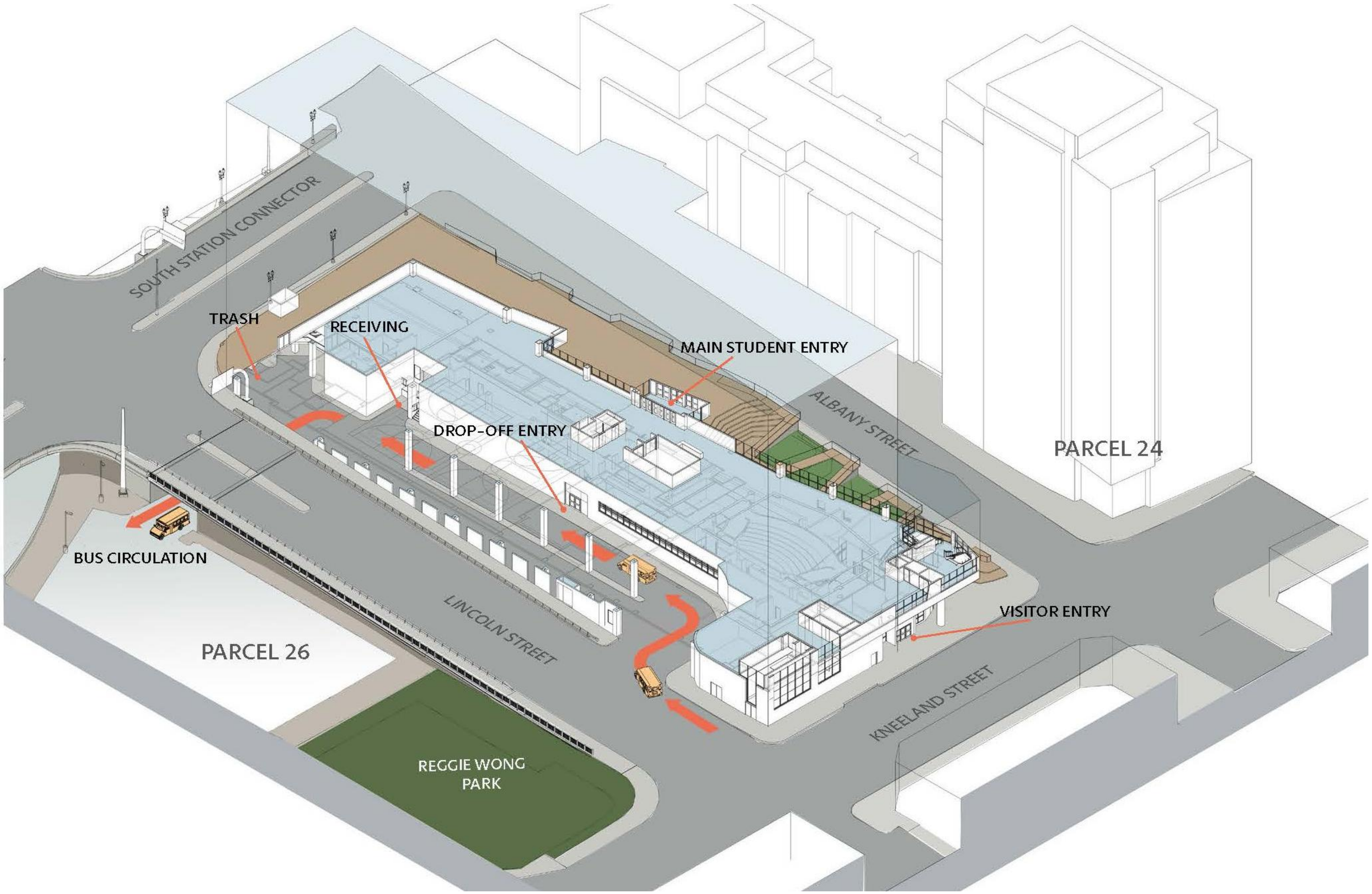
Drawings by Giamportone Design

Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

Chinatown Neighborhood Decking diagram



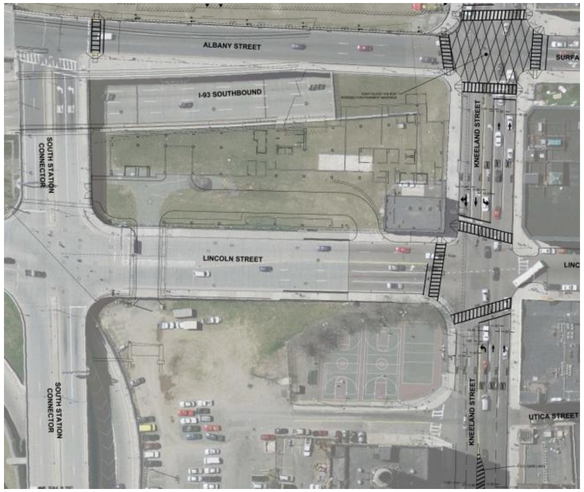
Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

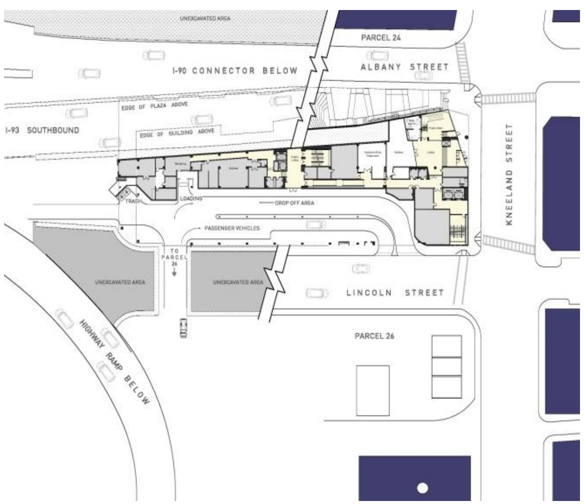


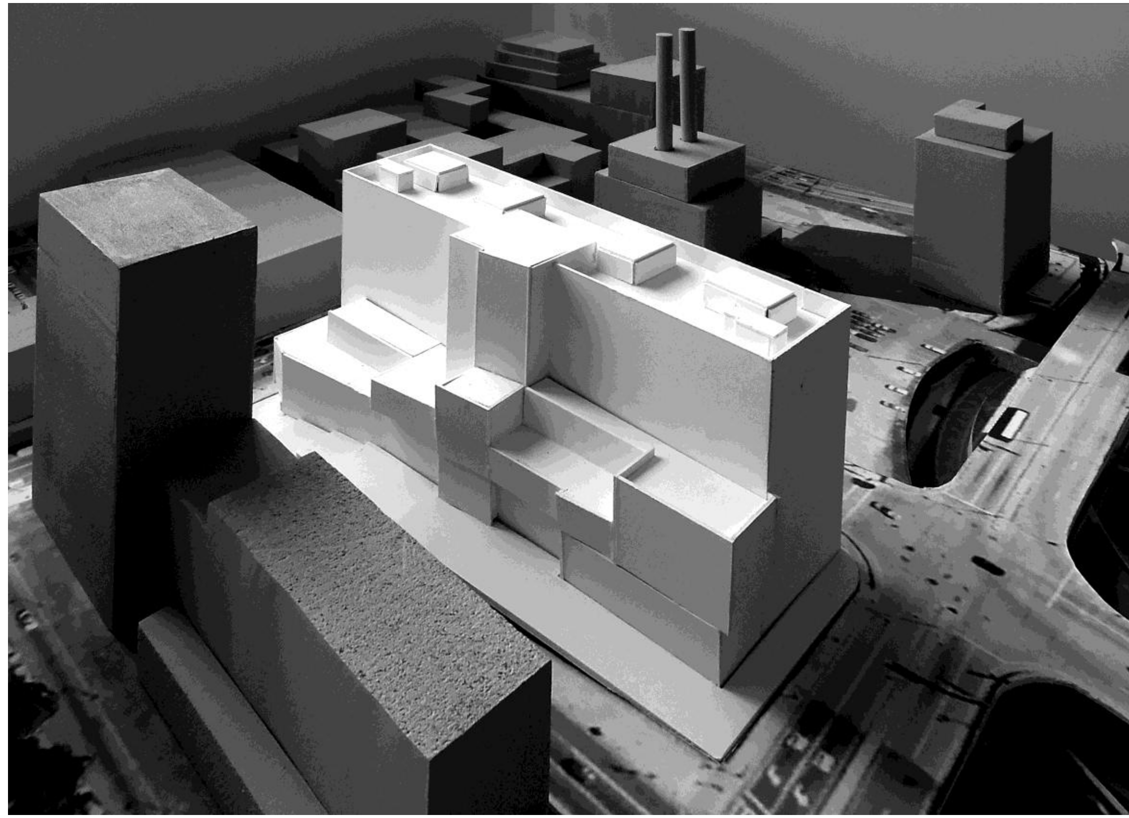
Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

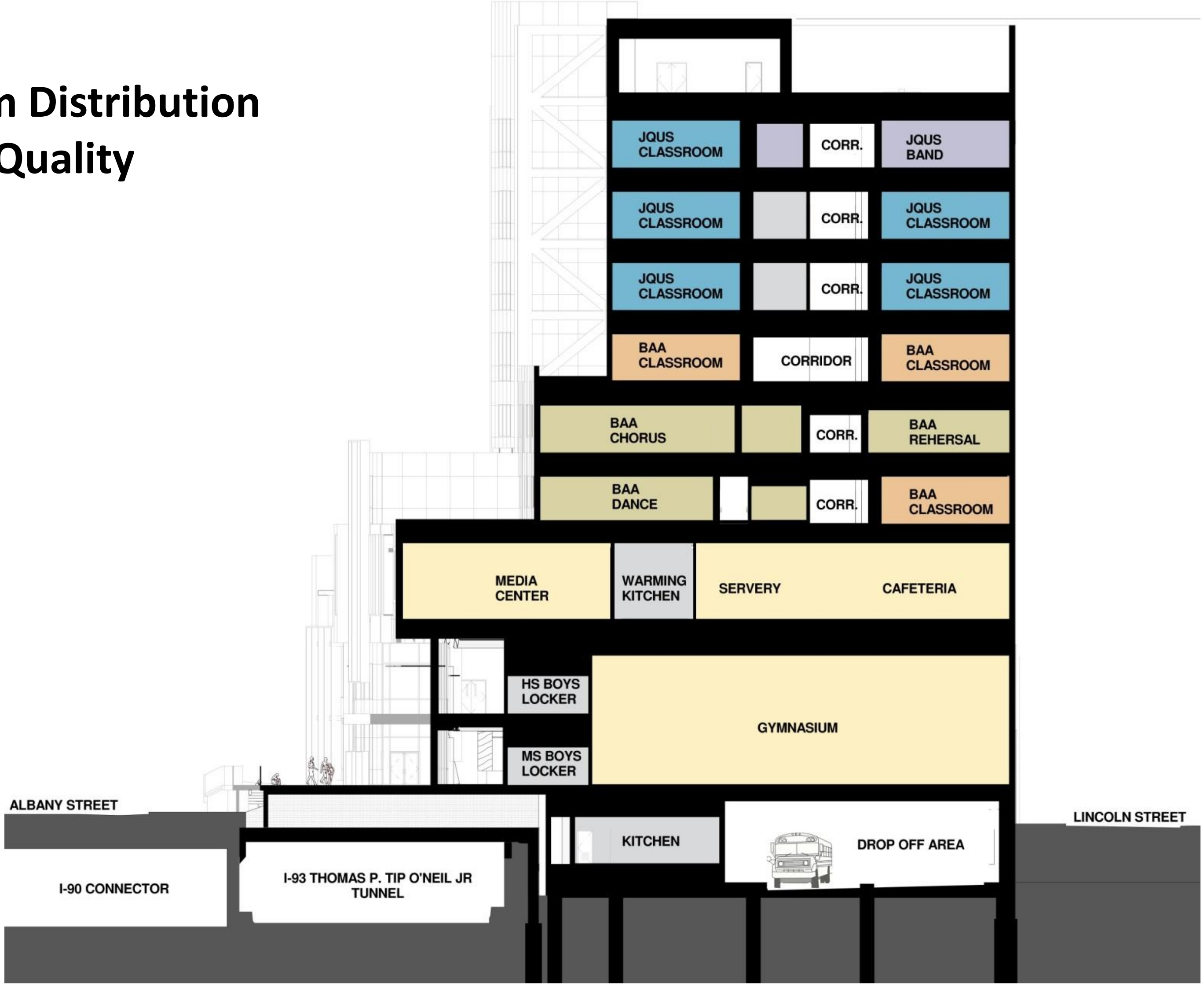






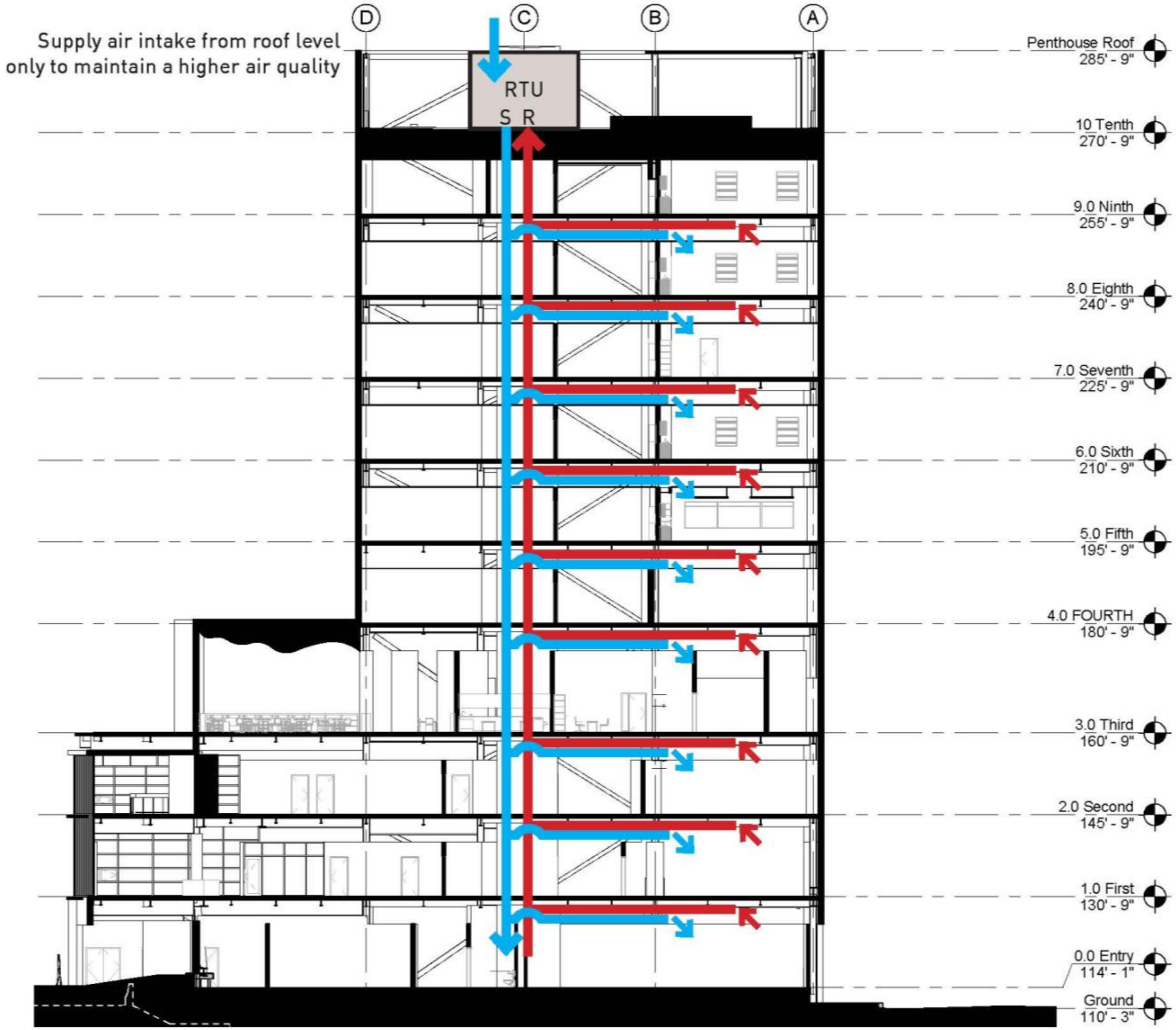
Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

Program Distribution
For Air Quality



HVAC Design
Supply Air
Intake Location

- Centralized Fresh Air Intake at rooftop level
- MERV 14 filter at RTU

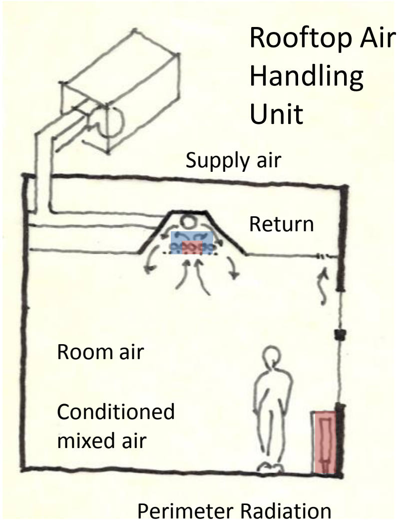


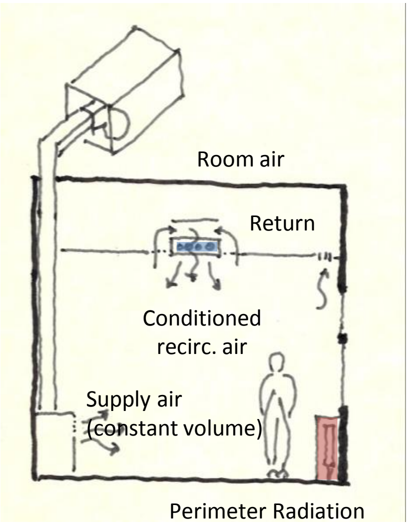
HVAC Classroom System Options

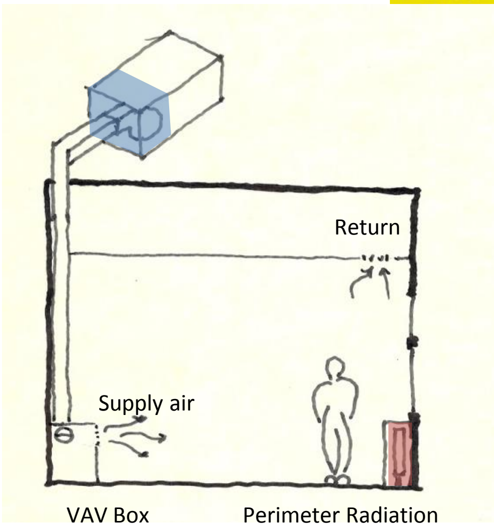
Cooling Source

Heating Source

	HVAC system 1	HVAC system 2	HVAC system 3







Comparisons	**Active Chilled Beam (induction unit)**	**Displacement w/ Passive Chilled Beams**	**Displacement, Full AC w/ VAV Boxes**
Duct/Chase & RTU Size	100%	80-90%	**200%**
Air Quality	+	++	++
First Cost ($)	+	base	-
Operational Cost ($)	-	base	++
Energy Use	-	base	++
Life Cycle Cost		*analysis in progress…*	
Remarks	Induction unit utilize only primary air volume to heat and cool spaces, reducing the RTU sizing and ductwork sizing.	Temp. control by chilled or hot water via radiant panels & radiators. Displacement system has some cooling capacity but not enough for full cooling.	Full AC displacement ventilation stratifies the space load by adjusting the variable air volume box

Josiah Quincy Upper School & Boston Arts Academy Chinatown, Boston

COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

East Façade Classroom Spaces

EAST	ASHRAE 90.1-2010 24% WWR	Design 39% WWR (Low internal loads)	Design 39% WWR (Low Loads _ Dimming + Controls)	Design 39% WWR (Low loads + External Screen)
Total Energy	Baseline	9%	12%	5%
Heating	Baseline	**25%**	**31%**	**28%**
Cooling	Baseline	**22%**	32%	12%
Fan	Baseline	**5%**	10%	**17%**
Lighting	Baseline	**60%**	**75%**	**60%**
Peak Demand Electricity	Baseline	19%	26%	9%
Peak Demand Natural Gas	Baseline	7%	5%	15%
Avg. Daylight Illum.	Baseline	101%	101%	111%
Avg. Discomfort Glare	Baseline	10%	10%	16%

Question 5: What are the differences across the scenarios for the 39% WWR set?

Better   Worse

Note: This comparison set looks more closely at the scenario options for the 39% WWR.

Bottom Line: *The dimming controls + interior screen controls (column 4) appear beneficial to incorporate because they are providing a 3% increase in savings in total energy and a 7% increase in savings in peak demand reduction.   Taking a closer look at where the savings are coming from, there is an additional 10% savings in cooling and 15% savings in lighting.*