

ANTICIPATION

*Enhancing Schools for the
Present and Unpredictable*

By Cassandra Sims

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Post Doctoral Affairs in partial fulfillment of the
requirements for the degree of*

Master of Architecture

CARLETON UNIVERSITY
OTTAWA, ONTARIO, CANADA

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Cassandra Sims

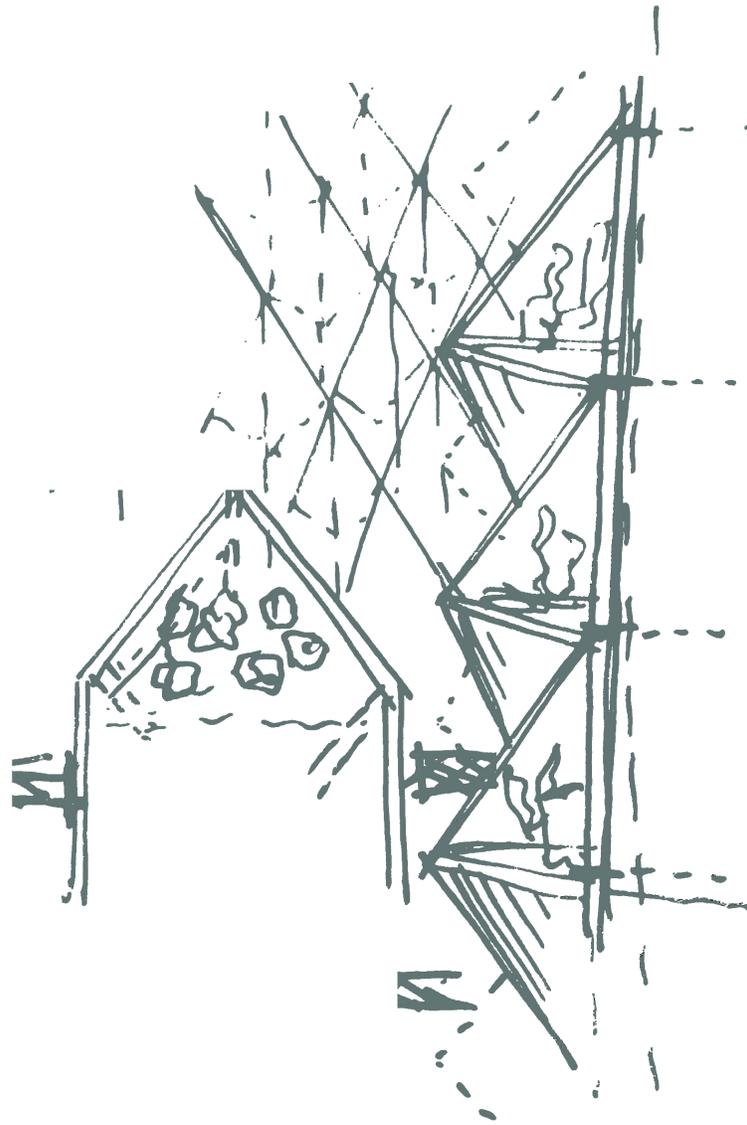


Figure 1

ABSTRACT

This thesis is an exploration of architectural interventions that improve how schools serve their communities on an ongoing basis, and during emergency situations.

Many of Manhattan's public schools are designated emergency shelters, expected to support a large influx of occupants during crises, even if they struggle to accommodate students under normal circumstances. Schools are valuable community anchors, and there is potential to intensify their use through architectural intervention. Current social inequalities, the advent of climate change, and the threat of pandemics pose both long- and short-term challenges that will affect human interaction with the built environment. This thesis culminates in a catalogue of architectural interventions, organized by what they offer to the school's community and student body, and how they function on two timescales: the Present and the Unpredictable. The premise is not to instantly solve the social problems within urban schools, but to articulate that there are a multitude of possibilities for improvement through architecture. This is an investigation of how design strategies contribute to the comfort of an occupant living an inherently uncomfortable circumstance.

ACKNOWLEDGEMENTS

Thank you Jill Stoner and Zach Colbert, for advising me with kindness, enthusiasm, and honesty. I feel very fortunate to have worked, and laughed, with you this year.

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TABLE OF CONTENTS

Title page	i.
Abstract	iii.
Acknowledgements	v.
Table of Contents	vi.
List of Illustrations	viii.
Prologue	1.
Part 1: Schools and Emergency	8.
Introduction	9.
The School	14.
The Emergency Shelter	16.
New York City Emergency Shelter Schools	18.
Part 2: Identifying Inadequacies	21.
Room for Improvement	22.
Considering the Occupants	23.
Deficiencies and Gaps	26.
Part 3: Anticipation and Interventions	28.
Intervening in Manhattan	29.
School versus Home	34.
Intervention Categories and Constraints	38.
Building Construction Considerations	40.
Timescales	44.

Defining the Present	46.
Defining the Unpredictable	48.
Imagining Interventions on Site	50.
Epilogue	52.
Wuhan to Manhattan: Current Emergencies	61.
Reflections	69.
Bibliography	72.
Image Sources	78.
Appendix A: The Catalogue	80.
Appendix B: Intervention Application, Example	120.

An online adaptation of this thesis can be explored at:
www.anticipationcatalogue.com

LIST OF ILLUSTRATIONS

Figure 01:	Sketch of “exoskeleton” intervention	ii.
Figure 02:	Photo, New York after Hurricane Sandy	2.
Figure 03:	Photo, New York after Hurricane Sandy	2.
Figure 04:	Photo, New York after Hurricane Sandy	2.
Figure 05:	Photo, Friends Seminary School and Shelter	4.
Figure 06:	Photo, Friends Seminary School and Shelter	7.
Figure 07:	Photo, taking refuge in school gym after Sandy	7.
Figure 08:	Photo, taking refuge in school gym after Sandy	11.
Figure 09:	Meanwhile Use Diagram for NYC Schools	12.
Figure 09a:	DIY Urbanism in Manhattan - community gardens	13.
Figure 09b:	Community Gardens DIY guidelines	13.
Figure 09c:	Protest for community gardens to be permanent	13.
Figure 10:	Photo, “Schools at Centre of Sandy Aftermath”	16.
Figure 11:	Photo, taking refuge in school gym after Sandy	16.
Figure 12:	Photo, taking refuge in school gym after Sandy	17.
Figure 13:	Map of Manhattan public schools and emergency shelters	19.
Figure 13a:	Map of Manhattan emergency shelters and gaps between	20.
Figure 14:	Graphic, percentage of students experiencing homelessness	23.
Figure 15:	Graphic, percentage of students with disabilities	23.
Figure 16:	Graphic, percentage of students living in poverty	24.
Figure 17:	Graphic, percentage of ESL students	24.
Figure 18:	Graphic, percentage of black and latinx students	24.
Figure 19:	Map of demographics by school	25.
Figure 20:	Headline, Disability Rights Advocates	26.
Figure 21:	Headline, NYC School Safety Audit	26.

Figure 22:	Headline, NYC Public School Homeless Students	26.
Figure 23:	Photo, Chinatown Manhattan	29.
Figure 24:	Photo, Highline Manhattan	30.
Figure 25:	Composite sketch, intervening in Manhattan	31.
Figure 26:	Composite sketch, intervening in Manhattan	31.
Figure 27:	Composite sketch, intervening in Manhattan	32.
Figure 28:	Composite sketch, intervening in Manhattan	32.
Figure 29:	Composite sketch, intervening in Manhattan	33.
Figure 30:	Composite sketch, intervening in Manhattan	33.
Figure 31:	Layered photo, Stephen T. Mathers School	35.
Figure 32:	Layered photo, Hunter College	35.
Figure 33:	Layered photo, George Washington Educational Campus	36.
Figure 34:	Layered photo, Stephen T. Mathers School	36.
Figure 35:	Layered photo, Wadleigh School for the Arts	37.
Figure 36:	Layered photo, George Washington Educational Campus	37.
Figure 37:	Photo, Brooklyn Grange, Queens	41.
Figure 38:	Photo, Brooklyn Grange, Queens	41.
Figure 39:	Photo, Hunter College Vertical Campus	43.
Figure 40:	Photo, George Washington Educational Campus	43.
Figure 41:	Defining Emergency, Relationality Diagram	49.
Figure 42a:	Sleeper Desk Intervention, position 1	50.
Figure 42b:	Sleeper Desk Intervention, position 2	50.
Figure 42c:	Sleeper Desk Intervention, position 3	50.
Figure 43:	Lift Intervention sketch	51.
Figure 44:	Lift Intervention drawing	51.
Figure 45:	Mobile Stair Intervention sketch	51.
Figure 46:	Mobile Stair Intervention drawing	51.
Figure 47:	Vignette, Rooftop Interventions, DIY	52.
Figure 48:	Vignette, Sleeper Desk, Ongoing basis	54.
Figure 49:	Vignette, Dining Board and Privacy Bench, Ongoing basis	55.

Figure 50:	Vignette, Dining Board and Privacy Bench, Unpredictable basis	57.
Figure 51:	Composite Vignette, Lift and Ramp on Pre-War building	58.
Figure 52:	Composite Vignette, Mobile Stair and Operable Window on Post-War building	59.
Figure 53:	Photo, makeshift hospital in NYC for Spanish Influenza, 1918	62.
Figure 54:	Photo, makeshift hospital in NYC for COVID-19, 2020	62.
Figure 55:	Graphic, COVID-19 testing rates NYC	67.
Figure 56:	Graphic, COVID-19 hospitalization rates NYC	67.
Figure 57:	Vignette, school gym conversion to COVID-19 testing centre	69.
Appendix A: Catalogue of Interventions		80.-119.
Appendix B: Intervention Application, Example		120.-126.

PROLOGUE

In late October of 2012, Hurricane Sandy made landfall in the Caribbean and shortly thereafter, the East Coast of the United States. Among the affected areas was New York City, which declared a state of emergency. Public transit was suspended, the New York Stock Exchange paused all trading operations, and the United Nations headquarters in Manhattan closed. Nine thousand people found themselves in need of emergency shelter and 7.9 million businesses and households were without power in the north-eastern United States¹. Manhattan schools remained closed well into November 2012, and eighty New York City public schools experienced severe damage. A week after the hurricane made landfall, an estimated 30,000 to 40,000 individuals were still in need of emergency housing². By the end of November 2012, Hurricane Sandy had cost the state of New York upwards of \$41.9 billion³.

During the disaster, vulnerable populations and approximately 375,000 individuals subject to mandatory evacuation dispersed to 76 schools across New York City for emergency shelter. Only fourteen among these were in Manhattan, where 4,900 displaced people required accommodations.⁴ No individual or their pets could legally be turned

1. "Hurricane Sandy Fast Facts," CNN (Cable News Network, 2013) <https://www.cnn.com/2013/07/13/world/americas/hurricane-sandy-fast-facts/index.html>

2. "Hurricane Sandy Causes School Closings Along East Coast," HuffPost (HuffPost, October 29, 2012), https://www.huffpost.com/entry/hurricane-sandy-school-cl_n_2038887

3. "Emergency Shelters: Relief and Refuge for New Yorkers after Hurricane Sandy," SmartSign Blog, December 7, 2017, <https://www.smartsign.com/blog/emergency-shelters-relief-and-refuge-for-new-yorkers-in-hurricane-sandy/>

4. Ibid.

away, and many buildings were occupied beyond normal capacity.

Maintaining occupant health was a challenge in these shelters⁵. In the wake of the hurricane, the NYC Department of Health and Mental Hygiene implemented a system to surveil the spread of communicable disease in emergency shelters.⁶ A retrospective assessment found that nothing had been done to prevent illness from spreading in these temporary accommodations. Front line volunteers and healthcare workers were under-equipped, and shelter set-up procedures were deemed under-planned. Also cited in the assessment was difficulty identifying which shelters in the city were open at what times, and whether or not they could even be reached. “Many shelters were established in schools with evacuees housed mainly in large gymnasiums at the same time classrooms were being



Figure 2: Dark streets in Manhattan following Hurricane Sandy's landfall



Figure 3: Emergency repairs on a fallen facade reveals the extent of damage in some areas



Figure 4: Power failures throughout lower Manhattan are a stark contrast to the bright lights of night the city is known for

5. For chapter on COVID-19 virus and its application to this thesis, please see page 59. It is also available on the thesis website, www.anticipationcatalogue.com

6. Alison D. Ridpath et al., “Challenges to Implementing Communicable Disease Surveillance in New York City Evacuation Shelters after Hurricane Sandy, November 2012,” *Public Health Reports* 130, no. 1 (2015): pp. 48-53

prepared for students to return to school. These shelters were not able to comply with all DOHMH's infection control recommendations, especially isolation"⁷.

Some schools - including those that served as emergency shelters - were closed or relocated for as long as two weeks following the storm. Even after schools reopened or held classes at alternate locations, attendance rates were extremely low. Attendance rates before Hurricane Sandy averaged around 91%, and dropped below 33% for weeks afterward⁸. Of 200 schools having suffered damage from the storm, 65 needed to be temporarily relocated for extended repairs. Some reopened without heat despite winter approaching. Funding for the recovery came from donations, school staff's personal funds, and bake sales. School holidays were trimmed to make up for missed instructional time⁹.

Disasters like Sandy will strike again, and New York City is underprepared for them. An audit published by the New York City Department of Education in June 2019, nearly seven years after Hurricane Sandy, asserted that most New York City schools are not aligned with basic safety regulations required by the state, such as having up-to-date floorplan and the ability to shelter students in place if an external threat makes evacuation unsafe¹⁰. According to this audit, between 2015 and 2018, 219 lockdowns took place in addition to 684 instances where students and

7. Ridpath et al., "Challenges to Implementing Communicable Disease Surveillance in New York City Evacuation Shelters after Hurricane Sandy, November 2012," 52

8. "Hurricane Sandy Causes School Closings Along East Coast," HuffPost

9. Ibid.

10. Amy Rock, "Audit Finds NYC Schools Unprepared for Emergency Situations," Campus Safety Magazine (Campus Safety, June 18, 2019), <https://www.campussafetymagazine.com/safety/nyc-schools-unprepared-for-emergency-situations/>

staff had to shelter-in-place in response to a threat¹¹. Based on this data, it is apparent that schools must be equipped to support occupancy for extended periods if need be. The requirement for extended occupancy during both regular and emergency circumstances calls into question the notion that schools are typically operational during daytime hours only. Schools are buildings equipped to support large numbers of staff and students between 8:00 am and 4:00 pm, leaving most parts of the buildings unprogrammed for the other fourteen hours of the day.

One school in Manhattan has expanded the use of their building by sheltering the homeless. The Friends Seminary private school converts their gymnasium into a dormitory every night to accommodate guests who are vulnerable individuals in need of overnight



Figure 5: A guest at the Friends Seminary shelter helps take down the beds in the morning



Figure 6: Students of the Friends Seminary School work to clean the beds and furniture

11. Amy Rock, "Audit Finds NYC Schools Unprepared for Emergency Situations"

shelter. From the perspective of overnight occupants, it offers relief from larger shelters which often experience theft and violence. The school's shelter is largely run by student and parent volunteers, so individuals struggling with severe addictions, behavioral problems or illness are not accommodated at this shelter. Instead, the occupants are primarily individuals facing temporary homelessness due to rising housing costs. The Friends Shelter has been operating for over 30 years and seeks to bridge the gap between the city's richest and poorest¹². Not all schools have the resources to accommodate the homeless.

Unfortunately, one of the major social problems in New York City is that the number of homeless students attending the public school system has risen by 70% in the last decade alone. As of October 2019, according to data from the Department of Education, the number of homeless students is over 114,000. This translates to one in ten students at every school facing homelessness. Of those, about two thirds are living with family friends or relatives, while the remaining third live in shelters. The consequence of this, besides individual trauma and stress, is poor academic performance. Youth facing challenges such as these tend to be chronically absent, with only about 57% of them graduating high school. Lack of education perpetuates cycles of poverty. In Manhattan specifically, District 5 (located in the Harlem neighbourhood), nearly 25% of the student population in public schools are homeless¹³. As of 2019, all school districts in Manhattan

12. Leslie Brody, "NYC Private School Hosts Homeless Shelter With a Touch of Class," The Wall Street Journal (Dow Jones & Company, December 3, 2017), <https://www.wsj.com/articles/nyc-private-school-hosts-homeless-shelter-with-a-touch-ofclass-1512323019>

13. Taylor Swaak, "NYC's Homeless Student Population Stabilized in 2018-19 After a Decade-Long Surge, Report Finds. But the Educational Crisis Continues," NYC's Homeless Student Population Stabilized in 2018-19 After a Decade-Long Surge, Report Finds. But the Educational Crisis Continues, October 28, 2019 <https://www.the74million.org/article/nycs-homeless-studentpopulation-stabilized-in-2018-19-after-a-decade-long-surge-report-finds-but-the-educational-crisis-continues/>

are reported to have at least 5% homeless student populations. The city is currently taking steps to improve these situations by hiring additional community support social workers and providing bus service, but it is too early to determine whether this will yield significant results¹⁴.

These students attending Manhattan schools facing socio-economic barriers rely on their schools for more than an education. For many, schools provide meals, counseling, an internet connection, and even laundering facilities¹⁵. These buildings are typically designed for pedagogical programming only, but out of necessity, are required to support a vast and nuanced range of additional services.

The ongoing issues of student poverty, lack of resources and unpredictable nature of emergency present an opportunity to extend the capacity of institutional buildings. This thesis is grounded in the notion that, through architectural intervention, schools can better function as both refuge and social support.

14. Taylor Swaak, "NYC's Homeless Student Population Stabilized in 2018-19 After a Decade-Long Surge, Report Finds. But the Educational Crisis Continues,"

15. Eliza Shapiro, "Coronavirus in N.Y.C.: Why Closing Public Schools Is a 'Last Resort'," The New York Times (The New York Times, March 7, 2020), <https://www.nytimes.com/2020/03/07/nyregion/nyc-schools-coronavirus.html>



Figure 7 (above) and Figure 8 (below): School Gyms converted to dormitories after Hurricane Sandy in 2012.

INTRODUCTION

I question the state of New York City's schools, the contrast between public and private, and how their architecture might impact the occupants' daily wellbeing and education. Although this thesis will discuss New York City as a whole, the primary focus is on Manhattan schools. In doing so, I will identify deficiencies and propose ways to enrich and improve the schools through intervention. It is logical, but circumstantially unfortunate, that public schools are designated to be New York City's emergency shelters despite having fewer means to offer well-equipped, comfortable accommodation. During times of mass pandemic like today, there is neither a defined plan for converting the buildings for quarantining and community support purposes, nor are there guidelines for supporting underprivileged students when their schools are forced to close. The American Red Cross provides basic equipment for emergency shelters during natural disasters, but arriving with supplies can take time and the basics provided are the bare minimum¹⁶.

Why offer the minimum during a time of desperation, when instead, a building could already be equipped in a way that enriches daily life? My argument is that existing buildings can be expanded through architectural

16. Justin Elliott and Jesse Eisinger, "The Red Cross' Secret Disaster," ProPublica, March 9, 2019, <http://www.propublica.org/article/the-red-cross-secret-disaster>)

gestures of varying scales. To support this, I will propose a series of potential design interventions which together form a Catalogue.

The notion of using interventions to accommodate alternate building program is grounded in meanwhile-use and DIY-urbanism theory. Meanwhile use is a term adopted to describe a secondary use of a space whilst it is not in use for its primary purpose¹⁷. The aforementioned Friends Seminary private school in Manhattan converting to a homeless shelter overnight is an example of this. In urban areas where the financial cost of occupying space is rising rapidly, meanwhile use is a way to maximize the use of space that “takes advantage of a window of opportunity on a site, before and after another use”¹⁸. Although “many meanwhile use projects are inherently flexible... [they might] not sit easily with the planning system”¹⁹. The designation of schools as emergency shelters and community support centers could be considered a state-sanctioned version of meanwhile use (see Figure 9). In this thesis, the deployment of meanwhile use through intervention is facilitated by the concept of DIY-urbanism. In writing by Cathy Smith and Megan Heim LaFrambois, the term is used to refer “to a broad range of self-initiated, temporary and low-budget interventions in existing cities that are enacted by local communities”²⁰ thereby making it a “transformative spatial practice that

17. Nicolas Bosetti and Tom Colthorpe, “Meanwhile, In London: Making Use of London’s Empty Spaces,” October 2018, p. 8

18. Ibid, 10

19. Ibid, 53

20. Smith, Cathy. “The Artisan, the State and the Binaries of DIY Urbanism.” *In Proceedings of the Society of Architectural Historians, Australia and New Zealand: 32, Architecture, Institutions and Change*, edited by Paul Hogben and Judith O’Callaghan, p. 617

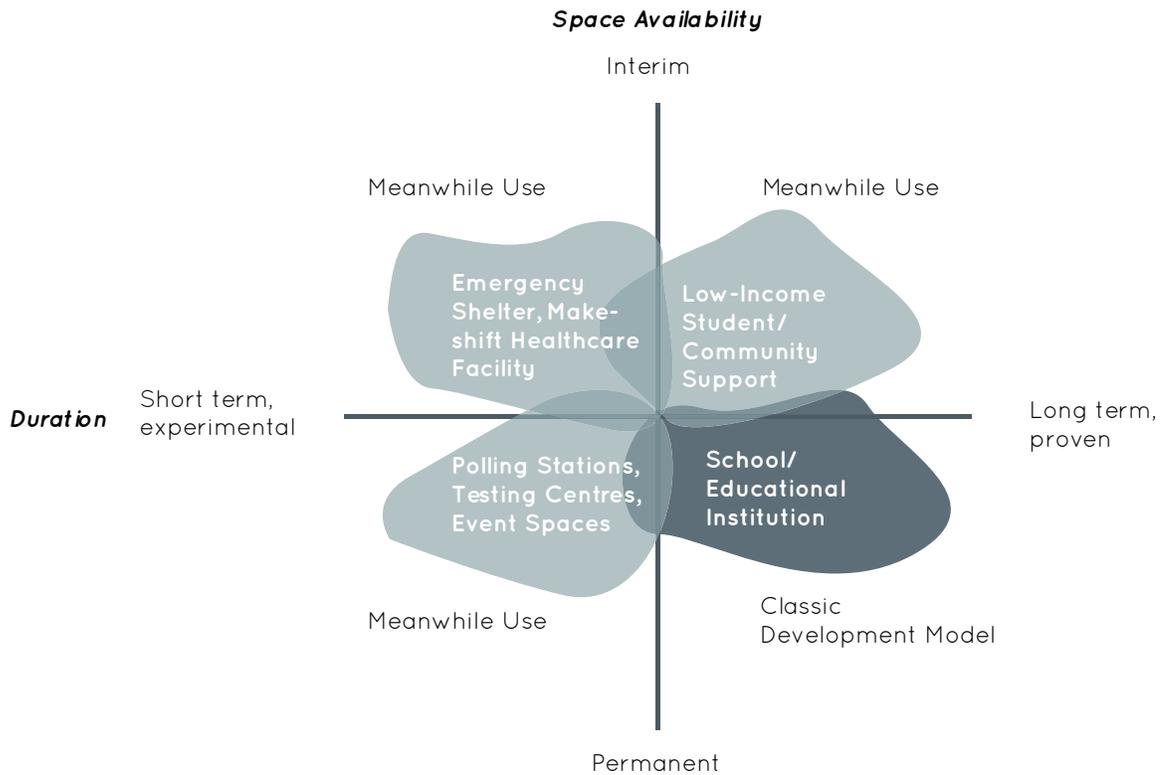


Figure 9: Proposed meanwhile use diagram for emergency shelter-designated public schools. Adapted from Nicolas Bosetti and Tom Colthorpe's "What do we mean by meanwhile use?" diagram in their publication, *Meanwhile, In London: Making Use of London's Empty Spaces*

shifts planning power away from city authorities towards marginalised, creative do-it-yourselfers"²¹. It is a way "to improve urban spaces in an era of tightening public and private investment"²². DIY Urbanism is alive and well in New York City's environmental and social activism communities and could be extended to emergency shelter schools (figures 9a, 9b, 9c).

This Catalogue is intended to empower school boards, teachers, and students to alter their buildings to better suit their needs. It is an

21. Megan Heim Lafrombois, "Blind Spots and Pop-up Spots: A Feminist Exploration into the Discourses of Do-It-Yourself (DIY) Urbanism," *Urban Studies* 54, no. 2 (November 2016): p. 422

22. *Ibid.*, 422

invitation to take a self-initiated approach to selecting and combining interventions, modifying them if they so choose. On the website²³ which accompanies this thesis, an “online-shop” serves as a contemporary experimental method for sharing and decentralizing the deployment of these interventions. The interventions are modular and adaptable to better accommodate a range of scenarios, with the potential to eventually be applied to schools in other similar urban conditions. The intention is to consider ways that architectural gestures might make a building friendly, safe, and generous.

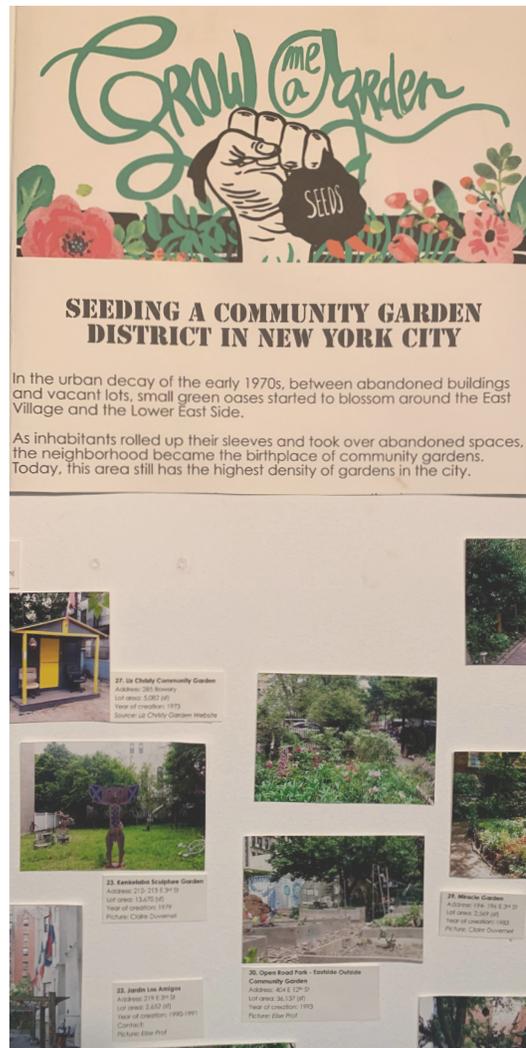


Figure 9a: DIY urbanism in Manhattan: taking over unused and abandoned spaces and turning them into community gardens. Exhibit in Manhattan Museum of Reclaimed Urban Space

23. <https://www.anticipationcatalogue.com/shop-interventions-1>

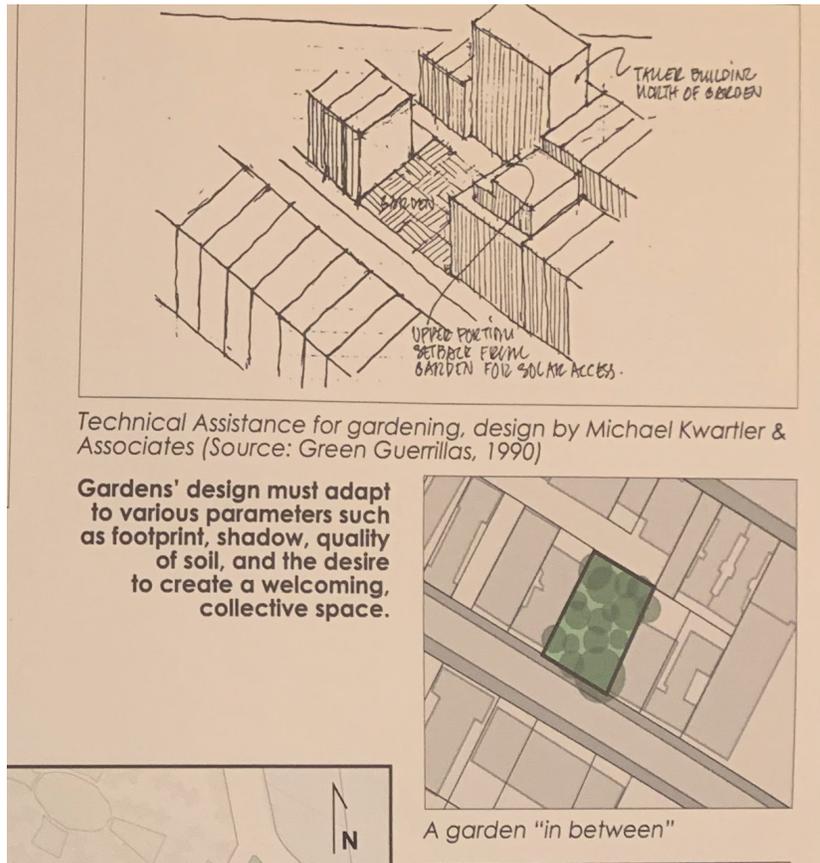


Figure 9b: Architect-provided guide for building a community garden in the city



Figure 9c: Protests for the protection of these DIY garden spaces

DEFINING THE SCHOOL

The School has both a physical and social significance within the context of New York City.

Physically, New York City's schools range widely in their construction and upkeep. Nearly all public schools in Manhattan are older buildings. Among the schools which are designated as emergency shelters, most are heritage buildings built pre-war – that is, before the mid 1900s²⁴. Because of this, many of these buildings have been retrofitted throughout the years to attain 21st-century functionalities such as updated mechanical and electrical building systems. While private schools typically have the resources to maintain modern accessibility and interior comfort standards, public schools tend to lack the funds to keep up. This is because public school funding is more likely to go toward social programs ensuring students with limited means are supported²⁵. Consequently, the physical state of many New York City public schools leave something to be desired, as many have been critiqued for lagging in accessibility and even life safety standards.

Socially, schools offer more to their community than just a pedagogical

24. "Urban Layers. Explore the Structure of Manhattan's Urban Fabric." MORPHOCODE. <http://io.morphocode.com/urban-layers/>.

25. Eliza Shapiro, "Coronavirus in N.Y.C.: Why Closing Public Schools Is a 'Last Resort',"

environment. They are important neighbourhood anchors for hosting events, gatherings, political polling stations, and multitudes more depending on the needs of a community. They are spaces where people spend their formative years – a child’s experience at school can have a lifelong impact. For many students, schools are a safe space away from home, especially if home is not secure at a given time. Given the high number of socially and economically disadvantaged students attending New York City schools, these buildings are often the site where they access hot meals, internet connections, and social support.

DEFINING THE EMERGENCY SHELTER

How and where an emergency shelter is assembled depends entirely on the situation prompting it. If it is in response to an environmental crisis or political conflict, the Red Cross is the entity that coordinates mobilization to equip and manage shelters, as well as other local government and volunteer initiatives. The Red Cross Sheltering Handbook cites a philosophy of offering comfort and security to all who need it. It mandates that it will provide meals and sleeping quarters, however, delivery of these services depends on local Red Cross chapters and their organizing principles²⁶. This means that emergency shelter conditions will vary greatly depending on the resources available. Although volunteers running the shelters are trained



Figure 10: An elder person is directed to an emergency shelter following Hurricane Sandy



Figure 11: Crowding and lack of privacy in emergency shelter following Hurricane Sandy

26. *American Red Cross Sheltering Handbook*. American National Red Cross, May 2012

and equipped to ensure that services for occupant health and safety are provided, circumstances such as seismic or climate events, pandemics, or political instability can all bear consequence on their ability to do so. In developing the interventions for the Catalogue, I am considering the ways in which a local Red Cross chapter's limited resources could run scarce in a disaster scenario, and how to supplement them. Beds could run short, disease could spread, pets could be left behind, food supply could diminish. Today, this is a reality for medical care facilities treating COVID-19 patients.

Given the unpredictable nature of emergency, there is no certain way to be fully prepared without considering the many variables affecting how well a community is able to run a shelter.



Figure 12: Mass school closures in affected areas.

MANHATTAN EMERGENCY SHELTER SCHOOLS

Today, most of the designated emergency shelters in New York City are public schools²⁷. In the event of an emergency, schools become home to local vulnerable populations and others seeking refuge. As is apparent on the following map of designated emergency shelters (figure 13), there are gaps where the nearest shelter is not within a comfortable walking distance, and shelters are not evenly dispersed. If schools are equipped to autonomously convert to shelters, there might be more options for displaced individuals as well as the schools' staff and students. Issues of overcrowding and lack of access are among the primary arguments for proposing a series of interventions for better preparedness. Interventions could be provided not only to existing designated shelters, but also to additional schools to create a more robust network of options for temporary housing and social support when, and where needed.

27. Nicole Bode, "Where to Find the Shelter Closest to You," DNAINfo New York (DNAINfo New York, October 29, 2012), <https://www.dnainfo.com/new-york/20121029/new-york-city/where-find-shelter-closest-you/>)

Figure 13: Map of Manhattan which shows all schools on the island, and distinguishes those which are designated emergency shelters

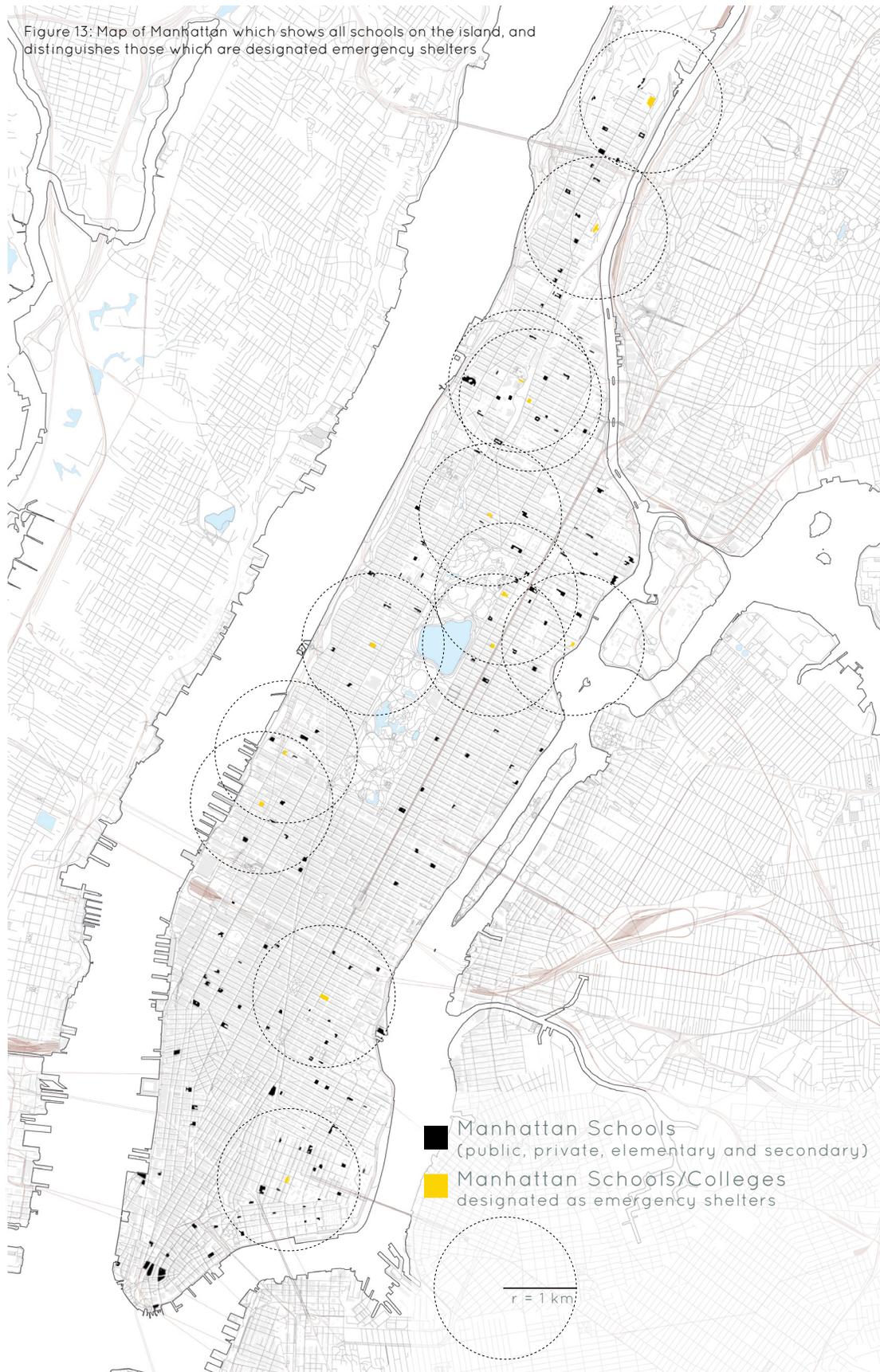


Figure 13a: Map of Manhattan which shows emergency shelter schools, indicating large gaps where additional schools could be designated as potential emergency shelters



ROOM FOR IMPROVEMENT

There could be improvement on two scales: within the city, and within the school. Within the city, shelters are dispersed unevenly. This means that there is no nearby shelter for those living in certain areas. Furthermore, New York City's emergency shelters have been overwhelmed by large numbers of individuals seeking refuge, resulting in cramped and uncomfortable conditions for individuals already undergoing a difficult circumstance. Additional schools should be designated emergency shelters. If interventions are deployed to benefit the schools on an ongoing basis, they can also facilitate more schools' conversions to viable emergency shelter. In addition to issues of distance between, and crowding within shelter schools, disparities between school constructions mean that conditions are different at every potential shelter. Several deficiencies have been flagged in terms of life safety and accessibility, both in public schools' daily operations and in times of emergency²⁸. Considering the occupants and their relationship to the buildings they occupy provides insight into the social impact of these issues.

28. Henk Ovink and J. Boeijenga, *Too Big. Rebuild by Design: Transformative Response to Climate Change*. 2018

CONSIDERING THE OCCUPANTS

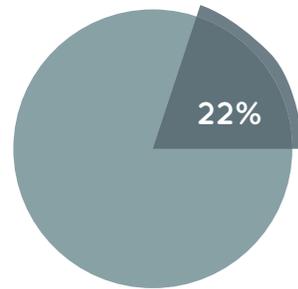
Many of the students attending schools in Manhattan that are designated emergency shelters are socioeconomically vulnerable. Inevitably, the main difference between students attending private and public schools in Manhattan are economics. While private schools have the means to support students who are likely also coming from reliable housing circumstances, public schools are attended by a shocking number of homeless students. As previously noted, this requires public school buildings to offer more than a place of education, providing additional services which would otherwise be typical for a home. The occupants of emergency shelter designated schools appropriate these buildings as homes, both on a day-to-day basis and in crisis. In developing

Manhattan Public School Student Bodies



1 in 10 are experiencing homelessness

Figure 14



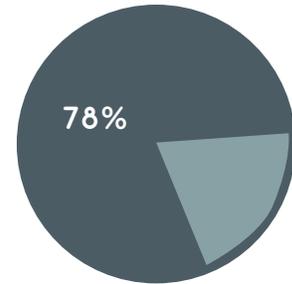
benefit from special education, or live with a disability

Figure 15

29. Data for figures 14, 15, 16, 17, 18, and 19:

Lankes, Tiffany. "NY School Funding." The Education Trust - New York. <https://newyork.edtrust.org/ny-school-funding/>.

these interventions, I am considering how to respond to deficiencies in schools and emergency shelters, as well as quality of daily life.



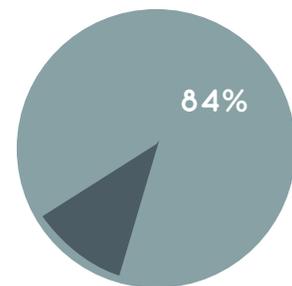
are living in poverty

Figure 16



are learning English as their second language

Figure 17



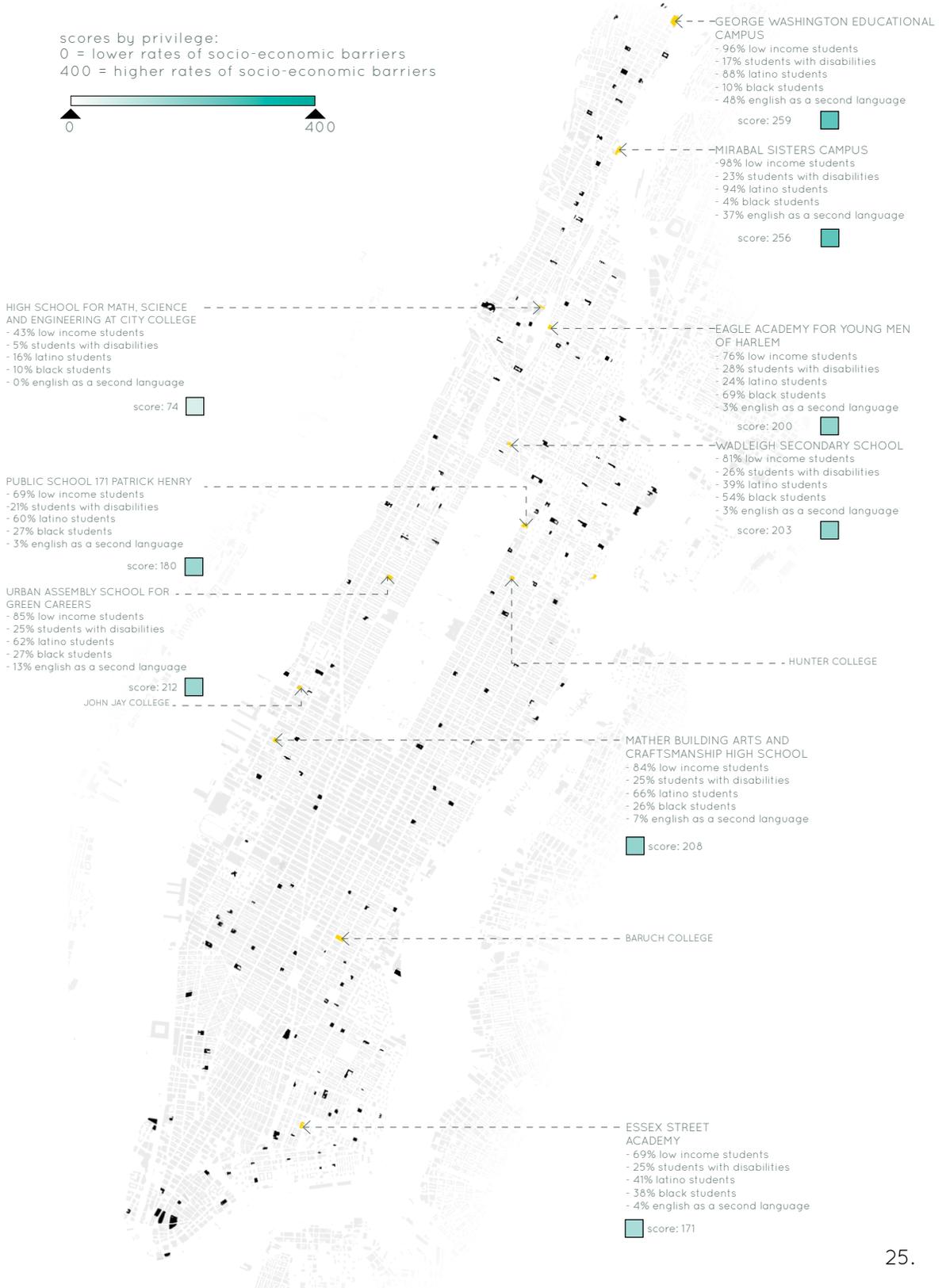
identify as black or latinx

Figure 18

Figure 19:

EMERGENCY SHELTERS OF MANHATTAN OCCUPANT DEMOGRAPHICS

scores by privilege:
0 = lower rates of socio-economic barriers
400 = higher rates of socio-economic barriers



DEFICIENCIES AND GAPS

Hurricane Sandy not only revealed the strain put on schools functioning as emergency shelters, but also the lack of accommodations for individuals living with special needs. A class action lawsuit went to trial in March of 2013 demonstrating that disabled and elderly New Yorkers were subjected to inconvenience and suffering as a direct result of lack of planning. During this trial, the evidence indicating the city of New York's lack of disaster planning for the disabled largely involved flaws in the built environment. The city has no system to evacuate large numbers of people with disabilities trapped in high rise buildings, and no system in place to indicate which emergency shelters are wheelchair accessible³⁰. The use of schools as emergency shelters was critiqued several

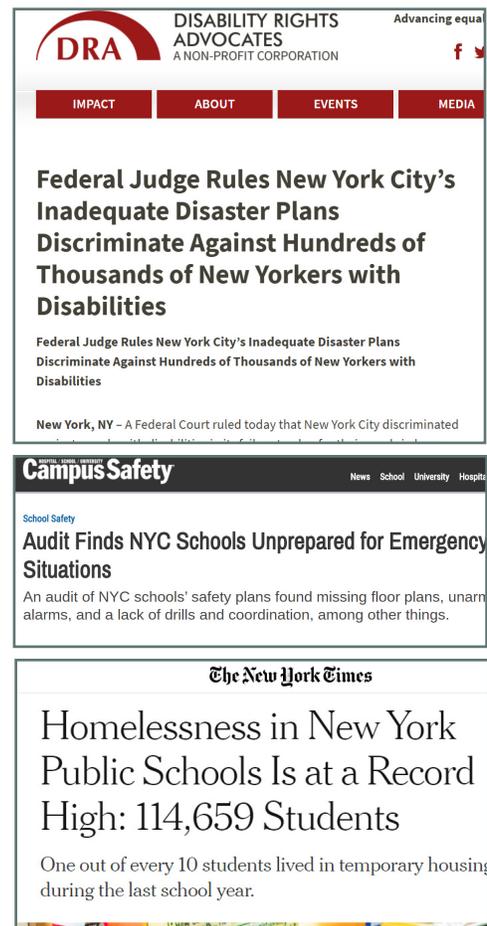


Figure 20, Figure 21, Figure 22 (above): Recent news headline clippings regarding state of public schools in New York City

30. "Federal Judge Rules New York City's Inadequate Disaster Plans Discriminate Against Hundreds of Thousands of New Yorkers with Disabilities," Disability Rights Advocates, January 20, 2016,

times during this trial, primarily because of how few of Manhattan's public schools are accessible. A lack of food, water, and utilities available in the public schools during emergencies was also cited³¹.

Access is a serious issue facing New York City schools, emergency scenario or otherwise. In 2017, the Department of Education in Manhattan admitted that nearly 50,000 students living with special needs did not receive the help they were legally entitled to. Unfortunately, the lack of assistance is not due to unwillingness on behalf of New York City schools, but due to insufficient human and physical resources³². A 2018 report revealed that less than one fifth of New York City schools are fully accessible to students with physical differences. One third of New York City schools are partially accessible, meaning that individuals using wheelchairs or with visual impairments can attend, but might not be able to access all areas of the building. In some cases, students must be separated from their peers if a class they are enrolled in is not offered in a space they can physically access. The reason provided by New York City's public school districts for the lack of physical accessibility is that most of their schools are in outdated buildings which have not been retrofitted³³. Issues of access to resources and accessibility are pressing and there is no quick fix. These issues help define the interventions in the Catalogue, offering potential solutions that can be applied to school buildings on an as-needed basis.

31. Federal Judge Rules New York City's Inadequate Disaster Plans Discriminate Against Hundreds of Thousands of New Yorkers with Disabilities," Disability Rights Advocates, January 20, 2016

32. Zimmer, Amy. "48,000 Students With Disabilities Not Getting Help They Need, DOE Admits." DNAinfo New York. DNAinfo New York, November 2, 2017. <https://www.dnainfo.com/new-york/20171102/tribeca/students-with-disabilities-support-services-nycschools/>

33. Chapman, Ben. "More than 80% of City Schools Are Inaccessible to Kids with Disabilities: Report." nydailynews.com. New York Daily News, December 12, 2018

INTERVENING IN MANHATTAN

Manhattan offers a unique environment for architectural intervention. This borough of New York is confined to an iconic island, comprising an urban fabric that is as dense as it is eclectic. It was important for me to understand how the city unfolds and repeats itself. Several architectural elements are distinctly characteristic of Manhattan, even if they are common in other cities as well. Fire escapes adorning low-to-midrise apartment building facades, subway stations, bridges connecting the island to other boroughs, and the juxtaposition of old buildings against towering steel-and-glass skyscrapers are the repetitive architectural moments that together give Manhattan its unique landscape. During my visits, in addition to photographing



Figure 23: Photo taken in Chinatown which juxtaposes distinct Manhattan moments

schools and institutional buildings, I tried to capture some of these moments. Attempting to better understand how they could inform interventions, I sought to use these images as departure points for generating ideas. The following sketches were a way to imagine how architectural gestures might be inserted into the existing vertical and horizontal planes of the city.



Figure 24: The Highline and Whitney Museum in Chelsea neighbourhood, Manhattan



HIGH LINE @ WHITNEY MUSEUM

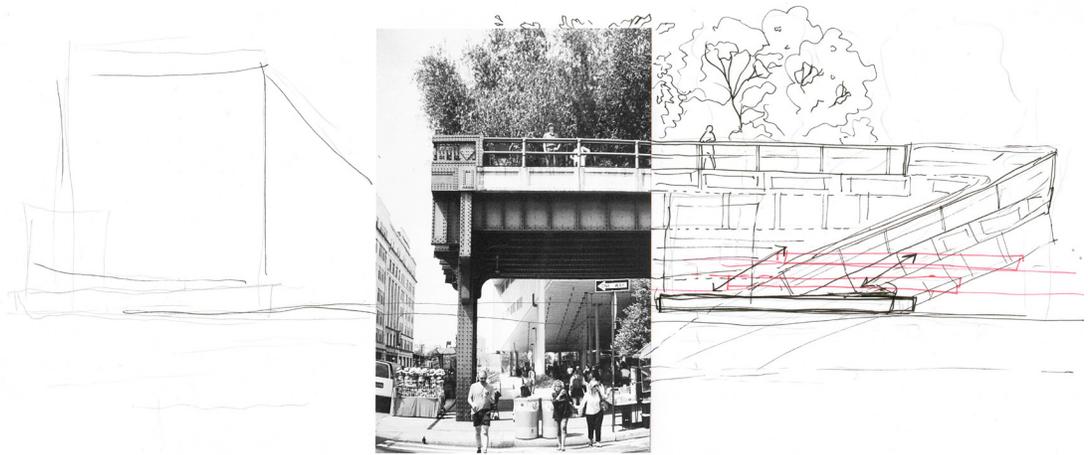


Figure 25 and Figure 26 (above): Intervening in Manhattan through sketching

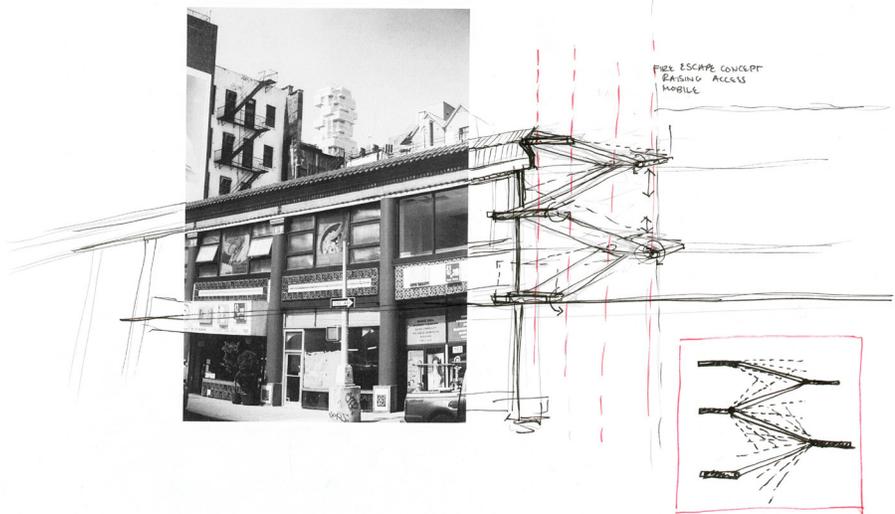


Figure 27 and Figure 28 (above): Intervening in Manhattan through sketching

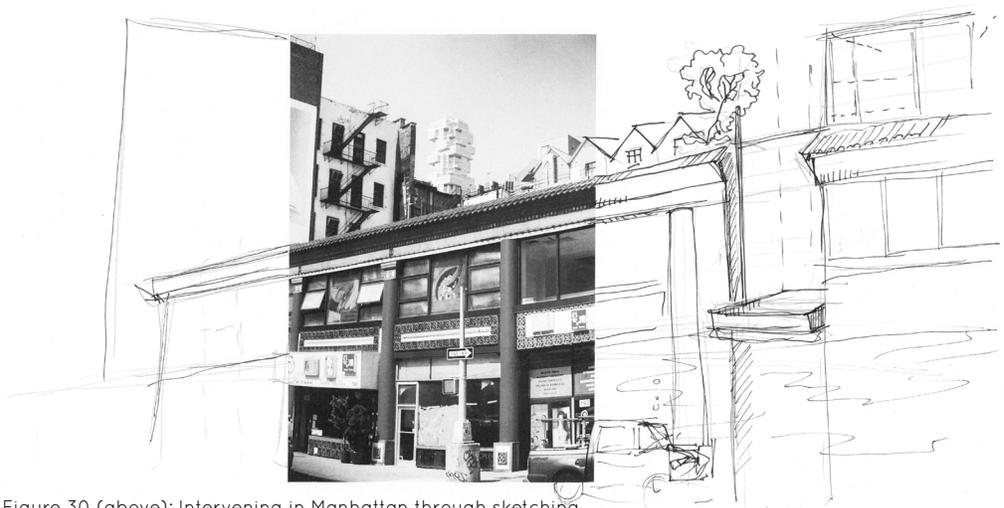
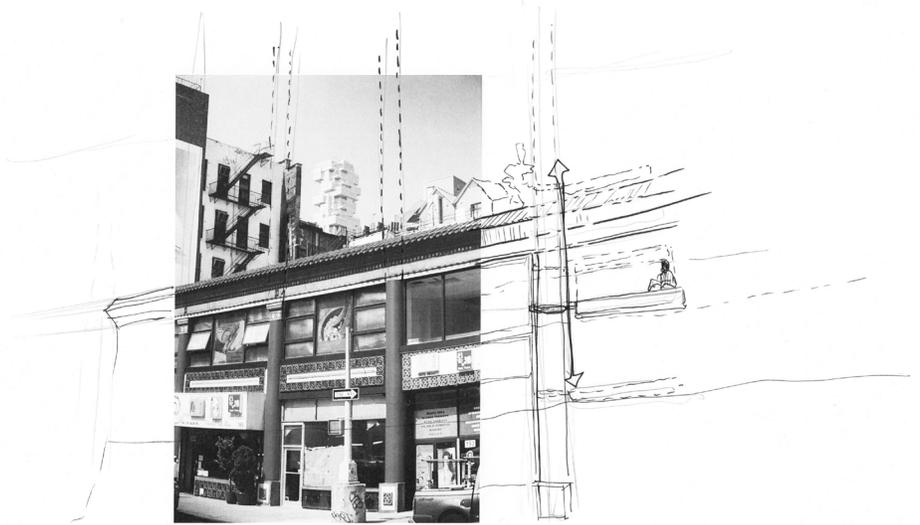


Figure 29 and Figure 30 (above): Intervening in Manhattan through sketching

THE SCHOOL AS A HOME

A challenge in generating interventions for the Catalogue has been to consider how the designs can integrate into an existing building while expanding its capacities. What can an intervention offer, and how? Shelter-designated schools already operate as more than places for education. In the life of a student whose home life is unstable, the school is the place of respite, stability, and growth. For a displaced individual seeking shelter or quarantine after evacuation, the school is a surrogate home. In this sense, the re-appropriation of a school for a shelter is a transition from institutional architecture to domestic.

A strategy to overcome the challenge of expanding these buildings' range of programming has been to draw parallels between the school and the home. In doing so, objects and architectures are identified in the schools that could be transformed or re-imagined as characteristics of a domestic environment. The following images (Figures 31-36)³⁴ are photos from inside Manhattan's emergency shelter-designated schools where characterizing elements are highlighted in yellow. This helps to inform and situate the design work for this thesis on its proposed sites.

34. Tom Liam Lynch. "InsideSchools." InsideSchools, <https://insideschools.org/>.

CORRIDOR: FOYER, HALLWAY

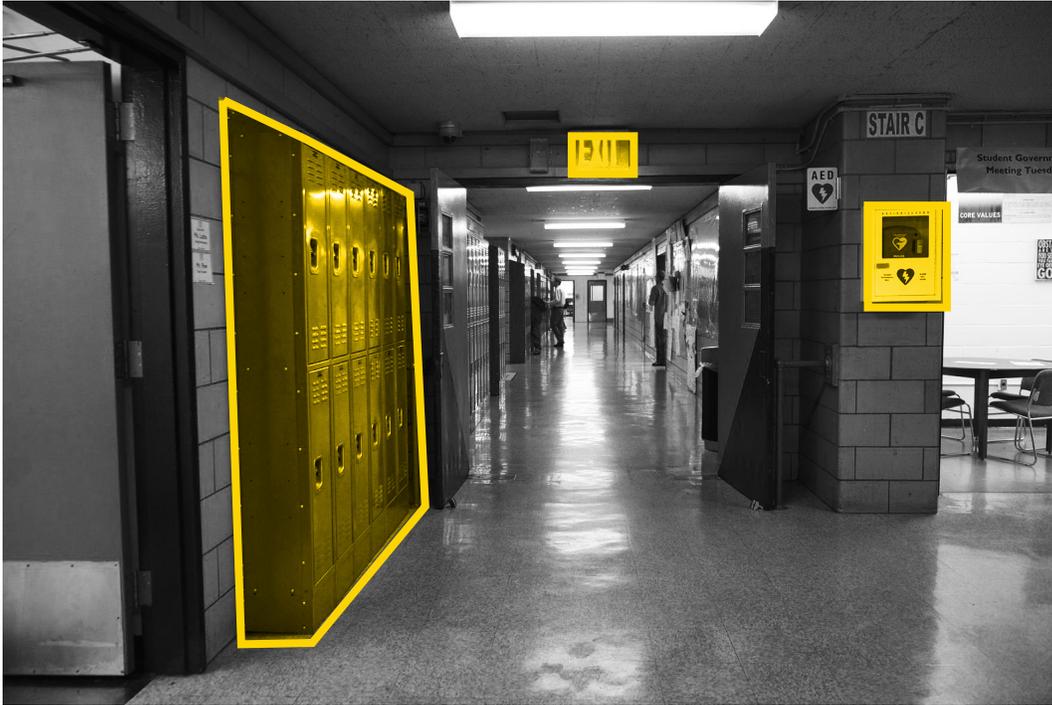


Figure 31: Corridor in Stephen T. Mathers School



Figure 32: Corridor in Hunter College

CLASSROOM: BEDROOM



Figure 33: Classroom in George Washington Educational Campus

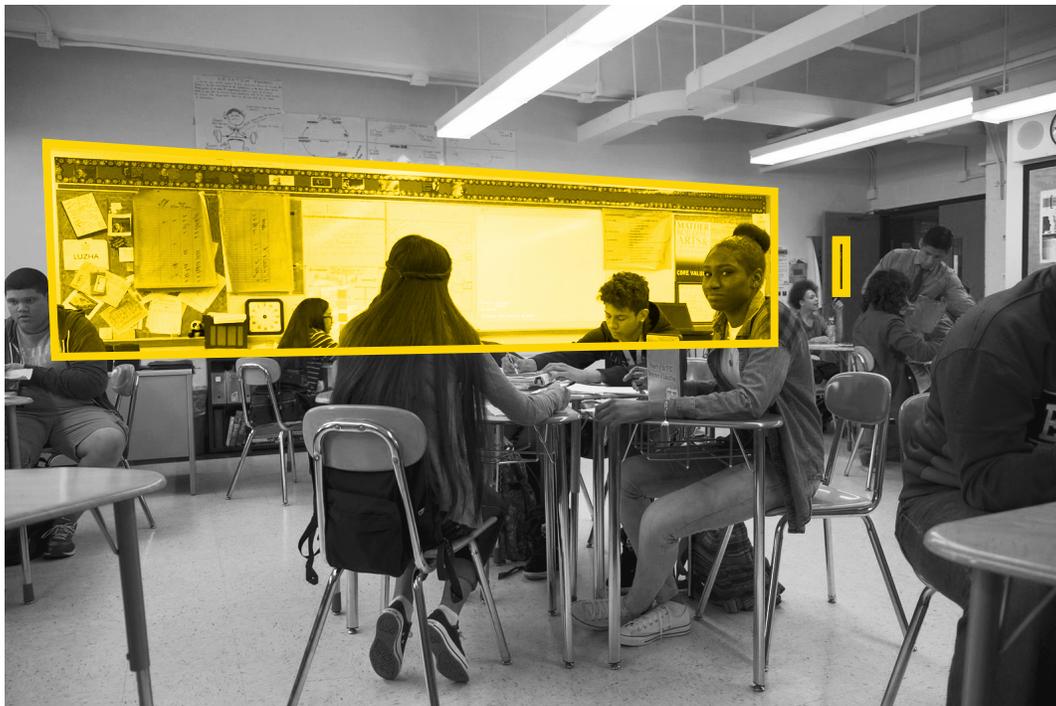


Figure 34: Classroom in Stephen T. Mathers School

GYM: LIVING ROOM, DINING ROOM

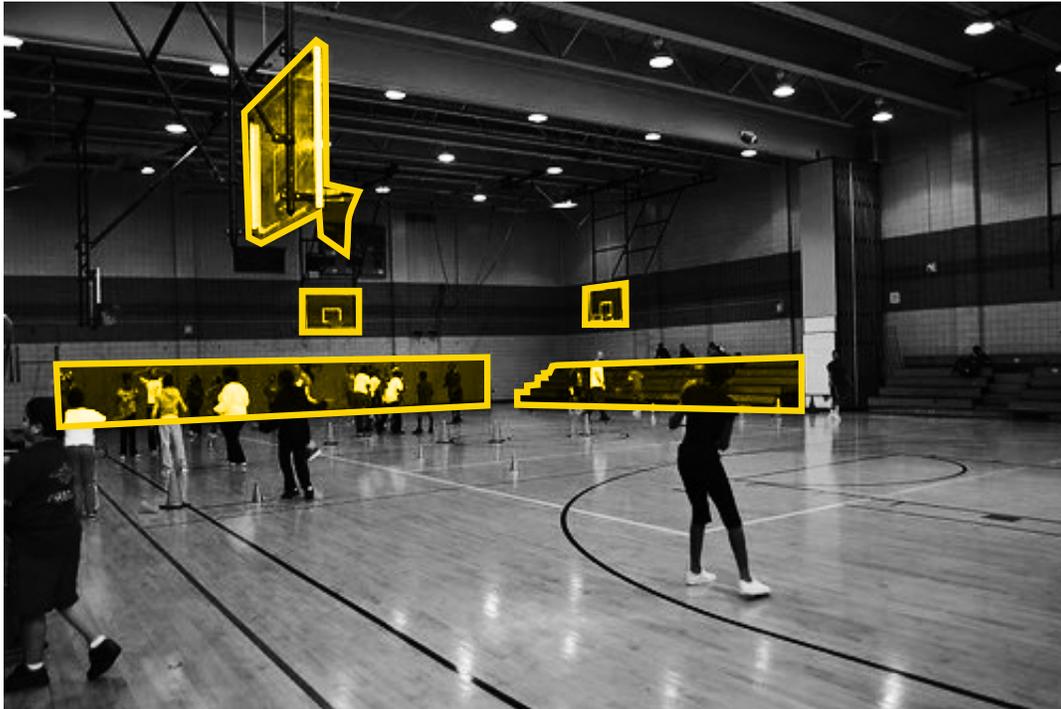


Figure 35: Gymnasium in Wadleigh School for the Performing and Visual Arts



Figure 36: Gymnasium in George Washington Educational Campus

CATEGORIES AND CONSTRAINTS

In considering what roles the school and the home play, and the gaps in existing shelter-designated schools, the following are key terms that could categorize and define purposes for the Catalogue of interventions:

Life Safety/Bare Necessity: This describes interventions that contribute to a building remaining safely habitable and supportive of basic daily needs of the occupants

Mental + Social Wellbeing: Acknowledging that mental health is an important component in remaining resilient during a traumatic time, certain interventions should improve the occupants' daily life by providing privacy or supporting casual gathering and interaction

Accessibility: Accessibility is a major obstacle in ensuring that vulnerable, or circumstantially disabled people are able to reach safe spaces. There should be interventions that could address barriers in building design.

Placemaking + Wayfinding: Schools have mascots and "school colours" to

incite student pride and identity, just as people customize their homes to reflect their preferences and personalities. Placemaking is a comfort and allows for wayfinding. If an emergency affects telecommunications, safe spaces should be easy to locate. Providing interventions that address this will ensure that people can find shelter, and a sense of belonging there. To remain sensitive to the context of crisis, the following are constraints considered for the design of interventions:

Inexpensive

Modular or Customizable

Operable by Most or All

Durability

Independence from City Power and Plumbing

BUILDING CONSTRUCTION CONSIDERATIONS

In proposing a catalogue of architectural interventions, one must consider how an existing structure will take on an addition. In Manhattan, various school buildings can vary in age by one hundred years or more. For example, Percy E. Sutton Educational Campus and Baruch College are both designated emergency shelters and on a day-to-day basis, accommodate very different demographics of students. Percy E. Sutton Educational Campus was built in 1926, whereas Baruch College locates most of its programming in a “vertical campus” built in 2003³⁵. Not only do the two buildings foster different demographics – one is occupied by a high school with a predominantly low-income student body whereas the other is a private college – but they are built with completely different construction styles, distinguished by time.

As architecture and building science has developed over the past century, material efficiency and engineering has increased. The results are buildings that are structured enough to safely support themselves and occupant loads, but not necessarily to take on the additional stress of architectural additions or interventions without accompanied structure³⁶. Brooklyn Grange is a roof-top farming operation currently located across

35. “Urban Layers. Explore the Structure of Manhattan’s Urban Fabric.” MORPHOCODE

36. “Our Farms.” Brooklyn Grange. <https://www.brooklyngrangefarm.com/farms>.

three farms in Brooklyn and Queens. This is an example of an intervention which expands the use of a building; however, they are only able to construct farms on pre-war buildings. This is because pre-war buildings are typically over-structured and hence readily able to support additional loads without significant alterations to the building's structural systems³⁷. For this reason, all three of Brooklyn Grange's rooftop farms are located atop buildings that are nearly a century old. Brooklyn Grange is also a glowing example of the way an ordinary building's use can be extended through intervention, as they are able to produce over 80,000 pounds of fresh food each year³⁸.

Given the implications of different construction types and the eras during which different schools were built, it is important to acknowledge in the Catalogue that there cannot be universal



Figure 37 and Figure 38 (above): Photos taken at Brooklyn Grange Queens rooftop farm location.

37. "Our Farms," Brooklyn Grange
38. Ibid.

solutions applied to any structure. Options for interventions featured in the Catalogue must therefore include variants in dimension and connection to the buildings to ensure that they are valuable wherever they are applied. In order to consider, on a broad level, how each intervention might be applied to different types of buildings, their applications are separated into two categories: **Pre-War** and **Post-War** constructions. In the context of this thesis, Pre-War indicates buildings that are over-structured and robust enough to take on significant additional loads, and Post-War indicates adequately structured buildings which may require extensions to support new loads.

Pre-War Construction:

- Over structured, ideal for roof farming
- Older building systems: harder to replace/repair
- Building envelope inherently less efficient
- Greater average distance between floor plates
- Protected by Landmarks Preservation commission, intervention highly regulated
- Building safety requirements either grandfathered or met through retrofit

Post-War Construction:

- Calculated structure may not be sufficient for significant additional loads without reinforcement
- Newer building systems: parts more likely available
- Building envelope most likely more efficient
- Shorter distance between floor plates
- Less likely to be subjected to stringent regulations for heritage preservation during renovation



Figure 39: Hunter College Vertical Campus, built in 2003



Figure 40: George Washington Educational Campus, built in 1945

39. Landmarks Preservation Commission. <https://www1.nyc.gov/site/lpc/index.page>.

TIMESCALES

Another important consideration for developing the Catalogue is time. For the interventions to best extend the capacity of any given school, including the temporal context might help determine which interventions are necessary. The Catalogue is a guide to empower students and staff to identify which interventions might be most helpful, and when.

The present, in this context, refers to ongoing social and environmental issues that necessitate the extension of a school's capacity to serve its community. As previously outlined, New York is currently faced with a student poverty crisis. If schools have the capacity to provide their occupants and community at large with resources such as reliable food and shelter, they might be able to impact self-perpetuating cycles such as poverty due to lack of education. These issues help inform the Catalogue interventions.

DEFINING THE PRESENT

If designing for emergency is designing for the *unknown*, designing for the present is designing for the *known*. Schools can be expanded by the interventions in the Catalogue, broadening the range and quality of day-to-day activities in the given buildings. This harkens to the previously mentioned concept of meanwhile use. The interventions graft and expand classroom furniture, blank walls, windows, and exterior facades to give them secondary and tertiary functions as needed. In a city like New York, space is expensive and cannot be wasted. Some of the more complex interventions will have to be pre-fabricated while others could be built by community members. In either of these case, the role of the architect will be to facilitate and support these DIY (do-it-yourself) or mostly-DIY endeavours.

Just as an architect provides working drawings and supervises the construction of a building, the architect provides drawings for each intervention in the catalogue and supports the occupant in the deployment and day-to-day use. This will be especially necessary for larger interventions that engage the existing building's envelope and threshold conditions. The catalogue could be provided to individual

schools and school boards, who would then select the interventions that would improve their schools on an ongoing basis. These could be interventions that improve vertical accessibility, create rooftop farming and gardening opportunities, or provide additional classroom furniture wherever needed. Once that is determined, the funds will have to be generated to support the construction and implementation. The intent is for everything in the catalogue to be relatively inexpensive. Ideally, funding would be made available at a school-board level, allowing local governing bodies to provide the necessary capital for construction where needed, acknowledging that the costs for the interventions would be much lower than conventional building additions. Otherwise, funding could be generated by local charities and community-initiated fund-raising efforts. The cost could be justified because of the interventions' dual nature and capacity for modularity: as the schools needs evolve, so too can the interventions. They benefit the day-to-day experience of attending the schools, while also improving emergency preparedness.

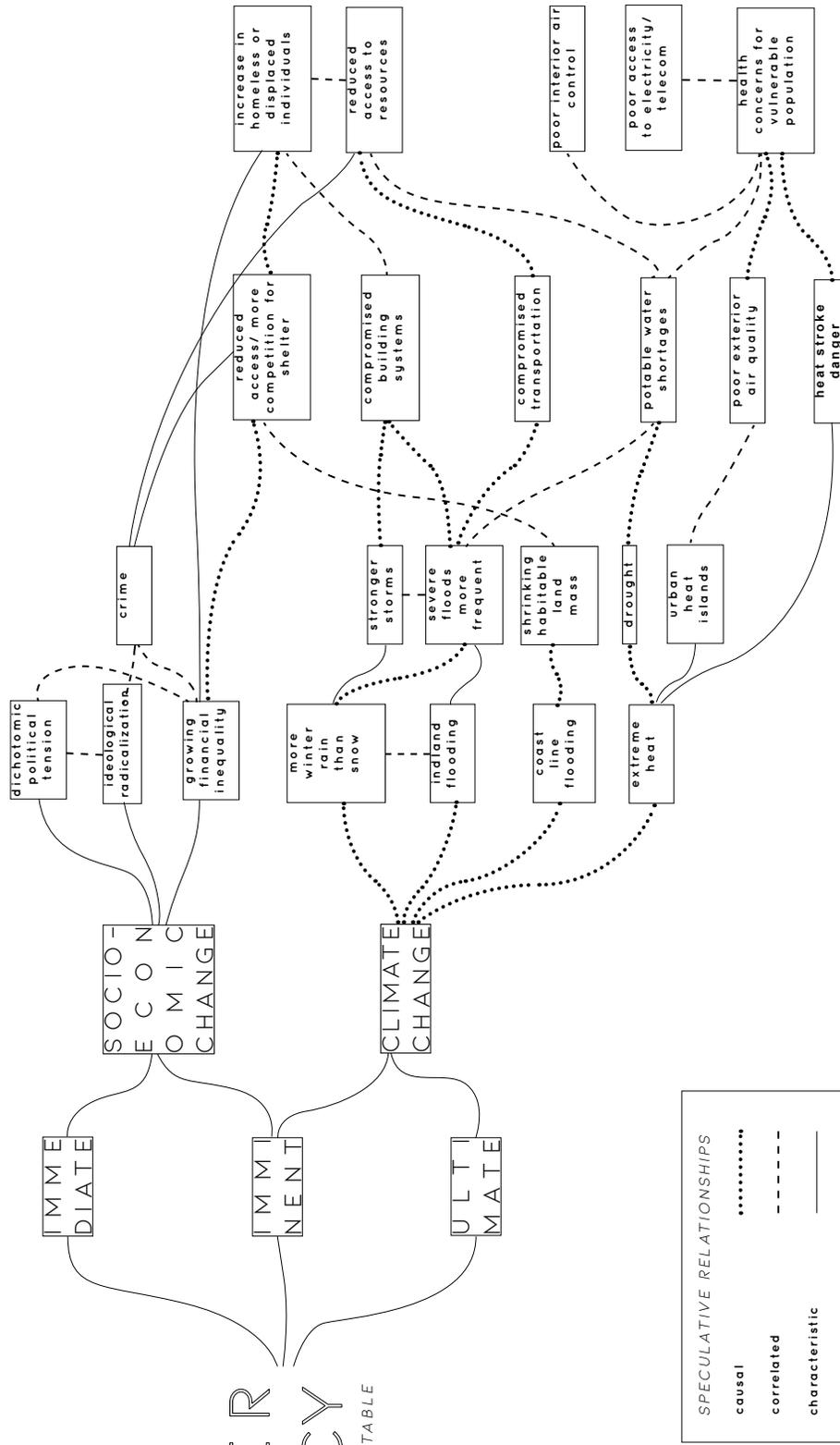
DEFINING THE UNPREDICTABLE

Though one cannot predict the future, one can take into consideration what could happen based on available historic data. On the following page, figure 41 is an experimental diagram which attempts to define the potential effects of an unpredictable emergency, and their relationality.

These scenarios help define the interventions that might be necessary to better equip school buildings for conversion to emergency shelter or otherwise, such as a temporary hospital, quarantine, or community centre. It also reveals how many disaster scenarios have consequences that are interwoven or concomitant. Most (if not all) of the interventions pertaining to the present are applicable on the long term or in emergency scenarios. Issues such as access to food, shelter, and accessibility, transcend urgency – that is, they are as important, if not more so, on a day-to-day basis as in an emergency.

There are infinite types of emergency, and unfortunately, many cannot be known or predicted until they happen. Nonetheless, establishing this not-knowing creates the opportunity to take a broad approach which is grounded in the present, and malleable for the future.

Figure 41:
DEFINING
EMER
GENCY
THE UNPREDICTABLE



IMAGINING INTERVENTIONS ON-SITE

The following pages include select interventions from the Catalogue (see Appendix A) and vignettes that situate them in schools.

Architects serve their clients through drawings. This is the service that the Catalogue provides as well. Though the interventions range in scale, the intention is that many are either “do-it-yourself”, or, the larger ones, constructible with limited time, space, and money.

In the spirit of empowering the clients/occupants to have control over their spaces, selecting interventions from the Catalogue entails providing all documents and instructions at no financial cost. With this information, they, or qualified community members, can build and modify to suit their needs.

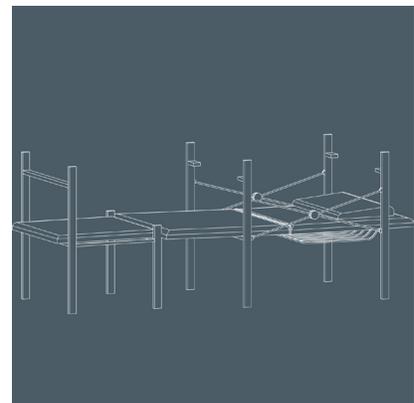
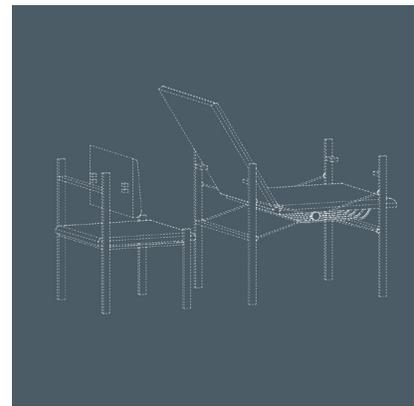


Figure 42a, 42b, 42c: “Sleeper Desk” is a student desk which can unfold into a bed 50.

Process of developing the interventions;

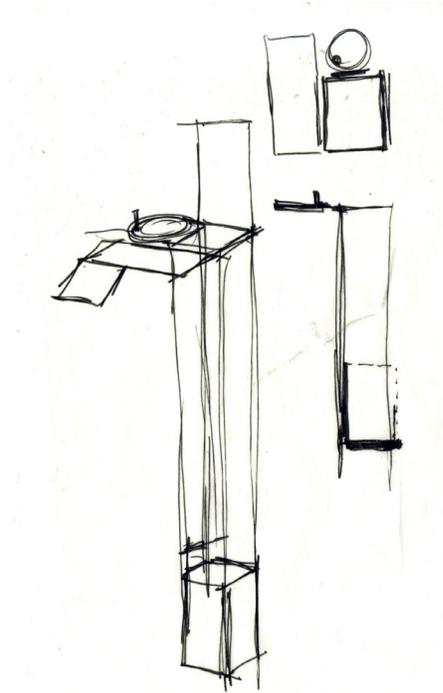


Figure 43

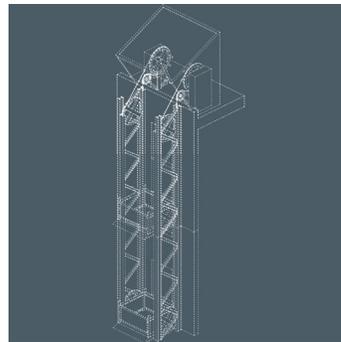
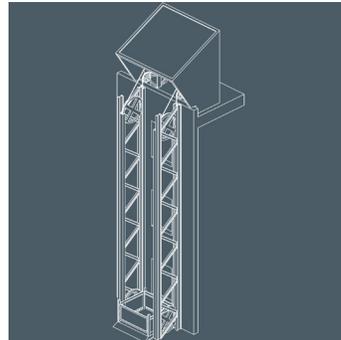


Figure 44

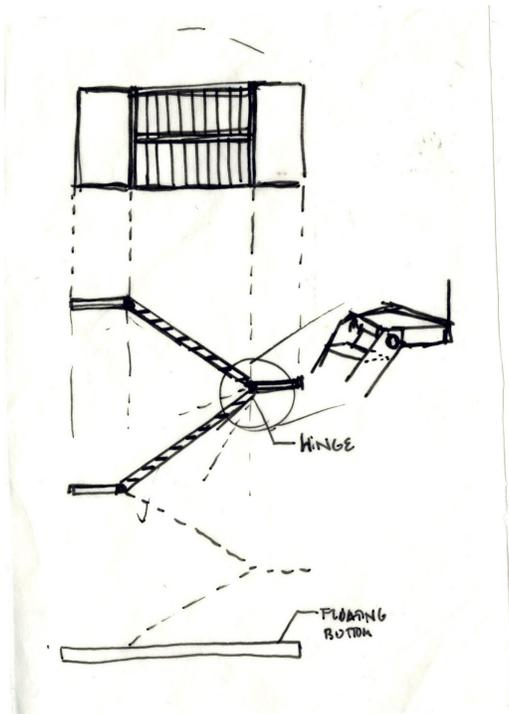


Figure 45

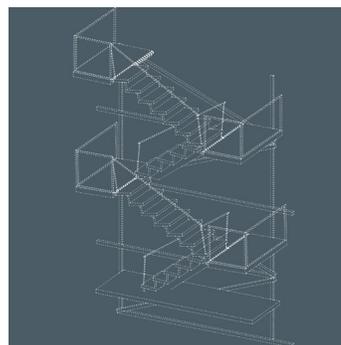
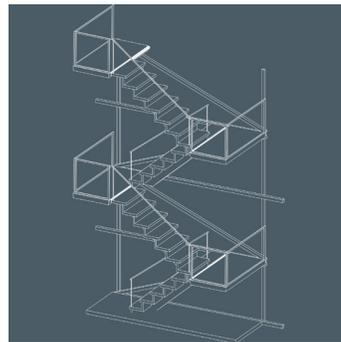


Figure 46



Figure 47:

*A new relationship with their school is forged when students build and customize selected interventions on an **ongoing** basis. They are actively improving their space, fostering a sense of ownership and pride in what their work will offer for years to come.*

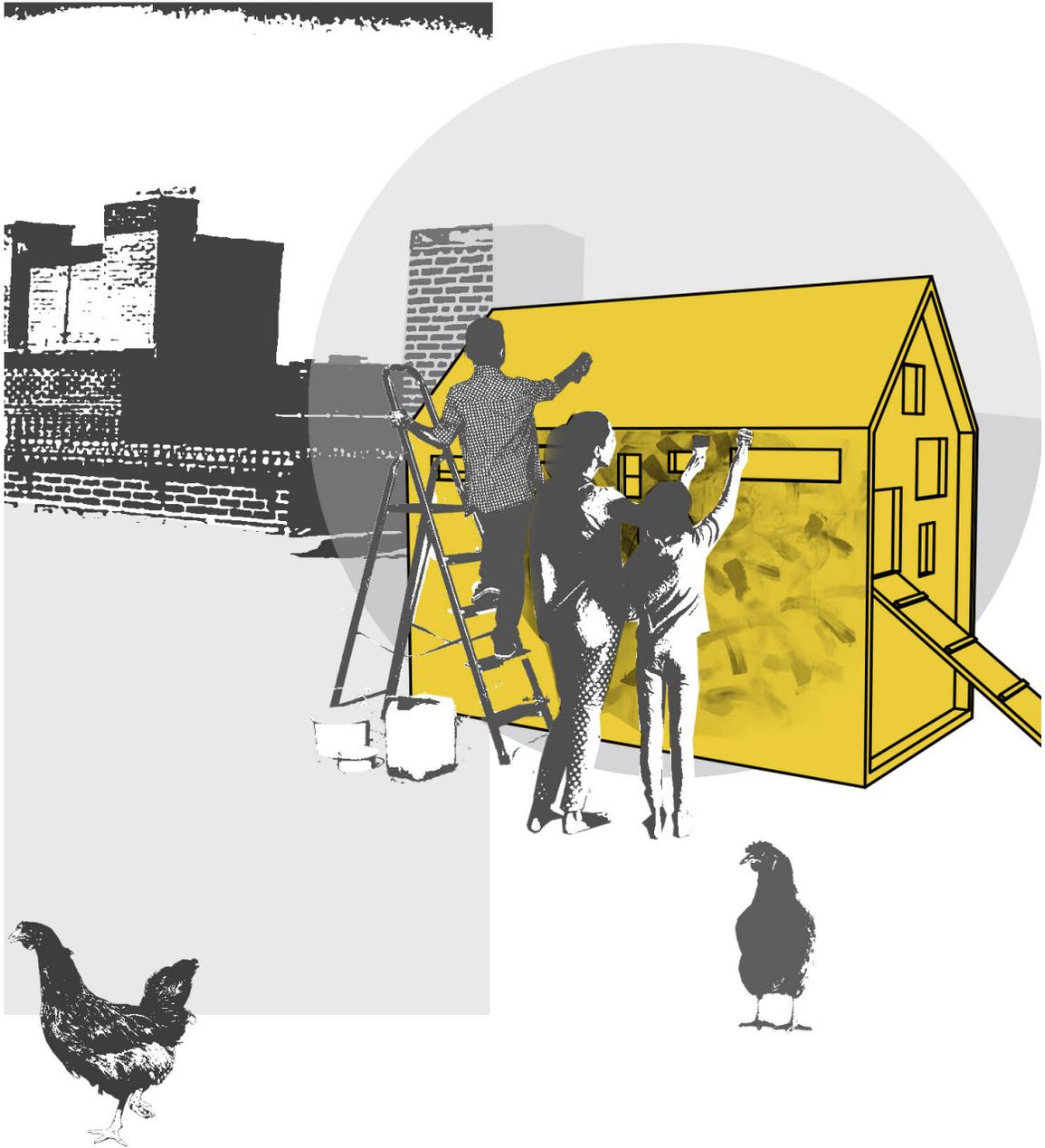


Figure 47 enlarged

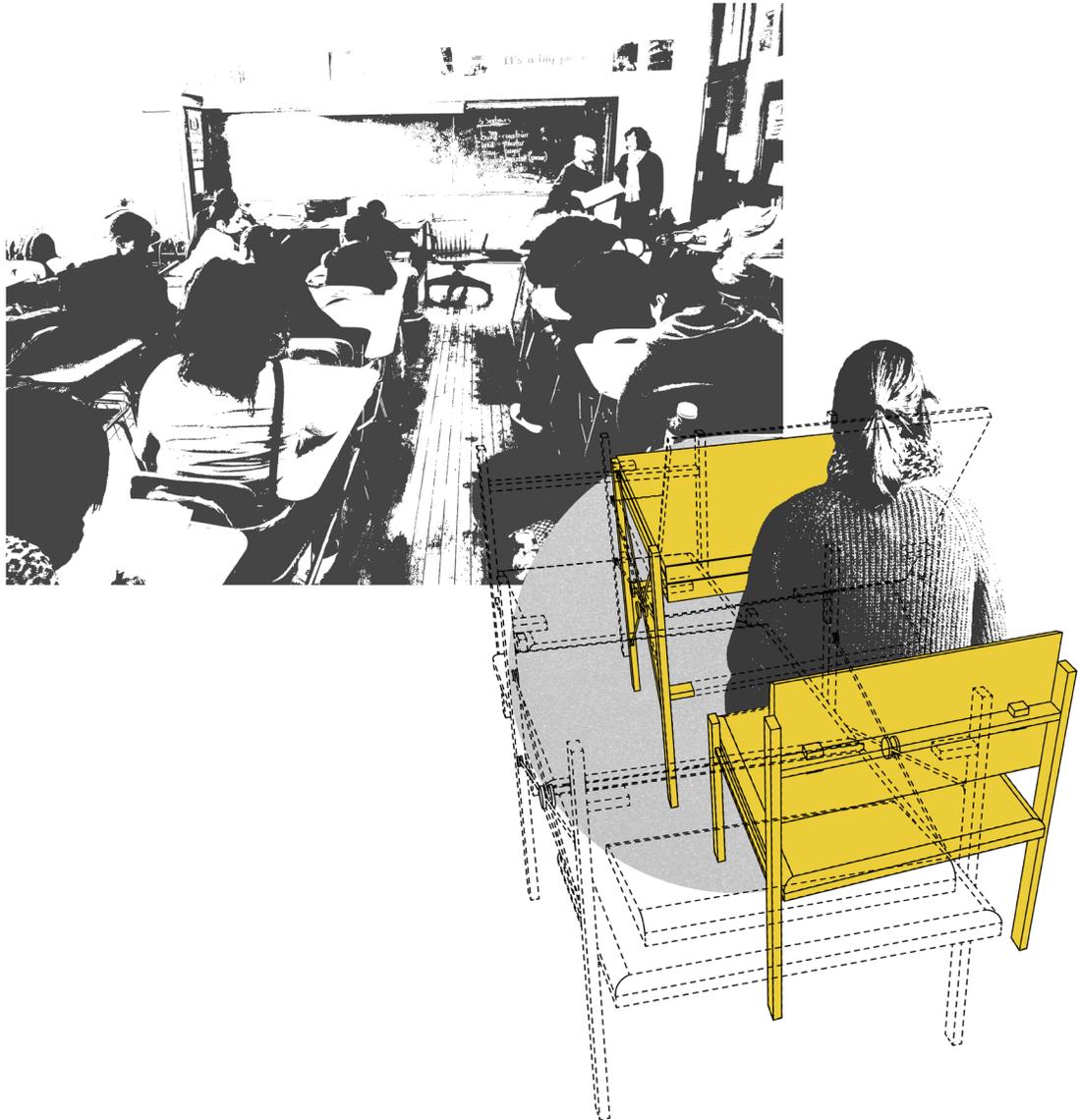


Figure 48

*In the classroom, desks are integral on an **ongoing** basis. Expanded capacities of everyday objects are hidden in plain sight.*

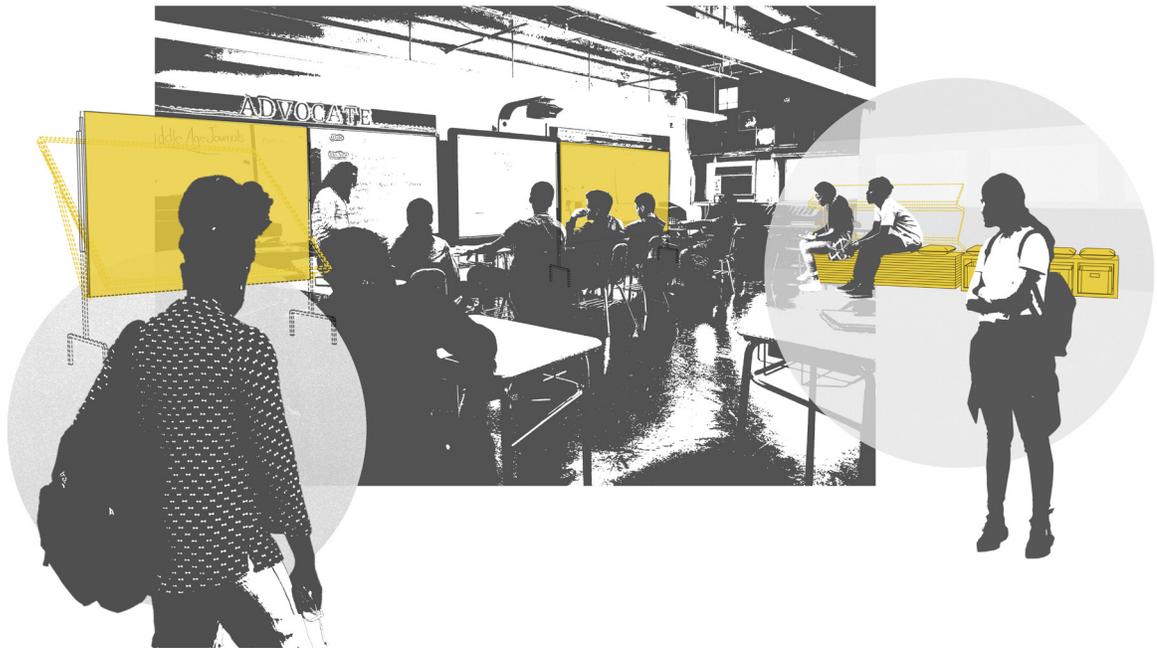


Figure 49

*In the classroom, seating and whiteboards are integral on an **ongoing** basis. Expanded capacities of everyday objects are hidden in plain sight.*



Figure 49 enlarged



Figure 50

*The circumstances during which interventions are unfurled and expanded will vary **unpredictably**. Perhaps these are teachers sharing a meal after working late, or perhaps they are sheltering in place, seeking respite in a moment of conviviality.*

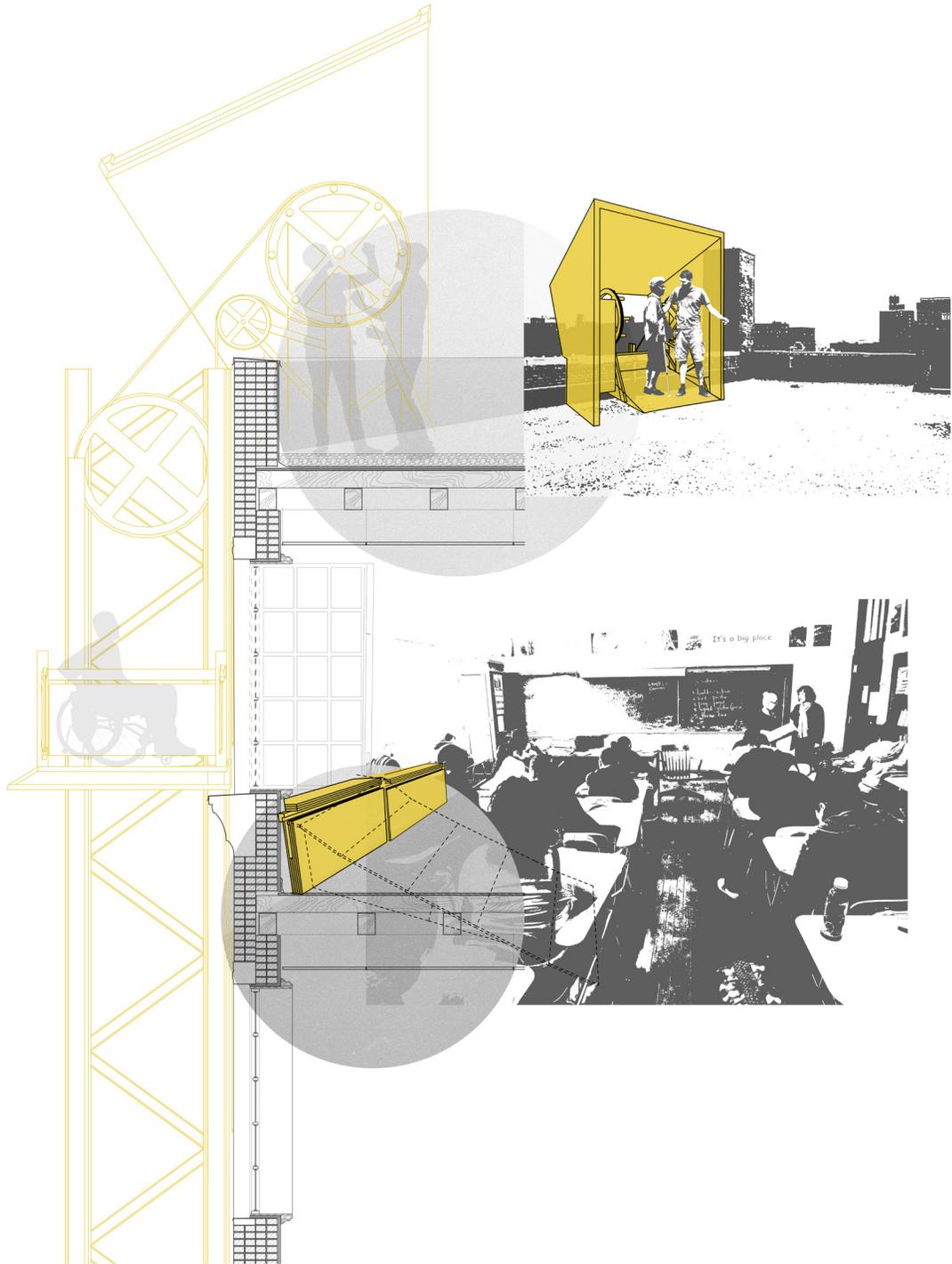


Figure 51

A pre-war building with thick walls steeped in memories of the patterns of student life is given new dynamism, as windows become doors and roof planes become outdoor living spaces, all without losing their original programming.

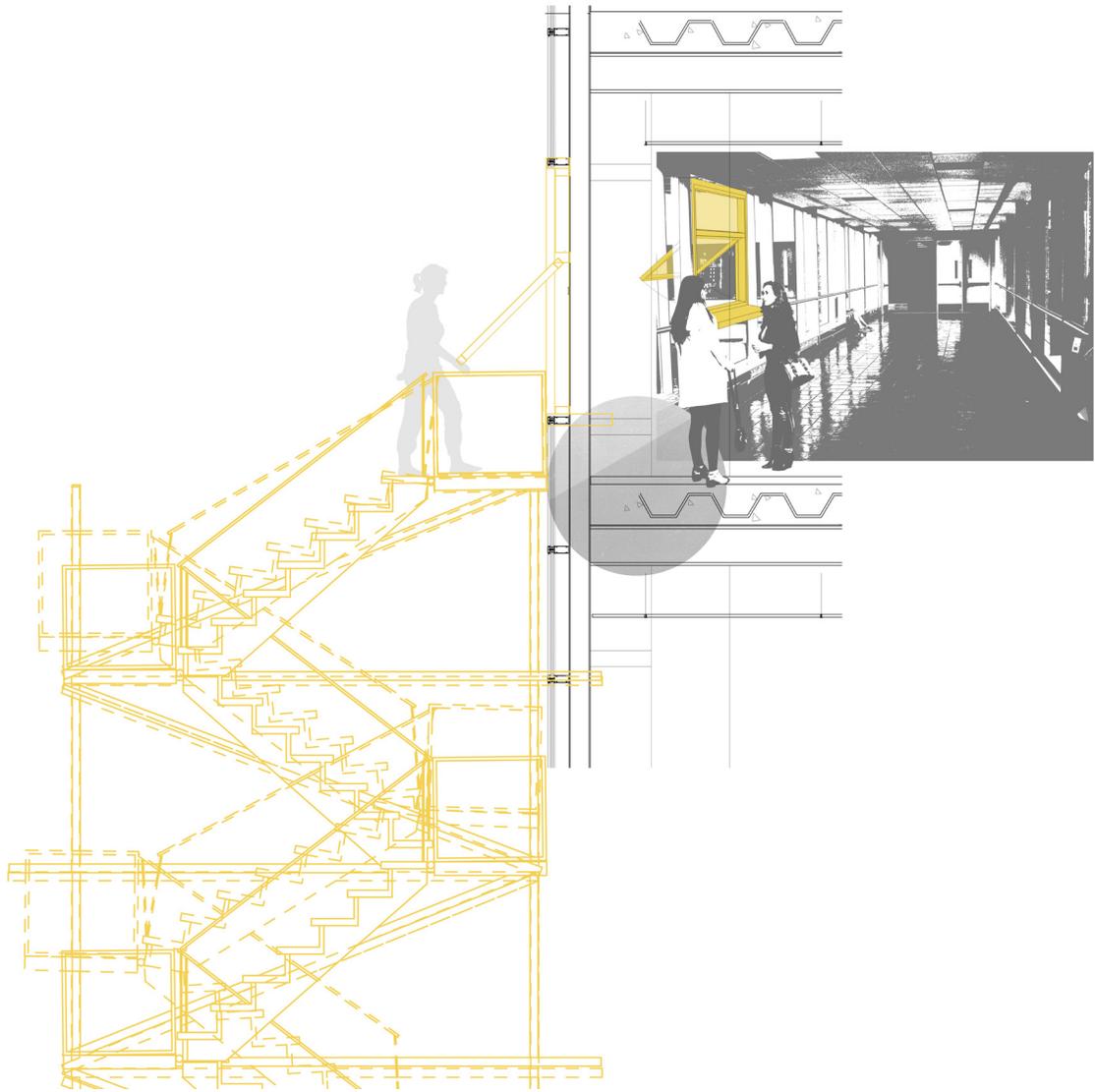


Figure 52

A post-war building stands tall and light, its generic and repetitive details a blank canvas for new openings, new views and new projections.

WUHAN TO MANHATTAN: LESSONS FROM CURRENT EMERGENCIES

Schools, in their roles as community hubs and shelters, offer a place for gathering and intimacy. But some emergencies necessitate distance and isolation...

The world is stricken by a pandemic. A viral illness originating from Wuhan, China was transmitted from animals to humans. Following this, China fell victim to a massive outbreak, as did, eventually, the world. With the advent of globalization and the popularity of leisure travel, the virus is inevitably spreading quickly, transitioning from an epidemic to a pandemic in late February 2020. The phenomenon of widespread disease repeats itself throughout history - the spread of SARS in 2003 and H1N1 in 2009 are recent precedents to which government officials and healthcare professionals have referred in preparing to mitigate this virus, COVID-19. Nevertheless, the sweeping effects of this virus are unprecedented, causing entire countries to shut down in concerted efforts to minimize casualties⁴⁰.

The way that this virus has drained the streets of Manhattan of its people is a reminder of the Spanish Influenza of 1918. As articulated

40. "COVID-19: Data," COVID-19: Data - NYC Health, <https://www1.nyc.gov/site/doh/covid/covid-19-data.page>

throughout this text, emergency is unpredictable, but past crises can inform our future reactions. The parallels between the pandemics of 1918 and 2020 in New York City are harrowing demonstrations of how little, in a century, humankind's spatial response to emergency has changed⁴¹.



Figure 53: Makeshift hospital in New York City for Spanish Flu, 1918



Figure 54: Makeshift hospital in New York City for Coronavirus, 2020

41. Noah Sheidlower, "How NYC Survived the 1918 Spanish Flu Pandemic," Untapped New York, March 20, 2020, <https://untappedcities.com/2020/03/17/how-nyc-survived-the-1918-spanish-flu-pandemic/>

As with any potential threat to humanity, news media is frenzied over COVID-19's international spread. The result is a daily onslaught of news updates provoking varying levels of panic. At the time of writing this, the virus has peaked in China and the number of cases has plateaued; however, cases of infection throughout the world at large have yet to peak; experts on the matter suggest that the virus can no longer be contained and that all nations can expect some level of mass infection, especially among vulnerable populations⁴². New York City is no exception. Manhattan's rich urban density prompts candid moments of physical intimacy on sidewalks, in bodegas, and in the subway system – inevitably encouraging the spread of illness. While some were immediately able to forego these daily opportunities for incidental intimacies as a precaution, many New Yorkers did not, and do not have the option to skip work, public transit, and other aspects of the public realm.

An example of an inevitable public realm is the school. As Eliza Shapiro wrote for the New York Times, the closure of New York City's public schools in attempts to avoid infection would cause massive social disruption⁴³. Because these buildings are so vital to supporting their communities' underprivileged youth, "Even a single snow day could seriously disrupt the lives of New York's most vulnerable children", and "Large-scale school closings [could] mean... that subway conductors and bus drivers must stay home with their children, or that nurses at

42. Ben Doherty, "Australia's Coronavirus Pandemic Plan: Mass Vaccinations and Stadium Quarantine," The Guardian

43. Eliza Shapiro, "Coronavirus in N.Y.C.: Why Closing Public Schools Is a 'Last Resort',"

public hospitals would not be able to come to work, potentially slowing essential city services”. More concerning is the fear that children “would not have access to crucial medical help at the school’s on-site clinic if there were widespread closings.”⁴⁴ This unique circumstance highlights the importance of the public school and reveals that these buildings offer far more than education to their occupants. It also offers a stark contrast with private schools - none of which are designated emergency shelters - “where the student bodies tend to be much whiter and wealthier than they are in public schools”, several of which already had temporary closures for deep-cleaning as precaution⁴⁵.

As confirmed cases of the illness were rapidly rising and the pandemic was worsening, “three dozen infectious disease experts in New York signed a letter calling on the mayor to close all schools”⁴⁶, however, city officials insisted that the consequences of closing them still outweighed the virus. What was proposed as a compromise is for the schools to remain open as “‘centers community aid’ and ‘emergency childcare’ but not for students who have adequate support at home”⁴⁷. Then, on March 8th, 2020, New York City’s governor Andrew M. Cuomo declared a state of emergency.⁴⁸

44. Eliza Shapiro, “Coronavirus in N.Y.C.: Why Closing Public Schools Is a ‘Last Resort’,”

45. Ibid.

46. Joseph Goldstein and Michael Gold, “City Pleads for More Coronavirus Tests as Cases Rise in New York,” The New York Times (The New York Times, March 6, 2020), <https://www.nytimes.com/2020/03/06/nyregion/coronavirus-new-york.html?action=click&module=RelatedLinks&pgtype=Article>

47. Ibid.

48. Jesse Mckinley and Edgar Sandoval, “Coronavirus in N.Y.: Cuomo Declares State of Emergency,” The New York Times (The New York Times, March 7, 2020), <https://www.nytimes.com/2020/03/07/nyregion/coronavirus-new-york-queens.html>

The second week of March 2020 saw stark drops in student and teacher attendance, but no official decisions on public school closures had yet been made. At that time, over 2300 individuals in New York City suspected of carrying the virus had been asked to self-quarantine. These were people who had recently returned from countries where infection was more widespread. An extreme concern about mitigating the spread of the illness was, and is, ensuring the availability of sufficient medical equipment, staff, and hospital beds to treat severe cases⁴⁹.

On the third week of March, New York City's public schools were finally ordered to close. The mayor, Bill DeBlasio stated that this decision was "taken with no joy and a lot of pain."⁵⁰

By March 23rd, select schools were slated to re-open as "Enrichment Centres", where children living with homelessness, special needs, or other vulnerabilities could still seek instruction and basic services⁵¹. By then, New York City had over 20,000 active cases of COVID-19, upwards of 12,000 of them in Manhattan proper. These numbers are still rising quickly⁵².

With thousands of hospital beds expected to be required for treatment, New York City's officials set out to develop plans to reclaim any suitable spaces for temporary medical use. Speaking on this, Mayor DeBlasio stated that it "will be a race against time to create these facilities,

49. Jesse Mckinley and Edgar Sandoval, "Coronavirus in N.Y.: Cuomo Declares State of Emergency,"

50. "New York City to Close Schools, Restaurants and Bars," The New York Times (The New York Times, March 15, 2020), <https://www.nytimes.com/2020/03/15/nyregion/new-york-coronavirus.html>

51. Ibid.

52. Joseph Goldstein and Michael Gold, "City Pleads for More Coronavirus Tests as Cases Rise in New York,"

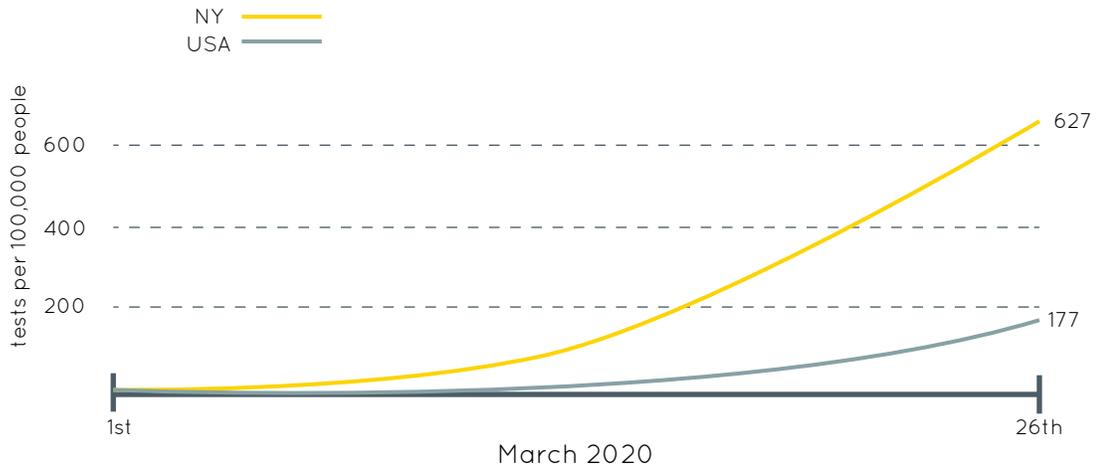


Figure 55: COVID-19 Testing Rates in New York State versus USA Average

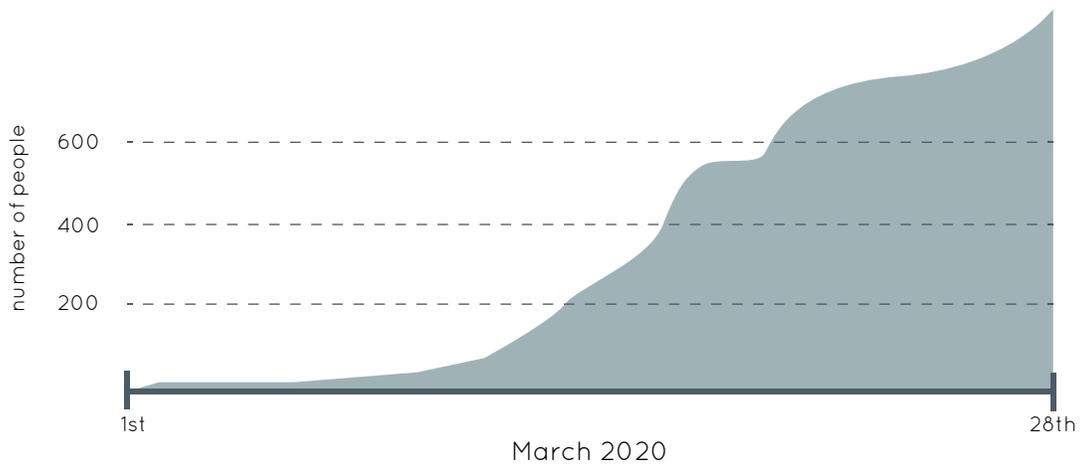


Figure 56: Daily hospitalizations for COVID-19 in New York City only,

53. Figure 55 data: Lazaro Gamio, Weigi Cai, and Adeel Hassan, "Where the U.S. Stands Now on Coronavirus Testing," The New York Times (The New York Times, March 27, 2020), <https://www.nytimes.com/interactive/2020/03/26/us/coronavirus-testing-states.html>

54. Figure 56 data: "COVID-19: Data," COVID-19: Data - NYC Health, accessed March 29th, 2020, <https://www1.nyc.gov/site/doh/covid/covid-19-data.page>

to get them up and running, to find the personnel and the equipment we need,”⁵⁵. This appropriation of a building for a temporary use is consistent with characterizations of emergency shelters in this thesis. DeBlasio’s concern about the challenges of converting buildings into care facilities underscores the notion that some buildings should be designed for quick adaptation to secondary and tertiary uses. Schools could be potential overflow facilities to accommodate additional patients, or as testing centres. This is an unpredicted scenario wherein one could imagine how the interventions featured in the catalogue would improve the experiences of the ill and their caretakers.

55. Jesse Mckinley and Edgar Sandoval, “Coronavirus in N.Y.: Cuomo Declares State of Emergency,”

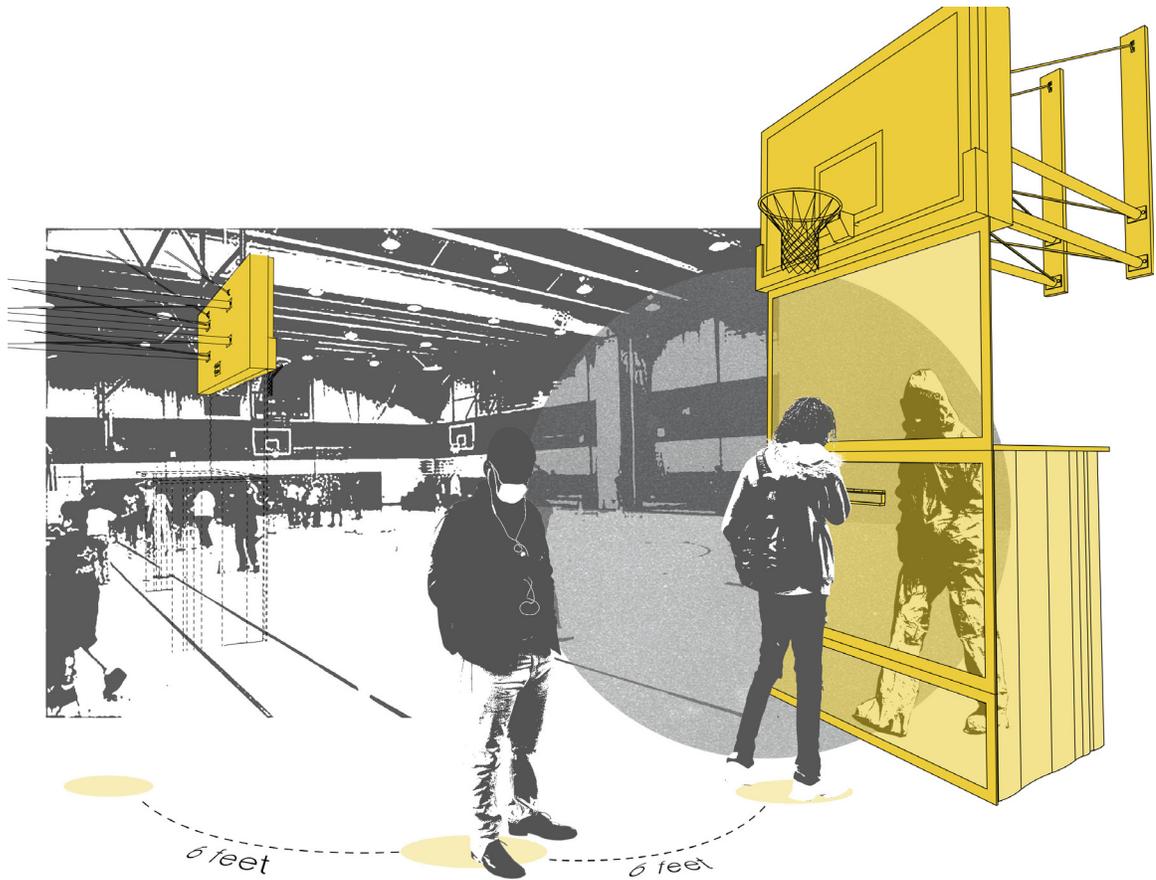


Figure 57

In a time when all is uncertain, the assurance provided by a medical test can mean the difference between life and death. A school gym could be deployed as a testing centre while libraries and classrooms house makeshift hospital beds, allowing for the entire building to be a hub for healing

REFLECTIONS

There is no one-size-fits-all solution to improving how buildings serve their communities, but this thesis sought to generate a discussion about how improving a building could be done simply, and at a DIY-scale⁵⁶. This discussion provided insight as to how the implementation of the catalogue could become a pedagogical experience, one that is implemented from a higher level to allow for seamless integration and consideration for local building code and planning authorities. This in turn could create a stronger relationship between the professionals who manage and modify the fabric of the city, and those who might otherwise be forgotten by them.

While New York City is an ideal site and circumstance for building this case, the catalogue could be replicated in many cities throughout the world, with additional or modified interventions depending on local contexts and cultures. The novel Coronavirus outbreak served as a real-time immersion as I worked to conclude this thesis. It expanded my definition of emergency and made me consider how relationships with spaces change when individuals are forced to quarantine or self-isolate. Though it has been incredibly sobering, it became a fruitful point of

56. See Appendix A, The Catalogue, page 80

conversation that continues to evolve, highlighting where the catalogue itself could evolve as well.

The thesis in general served a valuable lesson in reconsidering how institutional spaces are designed, and how the spaces in which we dwell can be mutated by external forces without notice. Of course, architecture should be designed to accommodate its intended program – ***but because we practice architecture in a world that can change without warning, perhaps our spaces should be designed to change as well.***

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IMAGE SOURCES

ALL IMAGES NOT CITED ARE BY THE AUTHOR.

Figure 02: Photo, New York after Hurricane Sandy
“Flooded, Darkened New York” Photos by Andrew Burton for
SLATE, 2012

Figure 03 and 04: Photo, New York after Hurricane Sandy
“A Powerless New York During Hurricane Sandy” Photos by Iwan
Baan for New York Magazine, 2012

Figure 05 and 06: Photo, Friends Seminary School and Shelter
Wall Street Journal, 2017

Figure 07 and 08: Photo, taking refuge in school gym after Sandy,
Hurricane Sandy Response, Eastern Red Cross, 2012

Figure 09a, 09b, 09c: DIY Urbanism in Manhattan - community gardens. Photos
taken by the author at exhibit in the Museum of Reclaimed Space
in Manhattan, October 2019.

Figure 10, 11, 12: Photo, taking refuge in school gym after Sandy
“Schools at Centre of Sandy Aftermath”, Alexandra Russo for
Scholastic Administrator, n.d.

Figure 20: Headline, Disability Rights Advocates, 2015

Figure 21: Headline, NYC School Safety Audit, Campus Safety, 2019

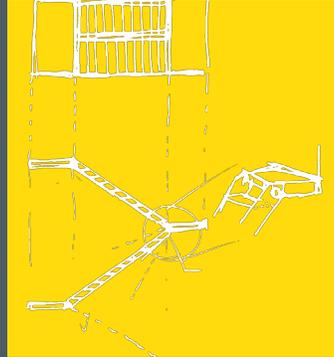
Figure 22: Headline, New York Times, Homelessness in New York Public Schools, 2018

Figure 53: Photo, makeshift hospital in NYC for Spanish Influenza, 1918. Published by Untapped New York, 2020

Figure 54: Photo, Javits Centre as makeshift hospital in NYC for COVID-19, 2020, Published by Sky News

ANTICIPATION

Enhancing Schools for the
Present and Unpredictable



CATALOGUE OF
INTERVENTIONS

The following interventions are speculative recommendations to improve and expand the use of school buildings on two time scales: the ongoing, and the unpredictable.

These may be modified to better serve certain buildings or circumstances. The intention is to consider ways that architectural gestures might make a building friendlier, safer, and more generous.

TIMESCALES

+ PRESENT: ONGOING

The present, in this context, refers to ongoing social and environmental issues that necessitate the extension of a school's capacity to serve its community. New York is currently faced with a student poverty crisis. If schools have the capacity to provide their occupants and the community at large with resources such as reliable food and shelter, they might be able to impact self-perpetuating cycles of poverty due to lack of education. The catalogue of interventions expands the ways in which a school serves its community on an ongoing basis, starting in the present.

+ UNPREDICTABLE: EMERGENCY

New York City schools are currently ill-equipped to support large changes in occupancy during emergency scenarios, despite their roles as city-designated emergency shelters. This thesis employs the term "unpredictable" to describe the inevitability of unknown future emergencies. Disaster could strike at any moment, and emergency shelters should be able to support their occupants in their darkest times. In addition to providing value to schools on a daily basis, the proposed interventions offer ways that architecture might offer warmth and sustenance to an occupant experiencing the trauma of an emergency.

BUILDING CONSTRUCTION TYPES

+ PRE-WAR

In New York, this refers to buildings built before 1945, which typically involved overstructured, robust construction.

+ POST-WAR

Post war refers to more recent building constructions that have been engineered to support a certain load proportional to the building type and size.

INTERVENTION RESPONSE TYPES



LIFE SAFETY/BARE NECESSITY

food, fresh water, shelter, environmental control, sanitation



MENTAL AND SOCIAL WELLBEING

privacy, emotional support, lighting



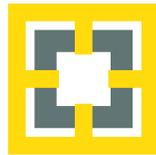
ACCESSIBILITY



PLACEMAKING/WAYFINDING

5.

EXTERIOR AND ENVELOPE INTERVENTIONS



MOBILE STAIR

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Additional fire escape or access to a building. May be particularly useful as an inexpensive method to retrofit older buildings with additional vertical access. An abstraction of the classic New York City fire escape.

+ UNPREDICTABLE: EMERGENCY

Height can be adjusted to meet specific floor on a building. In an event that affects the ground plane, such as a flood, the lower landing can lift to accommodate water level. In this sense it also serves as a dock or area of respite. Can also be used to connect rooftops to one another.

APPLICATION BY BUILDING TYPE:

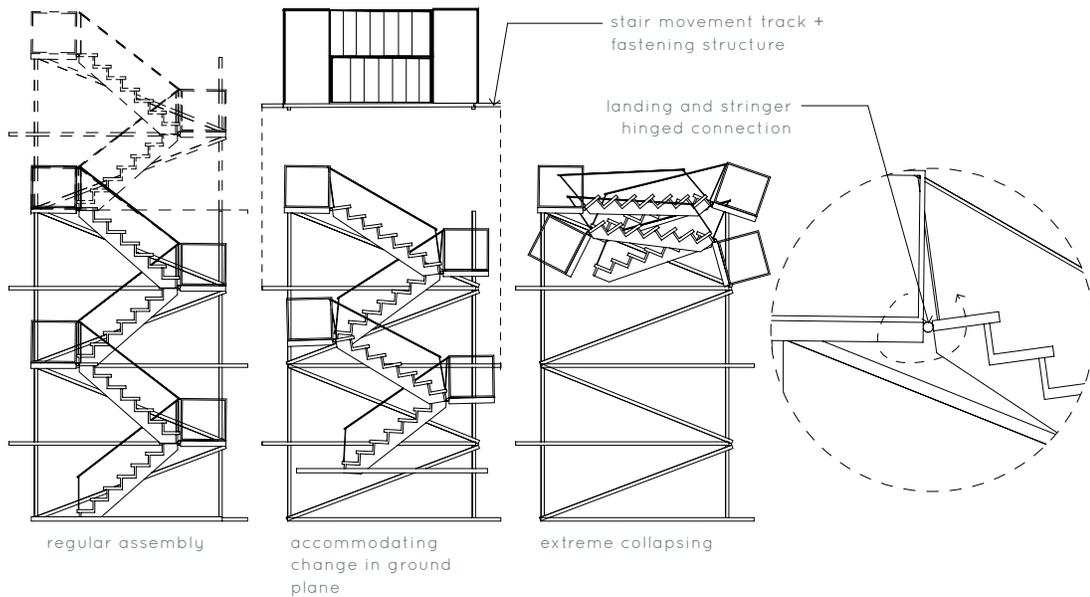
+ PRE-WAR

Mounted to existing facade.

+ POST-WAR

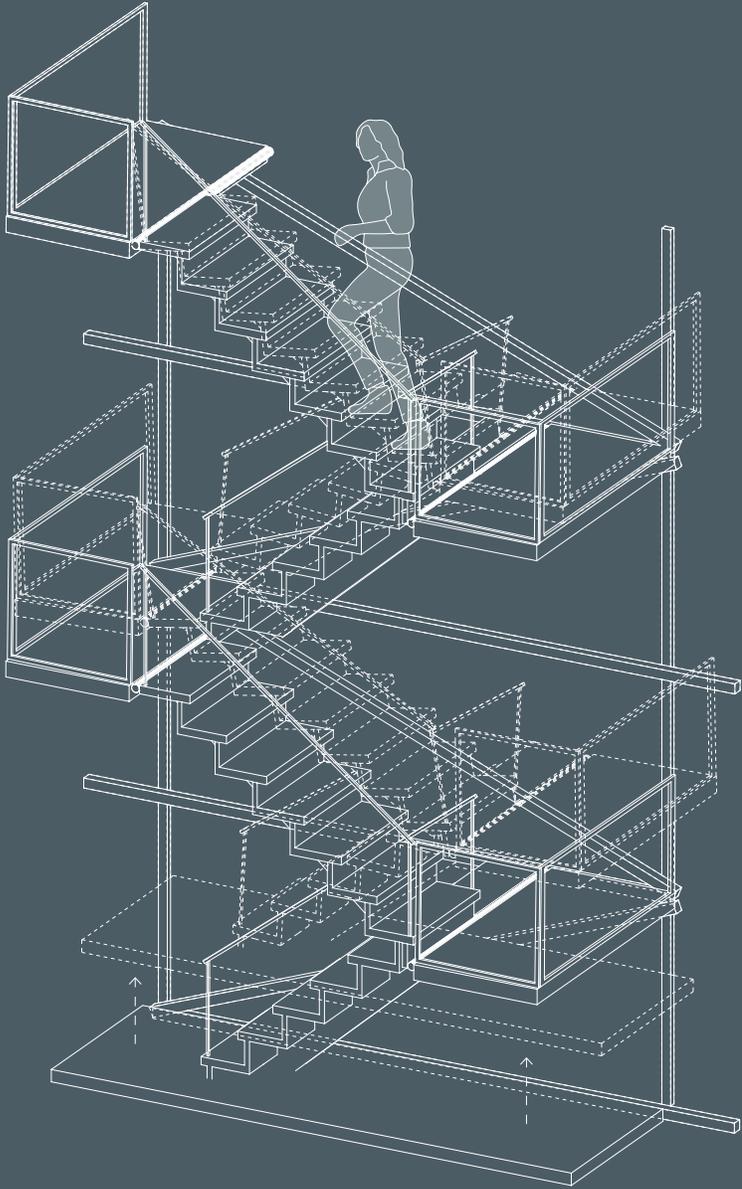
Mounted to exoskeleton or existing facade at locations where exterior envelope is able to accommodate load.

ASSEMBLY



MOBILE STAIR

RESPONSE TYPE



9.

LIFT

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Can improve the accessibility of a building from the exterior under circumstances where providing an elevator is not possible. Could be connected to city power grid for operation or rely on solar panel for power.

+ UNPREDICTABLE: EMERGENCY

Equipped with large solar panel and battery for operation. Also includes manual operation for independence from electricity in the event solar panel failure. Provides access to buildings that might not otherwise be accessible for individuals with mobility issues.

APPLICATION BY BUILDING TYPE:

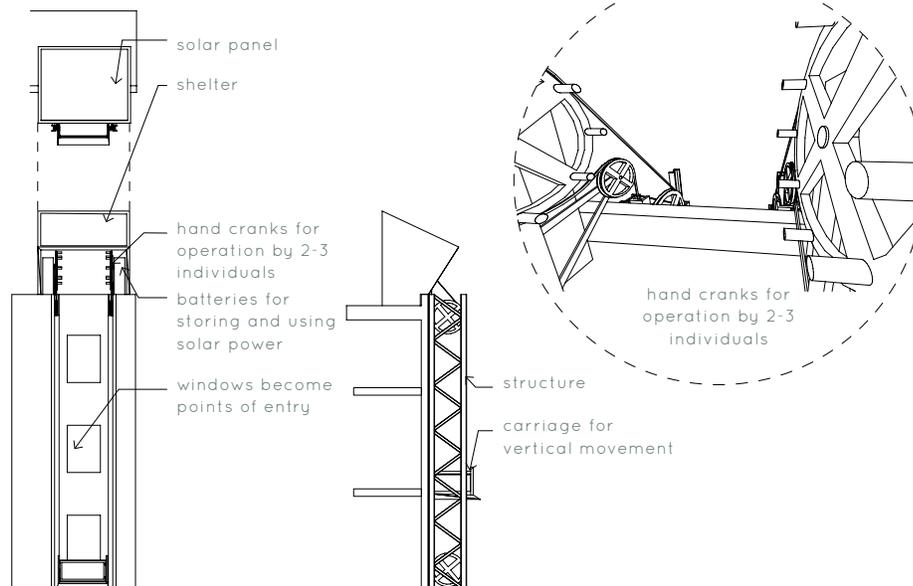
+ PRE-WAR

Mounted to existing facade.

+ POST-WAR

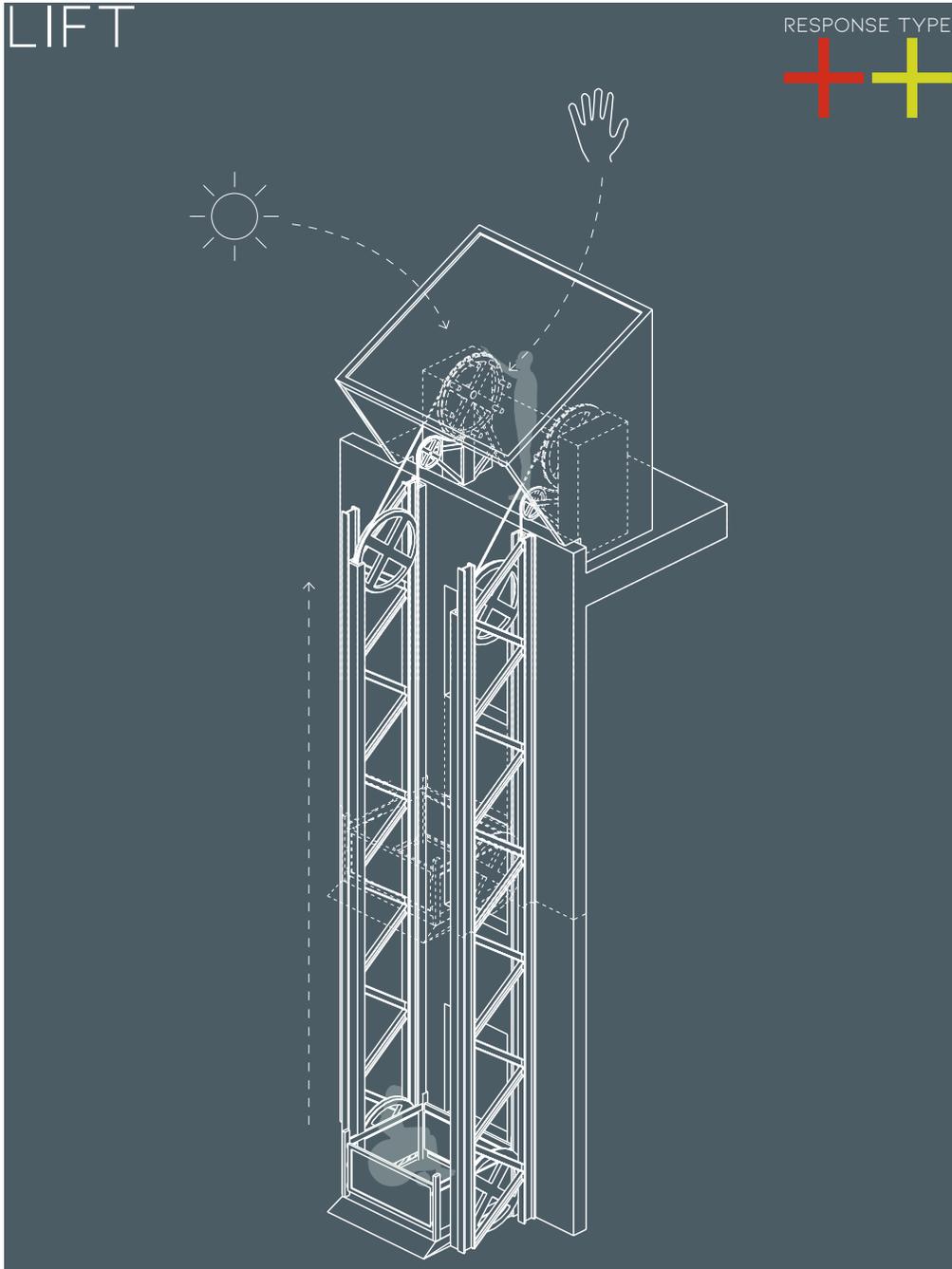
Mounted to exoskeleton or existing facade at locations of suitable exterior materials able to accommodate load.

ASSEMBLY



LIFT

RESPONSE TYPE



11.

EXOSKELETON

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Can be introduced in small forms and be expanded over time. It might be initially introduced as a superstructure to provide vertical farming to a building, and later intensified through the addition of beehives, stairs, lifts, solar panels, and more, to improve the building's day-to-day performance.

+ UNPREDICTABLE: EMERGENCY

In an active environmental emergency, this intervention extends the performance of the building's structure, while also supporting a variety of interventions which improve the experience of occupying the building as a shelter. The exoskeleton might be accessible from indoors through operable windows, or the outside by stair or lift attachments.

APPLICATION BY BUILDING TYPE:

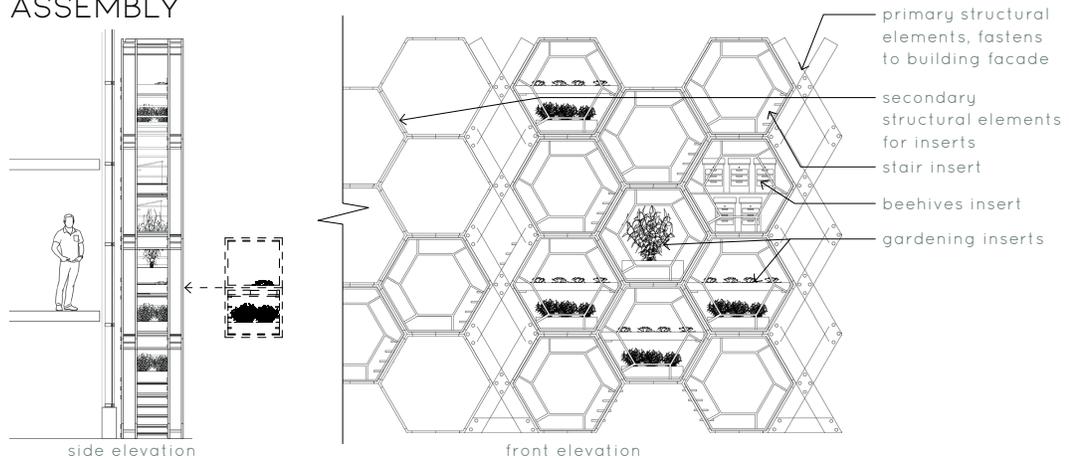
+ PRE-WAR

Not necessary unless facade is deteriorating and requires supports for the use of certain interventions.

+ POST-WAR

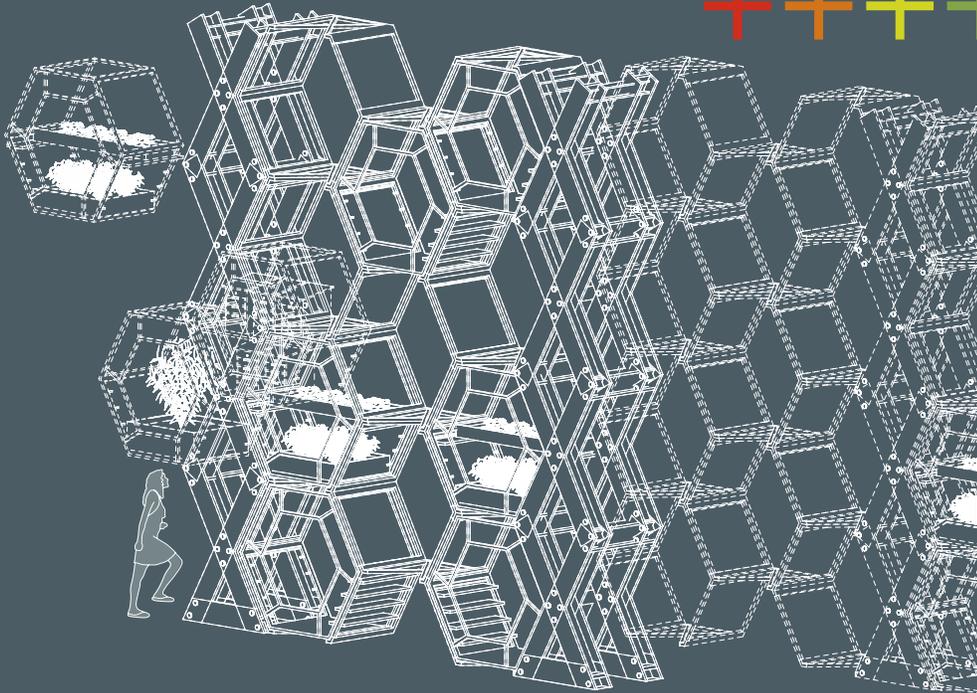
Where many post-war buildings are only engineered to support occupant loads, an exoskeleton provides an additional plane upon which to mount various extensions and interventions which would otherwise be too heavy to be safely applied to the building. This is a simple superstructure into which hexagonal frames can be inserted, each of which can be uniquely programmed or simply hold stair treads for vertical access. It can be repeated both vertically and horizontally however necessary to accommodate different building conditions.

ASSEMBLY



EXOSKELETON

RESPONSE TYPE



13.

WINDOW ENTRANCE

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Folds neatly to completely integrate with window and take very little space. Day-to-day, it simply extends the windowsill's profile so that it can be used as a shelf.

+ UNPREDICTABLE: EMERGENCY

Unfolds to create a sloped ramp connecting the window to the floor plane. Allows individuals with mobility issues to enter the building through the windows without significant assistance.

APPLICATION BY BUILDING TYPE:

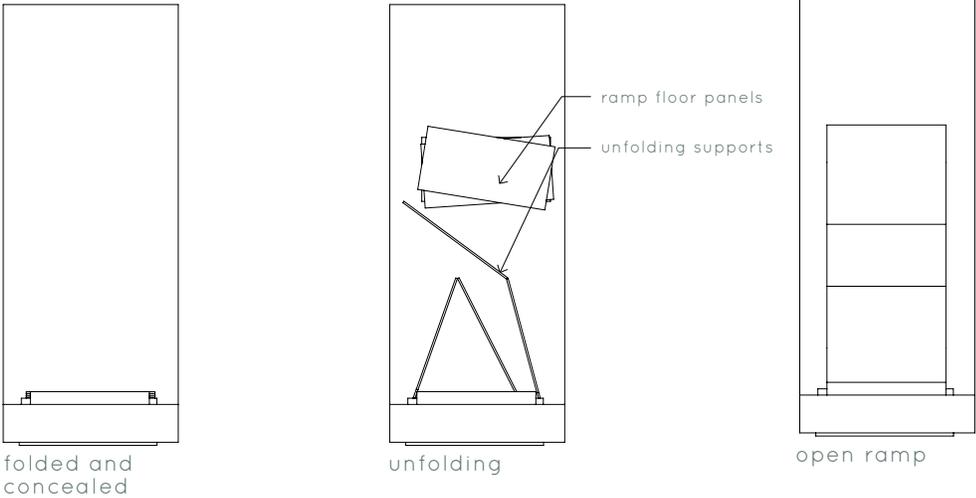
+ PRE-WAR

Requires operable window. Size of unfolding elements may require modifications to accommodate distance from window sill to floor.

+ POST-WAR

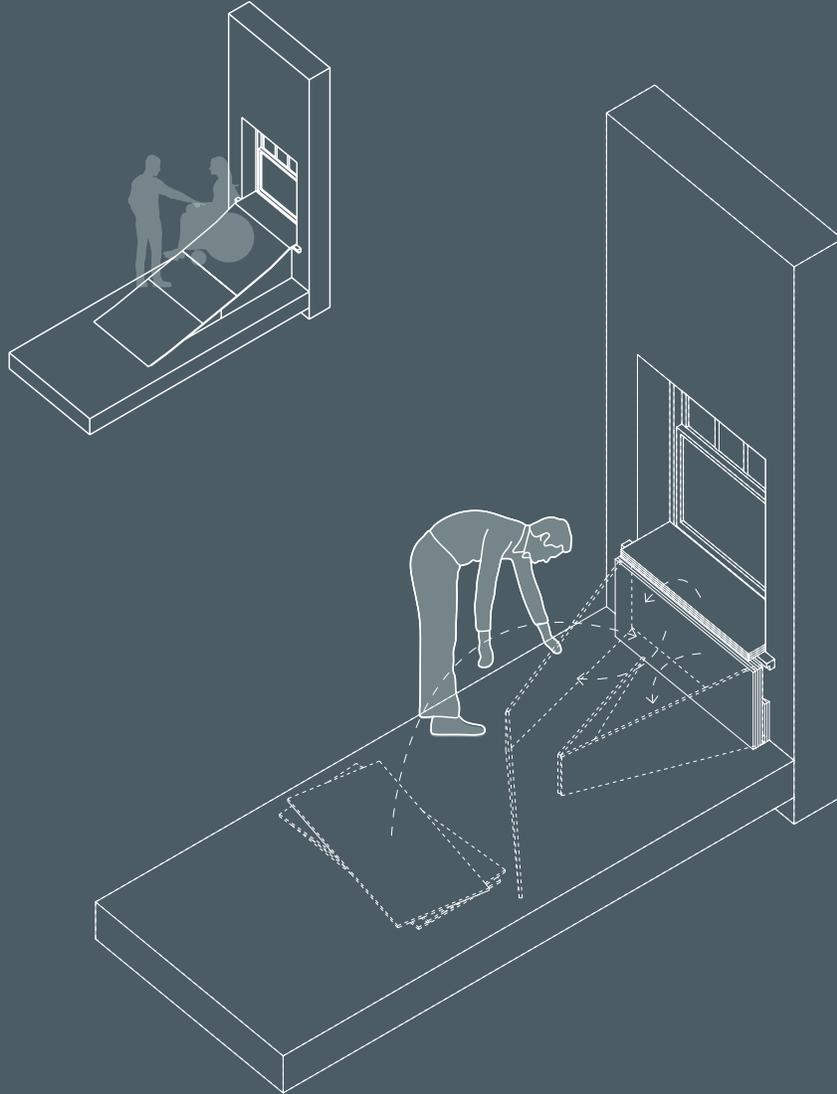
Requires operable window. Can function with curtain wall if paired with operable window intervention.

ASSEMBLY



WINDOW ENTRANCE

RESPONSE TYPE



15.

OPERABLE WINDOW

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Can create new room conditions in areas where curtain wall window type is not desirable for existing program. Can be applied to several or single windows for changes in interior room qualities such as lighting and fresh air access.

+ UNPREDICTABLE: EMERGENCY

Provides an opening where there wasn't one. This can allow for access through a facade in combination with exoskeleton, lift. Also provides qualities of home and placemaking for the improvement of an individuals relationship with the space during a long term stay.

APPLICATION BY BUILDING TYPE:

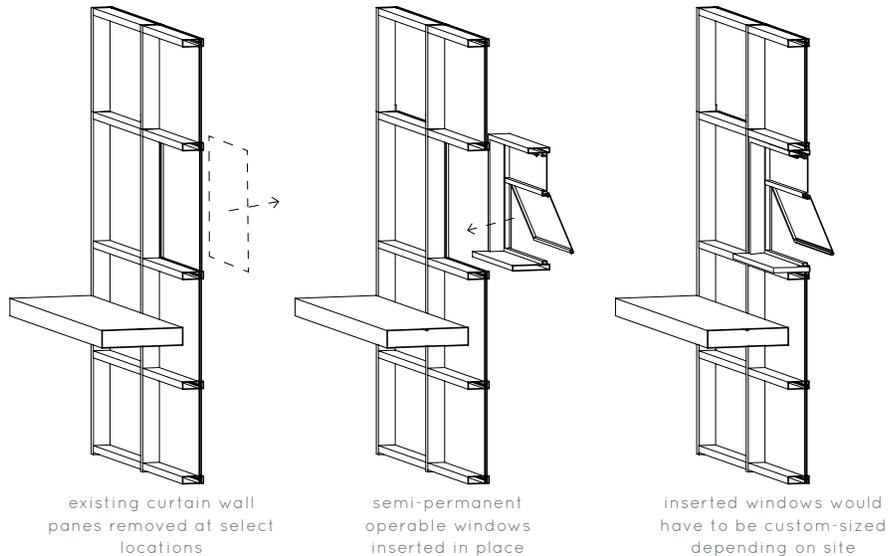
+ PRE-WAR

Tailored more for post-war construction styles, but could replace windows which are not operable or require retrofit.

+ POST-WAR

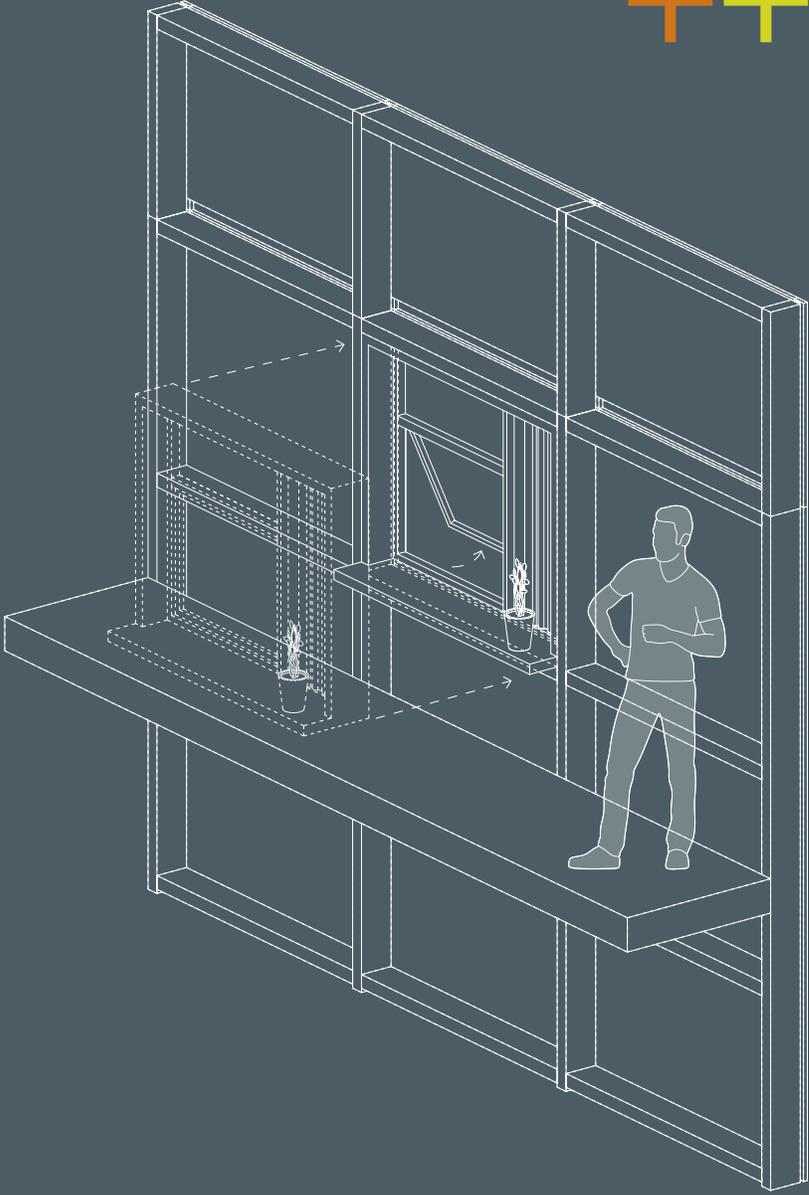
Should be resized depending on curtain wall panel being replaced. Frame seals into mullion openings at location where glass would normally be.

ASSEMBLY



OPERABLE WINDOW

RESPONSE TYPE



BEACON

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Primarily designed for use in emergency scenarios but can serve as a wayfinding element or signifier of special events such as sporting events, rallies, or holidays.

+ UNPREDICTABLE: EMERGENCY

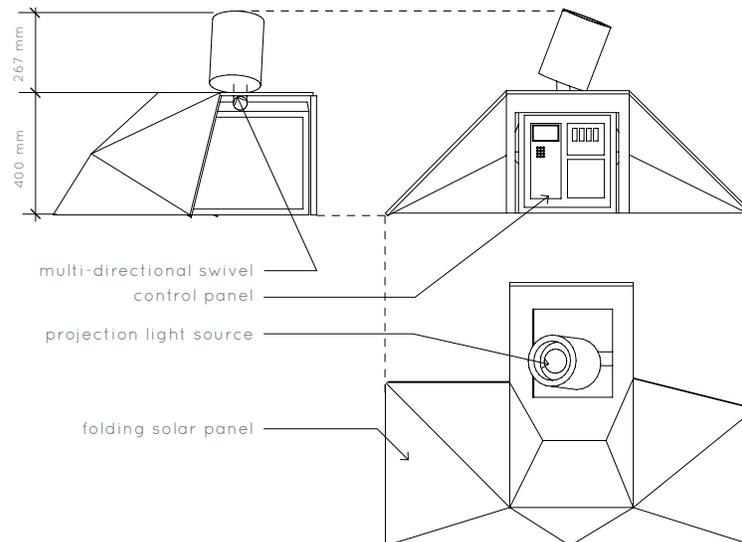
Serves to demark the locations of safe spaces during disaster scenarios. Projection into the sky allows individuals to locate and move toward emergency shelters during moments where locating shelters by internet or emergency procedure guidelines is not possible.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

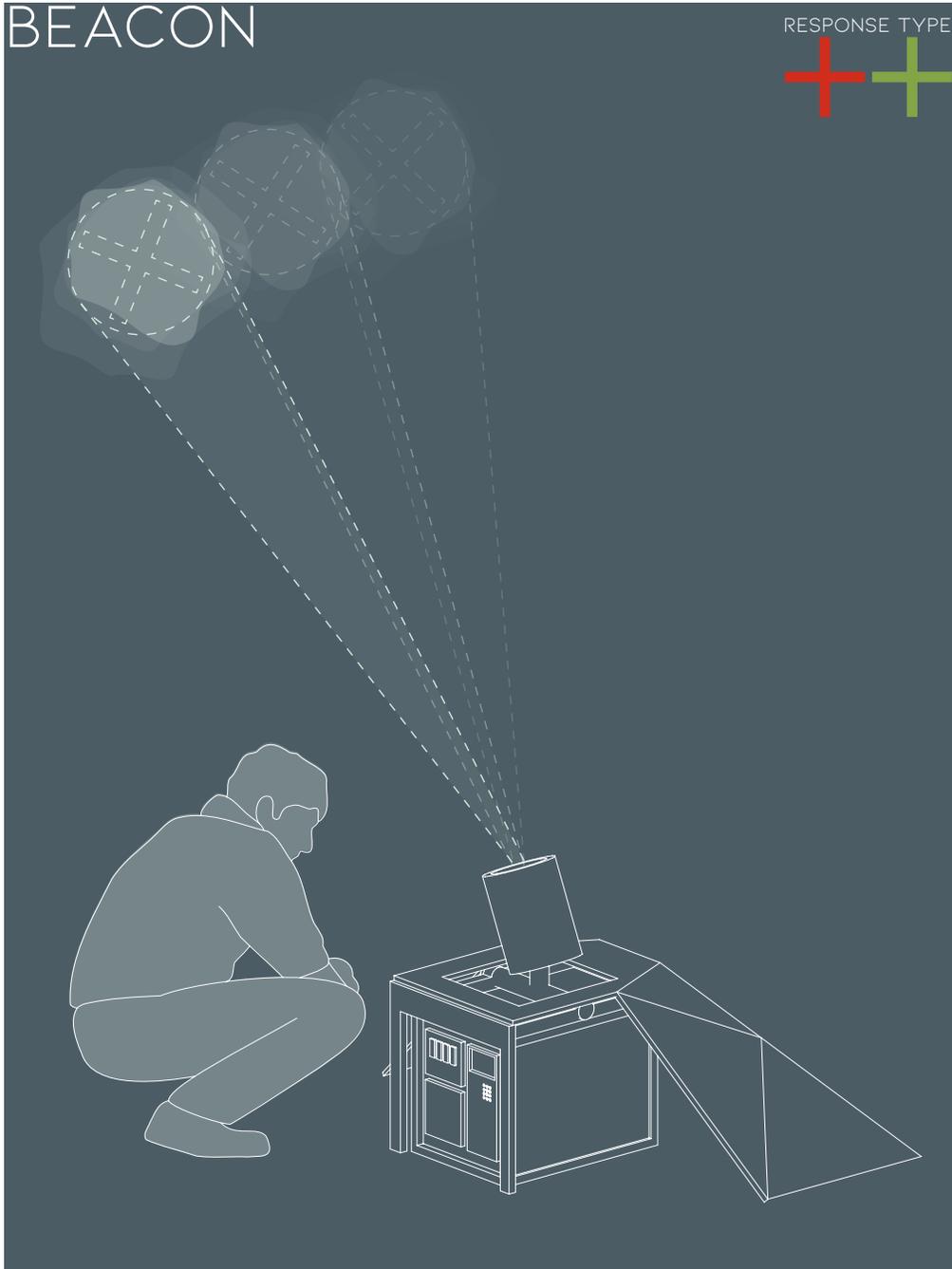
Mounts well on any accessible roof plane. Can also be mounted on highest points of exoskeleton. Could be programmed by hand or by remote control.

ASSEMBLY



BEACON

RESPONSE TYPE



19.

97.

CAMPFIRE

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Offers a gathering place. Could be used in teaching life-safety skills by schools and/organizations like cub scouts. Seats can also be used as large blocks as play tools for children.

+ UNPREDICTABLE: EMERGENCY

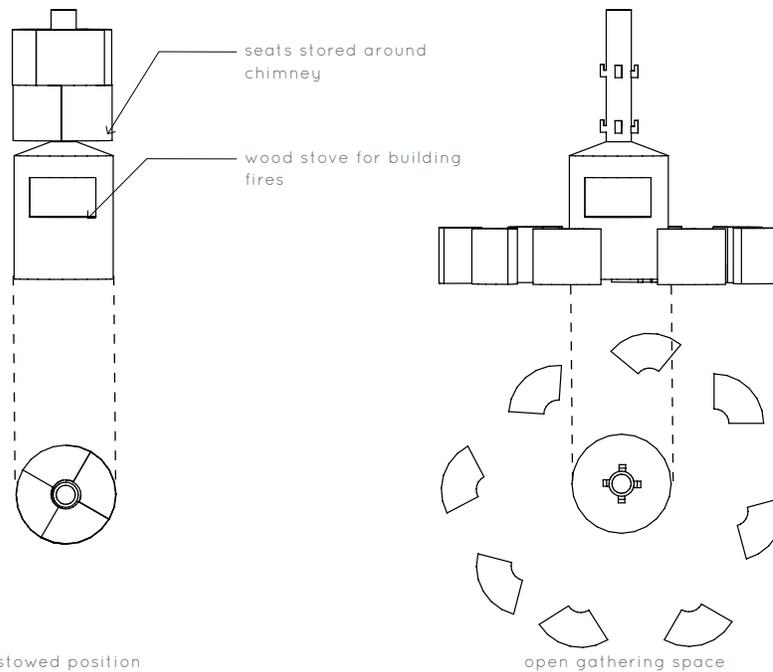
A safe way to build a fire, with seats included for gathering. In addition to providing heat and cooking energy, it also provides an opportunity for social supports like community building and story sharing.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

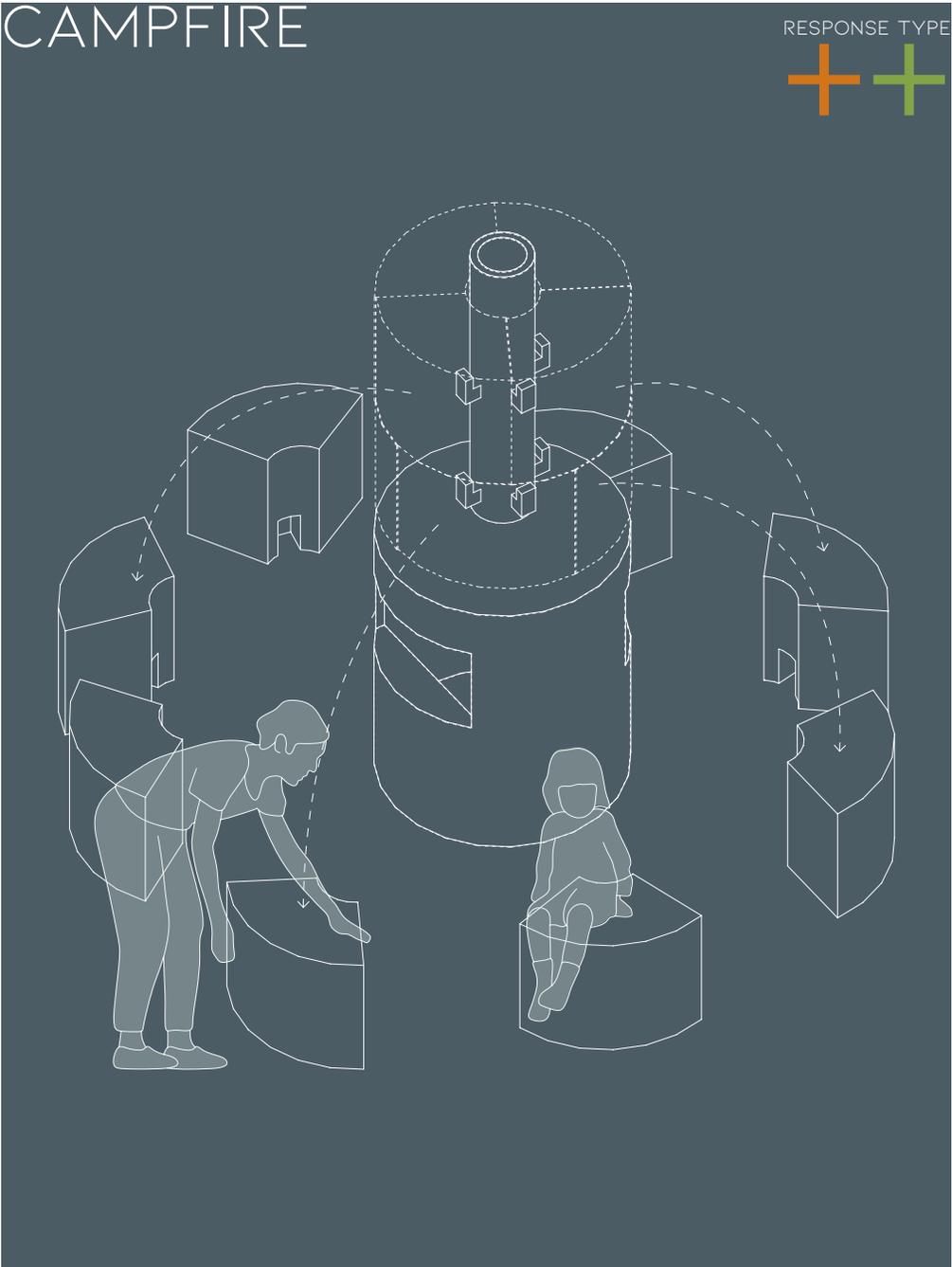
Can be located on an accessible roof plane or at outdoor location adjacent shelter, such as schoolyard, if ground plane is accessible.

ASSEMBLY



CAMPFIRE

RESPONSE TYPE



FOOD SOURCE

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

A daily lesson in caring for crops, and a supplement to school-provided lunches to students with limited resources. Encourages healthy eating practices for those who may not otherwise be getting nutrition and food production education.

+ UNPREDICTABLE: EMERGENCY

In the event of an emergency where food cannot immediately be transported to location, growing food on site provides assurance that there will be some form of accessible sustenance. It also allows schools to create stores on the long term that can then be consumed during a disaster scenario.

APPLICATION BY BUILDING TYPE:

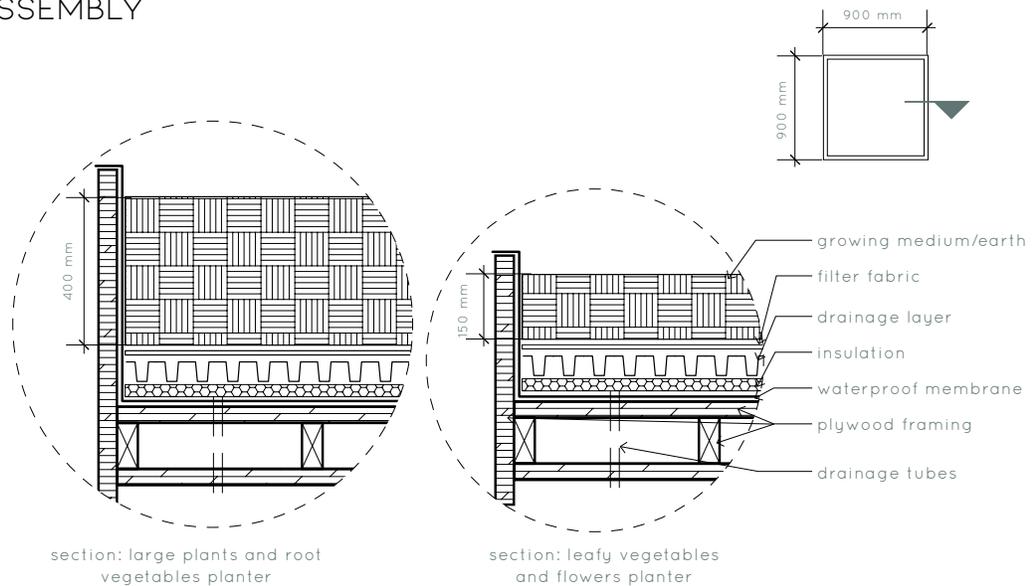
+ PRE-WAR

Can be built on any accessible roof plane.

+ POST-WAR

Loads with soil and crops may be too heavy for some modern accessible roofs. In these situations they can be mounted in exoskeletons.

ASSEMBLY



FOOD SOURCE

RESPONSE TYPE



23.

FLORA AND FAUNA

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

An aquaponics system and chicken coop which together function as an urban ecosystem providing daily lesson in caring for livestock, and a supplement to school-provided lunches to students with limited resources. Encourages healthy eating practices for those who may not otherwise be getting nutrition and food production education.

+ UNPREDICTABLE: EMERGENCY

In the event of an emergency where food cannot immediately be transported to location, growing food on site provides assurance that there will be some form of accessible sustenance. It also allows schools to create stores on the long term that can then be consumed during a disaster scenario.

APPLICATION BY BUILDING TYPE:

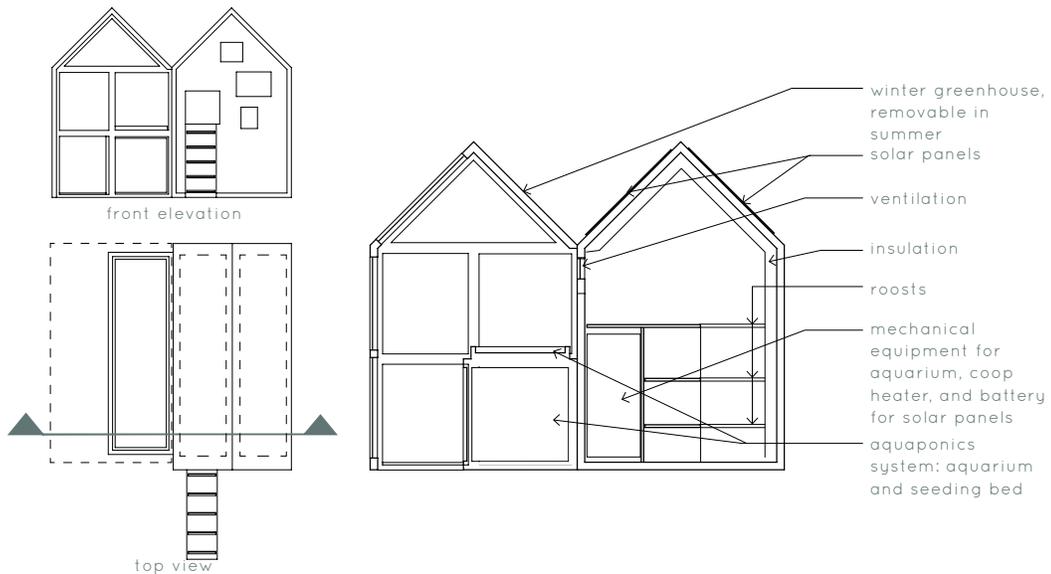
+ PRE-WAR

Can be built on any accessible roof plane.

+ POST-WAR

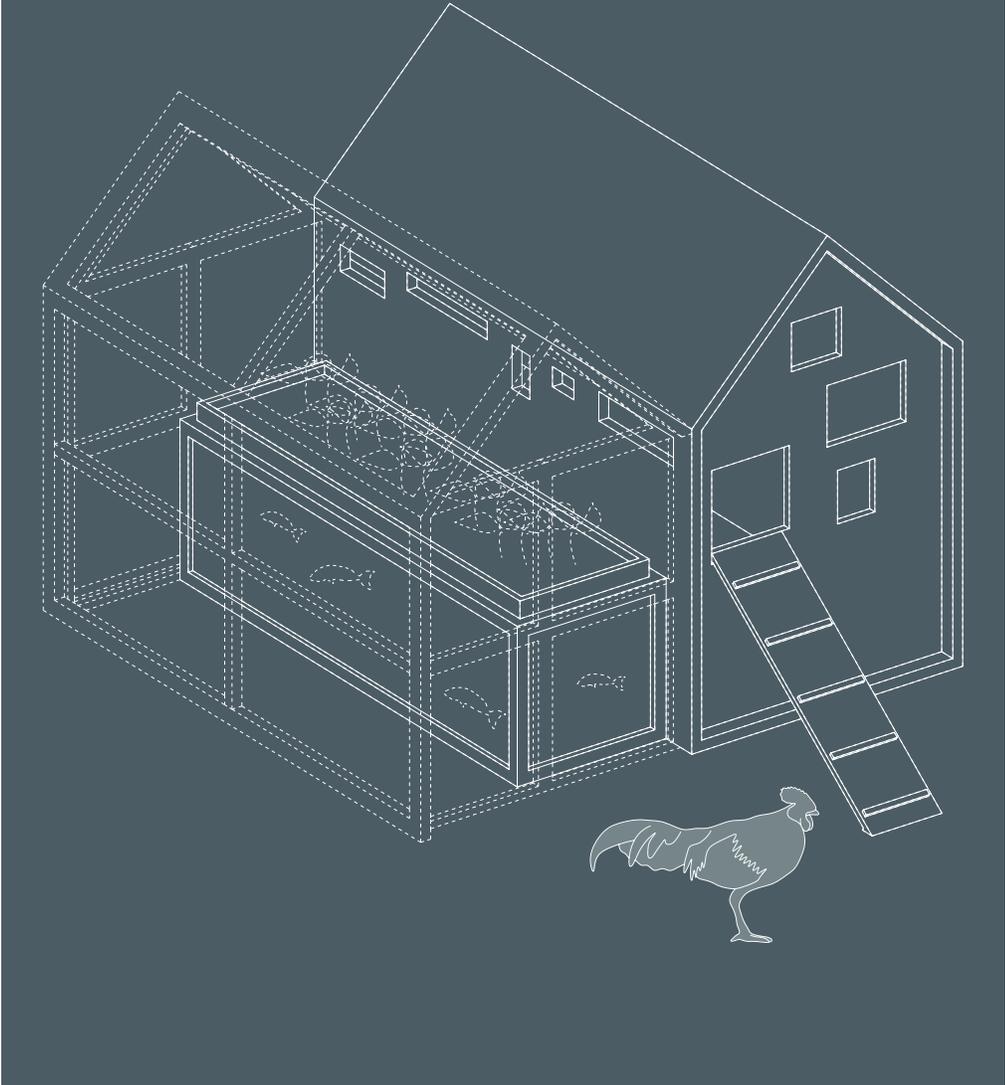
The load presented by the aquarium may be too heavy for some modern accessible roofs. In these situations they can be mounted in exoskeletons.

ASSEMBLY



FLORA AND FAUNA

RESPONSE TYPE



25.

WATER UMBRELLA

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Can turn an empty roof plane or school yard into a community gathering space with work/dining surfaces and shelter from the sun. Especially beneficial in the summer to provide a safe, supervised space for socializing and sharing meals.

+ UNPREDICTABLE: EMERGENCY

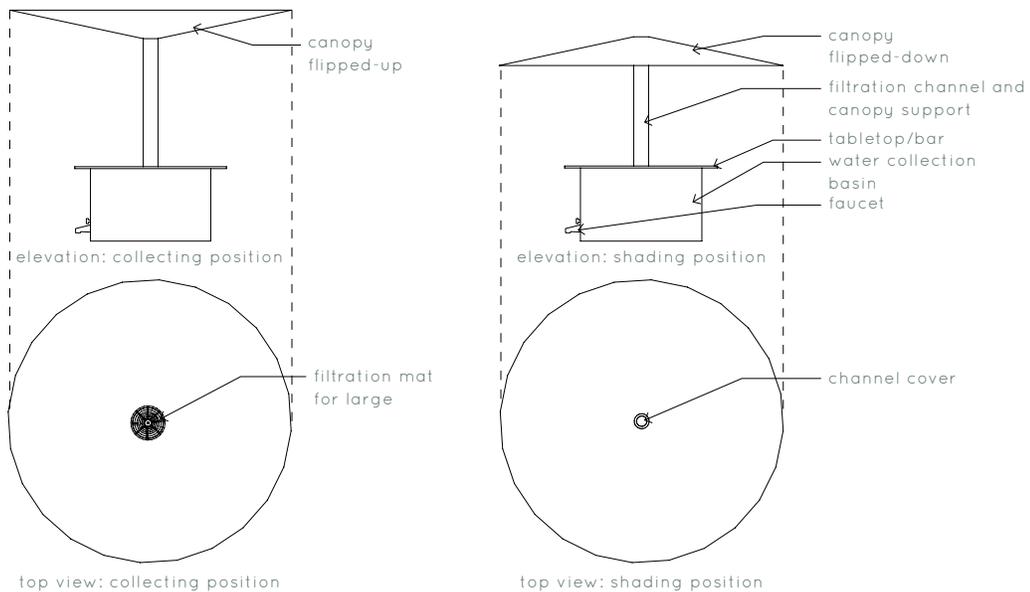
In addition to continuing to serve the same benefits as it does on the day-to-day, the water umbrella funnels and collects rainwater in a built-in basin. This water is filtered, however, it is not potable. This water can be used for basic washing in the event of limited water supply or issues with overloaded plumbing. Because the water is filtered, it could be consumed with water purification tablets in desperate scenarios.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

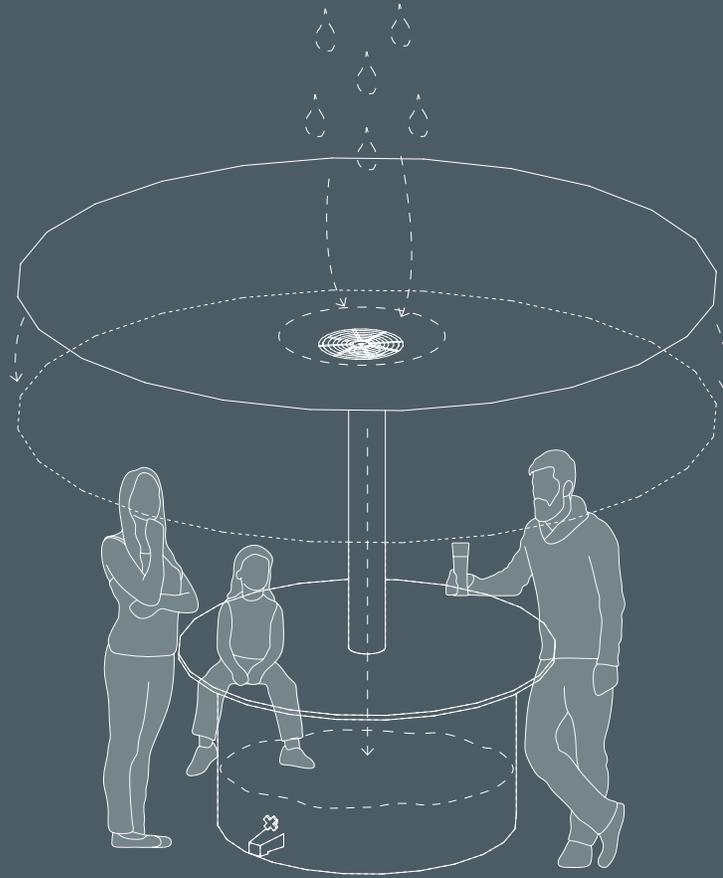
Can be located on an accessible roof plane or at outdoor location adjacent shelter, such as schoolyard, if ground plane is accessible.

ASSEMBLY



WATER UMBRELLA

RESPONSE TYPE



27.

105.

INTERIOR AND FURNISHING
INTERVENTIONS



SLEEPER DESK

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

An abstraction of the regular student's desk. Dimensions match standard student desks, however, chair's seat is slightly wider and includes a cushioned back. This improves day to day comfort for students.

+ UNPREDICTABLE: EMERGENCY

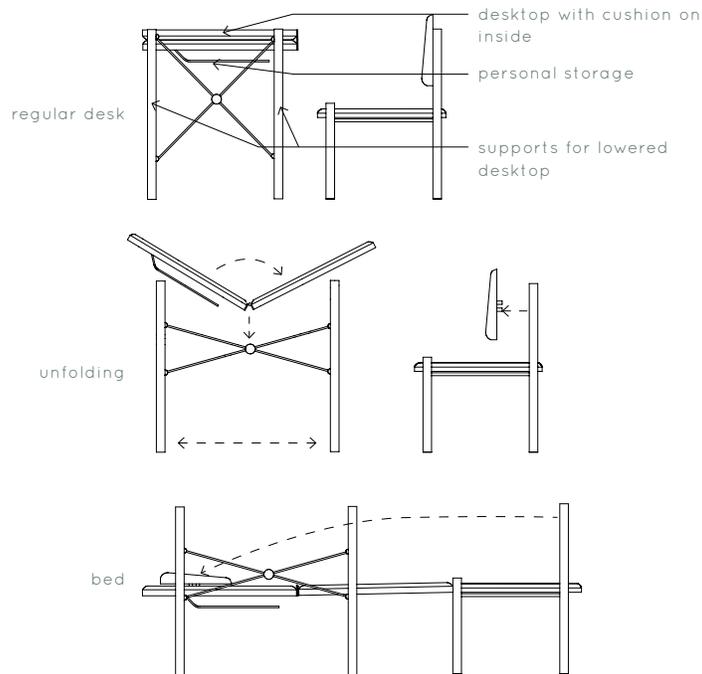
Desk unfolds into cot. Seat back becomes pillow, seat becomes support for feet. For hygiene purposes, head and back cushions are folded inside desk and not accessible by students under regular classroom circumstances. In the event that individuals must stay overnight, these can supplement or replace cots provided by emergency services and transform classrooms into safe resting places.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

Functional in any space.

ASSEMBLY

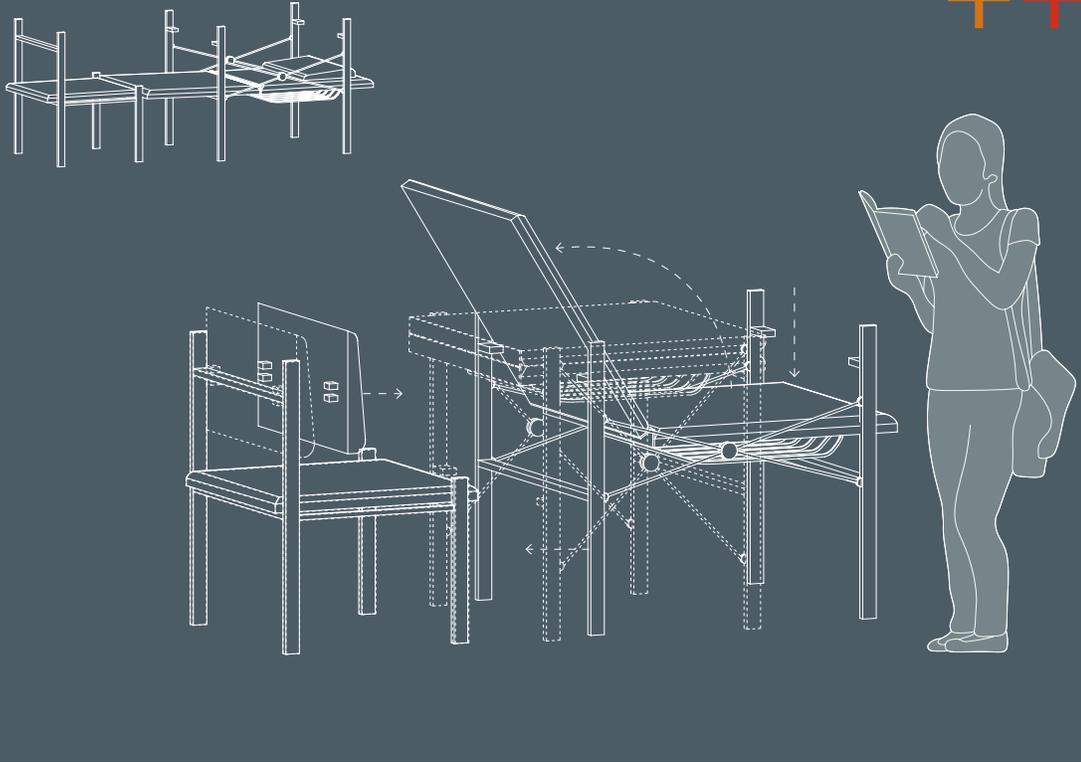


SLEEPER DESK

RESPONSE TYPE



31.



DINING BOARD

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Mobile chalkboard or whiteboard to supplement classroom wall-mounted boards. Can be wheeled to wherever it is needed. Can be transformed into a table if an extra communal worksurface is needed.

+ UNPREDICTABLE: EMERGENCY

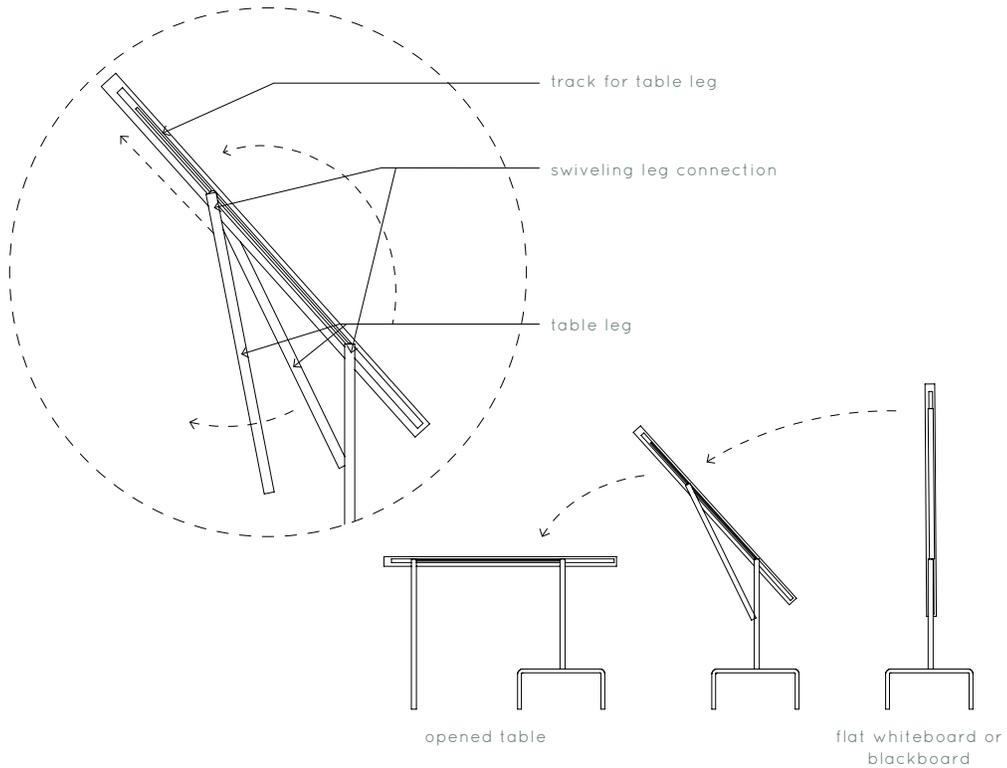
Can function as an additional surface for storage, dining, or community building wherever it may be needed.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

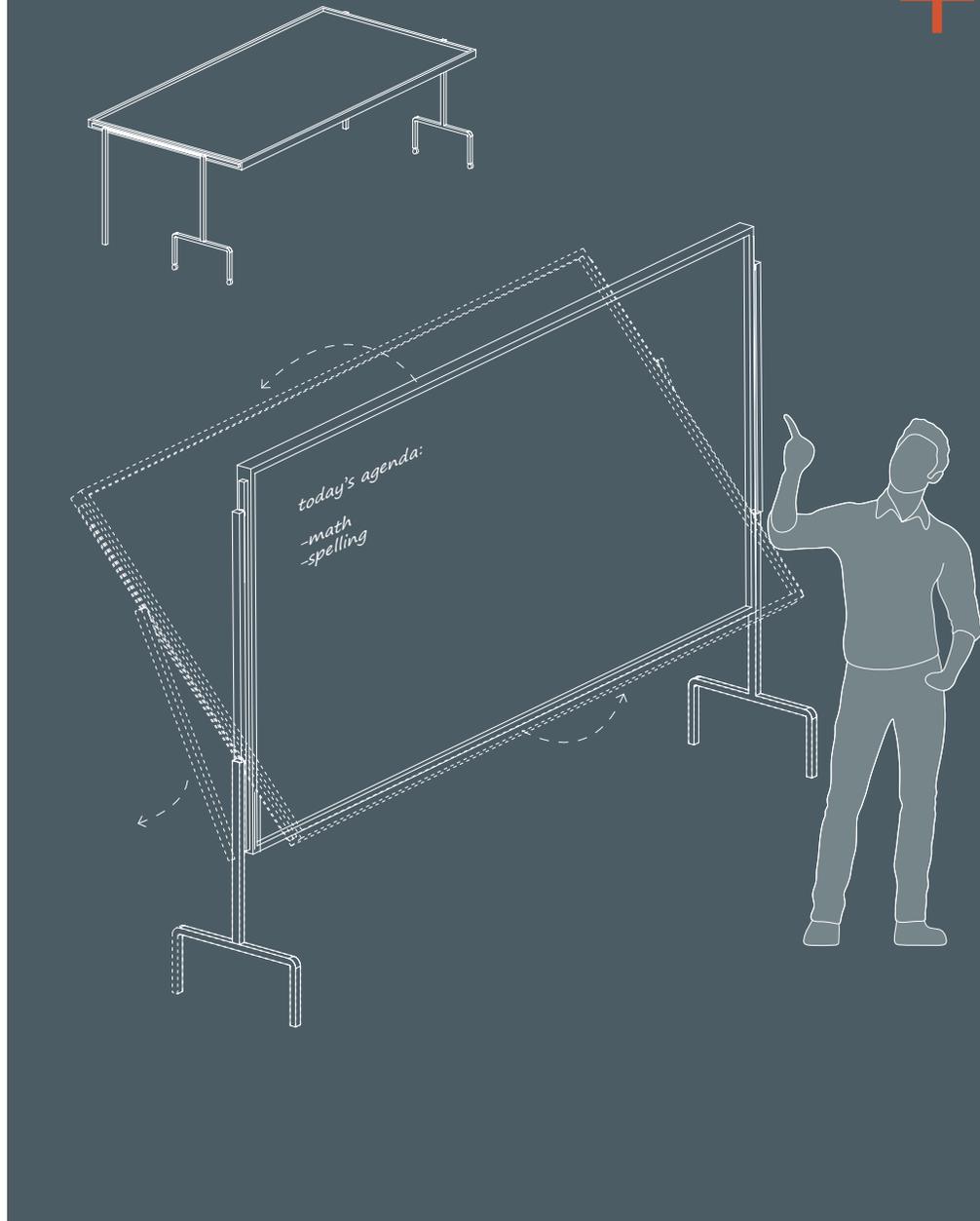
Functional in any space.

ASSEMBLY



DINING BOARD

RESPONSE TYPE



33.

110.

PRIVACY BENCH

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

An impromptu space divider or a bench. Functions well for a reading nook or seating in a corridor.

+ UNPREDICTABLE: EMERGENCY

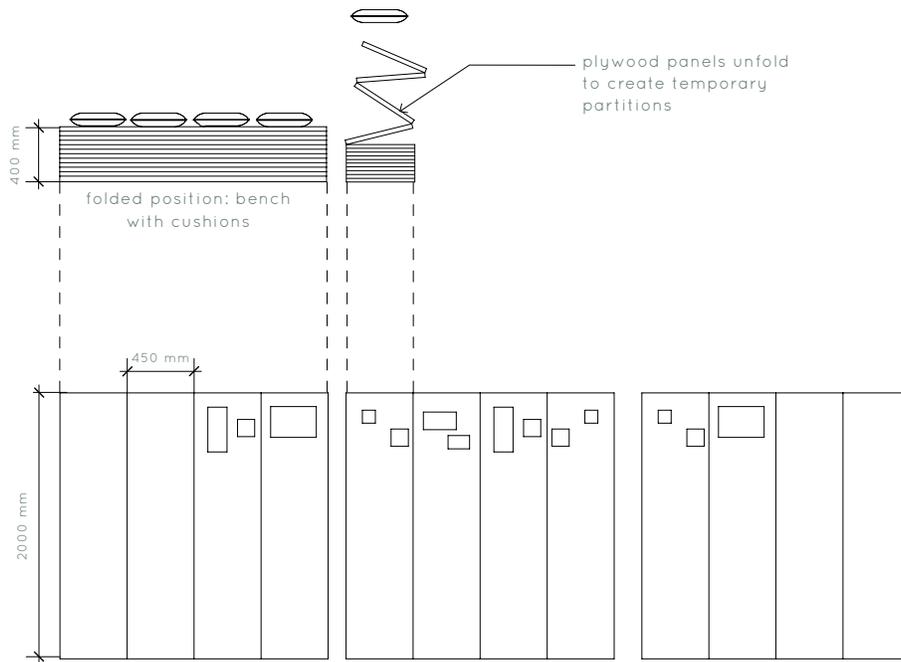
Divides space to provide privacy where needed. Bench unfolds to create three 4-paneled dividers which can be combined or moved as needed. Perforations in panels allow daylight to penetrate without compromising privacy.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

Functional in any space.

ASSEMBLY

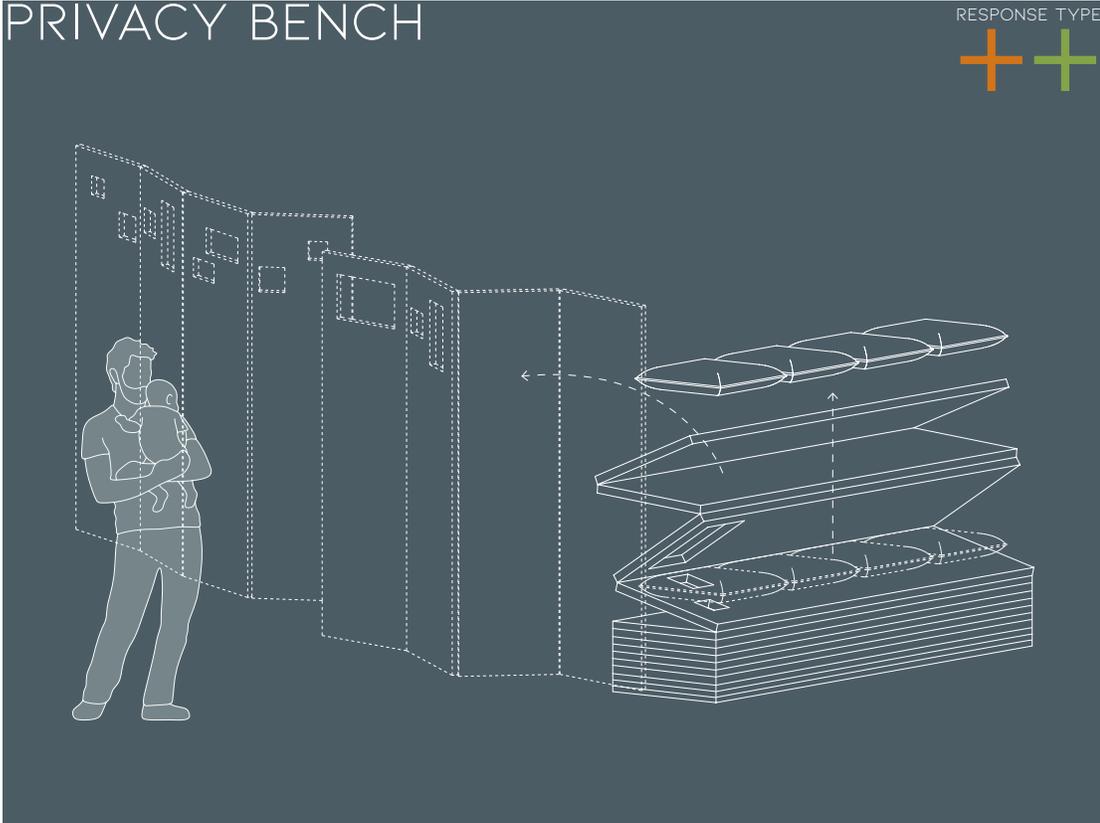


PRIVACY BENCH

RESPONSE TYPE



35.



LOCKER FOR BABY

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Could be assembled from most standard-sized existing lockers already in schools. The intervention are a series of objects that give the existing locker a secondary purpose. It could potentially be a discreet resource for young mothers finishing high school under the challenging circumstances an unplanned pregnancy could bring.

+ UNPREDICTABLE: EMERGENCY

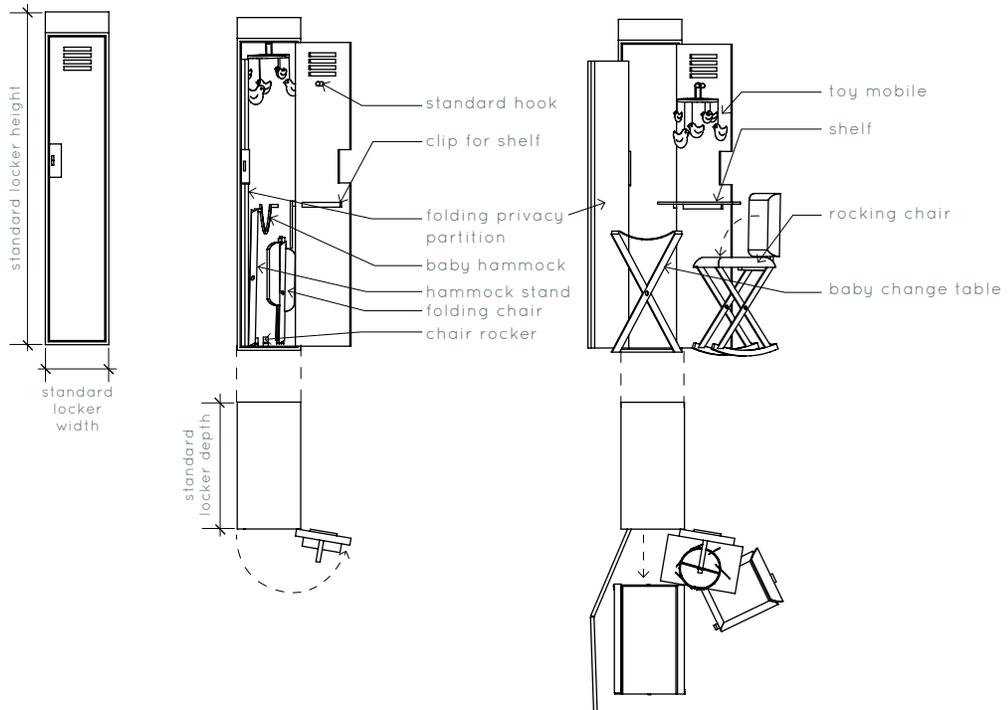
This is meant to offer a comfort for parents sheltering in a school with their children. It provides a basic changing table and nursing station. The intent is to provide a nursery seamlessly integrated in the existing school.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

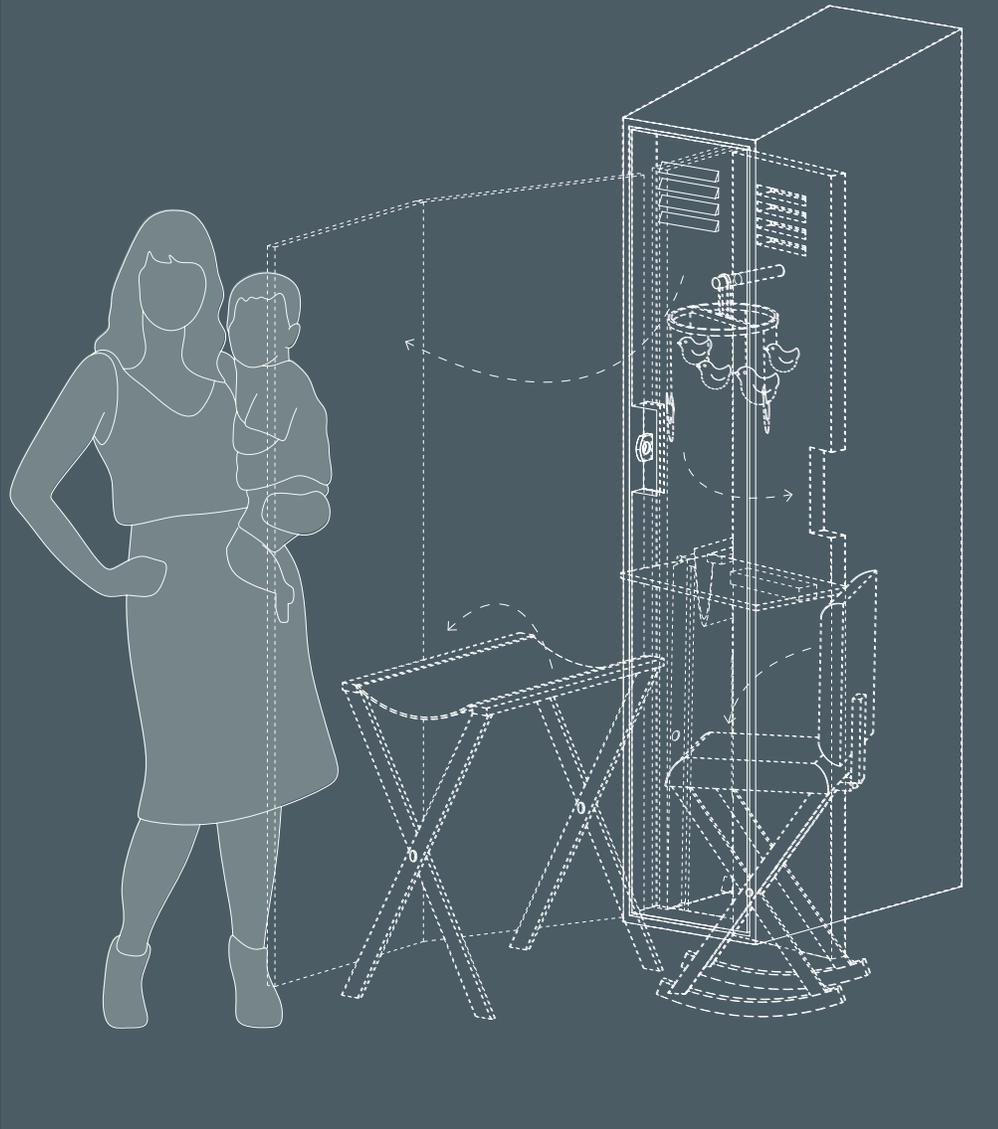
Functional in any space. Other storage components could be outfitted with these objects if lockers are not available.

ASSEMBLY



LOCKER FOR BABY

RESPONSE TYPE



37.

POP-UP CLOSET

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

Functions like generic, modular storage comprised of shelving with bins. Because of the bins expanding function, this could be helpful in classrooms running at high capacity where additional storage is needed.

+ UNPREDICTABLE: EMERGENCY

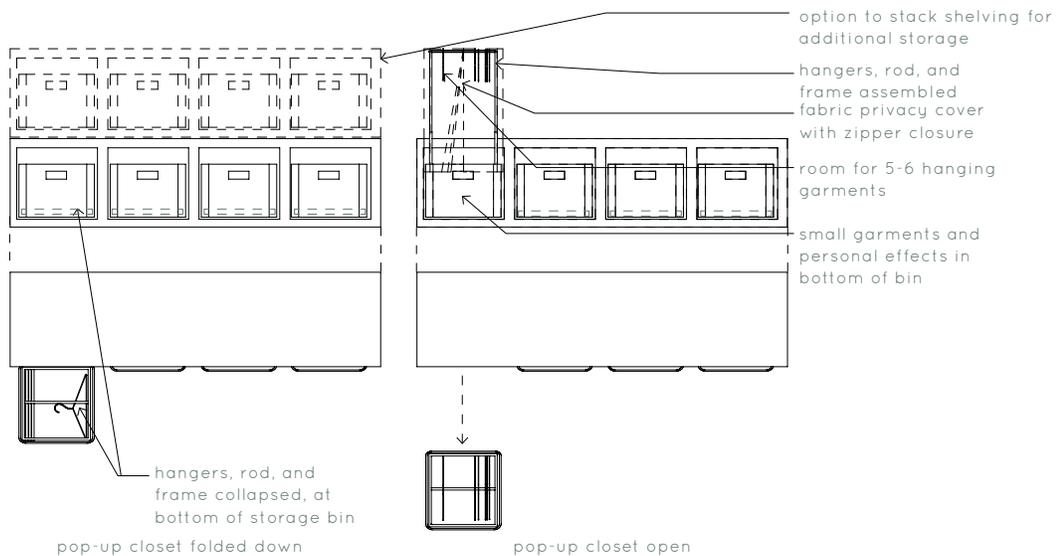
In an instance where one is away from home for a period of time, living out of a suitcase without any personal storage can be challenging. Having a place to unfold and assemble one's things can be a comforting and an important aspect of place-making. These could be removed from their cubbies and placed next to the cot where one is sleeping to better emulate a bedroom.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

Functional in any space.

ASSEMBLY

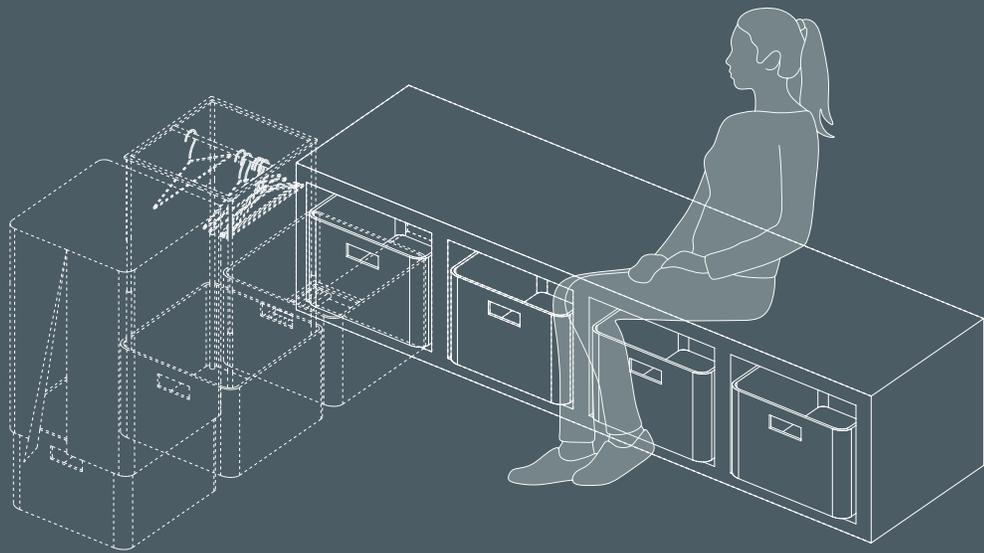


POP-UP CLOSET

RESPONSE TYPE



39.



SAFE DISTANCE

FUNCTION BY TIMESCALE:

+ PRESENT: ONGOING

The basketball hoop and backboard assembly is integral in school gyms. The typical number per gym is 6: two for a full sized court, and four more for two half-sized courts. Basketball hoops area also present on outdoor courts both on and off school campuses.

+ UNPREDICTABLE: EMERGENCY

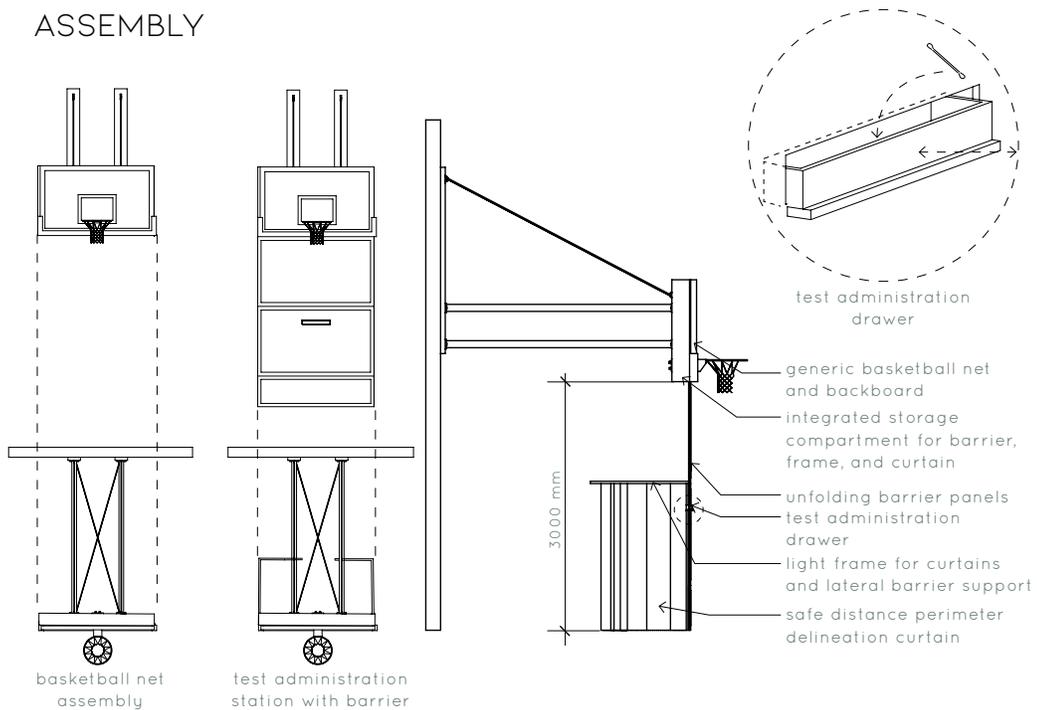
In the event of a epidemic or pandemic, part of prevention and mitigation is mass testing. In order to do so safely, separation to prevent contagion is paramount. This intervention would allow school gyms and public courts to quickly convert to testing centres, much like they already do polling stations.

APPLICATION BY BUILDING TYPE:

+ PRE-WAR + POST-WAR

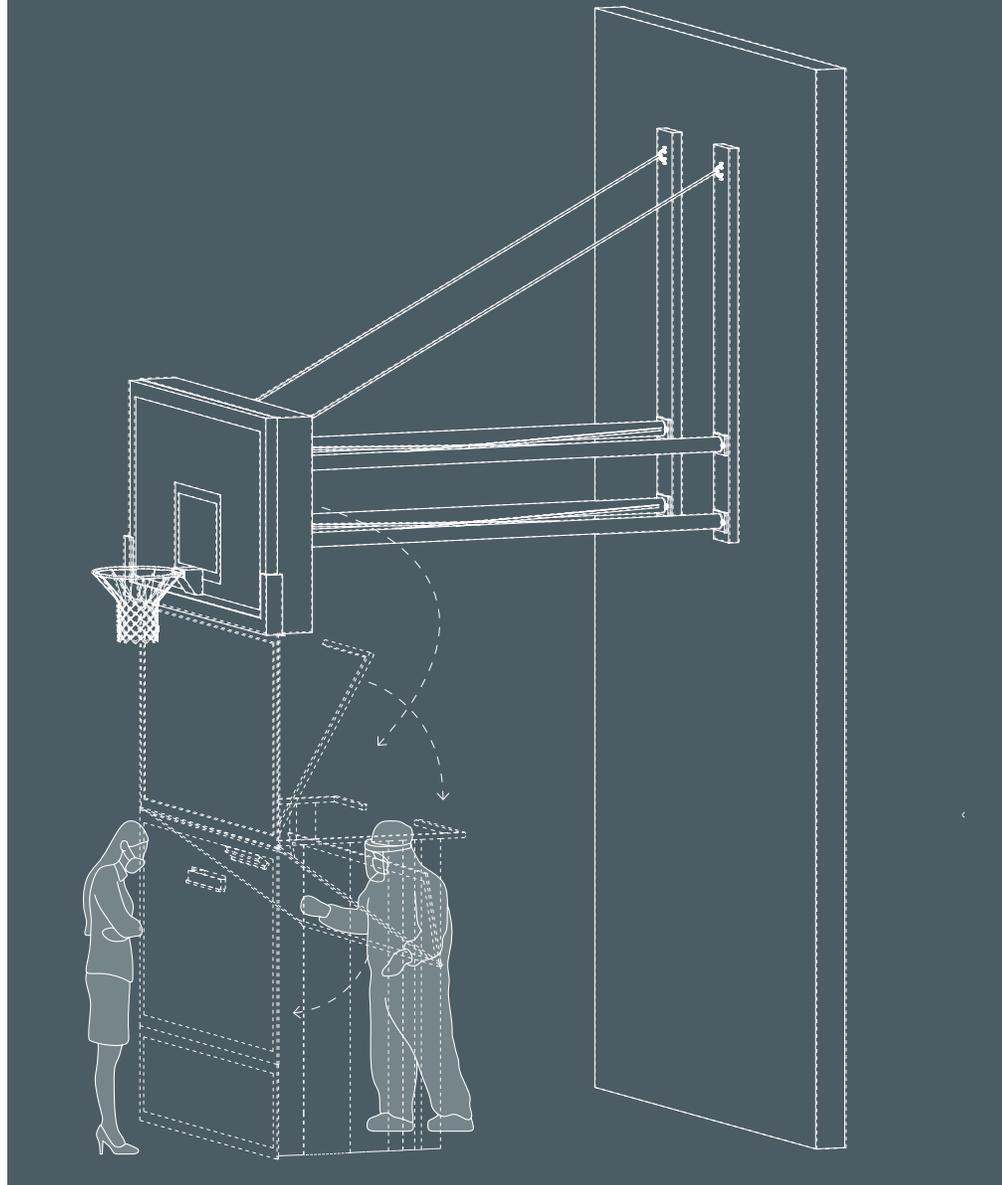
Functional in any space with regulation basketball hoop.

ASSEMBLY



SAFE DISTANCE

RESPONSE TYPE

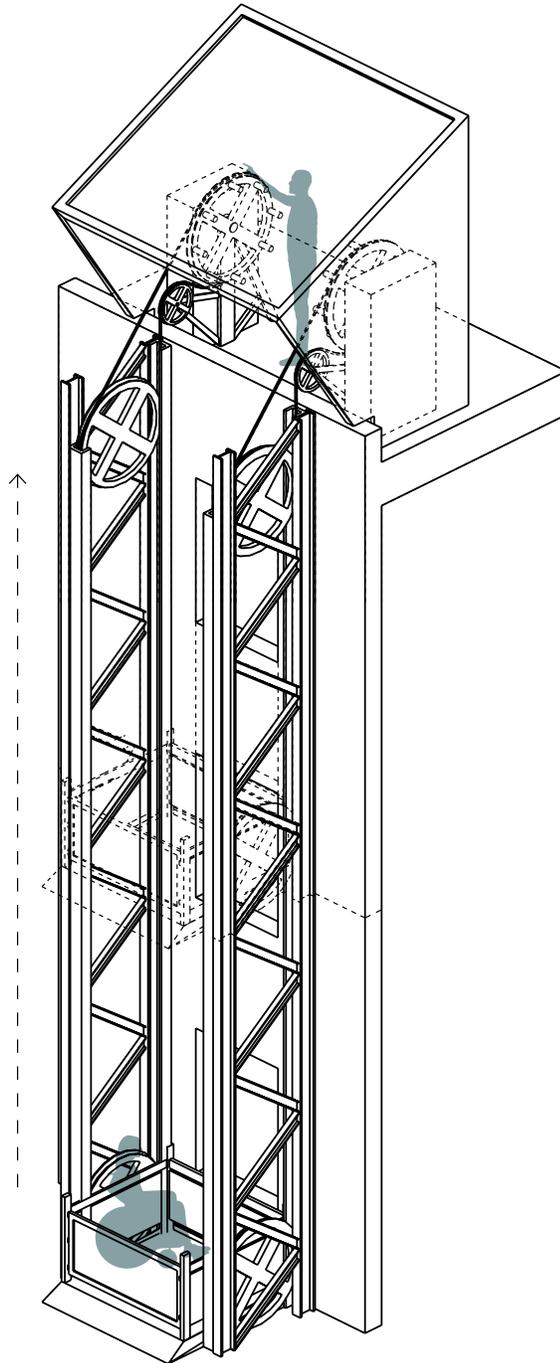


41.

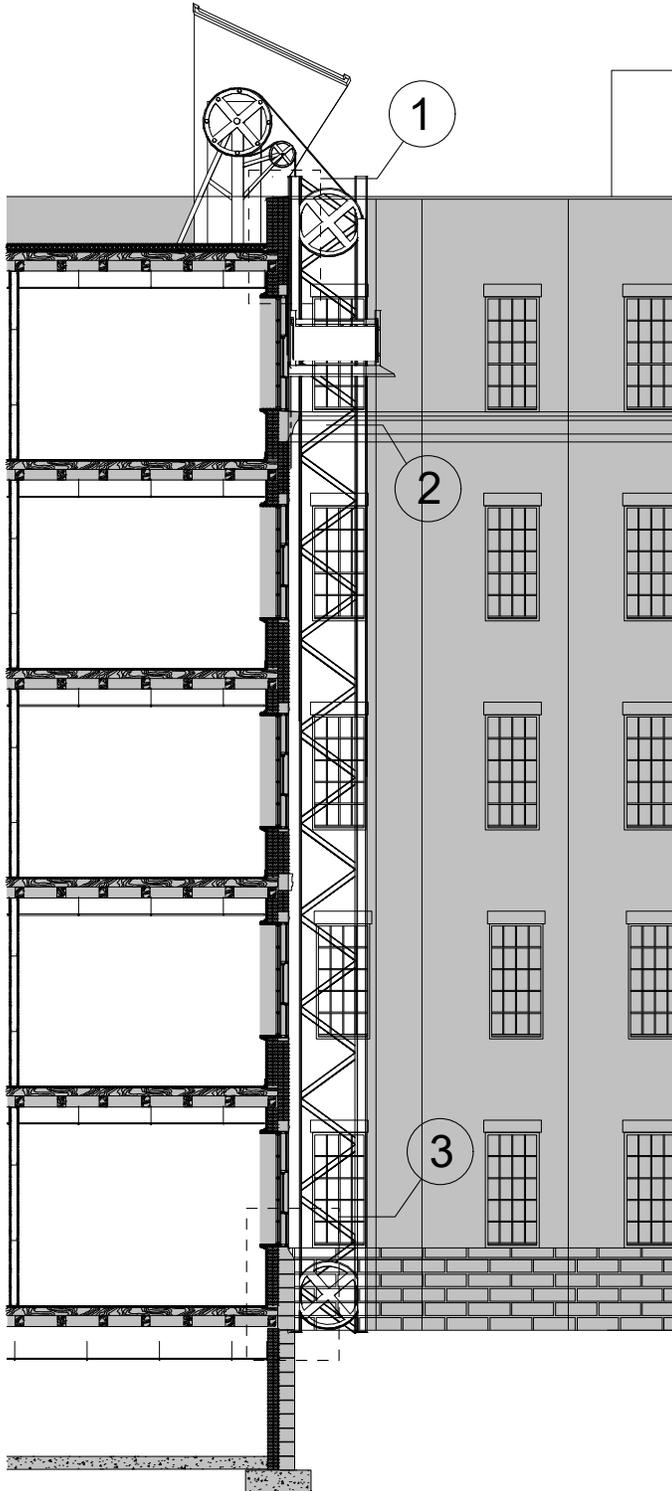
©2020
Cassandra Sims

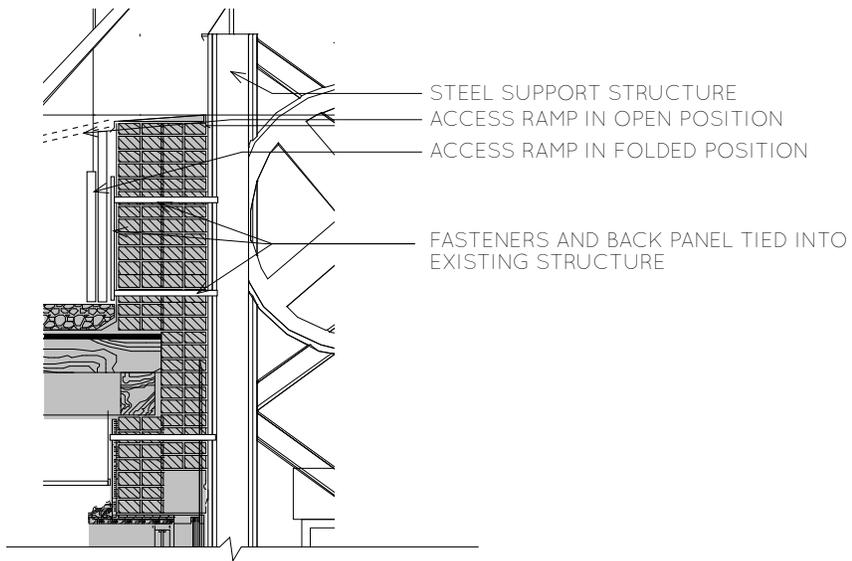
Azrieli School of Architecture
and Urbanism
Carleton University
Ottawa, Ontario

EXTERIOR ACCESS - LIFT AND THRESHOLD

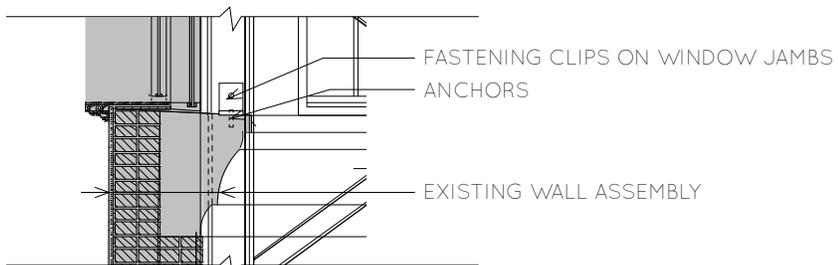


APPLICATION ON PRE-WAR BUILDING (1923)
SECTION: EAGLE ACADEMY FOR YOUNG MEN OF HARLEM

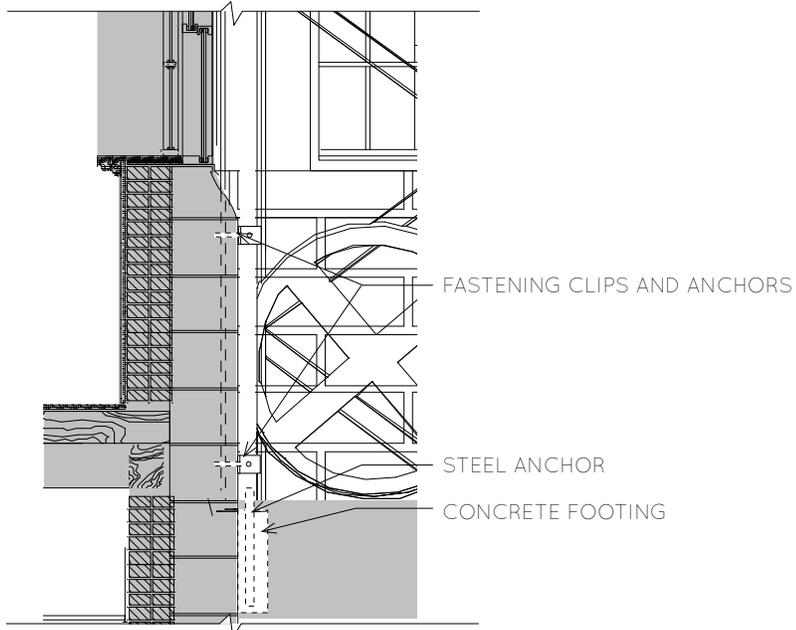




① Parapet/Roof Connection

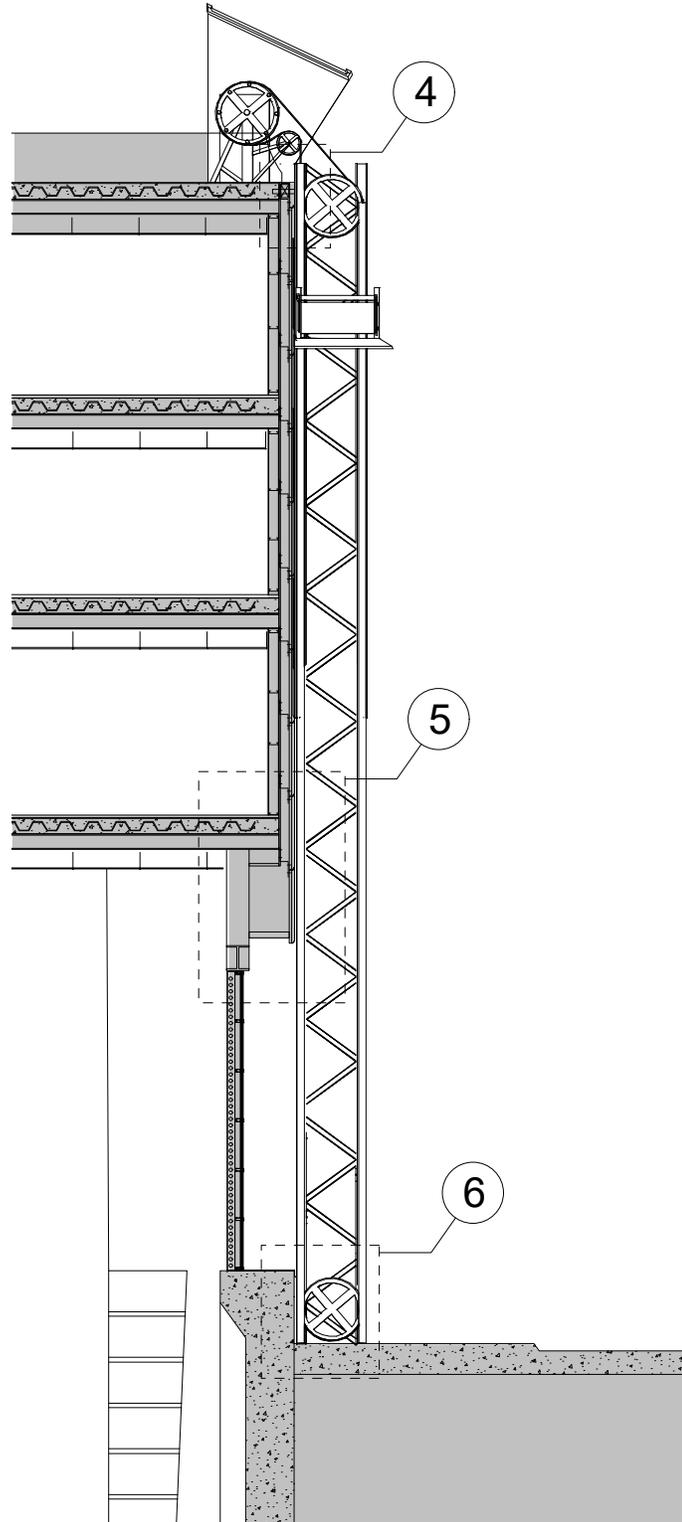


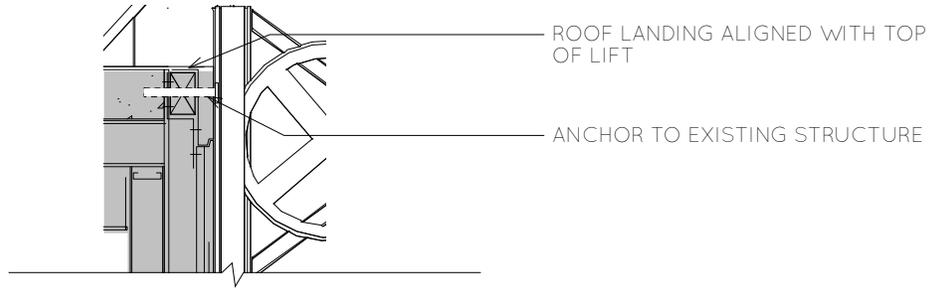
② Window Connection



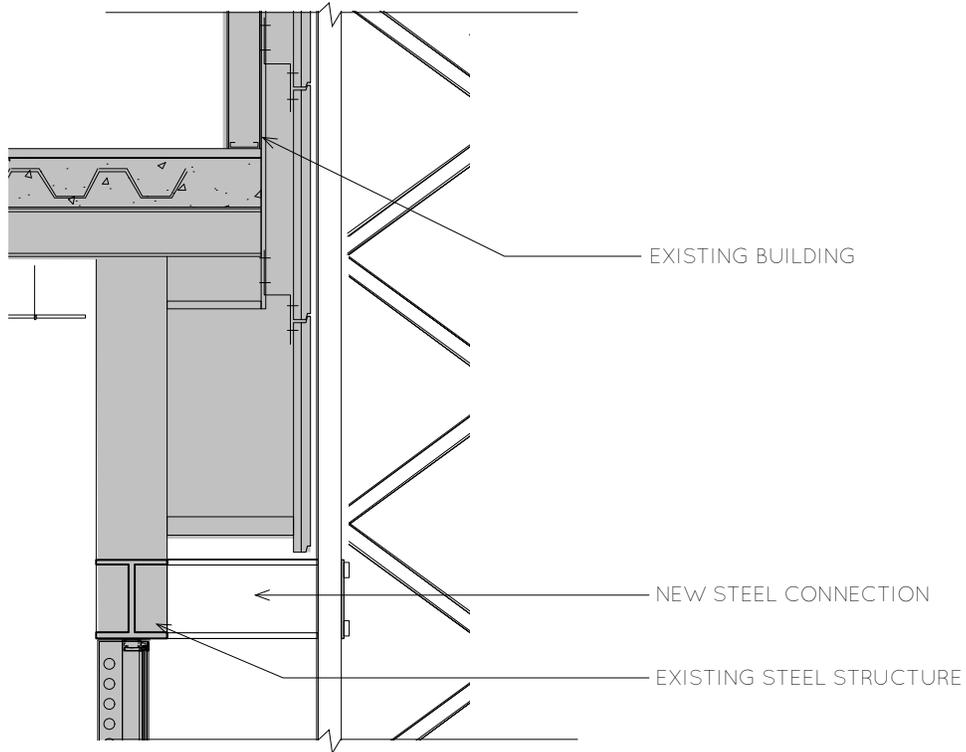
③ Ground Connection

APPLICATION ON POST-WAR BUILDING (2003)
SECTION: BARUCH COLLEGE

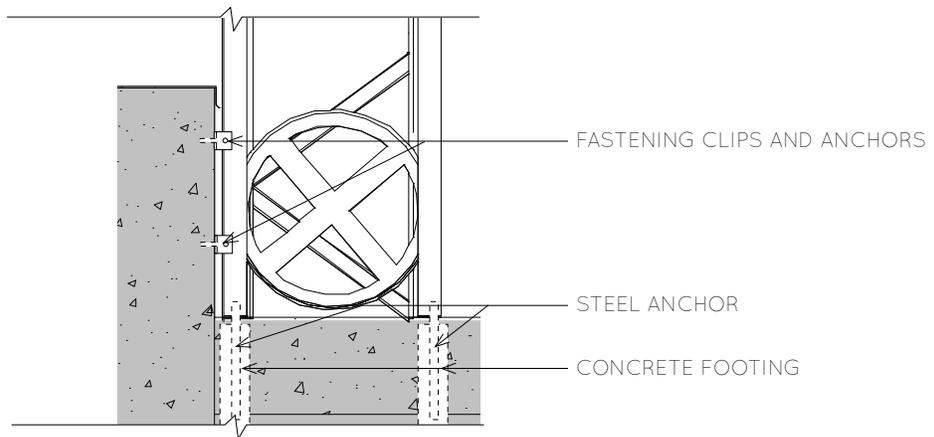




4 Roof Connection



5 Connection at Envelope



6 Ground Connection

