Cybernetic Campus:
University in the Fourth Industrial Revolution

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ABSTRACT

Cybernetic Campus:
University in the Fourth Industrial Revolution

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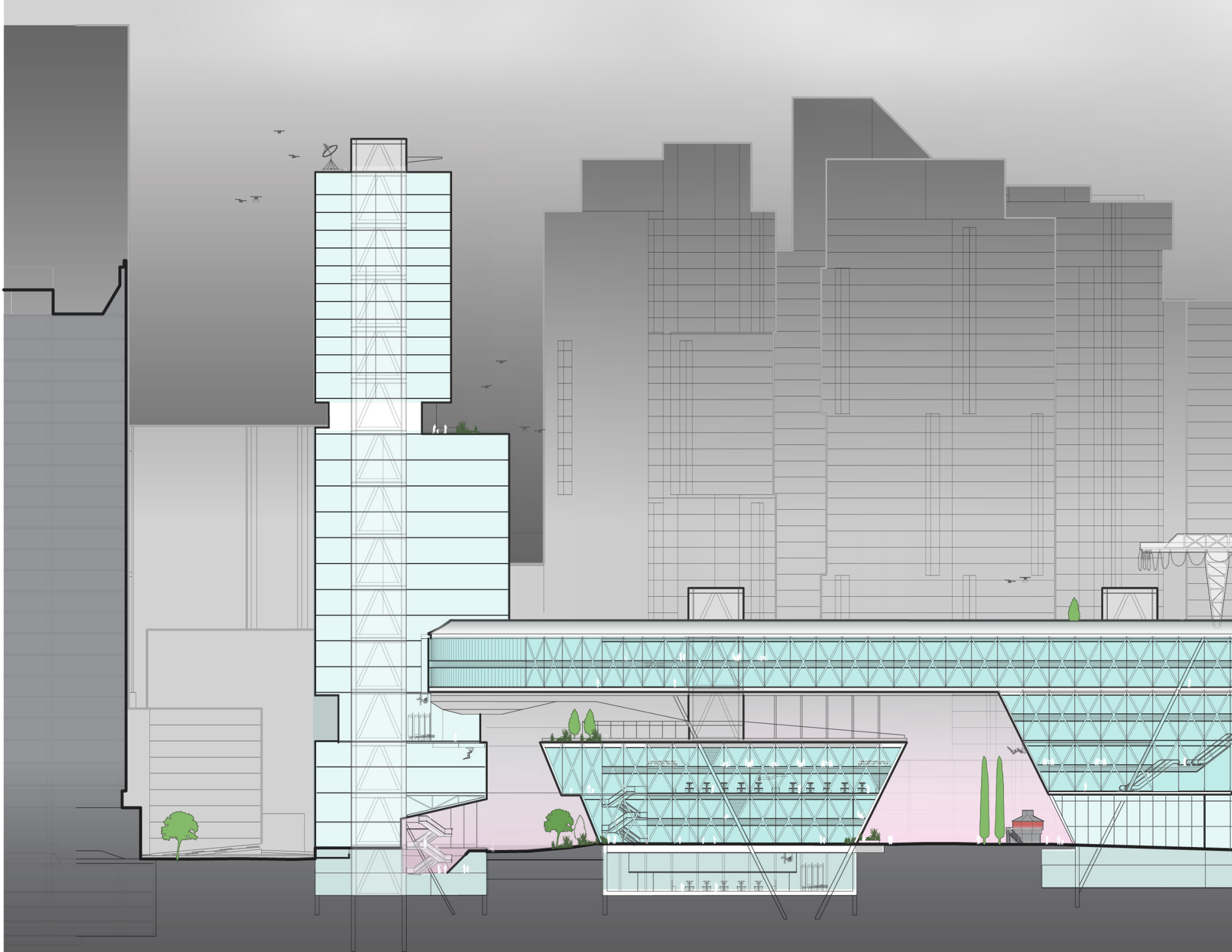
Chair of the Supervisory Committee:
Professor David Miller
Architecture

This thesis explores concepts for the urban university in response to the growing use of automation and artificial intelligence in the current Fourth Industrial Revolution. With the anticipated loss of nearly half of all jobs we have today, new forms of technology will disrupt the economy and society in unexpected ways while also creating opportunities to improve the quality of human life, help solve urgent global issues, and further the potential of human creativity. Critical to the successful integration of this unprecedented technological change is to revolutionize higher education and training.

This design proposes a new research institute in Denny Triangle, Seattle that applies the principles of cybernetic theory to set a new paradigm for campus spatial planning and design. The Cybernetic Campus is an experimental space embedded in the city, focused not only in the development of knowledge but also its dissemination.



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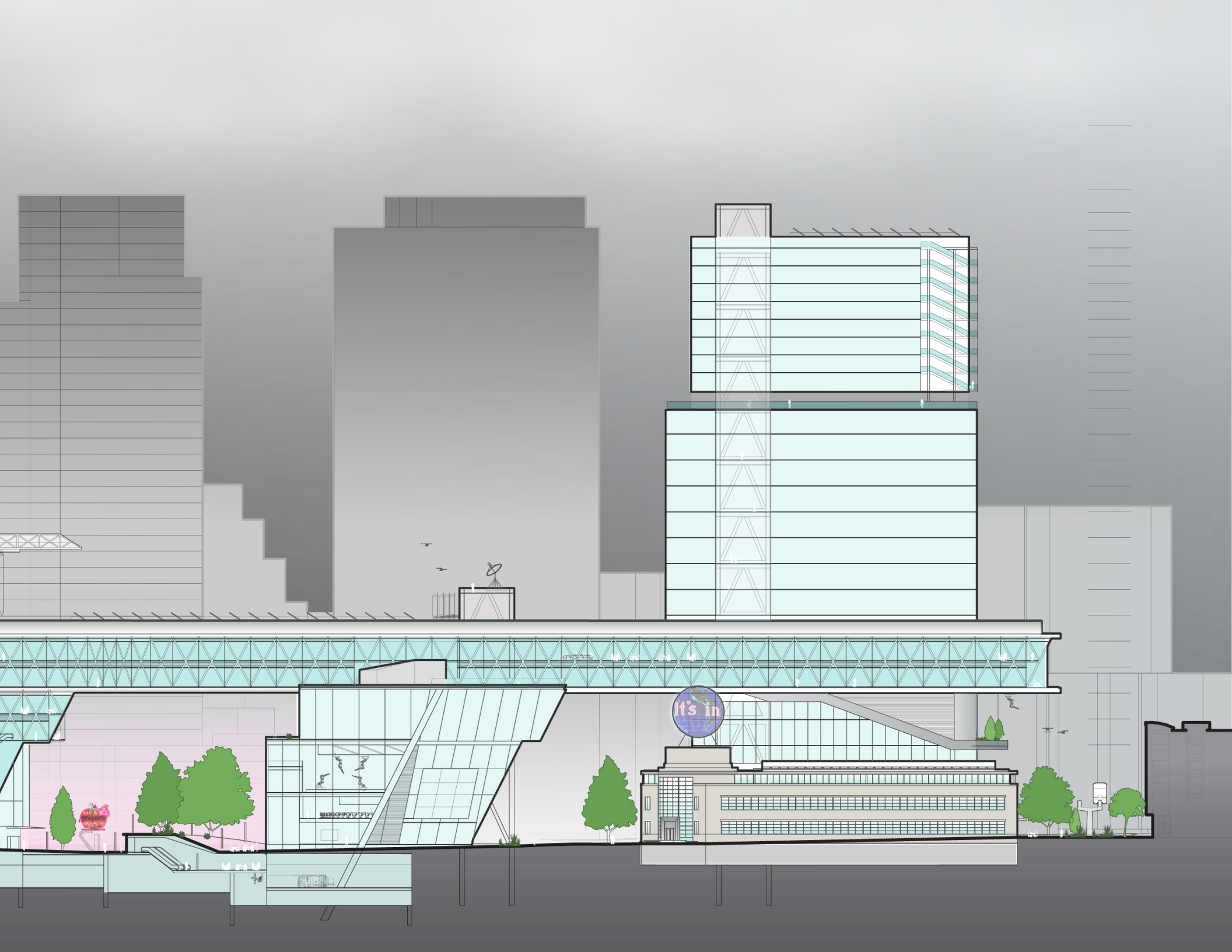

It's in

Figure 1.01
Professor Hugh Herr, director of Biomechatronics at the MIT Media Lab, seen with then British Prime Minister David Cameron during a 2013 visit. Courtesy of news.mit.edu. Professor Herr is himself a double-amputee. The space pictured is the Research Laboratory and Machine Shop at the MIT Media Lab, designed by Fumihiko Maki Associates and Leers Weinzapfel Associates and completed in 2009. The space is frequently reconfigured based on current projects.[15]

01. Introduction

Towards Digital Equity

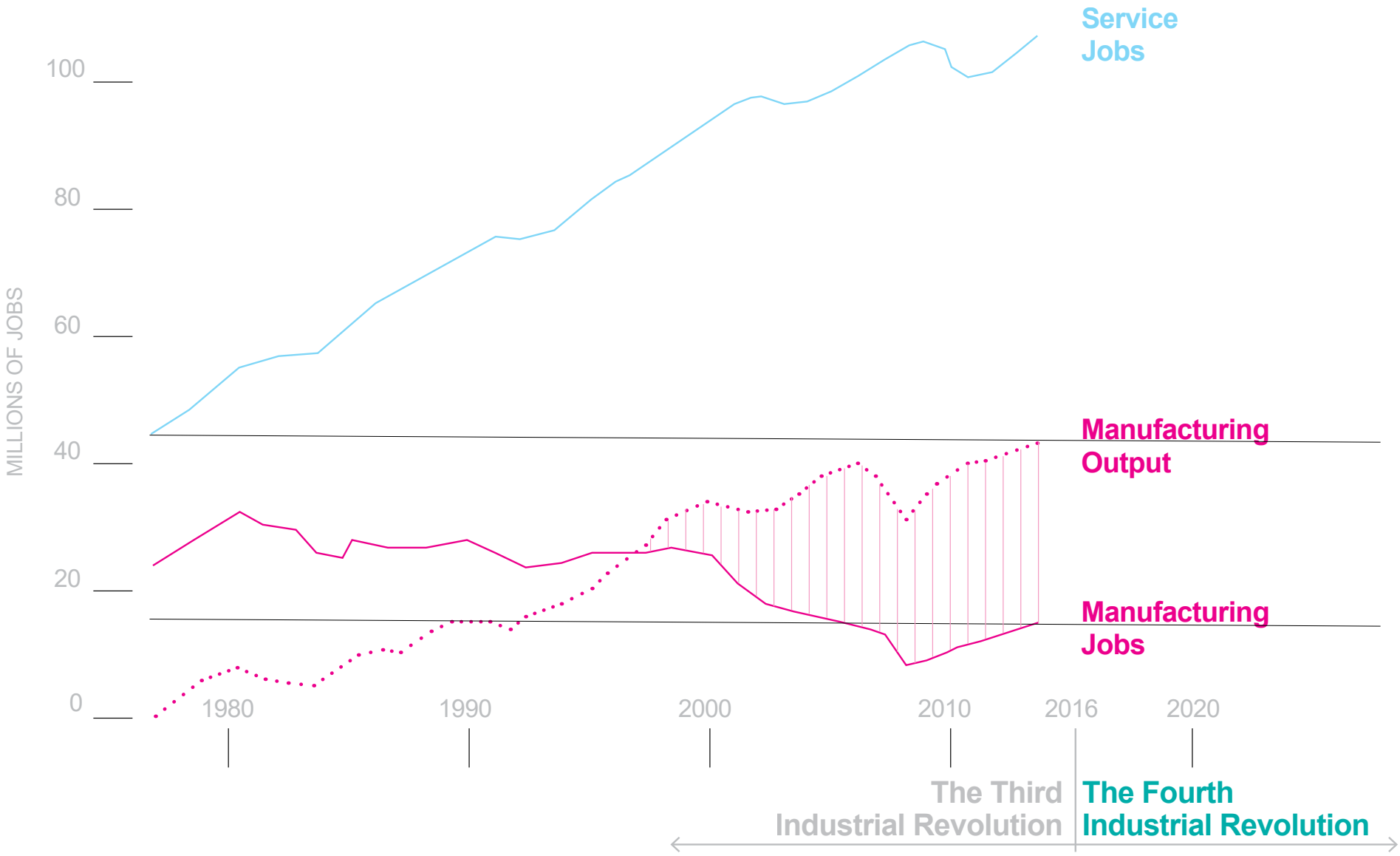
For centuries, higher education has been associated with scholarly advancement, ascending the economic ladder and furthering our social status. In an increasingly competitive and globally connected society, colleges and universities have had to keep pace with the latest technologies and infrastructural needs in order to stay relevant. As a result, campuses today are typically the most innovative spaces and concentration of knowledge in our cities. However higher education in the U.S. faces major challenges, and the value earned from the high cost of the degree has created or worsened economic inequalities for young, working Americans. Universities continue to issue degrees that specialize in a specific field with the expectation that the graduate will work on that same field until they retire. Yet experts argue that the impacts of automation and Artificial Intelligence (A.I.) will disrupt the economy and workforce in unexpected ways. Higher education needs to revolutionize its centuries-old traditions and pedagogies to guide society through this disruption.

1.1. Automation and Artificial Intelligence

Since the early 2000's, researchers have analyzed the capability for human work to be automated based on task rather than just by capability and skill.[1] In 2013, Oxford University published a study that found nearly half of jobs in the U.S. are at risk of automation within 20 years.[2] Similar research has suggested that the impacts will vary for each country, and it is not necessarily that the job itself will entirely disappear, but it will utilize more machines and less people. Other researchers suggest that in countries that have already introduced high levels of automation, such as Germany, South Korea and China, unemployment has generally decreased, and minimum wage has increased.[3] Unlike prior dramatic shifts in the workforce that automated routine and repetitive farm and factory jobs, technology today is increasingly automating high-skilled, high paid jobs such as radiologists, lawyers and accountants.[4]

Recent breakthroughs of A.I. technology and the decreasing cost of microprocessors have enhanced the development of machine learning, which mimics manual labor through algorithms and data, as well as deep learning, which mimics the structure of the human brain through an artificial neural network.[5] With this ability to visualize and replicate brain activity, technology is now bringing together digital, physical and biological systems, combining both human and artificial intelligence in ways not previously thought possible. While many of these

Figure 1.02
Manufacturing output has increased while manufacturing jobs have decreased. Jobs have shifted significantly to the service sector, but latest breakthroughs in automation and AI will have significant impacts to both.

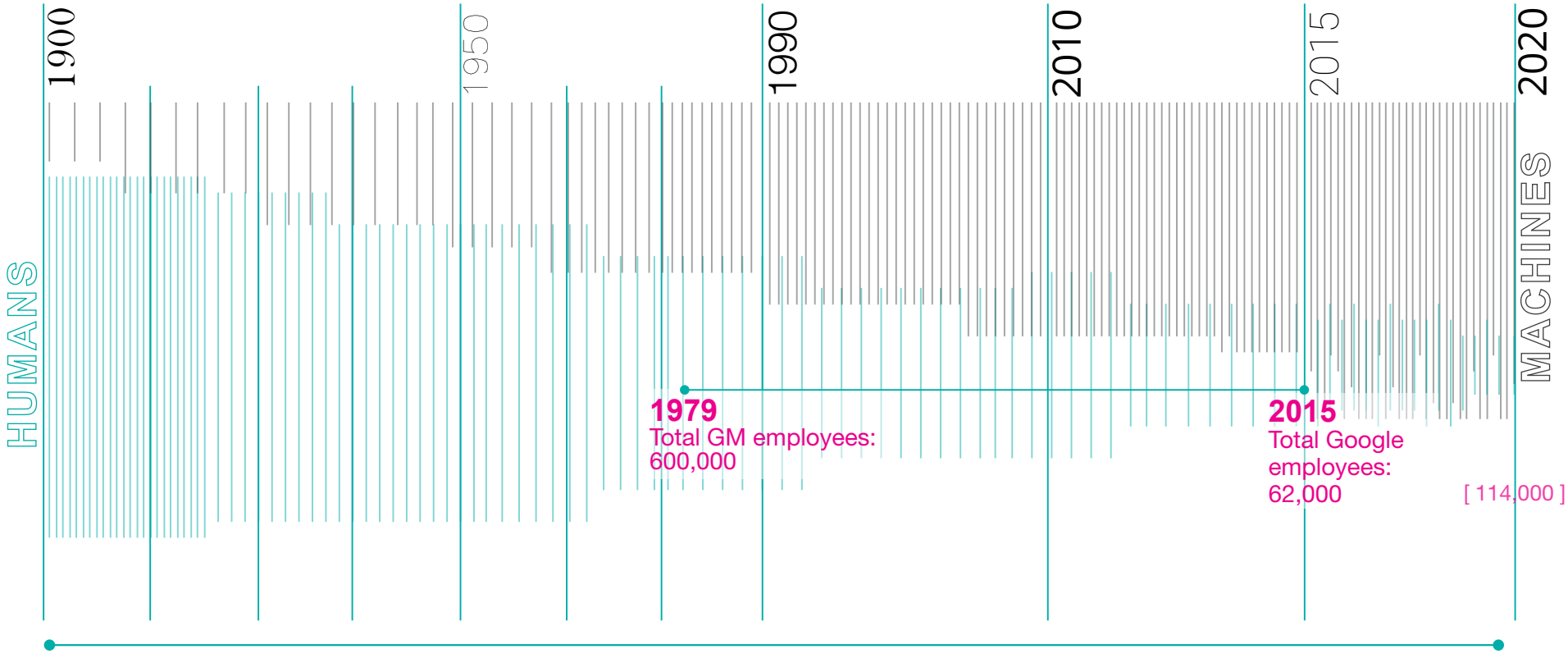

Service Jobs
Manufacturing Output
Manufacturing Jobs
MILLIONS OF JOBS
100
80
60
40
20
0
1980
1990
2000
2010
2016
2020
The Third Industrial Revolution
The Fourth Industrial Revolution

breakthroughs occurred in the labs of private military technology companies or corporations like Microsoft, NVDIA, Google and Neuralink, its development owes a great deal to the discoveries made by researchers on campuses.

1.2. The Fourth Industrial Revolution

In 2016, the World Economic Forum (WEF) established the "Center for the Fourth Industrial Revolution" with the goal of bringing together experts and industry leaders to focus on emerging technologies to help develop policies and governing protocols in ways that benefit humanity.[6] This was a central theme of the WEF annual conference that same year, where experts recognized that while the loss of millions of jobs was a critical issue, ultimately most industries will continue to exist and demand human skills. Larger, broader issues include the need to address the future of work, and to find ways to share wealth to meet the basic needs of every human on the planet. From the viewpoint of labor and jobs, the critical issue is the need to revolutionize education and training.[7] We are currently in the early stages of this Fourth Industrial Revolution, which is continuing the Digital Revolution that began with early computer technology developed in Silicon Valley.

Figure 1.3
Logarithmic timeline of efficiency achieved by automation.



1900
40% of the US workforce
is agricultural labor

TODAY
2% of the workforce
is agriculture labor

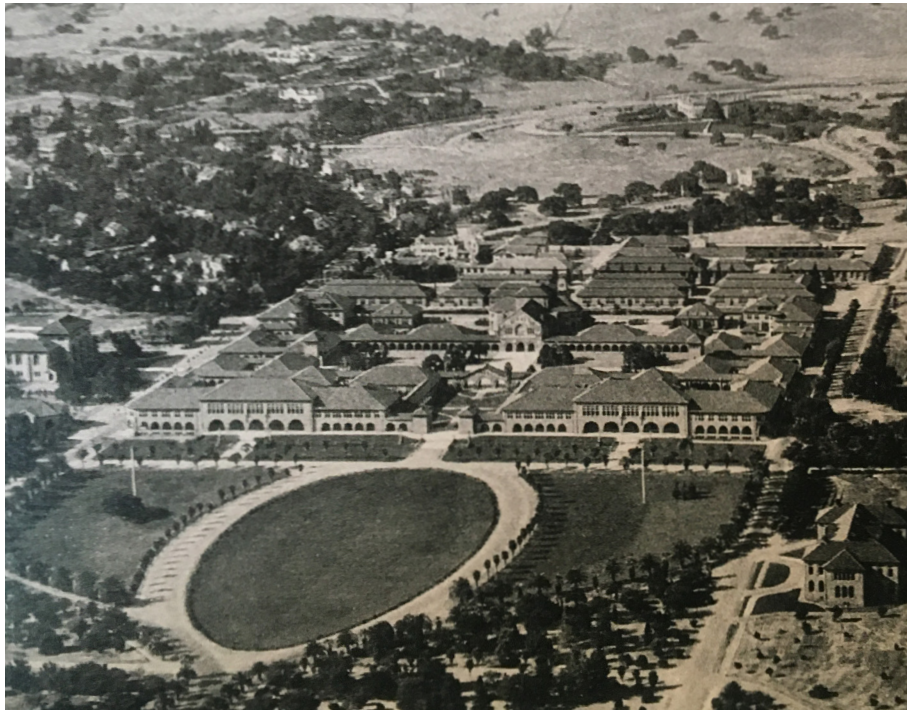
1.3. Stanford University and the Silicon Valley

The U.S. government's investment in electronics companies located in the San Francisco Bay area for military technology and the National Aeronautics and Space Administration led to an emerging electronics industry in proximity to several well-established universities. Today, the campus of Leland Stanford Jr. University, founded in 1885, spans both the city of Palo Alto and Santa Clara County's jurisdictions. The original master plan, designed by Frederick Law Olmsted in 1888, reflected the Beaux-Arts tradition and "City Beautiful" movement and envisioned the university as a self-contained town. The original buildings, designed by Shepley, Rutan and Coolidge, were completed in 1891 and combined features of the Richardsonian Romanesque with the California Mission styles.

Frederick Terman, a Stanford professor who became the Dean of the School of Engineering in 1946, fostered a highly entrepreneurial culture and encouraged students to start their own companies, often helping to bring in investors and investing in many start-ups himself.[8] He led the founding of one of the nation's first "industrial parks," now named Stanford Research Park, and is widely credited as one of the founders of what ultimately became known as Silicon Valley due to the agglomeration of semiconductor manufacturers.

Figure 1.4 (left)
Leland Stanford Jr. University, as seen approximately 30 years after its initial construction in 1888. Courtesy of Andrea Deplazes, "The Campus as Location and Strategy: Thumbnail Sketches of Science City."

Figure 1.5 (right)
Dean Terman presenting plans of Stanford Research Park to investors, 1951. Courtesy of boomcalifornia.com/ Margaret O'Mara



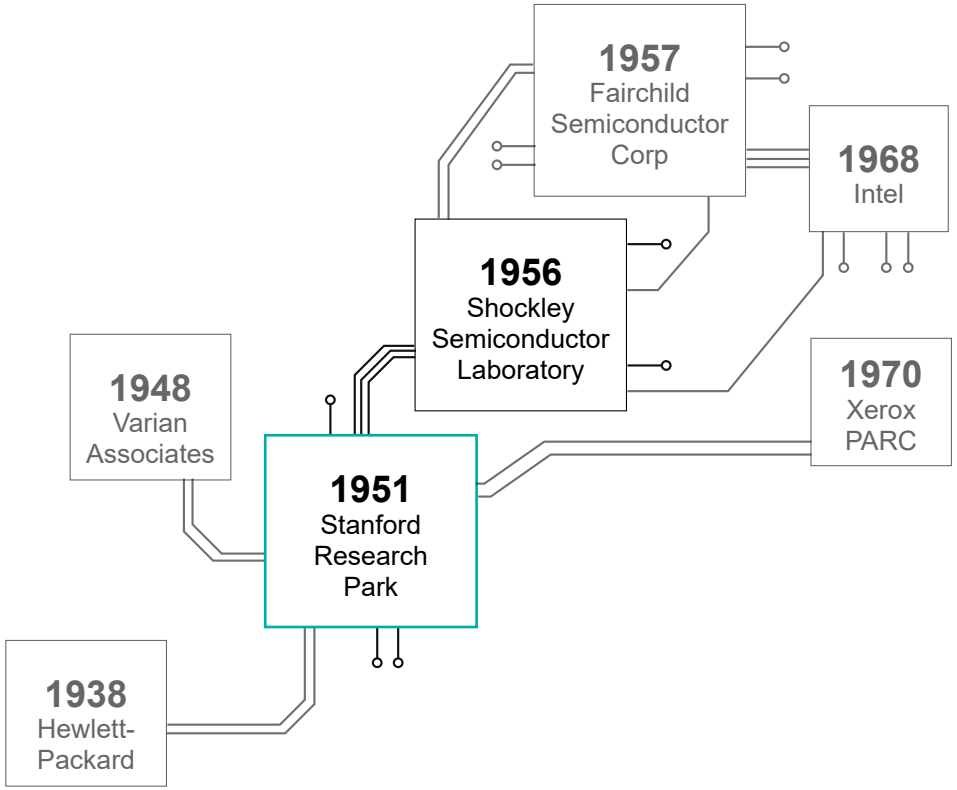
1.4 Agglomeration Economies

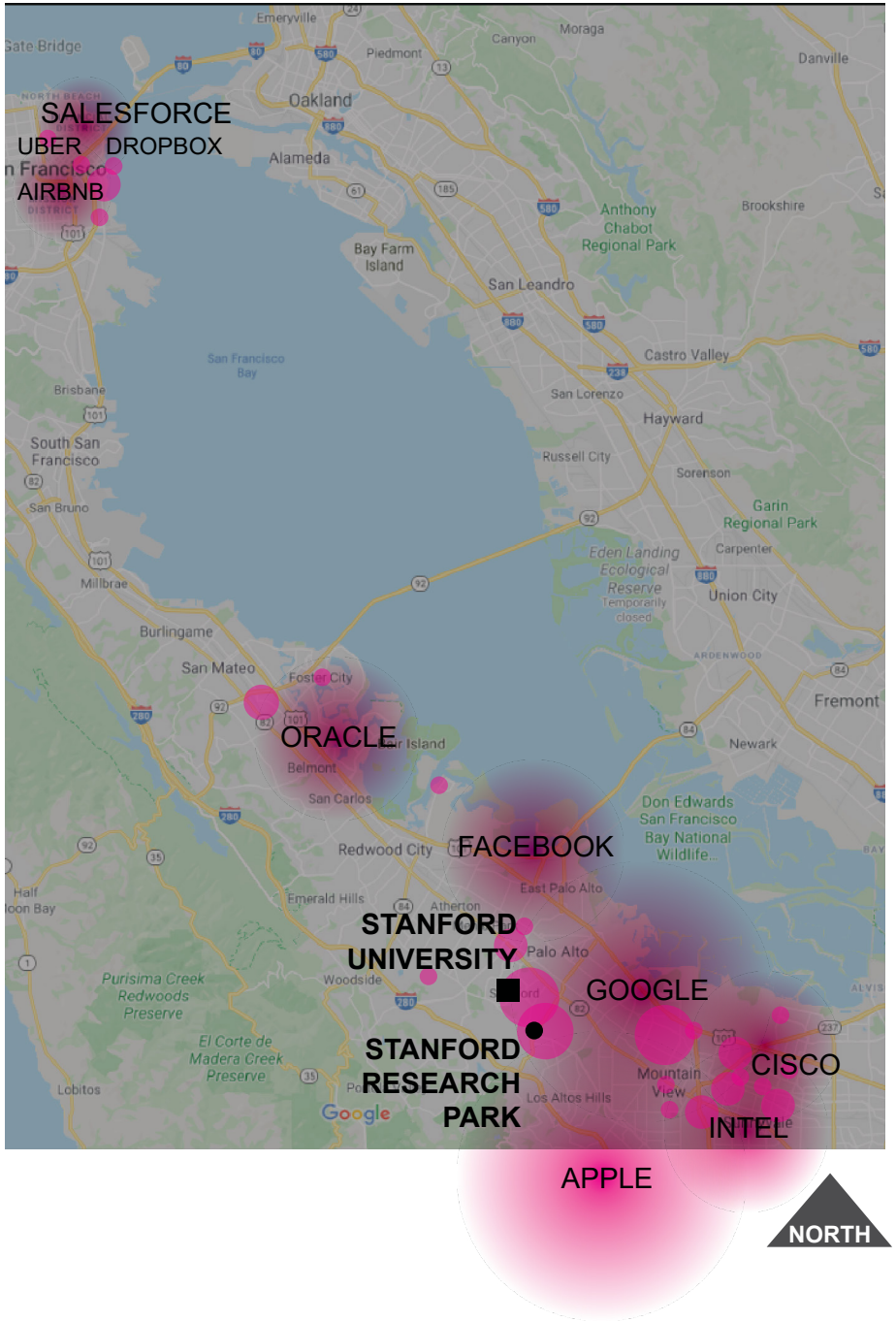
The start-ups emerging out of Stanford University conducted highly specialized technology research projects backed by funding from venture capital investment and located themselves in Silicon Valley in proximity of one another. The economist W. Brian Arthur observed this agglomeration, and in 1990, published *Mathematical Social Sciences,* where he theorized that firms form "agglomeration economies" when they choose to locate near other firms and benefit from their proximity, such as in Silicon Valley.[9] Arthur made the case that this was a "historical accident" where the initial firms attracted other firms entering the same industry, not necessarily due to advantages of that particular location, but from the benefits of proximity. Research universities in the U.S. have since played a major role in the development of the technology industry. Today, innovations in digital and robotic technology continue to generate high demand for high tech, data, biotechnology and start-ups near universities.

In Seattle, a similar agglomeration economy has emerged with most tech companies occupying a large portion of office space in the Denny Triangle and South Lake Union neighborhoods of downtown.

Figure 1.6 (left)
Diagram of early companies that were established out of Stanford Research Park.

Figure 1.7 (right)
Map of tech corporations in the Silicon Valley.


1938
Hewlett-Packard
1948
Varian Associates
1951
Stanford Research Park
1956
Shockley Semiconductor Laboratory
1957
Fairchild Semiconductor Corp
1968
Intel
1970
Xerox PARC


SALESFORCE
UBER
DROPBOX
AIRBNB
ORACLE
FACEBOOK
STANFORD UNIVERSITY
GOOGLE
STANFORD RESEARCH PARK
CISCO
INTEL
APPLE
NORTH

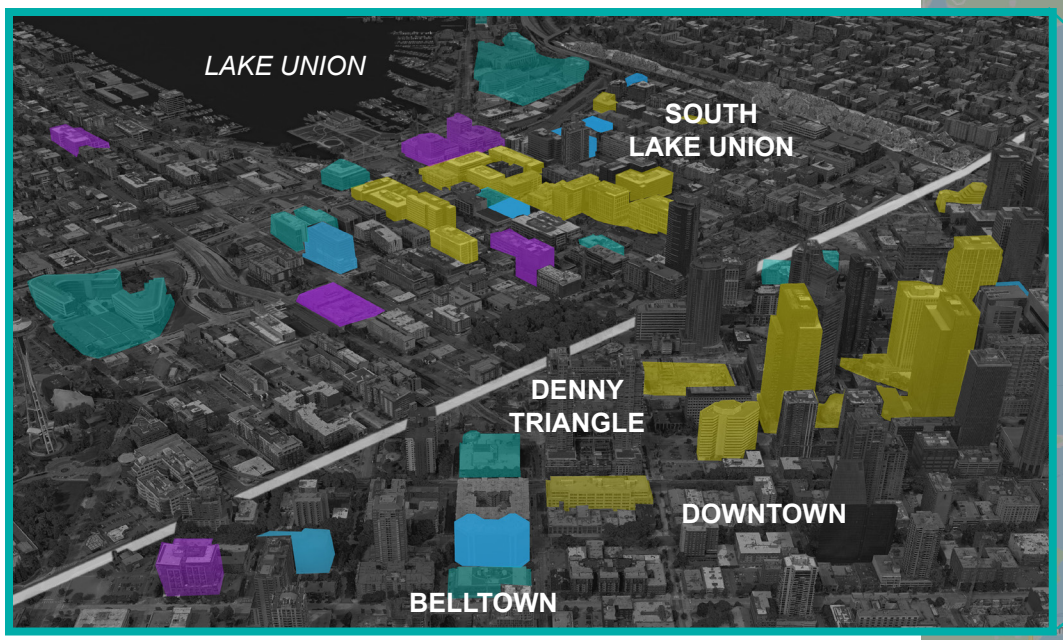
In addition to the presence of large tech companies, many of Seattle's startups specialize in life sciences, biotech and pharmaceutical research, with the proximity of major medical institutions as well as cancer research centers. Due to its tighter spatial constraints, the spatial relationship of the technology industry in Seattle is highly urban and compact, compared to companies in the Silicon Valley. Therefore, it is commonplace for research and tech companies to locate in high-rise construction, and space needs related to lab research or patient care must work within the constraints of the downtown infrastructure.

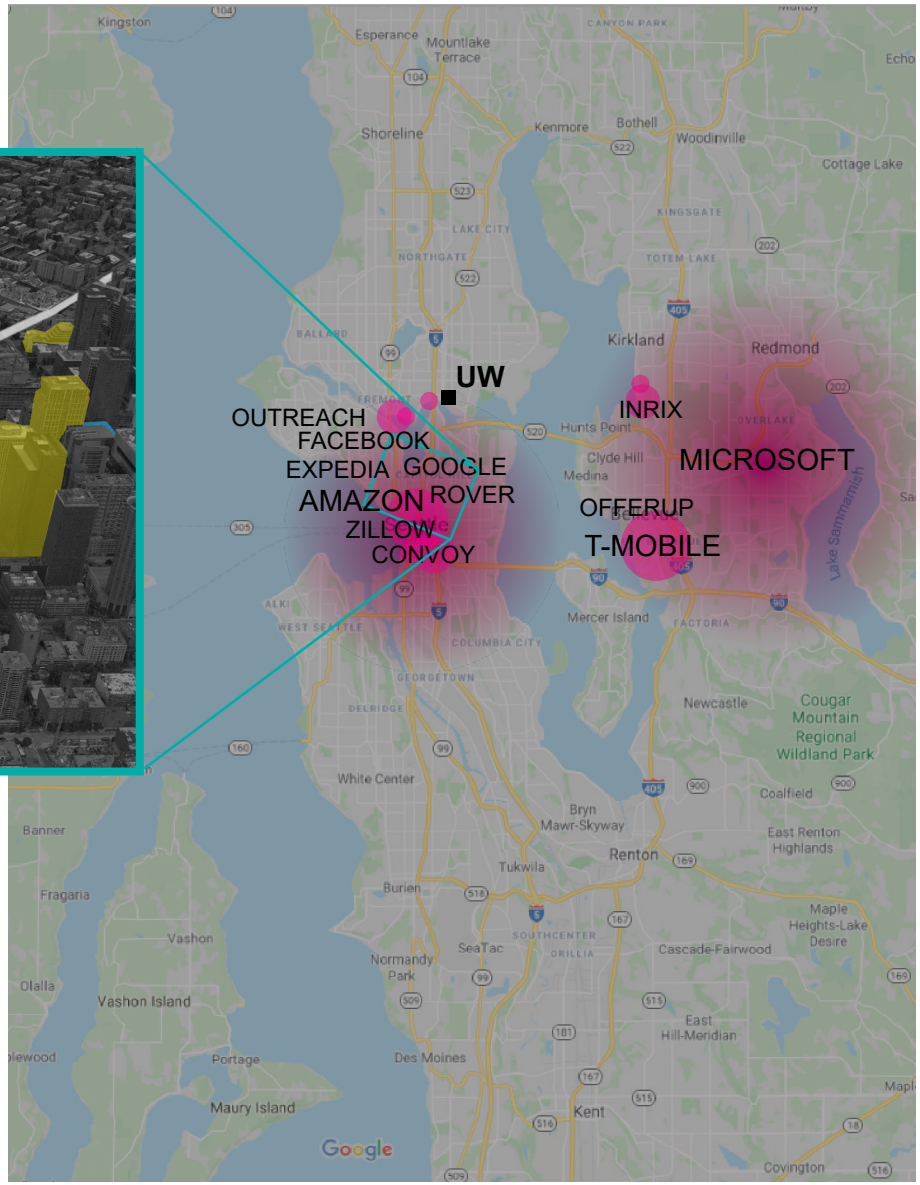
1.5 Smart Cities and Cybernetic Urbanism

Global cities facing challenges of urbanization and climate change are increasingly investing in green technology and setting ambitious sustainability goals. This has resulted in the emergence of the "smart city," which utilizes sensors to collect data to improve efficiency. However, when it comes to issues of social and digital equity, these smart city strategies can often contradict larger economic and political objectives. As discussed by Kristin Scott in her book, *The Digital City and Mediated Urban Ecologies*, Seattle was named the smartest city in North America by Fast Company in 2013, and the city was recognized for its initiatives to fight climate change and become carbon neutral by 2050.[10] According to Scott, Seattle's leaders have long aspired to make the city a

Figure 1.8 (left)
Google Earth Aerial of South Lake Union and Denny Regrade

Figure 1.9 (right)
Google Maps image of Seattle's largest tech companies





AMAZON

LIFE SCIENCES

TECH

INSTITUTIONS

NORTH

major player in the global economy and a hub for scientific and technological innovation.

As a smart city, Seattle's economy enables it to attract creative and entrepreneurial talent that helps to further generate economic growth. However, Scott observes that this economy relies on corporate investments and privatization, and Seattle's growth as a high-tech digital city has reinforced socioeconomic inequalities and divides. Scott argues that the city presents its crime data in order to reinforce economic and racial boundaries, calling it a form of "technological surveillance."[11]

Maros Krivy, in his article "Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control," discusses how citizens of the smart city are active participants in generating data, serving as sensing nodes in the city. He states that this cybernetic urbanism legitimizes a new regime of control that subjects citizens to surveillance and environmental-behavioral control, where individuals can be "nudged" to act a certain way while preventing them from doing certain things through their spatial environment.[12] Krivy claims that personal devices used by society and sensors embedded in the city used for environmental monitoring and feedback enable the governing body to have "environmental-behavioral control." He presents additional arguments that oppose the smart city, including the claim that it is incompatible with urban informality. Smart cities are typically realized as top-down urban planning approaches that are costly to implement and less flexible for unpredictable needs. *(The concept of "cybernetics" is discussed further in chapter 4).*

Krivy's essay critiques the smart city as a corporate exertion of control over the city, resulting in the "society of control", where citizens and their use of personal devices provides a real-time stream of data to be further capitalized by corporations. New smart cities, such as the Songdo Business district in South Korea, are typically built from scratch, and lack the desired characteristics such as culture, history and place found in more established cities. Nearly 10 years after completing its first phase, Songdo has only reached a third of the population its planners were expecting to reach in 15 years (as of 2014).[13]

1.6 The Role of Higher Education in Digital Equity

While smart cities enable cities to meet targets for clean energy and reducing carbon emissions, they have the potential to intensify social and digital inequalities in ways beyond having access to reliable high speed internet. The increased implementation of cybernetic urbanism subjects everyday citizens to corporate power, with the ability to mine vast amounts of consumer data, while the prohibitive cost of a competitive degree excludes marginalized and underrepresented groups.

Joseph Aoun, president of Northeastern University (NEU) and author of *Robot-Proof, Higher Education in the Age of Artificial Intelligence*, argues that we must revolutionize higher education to train students as creators and lifelong learners instead of laborers.[14] NEU has had a cooperative education and experiential learning program for over 100 years, which alternates academic terms with periods of full-time work so students can train in real-life scenarios while still earning their education in a traditional classroom environment.

Even with major reforms, higher education will no longer be able to promise to improve the quality of life and train individuals to serve their communities without the major investment and strong partnership of both public and private entities. It will, however, remain critical in preparing us for the uncertain impacts and disruptions of technology.

02. Campus

University in the 21st Century

Campus planning and design is considered a uniquely American tradition because, in contrast to European university students, many students in the US live on campus or in nearby neighborhoods. Architectural historian Paul Turner, makes this argument throughout his book *Campus, An American Planning Tradition*. He describes the American campus as "a kind of city in microcosm…a vehicle for expressing the Utopian social visions of the American imagination. Above all, the campus reveals the power that a physical environment can possess as the embodiment of an institution's character."[1] The growth of American universities, along with their host cities, has been largely due to their expanding regional and global engagement as well as rapid urbanization that has resulted in both spatial transformations and development pressures.

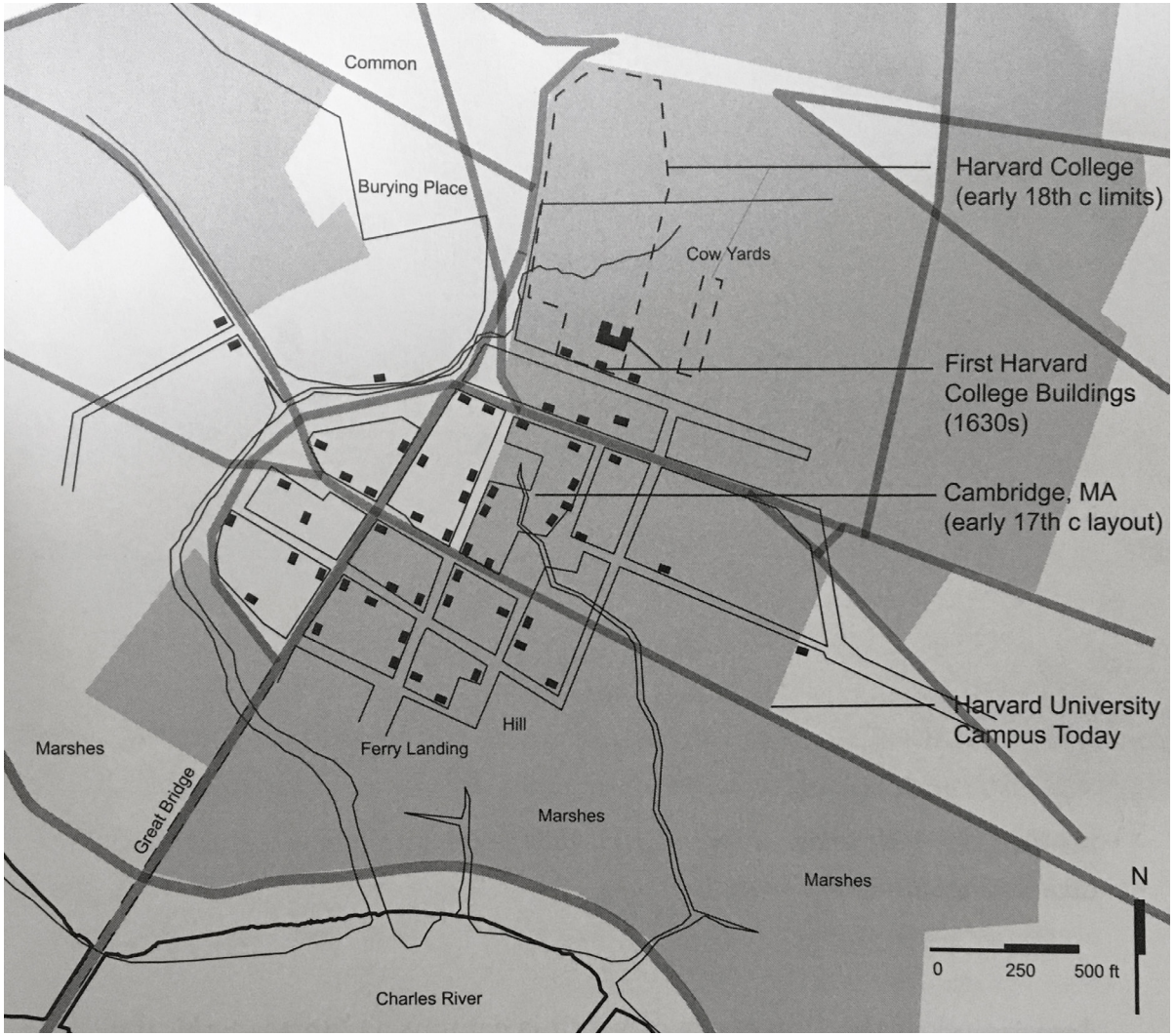
Figure 2.1
Seattle Central College and Cal Anderson Park, looking west towards downtown. Courtesy of seattlecentral.edu.

2.1. Historic Context

The phrase "town and gown" is often used to encapsulate the relationship between universities and their host city, where often the "town" is seen as secondary to the larger goals of the "gown" and its embodiment of the values of American society and the rest of the world.[2] When the first American colleges were established during the colonial period of the 1600's, the presence of the institution as a form of social structure and scholarly advancement was intended to lead to the growth of a surrounding or nearby city. Harvard College was one of the first examples, founded in 1636, based on the English collegiate system.[3] Over two hundred years later on the opposite coast, the Territorial University of Washington was established in 1861, less than ten years after Seattle was first settled and nearly thirty years before the State of Washington was admitted to the Union in 1889.[4] Shortly afterwards, religious leaders established Seattle Pacific University, followed by Seattle University, and thus higher education played an active role in the very early years of planning and growth of Seattle.[5] From this historical perspective, city and campus planning was typically carried out in an urban context and the urban conditions and academic interests distinctly shaped one another.

A similar relationship exists today, as partnerships between universities and their host cities take advantage of identifying mutually beneficial campus planning and urban design goals. However, the spatial context of many American university campuses today is often a result of a long period of anti-urbanistic sentiment that has

Figure 2.2
First Harvard College buildings and early buildings in Cambridge, Massachusetts. Harvard's campus today is represented in grey shaded area. Courtesy of Sharon Haar (The City as Campus, Urbanism and Higher Education in Chicago).


Common
Burying Place
Cow Yards
Harvard College
(early 18th c limits)
First Harvard
College Buildings
(1630s)
Cambridge, MA
(early 17th c layout)
Harvard University
Campus Today
Hill
Ferry Landing
Marshes
Great Bridge
Marshes
Marshes
Charles River
N
0
250
500 ft

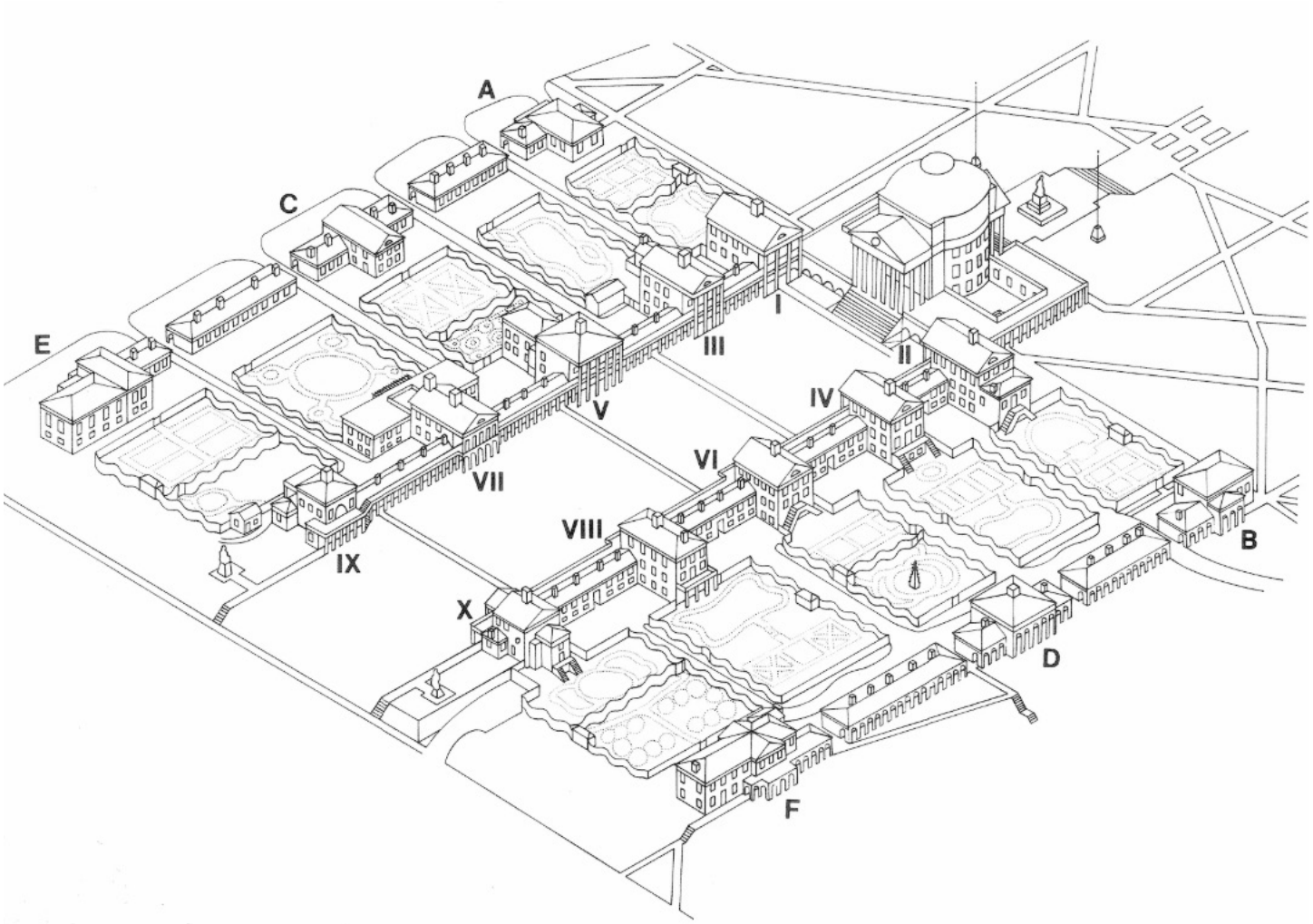
led to a variety of complex urban design and planning conditions.[6]

The University of Virginia and its "Academical Village," established and designed by Thomas Jefferson in 1817, is widely regarded as the model for most American universities. This approach treated the university as an independent entity, a "self-contained microcosm." Although this approach showed early European influence, it became distinctly American for its planning to accommodate residential life and social ideals.[7]

In some cases, college and university campuses offered a life for students intentionally sheltered from society. According to author Steven Diner, 19th century religious leaders believed the city offered a bad influence and temptations to students, while rural and agrarian life would connect them to nature and purity.[8] Despite what became a distinction of "town and gown," colleges and universities have continued to play a critical role in the cities that were established during the westward territorial expansion of the US. Through the end of the 19th century, universities may be considered experiments in town planning, under the heavy influence of popular movements like the "City Beautiful" and the Ecole des Beaux-Arts.

The first of two major federal planning initiatives that would make the university a defining aspect of American identity was the Land-Grant College Act of 1862 (also known as the Morrill Act) which provided government funding to support university development.[9] And, after World War II, the Serviceman's Readjustment Act of 1944 (commonly known as the "G.I. Bill") sent over two million veterans to American colleges

Figure 2.3
The University of Virginia Academical Village, designed by Thomas Jefferson, with the library as the defining central monument to knowledge. Historians believe the design is based on his home Monticello and the living quarters of the enslaved plantation workers. Courtesy of UVA Facilities Management, "Behind the Serpentine Wall, Maintaining the Pavilion Gardens at the University of Virginia."

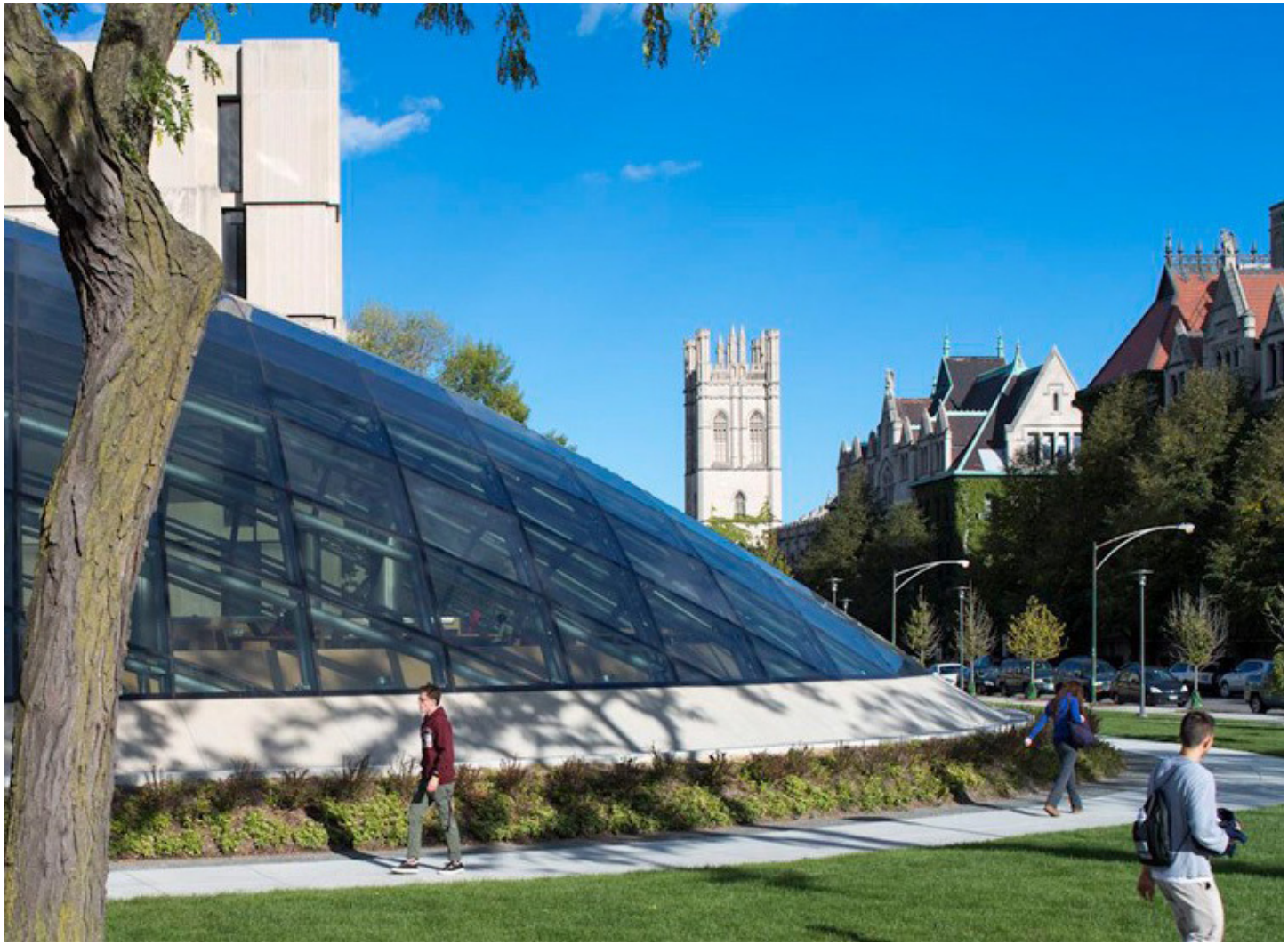

A
C
E
I
III
II
V
IV
VII
VI
VIII
IX
X
B
D
F

and universities by 1956. This post-war period, also a period of significant increase in American population, led to a building boom in university campus development, creating new or exacerbating existing relationships with its surrounding neighborhoods, which experienced their own development pressures. Transformations in workplace technology and prospects for ascending the economic ladder made higher education an important goal for many American families and their children. It was also during the postwar era that universities such as the Massachusetts Institute of Technology and Yale University became places of architectural experimentation for many prominent architects including Alvar Aalto, Eero Saarinen and Louis Kahn. This represented the impact of the Modern Movement and a shift from coherent planning under a single architectural style to a more individual focus with buildings as individual objects. The University of Chicago is a clear example of this distinction with the consistency in its early Gothic and Richardsonian style buildings and the stand-alone modern buildings as the campus spread out from its historic core after 1945.

Figure 2.4
The Joe and Rika Mansueto Library at the University of Chicago, designed by Helmut Jahn's firm and completed in 2011. Below the elliptical glass dome is a high-density book storage system. Seen in the background is Mitchell Tower, designed in the Oxonian Gothic style in 1903 by Shepley, Rutan and Coolidge. Courtesy of Tom Rossiter and Jay Pridmore, Building Ideas, An Architectural Guide to the University of Chicago.

2.2. A Changing Pedagogy

Sharon Haar, author of *The City as Campus: Urbanism and Higher Education in Chicago*, argues that a new relationship between urban campuses and their cities is beginning to form with the common mission to "acknowledge and accommodate diverse people, ideas, technologies and to advance knowledge directed toward global interactions."[10] The changing pedagogy of the American campus, both in retrospect and



for the future, has been widely written within planning and architectural communities. However, as Paul Temple argues in his book, *The Physical University: Contours of Space and Place in Higher Education*, relatively little information about the physical form of the new university exists compared to what has been written about teaching and learning methods as well as evaluating academic quality.[11]

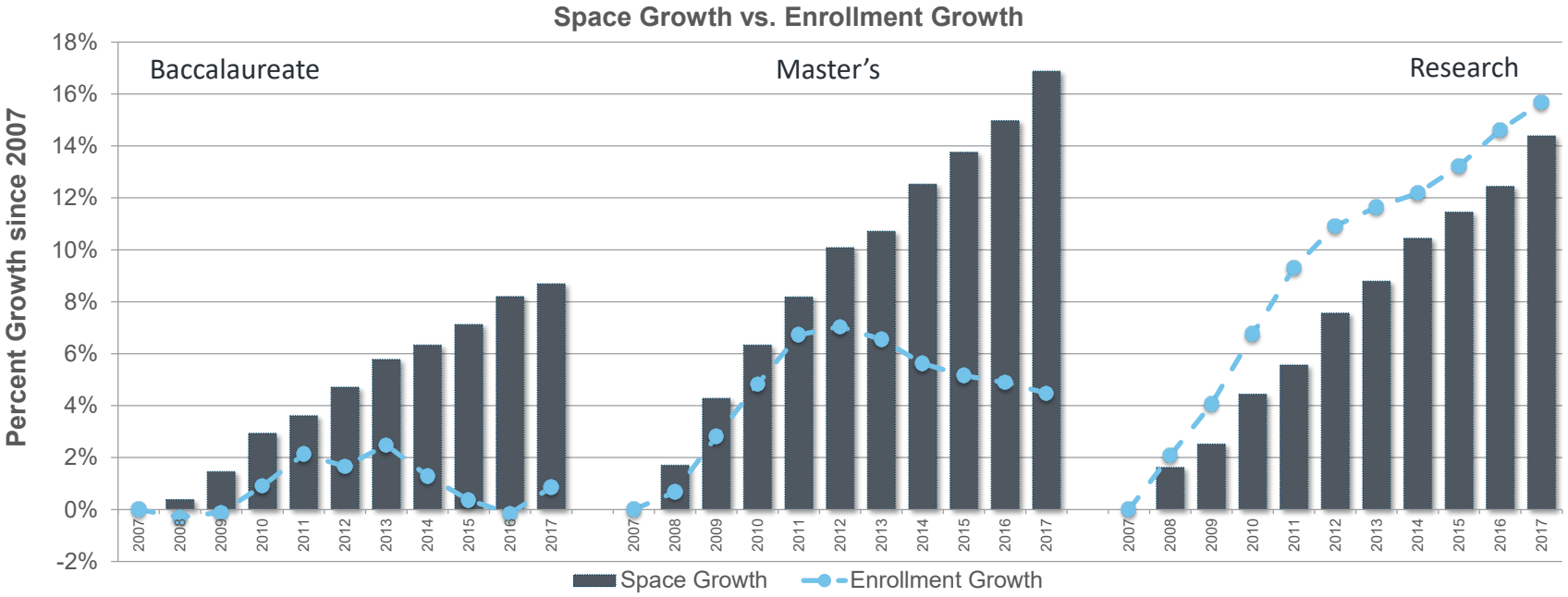
Urban campuses today are significantly influencing city renewal across many different cities. The traditional American campus evolved from inward focused quadrangles, sheltered from the city, to one that is open and transparent. Through this transformation, the campus now offers many more opportunities to enrich the city, providing active storefronts, new residential development, green space and athletic programs, urban revitalization and accessibility. During the conference "Shapers of the New City: Cultural Institutions and Universities," Robert Campbell, then Architecture Editor for the *Boston Globe*, discussed how institutions have taken the lead in city planning, either through expansion or regeneration of the neighborhood that surround them.[12]

Today, because economic interests are a primary driver in growth and development of university campuses, planning practices are beginning to change. Institutions are increasingly forming alliances with developers, major employers and medical centers, where campus development has taken place with the university as a leasing tenant rather than the sole funding source. Competition between colleges and universities have driven up spending in the construction of on-campus student

Figure 2.5
Space growth versus enrollment growth from 2007-2017. Courtesy of Sightlines, A Gordian Company, "2018 State of Facilities in Higher Education."

Space Growth with Declining Enrollment is an Exposure

Master's universities show the largest divergence



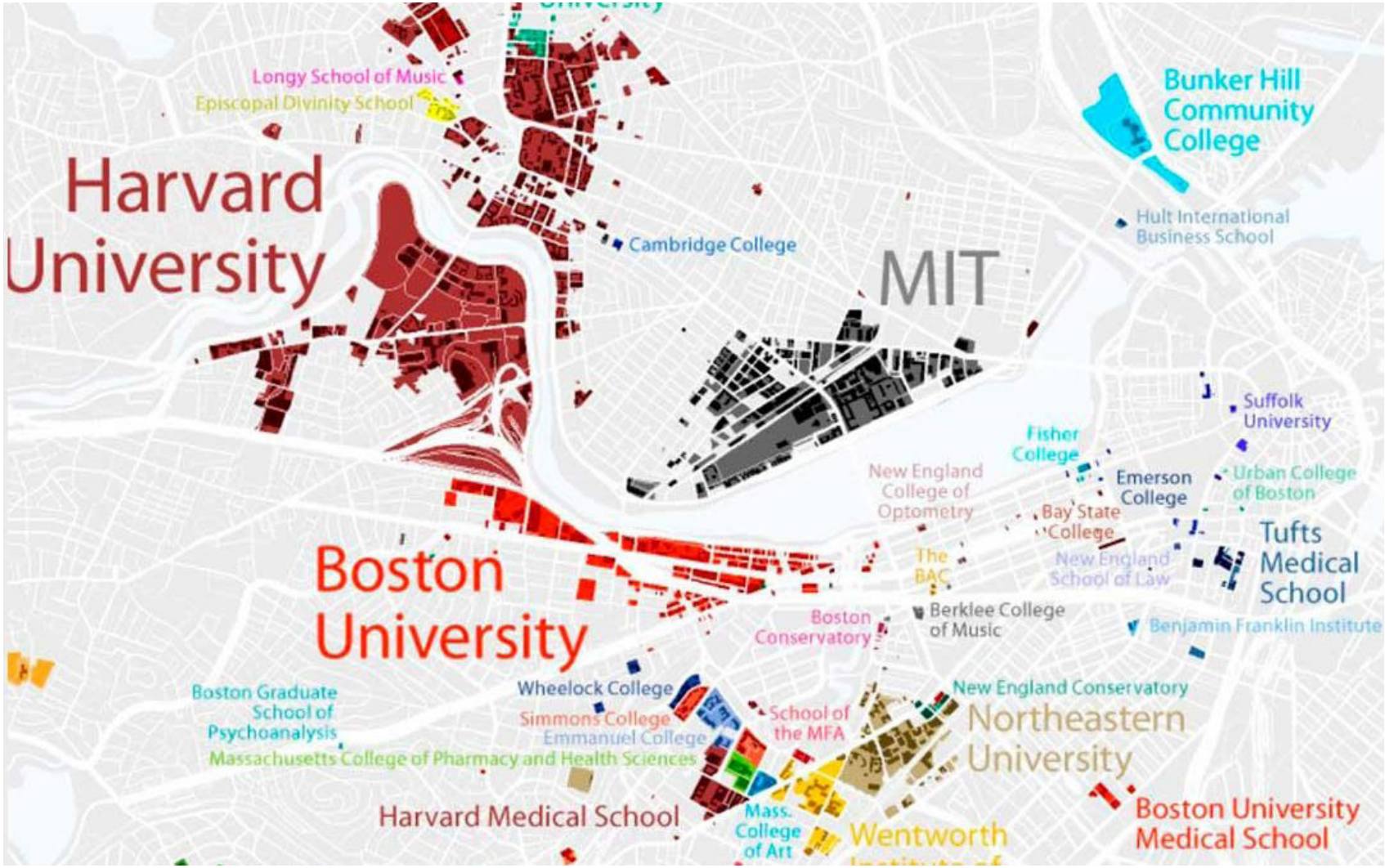
sightlines
a GORDIAN company

housing and facilities for athletics, dining and outdoor space. The recent campus building boom has been costly. National reports indicate total campus space has grown despite a decline in student enrollment, and institutions collectively owe $240 billion in debt borrowed to renovate and construct the latest facilities and amenities, an 18% increase at public universities from 2007 to 2017 (3% for private).[13]

2.3. The Traditional vs. Embedded Campus

Architect Robert Stern, in his monograph *On Campus*, states that "for many Americans, time spent on campus is the only significant time spent in an urbanistically and architecturally coherent place, in a community where town plan and its buildings directly support shared social and intellectual values." Stern makes a sharp contrast between universities that lack the traditional features of a campus. In *On Campus*, Stern argues that while some of the largest American universities exist in their own urban microcosm, many U.S. cities are home to universities that are embedded in the urban fabric. He discusses how some of Europe's great colleges and universities have no planned campuses, as can be seen with the Sorbonne in Paris, where the campus is "almost invisibly embedded in the architecture and urbanism of Paris."[14] Australian architect Andrew Nimmo provides similar examples of campuses in growing cities when he categorizes university campuses in his article "The City Campus and Urban Agency." He states that Australian campuses are either "traditional stone campuses," or "concrete city campuses," where the former is set on the edge of the city with park-

Figure 2.6
"College Town" by Bill Rankin, completed in 2009, maps land owned by colleges and universities in the greater Boston region. Courtesy of Bill Rankin, http://www.radicalcartography.net/?boston_campus.
More than 600 acres in Boston is occupied by educational institutions, but that comprises only 2.8% of city land.[26]


Longy School of Music
Episcopal Divinity School
Harvard University
Cambridge College
MIT
Bunker Hill Community College
Hult International Business School
Suffolk University
Fisher College
New England College of Optometry
Emerson College
Urban College of Boston
Bay State College
Tufts Medical School
The BAC
New England School of Law
Boston University
Boston Conservatory
Berklee College of Music
Benjamin Franklin Institute
Boston Graduate School of Psychoanalysis
Wheelock College
Simmons College
Emmanuel College
School of the MFA
New England Conservatory
Northeastern University
Massachusetts College of Pharmacy and Health Sciences
Harvard Medical School
Mass. College of Art
Wentworth
Boston University Medical School

like surroundings "in a world within themselves," and the latter are "tight and urban" where land is expensive and acquired in haphazard fashion… "[15]

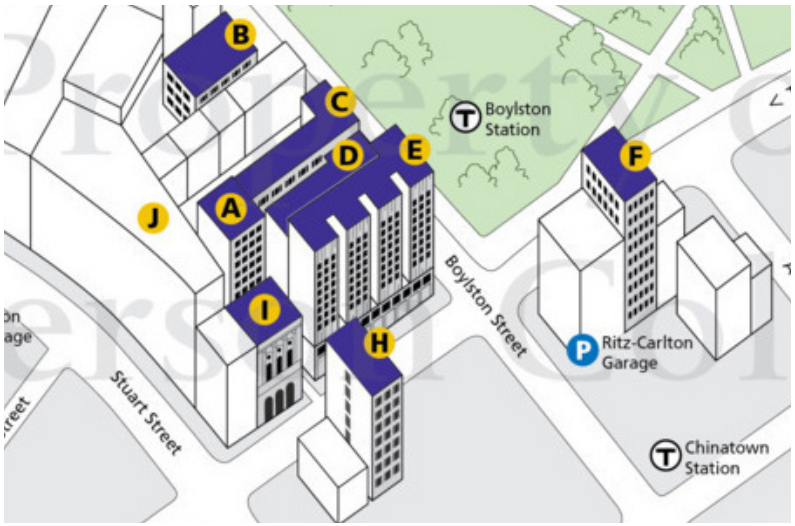
Most universities today seek greater public engagement, and, at its most basic level, this is illustrated through physical engagement. They desire to make campus edges more permeable and less defined. The public is invited to enter, to cross, and to find short cuts. Ground-level functions, especially at the edges, are more active and include retail outlets that can be used by both the public and students. In her 2016 article titled "Ivory Powers, Dynamic Urban Campuses Promote the Common Good," architect Ann Beha made a similar observation of campuses in Boston (a city with over thirty institutions of higher education).[16]

While some universities in Boston and Cambridge define entire neighborhoods with new high-rise construction and signature buildings, others, including Boston's Emerson College, represent a blend of campus and city. According to Beha, Emerson's campus of 5,000 students and faculty occupies a "10-block radius of largely re-purposed historic structures…" and "has knitted itself int the urban fabric and brought back a threatened city precinct." These urban campuses have grown over time, with spaces throughout campus separated by non-contiguous university space and busy streets. Real estate has been exchanged between organizations and businesses throughout their history in opportunistic acquisitions and sales.

In her article, Beha identifies an institutional agreement in Boston that has led to town and gown tensions: the city's "payment in lieu of taxes" (PILOT) program. Each

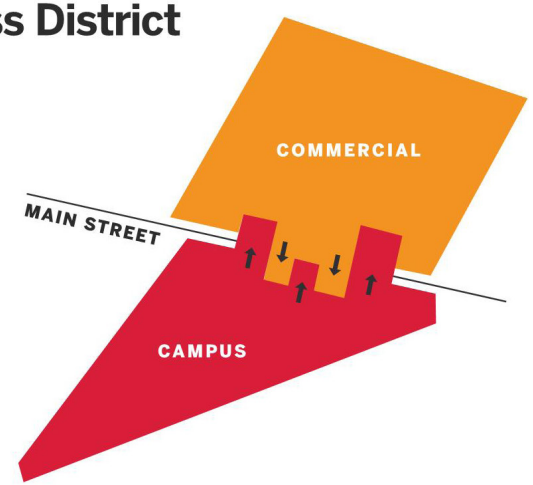
Figure 2.7
Diagram of the Kendall Square Innovation District and MIT campus, as presented at the 2019 Society for College and University Planners Annual Conference. Courtesy of Michael K. Owu and Mark D. Sardegna.

Figure 2.8
Emerson College, downtown Boston. Campus buildings embedded in the urban fabric. Courtesy of biographersinternational.org.



Integrated Campus & Business District

- Strengthening a unique mixed-use district
- Creating vibrant connections and sense of place
- Adding housing to bring life and vitality to the area
- Enabling industry and academia collaboration to advance science
- Solving global challenges together.



year, the City of Boston requests voluntary contributions from the various medical, educational and cultural institutions to make up for the lack of property tax revenue that their campuses would otherwise generate with residential and commercial land use. The city makes this request to help support costs including snow removal, utility work, street improvements and public safety. The responses from these institutions vary, with some institutions fulfilling 100% of their requested payments, while others only pay a fraction of the amount requested, citing expenses they incur in operating their own campus safety, maintenance and improvements costs. Each fiscal year the disparity between the amount requested by the city and the amount paid by these institutions highlights tensions between the two.

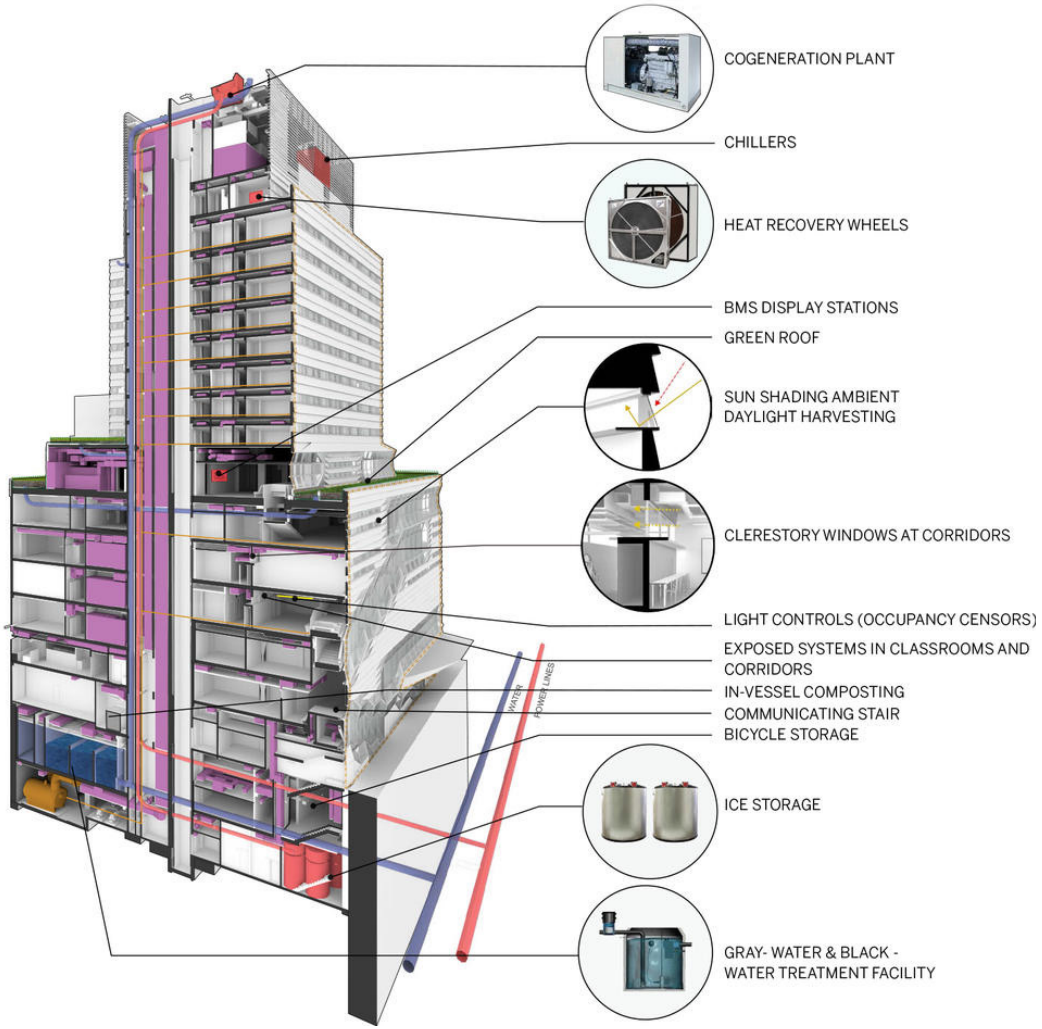
In the greater Boston area, "innovation districts" such as MIT's Kendall Square are blending campus facilities with startups, co-working space, and research and medical institutions. This "integrated campus and business district" model proposes mixed uses, place-making, housing and collaboration between industry and academia.

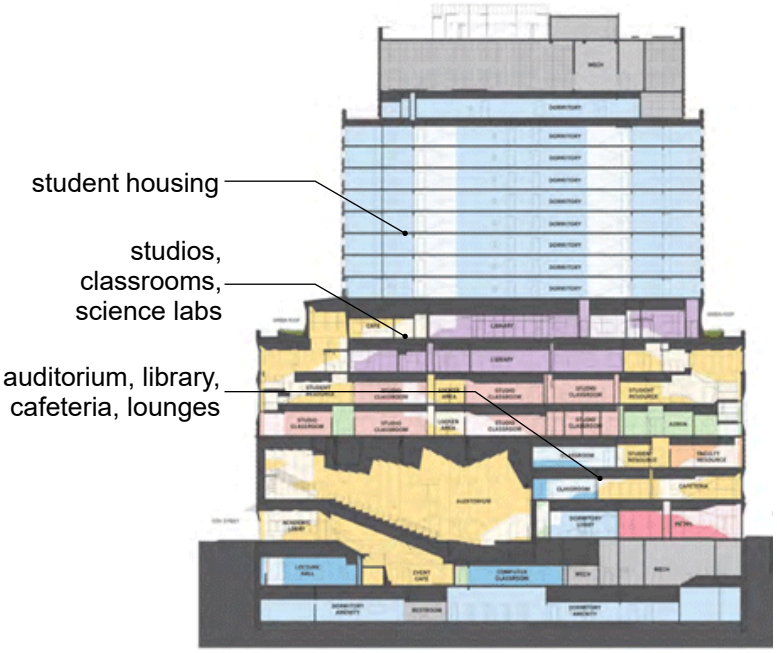
Figure 2.9 (left)
The New School University Center building systems. Courtesy of SOM/ aiatopten.org

Figure 2.10 (right)
Building Section. Courtesy of archdaily.com
The 16-story building's top 8 floors is residential housing for 600 students with an overall 375,000 square feet.

2.4. The Vertical Campus

During this period of higher education expansion, including establishing satellite campuses located in or near city centers, several recent projects demonstrate the success of multi-programmed, high-rise buildings that overcome the challenges related to cost and building code.[17] The University Center at the New School in New York, designed by SOM and completed in 2013, is a multi-purpose building that integrates


COGENERATION PLANT
CHILLERS
HEAT RECOVERY WHEELS
BMS DISPLAY STATIONS
GREEN ROOF
SUN SHADING AMBIENT DAYLIGHT HARVESTING
CLERESTORY WINDOWS AT CORRIDORS
LIGHT CONTROLS (OCCUPANCY CENSORS)
EXPOSED SYSTEMS IN CLASSROOMS AND CORRIDORS
IN-VESSEL COMPOSTING
COMMUNICATING STAIR
BICYCLE STORAGE
ICE STORAGE
GRAY- WATER & BLACK - WATER TREATMENT FACILITY
WATER
POWER LINES


student housing
studios, classrooms, science labs
auditorium, library, cafeteria, lounges

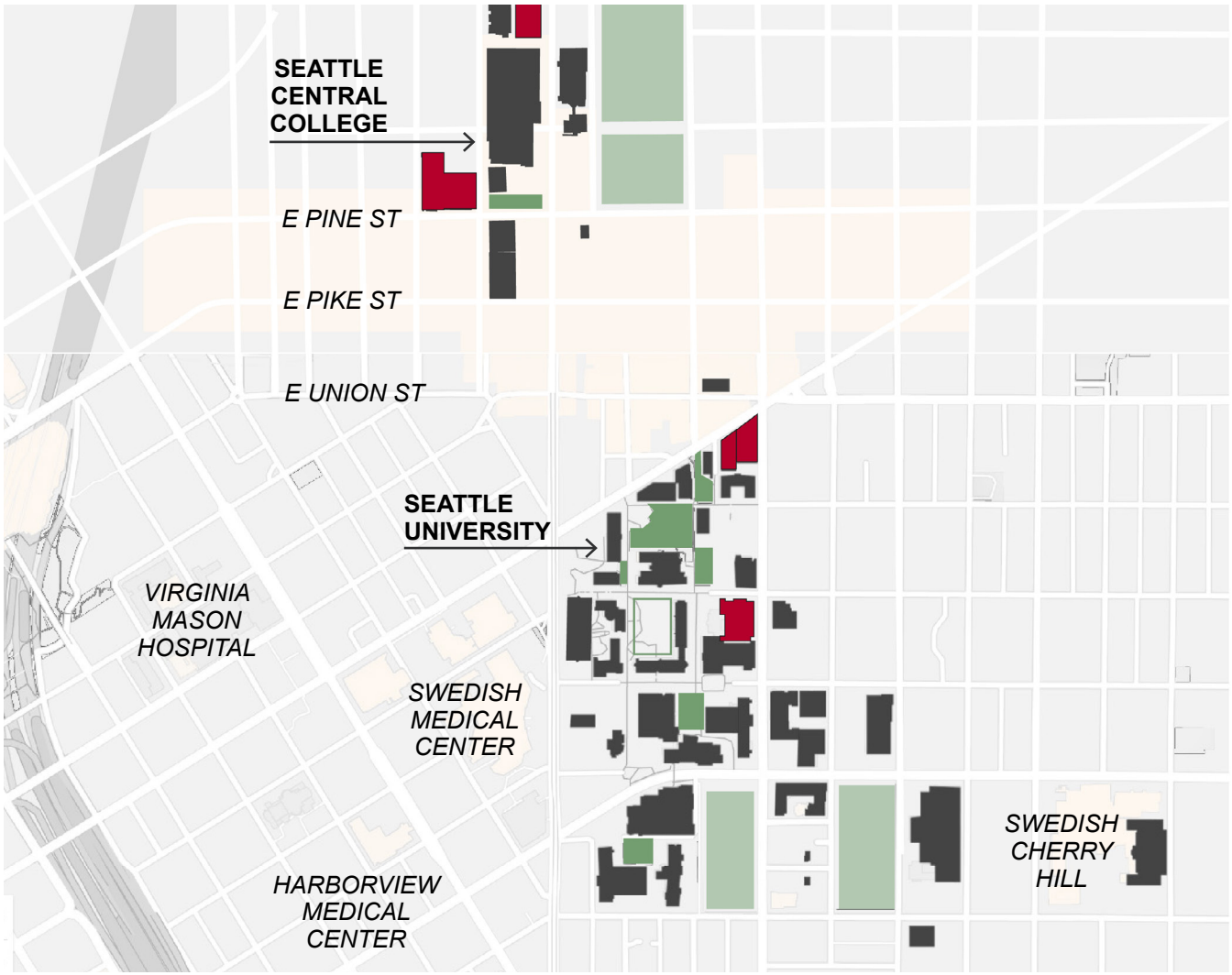
interactive, social spaces throughout the building, connected by a series of stairs with views to the city. Design studios, classrooms and computing labs are served by a dedicated HVAC system, designed to be renovated or reconfigured with minimal impact to power, data or lighting.[18]

2.5. Seattle's Urban Campuses

Seattle's Institutions of higher education have been expanding. Traditional campuses, including Seattle University and the University of Washington, that have defined boundaries, quadrangles, plazas and athletic fields, have grown beyond their historical campuses and are expanding with new construction that is embedded in the city. However, more recently established institutions such as Seattle Central College (SCC) or Northeastern University's Seattle campus have been embedded in the city since their origins.

In 1968, the Seattle public community college system was surveyed as part of a report on US urban community colleges in 25 cities, published by Caudill Rowlett Scott (CRS), then an architecture firm based out of Houston, TX. Similar to Robert Stern's observation, CRS also distinguishes traditional campuses from the "'storefront' or 'Sorbonne' approach" model where the institution is "synonymous with the city itself." Seattle established the community college system in 1966 with a "multi-college" approach similar to many other decentralized models of community college systems surveyed by CRS. At the time of the report, the Broadway-Edison Technical School

Figure 2.11
The urban campuses of Seattle Central College(15 acres) and Seattle University (50 acres) each serve between 5,000-7,000 full-time students. Recently completed or proposed new buildings shown in red.


SEATTLE CENTRAL COLLEGE
E PINE ST
E PIKE ST
E UNION ST
SEATTLE UNIVERSITY
VIRGINIA MASON HOSPITAL
SWEDISH MEDICAL CENTER
HARBORVIEW MEDICAL CENTER
SWEDISH CHERRY HILL

had just been transferred to the State of Washington, and planning studies to acquire a total of three city blocks to establish SCC were in progress.[19]

The CRS report states that urban community colleges have the responsibility to not only educate and train students, but to "provide a social, intellectual and architectural haven to the many disadvantaged whom it serves." The authors argue that while the decentralized and mutli-campus approach brings components of the college to the disadvantaged, it is equally important to bring the disadvantaged to a campus for the sense of place, quality of space and the identity of a campus that it provides.[20]

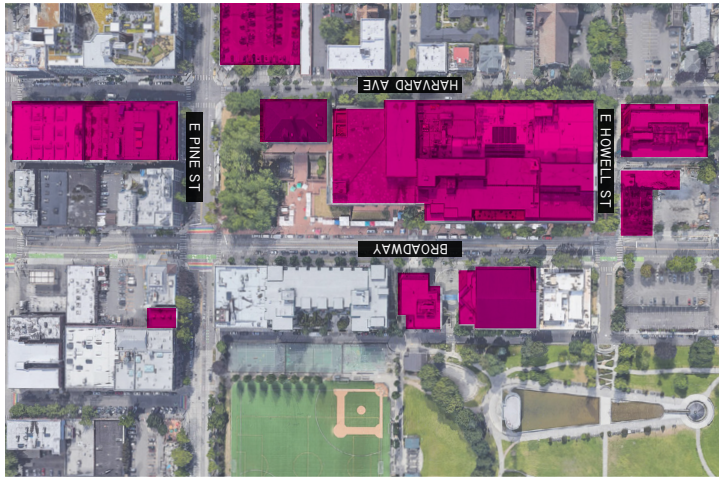
Both SU and SCC fall under "Major Institutional Overlays" (MIO), a zoning designation by the City of Seattle. Each institution's MIO is overseen by an advisory committee, generally made up of members appointed by the Seattle City Council or as part of the Community Master Planning Process. The committee engages with design professionals to complete a "Major Institutional Master Plan" (MIMP) document which outlines their anticipated growth and development projects for the next ten years.

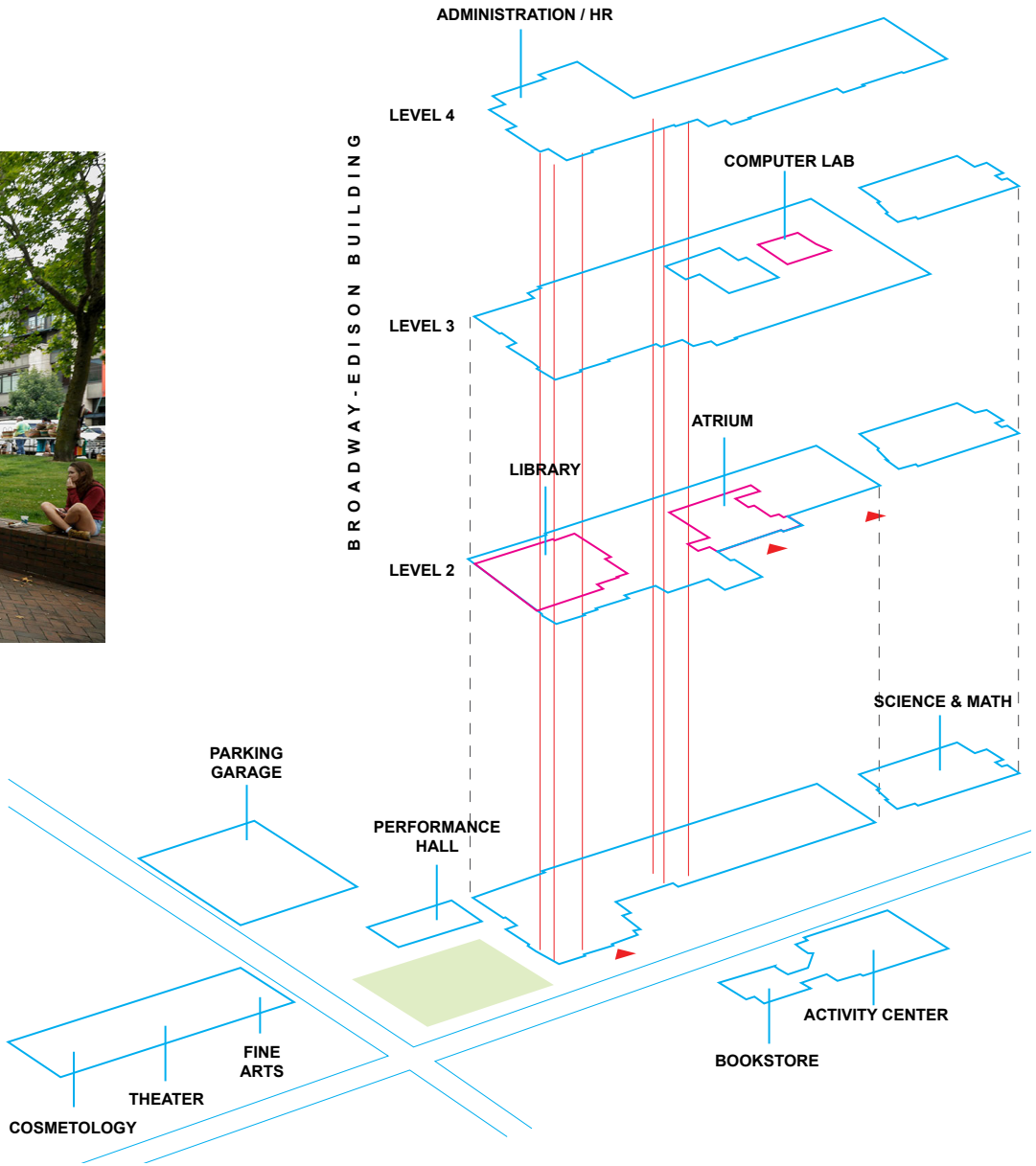
Additional colleges and universities in Seattle are on the west side of the Interstate-5 highway, including Cornish College of the Arts and Northeastern University's Seattle campus. Cornish's oldest building, Kerry Hall, is located on Capitol Hill, but its main campus today is a cluster of buildings in South Lake Union around Terry Avenue between Lenora and Virginia Streets. Cornish Commons, a high-rise student housing tower completed in 2015, features the Cornish brand

Figure 2.12 (upper left)
The brick Broadway-Edison Building is pictured to the left on a Capitol Hill Sunday Farmer's Market.

Figure 2.13 (lower left)
Google Maps view of Seattle Central College's ten building campus.

Figure 2.14 (right)
Axonometric of Broadway Campus at Seattle Central University.


HARVARD AVE
E PINE ST
E HOWELL ST
BROADWAY


ADMINISTRATION / HR
LEVEL 4
COMPUTER LAB
BROADWAY-EDISON BUILDING
LEVEL 3
ATRIUM
LIBRARY
LEVEL 2
SCIENCE & MATH
PARKING GARAGE
PERFORMANCE HALL
ACTIVITY CENTER
BOOKSTORE
FINE ARTS
THEATER
COSMETOLOGY

with colorful building signage. Older buildings re-purposed by the college also announce its campus through large murals painted on its masonry facades.

Northeastern University opened its Seattle campus in 2013, and currently occupies space leased in two buildings on Terry Avenue in South Lake Union. With both undergraduate and graduate programs, the university features graduate programs intended for non-traditional students entering into the profession. In 2019, Facebook invested $4.2 million to help expand Northeastern's computer science program based on a need for more qualified computer engineers.[21]

For growing urban universities like SCC and SU that are surrounded in by other institutions and communities, development must be carefully planned. The planning process in Seattle requires institutions and the city to cooperate with one another, with a transparent planning process that includes the community. As stated by Stern's in *On Campus*, "campus is a representation of beliefs and ideals crossed with the constant interaction and exchange between people over time."[22] The physical form seen today results from a consensus between institution, community and city.

2.6. Robotics and A.I. on Campus

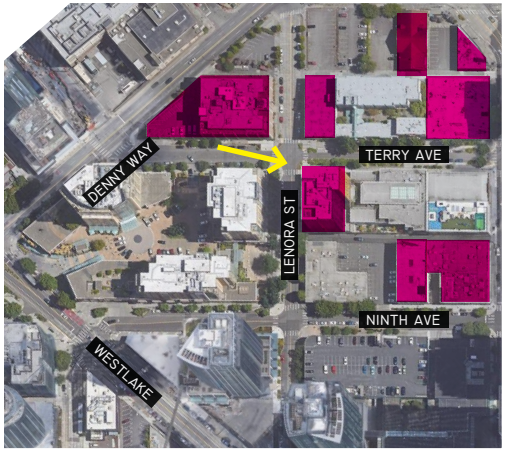
The Institute of Robotics and Intelligent Systems (IRIS) is part of the Eldgenossische Technische Hochschule (ETH) in Zurich, Switzerland and dates back to 1990 after having been established in the Institute of Mechanics. Today, it is comprised of seven laboratory divisions, including the Multiscale Robotics Lab,

Figure 2.15 (upper left)
Google Maps view of Cornish College's South Lake Union campus.

Figure 2.16 (upper right)
Cornish Commons is a 20-story, 157,000 square-foot residential tower with 432 beds for students of both Cornish College and the City University of Seattle (CityU). Courtesy of cornishcommons.org,

Figure 2.17 (lower left)
Google Maps view of Northeastern University's South Lake Union, Seattle campus. The two buildings serve approximately 600 students (2017).

Figure 2.18 (lower right)
Northeastern University classroom building at 401 Terry Avenue, designed by Perkins and Will. Courtesy of inhabitat.com.


DENNY WAY
TERRY AVE
LENORA ST
NINTH AVE
WESTLAKE


TERRY AVE
REPUBLICAN ST
HARRISON ST
THOMAS ST
WESTLAKE AVE


Northeast
Seattle

Figure 2.19 (Above)
Netted cage with infrared sensors and cameras at Engineering Product Innovation Center (EPIC) at Boston University, built 2015. Courtesy of Wilson Architects/ www.bu.edu.

Figure 2.20 (Facing page)
Robotics Fabrication Laboratory at the Institute of Robotics and Intelligent Systems, ETH Zurich. Courtesy of https://www.iris.ethz.ch

Sensory-Motor Systems Lab, Autonomous Systems Lab, Bio-Inspired Robotics Lab, Agile and Dexterous Lab, Mobile Health Systems Lab and Robotic Surgery. The Institute's mission is to enhance the transfer of research technology from academics to the market; many successful start-ups and spin-off projects have been launched out of the Institute.[23] The Robotics Fabrication Laboratory at IRIS was opened in 2018, and debuted a "multi-robot construction process" called *Spatial Timber Assemblies* which was done in partnership between the architectural research firm Gramazio Kohler and the timber construction firm ERNE AG Holzbau. The modules built in the laboratory were transported for construction as part of a modular housing project in the city of Dubendorf, Switzerland.[24]

In the US, although robotics and AI research was pioneered by students on a handful of university campuses, it has remained primarily in the private sector, and higher education has only recently began introducing robotics programs. According to NASA, today there are nearly 70 universities in the US with graduate programs in engineering that include robotics.[25] But the latest campus robotics spaces do not demonstrate the advanced level of robotics research seen in universities abroad. At the same time, research spaces for private companies remain largely behind closed doors. There is clearly an opportunity for a new kind of institution of higher education to be at the forefront of robotics education and research in the US.

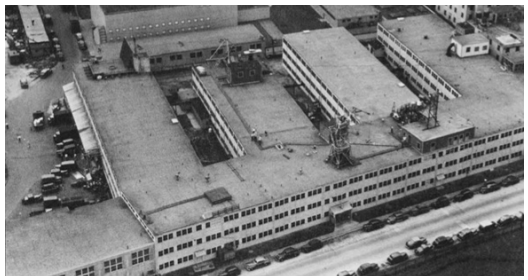


Figure 2.21 (Top)
Building 20, MIT
Courtesy of The Atlantic

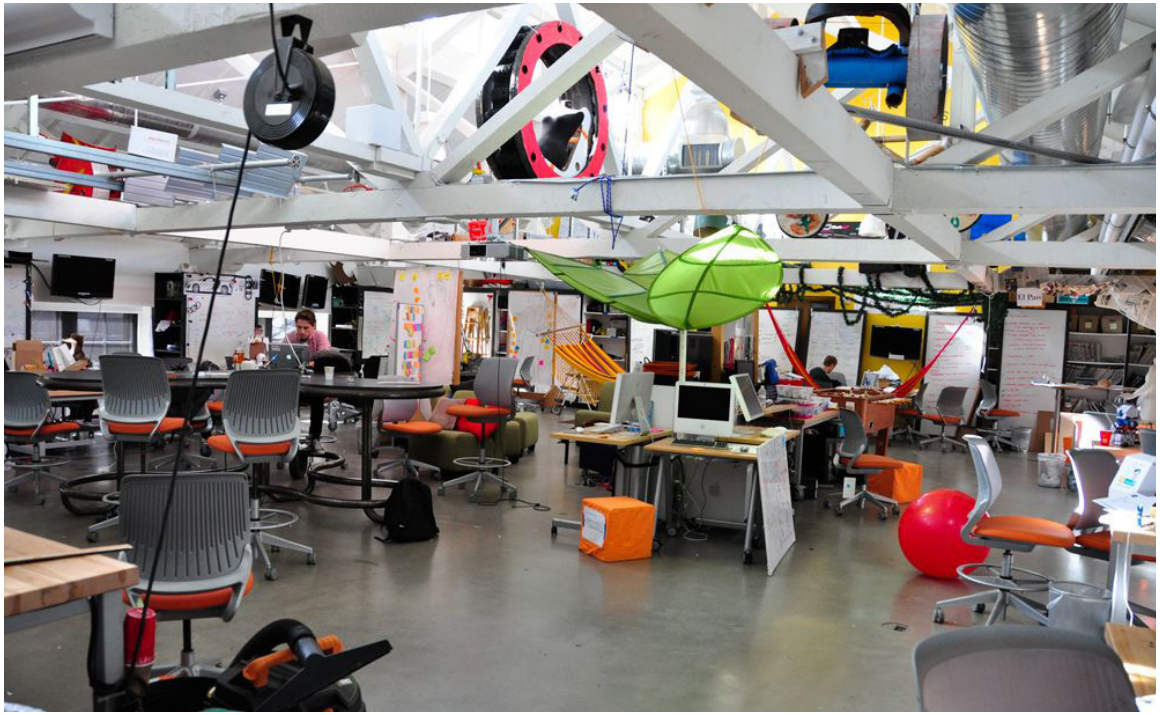
Figure 2.22 (Above)
Ray and Maria Stata Center at MIT
Courtesy of Dezeen

Figure 2.23 (Facing Page)
The d.School at Stanford University

2.7. Informality on Campus

In 1943, "Building 20," a 200,000 square-foot building, was hastily constructed at the Massachusetts Institute of Technology as part of "emergency war research efforts." Due to its intended temporary use, its occupants took full liberty in adapting the spaces to fulfill their research needs, often with rather crude methods. For instance, an article from the MIT Department of Electrical Engineering and Computer Science states, "if you wanted to run a wire from one lab to another, you didn't ask anybody's permission - you just got out a screwdriver and poked a hole through the wall."[27] During its 55-year lifespan, Building 20 was the site for numerous innovations. It was demolished in 1998 to make way for the Ray and Maria Stata Center, a 430,000 square-foot computer science and AI research building designed by Frank Gehry and completed in 2004.[28] This new building's design intended to capture the innovative spirit of Building 20 with an experimental and evocative form. However, like Building 20, many campus spaces for innovative research are nondescript and ordinary.

Another example is the Hasso Plattner Instiute of Design at Stanford University. Commonly referred to as the "d.school," it is a design thinking institute located in just outside the main quadrangle in a building that blends in with the rest of campus. Originally a U-shaped building, its courtyard has been enclosed to create the "Design Garage" and its interior spaces are spacious and industrial, accommodating various uses for experimentation and demonstration.



While experimental and high-tech architecture is appropriate for innovation and cutting-edge research, many examples of spaces related to robotics or computer science re-purpose old buildings that require nothing more than protection from the elements, security, and facilities that may require some additional infrastructure. In these examples, the innovation relates less to the space and architecture and instead, is centered around people and activity.


PONTIAC

03. Site

Denny Triangle, Seattle

Named after one of Seattle's first white settlers, the Denny Regrade is a neighborhood at the northern end of downtown. Its topography is the result of a three decade effort to level Denny Hill, and the last portion was finally removed in 1930. The area today is generally referred to as the "Denny Triangle," a fairly recent term that is now associated with the significant new development in the area. The City of Seattle zoning designation recognizes this area of approximately 143 acres and 39-blocks as "Denny Triangle Center," separate from "Belltown" and the downtown "Commercial Core Center."[1] Located between the more established neighborhoods of South Lake Union and Cascade and cut off from Capitol Hill by Interstate-5, this area was long considered a left-over space, with numerous surface parking lots.[2] Today, Denny Triangle is the site of four Amazon office towers located along Westlake and 7th Avenues, with a total of about 4.15 million square feet inhabited by as many as 28,000 employees.[3] In addition to the construction of Amazon's Denny Triangle campus, recent development in the area has included significant high-rise residential construction. With the introduction of street-level uses, greenspace and thousands of workers, the neighborhood today provides a vibrant connection between the other neighborhoods of northern downtown.

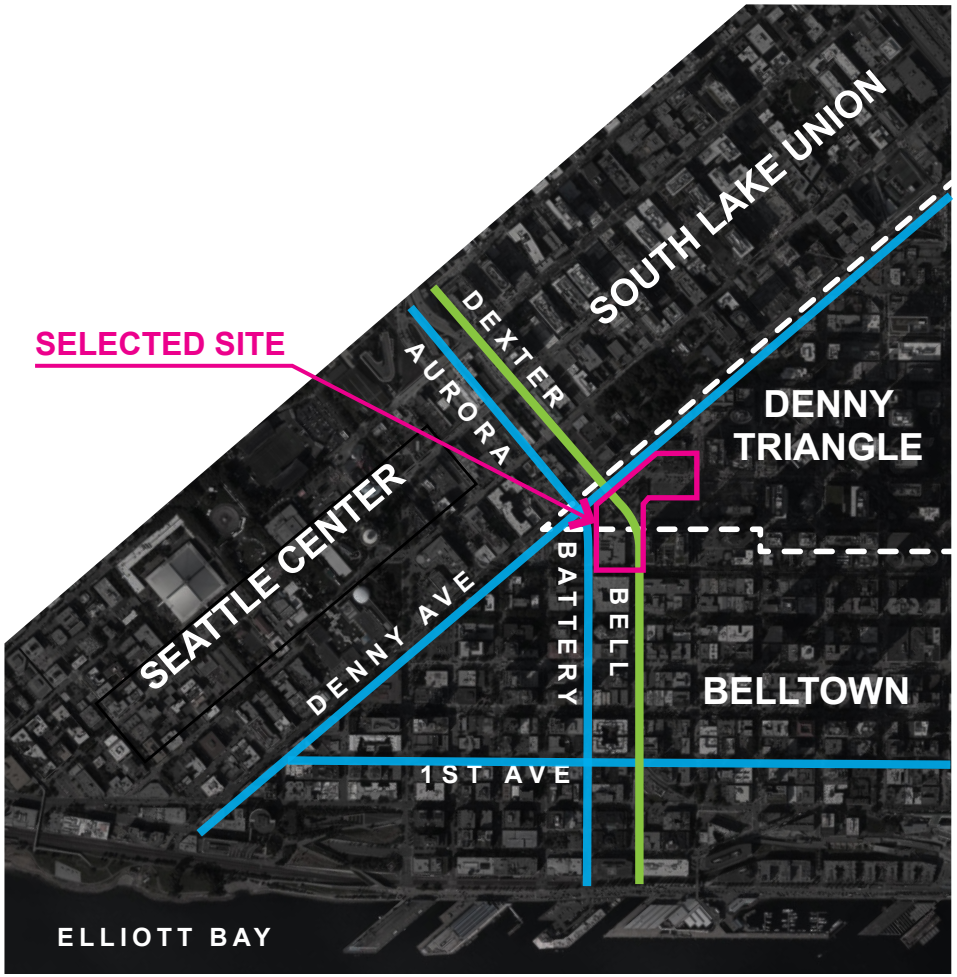
Figure 3.1
. Denny Regrade, pictured during construction for the 1962 Seattle World's Fair. Courtesy of top7travel.com.

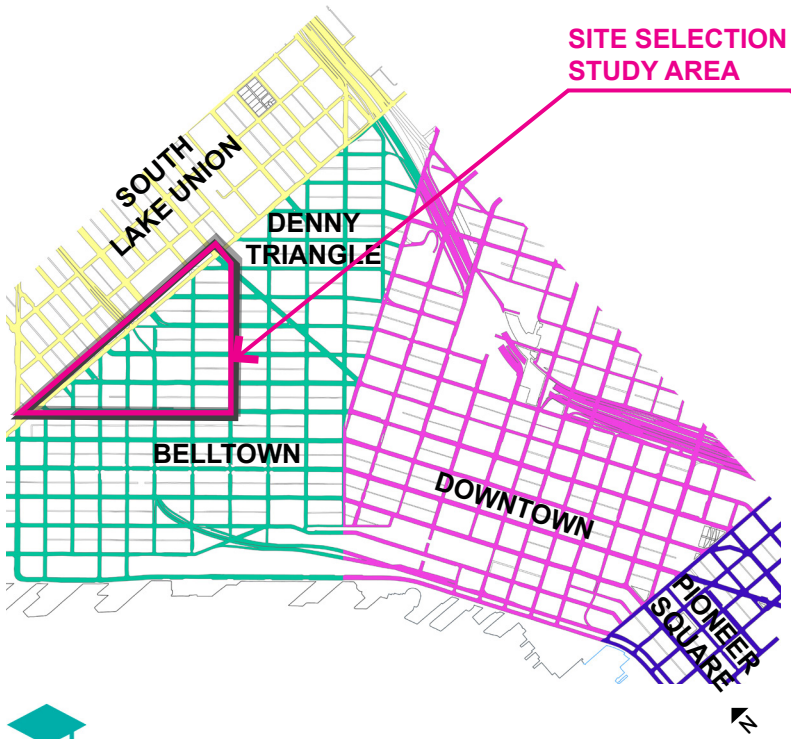
Figure 3.2 (above)
Denny Regrade project as seen from 6th and Battery Street in 1929. Courtesy of Seattle Municipal Archives.

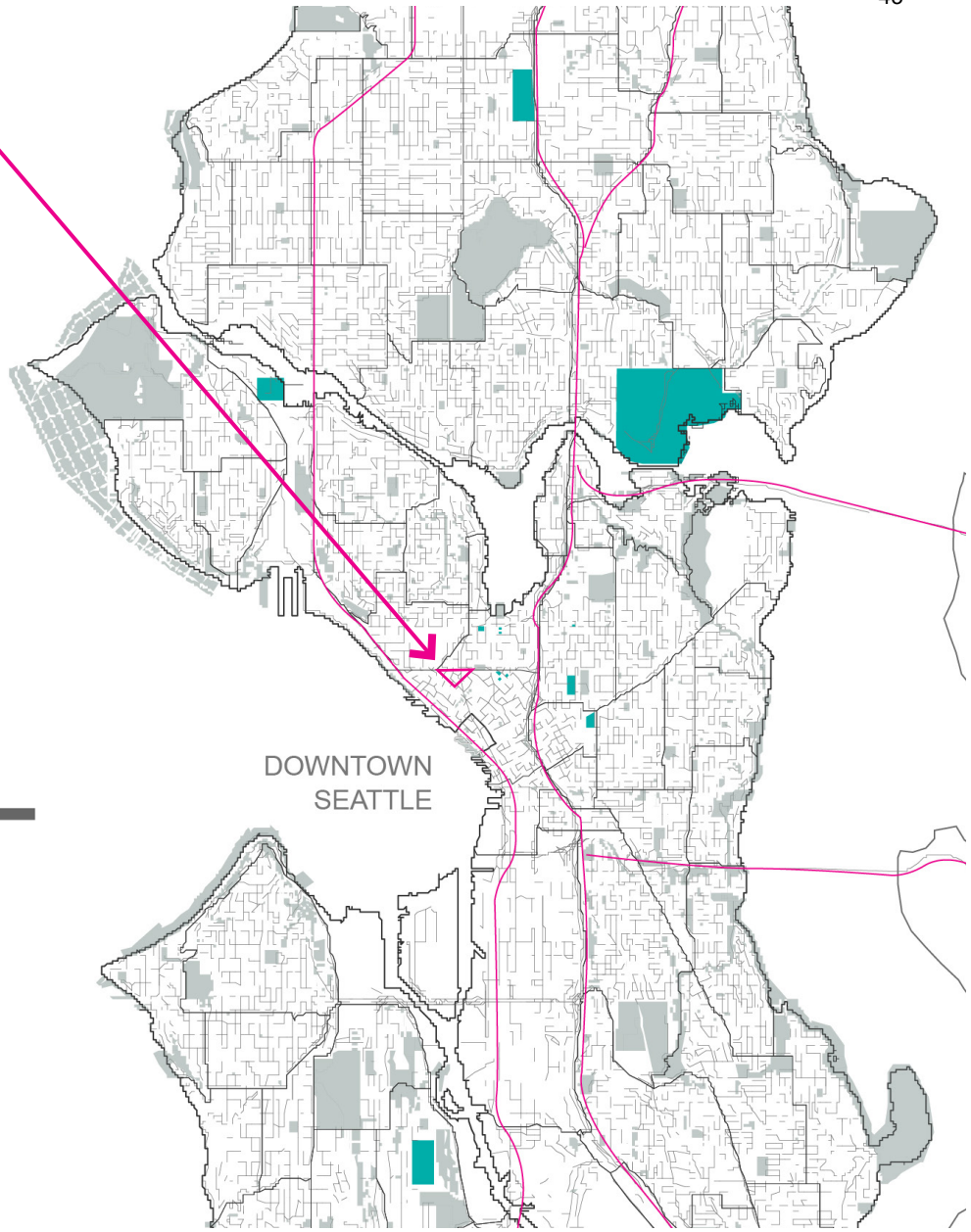
Figure 3.3 (right)
Google Maps site diagram of neighborhoods and major streets.

Figure 3.4 (facing page, top left)
Neighborhoods are defined by shifts in the city grid. The initial site selection study area for this project began with the outlined area.

Figure 3.5 (facing page)
Map of Seattle's higher education institutions and total student population.







University of Washington, Seattle - 43,850 students

Seattle Central College - 11,650 students

North Seattle College - 10,350 students

South Seattle College - 8,700 students

Seattle University - 8,400 students

Seattle Pacific University - 4,750 students

Northeastern University - 800 students

City University of Seattle - 700 / 3,150 students (online)

Cornish College of the Arts - 650 students

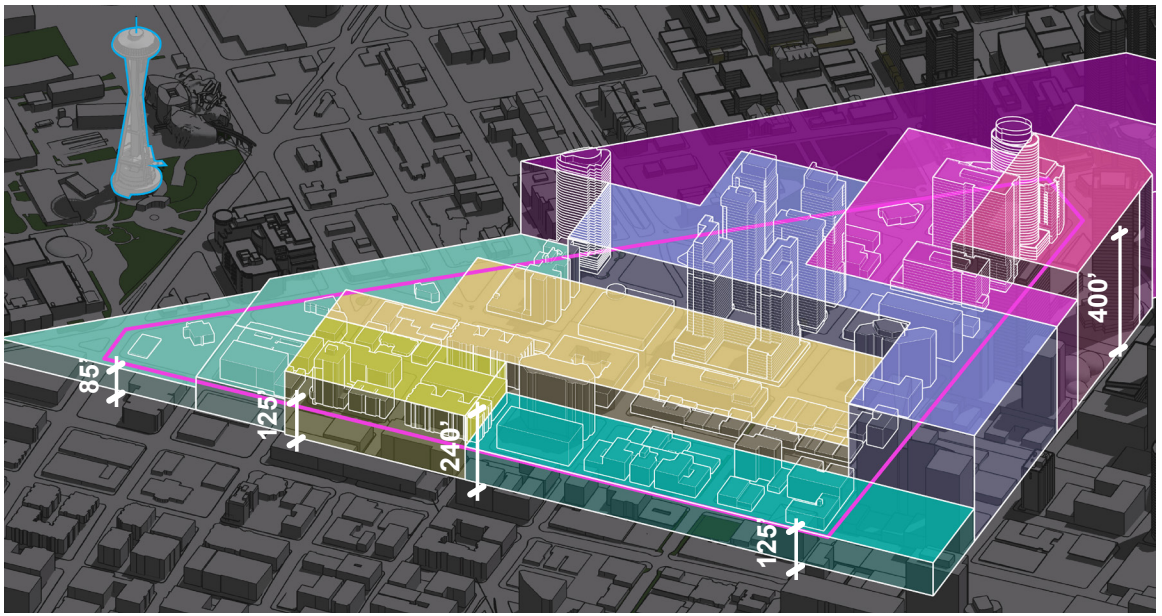


Figure 3.6
Zoning height diagram per Seattle zoning code

Figure 3.7
Diagram of buildings by height, with the tallest shown in bright red. Dashed line indicates proposed development.

3.1. Zoning and High-rise Development

The study area for this project is zoned Downtown Mixed Commercial" (DMC) with a height limit of 240 feet for commercial uses and 440 feet with residential units.

In 2016, Insignia, a large-scale condominium building, was completed, with two 440-foot towers over a full-block podium, with 700 residential units, 1,000 parking spaces and 26,000 square-feet of retail space.[4]


DENNY PARK
SPACE NEEDLE
NINTH AVE
SEVENTH AVE
SIXTH AVE
FIFTH AVE
FOURTH AVE
THIRD AVE
WESTLAKE AVE N
NINTH AVE N
DEXTER AVE N
SEVENTH AVE N
SIXTH AVE N
TAYLOR AVE
CEDAR STREET
FOURTH AVE
BROAD STREET
CLAY STREET
CEDAR STREET
VINE STREET
WALL STREET
BATTERY STREET
BELL STREET
BLANCHARD STREET
DMC 240/290-400
DMC 340/290-400
DMR/R 125/65
DMR/C 240/125
DMC-85
DMR/C 125/65
DMR/R 240/65
DMR/R 125/85
440’
15’
0 20 50 150 250

North of Insignia are two additional proposed development projects, separated by an alley. The 2300 6th Avenue project proposes two 440-foot towers with 1,000 residential units, 627 parking spaces and 25,000 square-feet of retail.[5] The 2301 7th Avenue project also proposes two 440-foot towers with 659 residential units, 543 parking spaces and 10,000 square-feet of retail.[6]

Facing Denny Way, the 600 Wall Street project, also known as "Spire Seattle Condominiums," is a 435-foot tower with 352 condominiums, 315 parking spaces and 2,000 square-feet of retail on a small triangular site.[7] Next to the Spire is the Skye at Belltown. Constructed in 1949, this 18-story residential tower has 370 residential units connects to an adjacent parking structure and roof garden with 210 parking spaces and 23,700 square-feet of retail. According to the Seattle Department of Neighborhoods, this building meets the criteria for both the National Register of Historic Places and the Seattle Landmarks Preservation ordinance. To the south of the Skye is a full-block, 6-story residential building called Fountain Court built in 1998 with 320 residential units and 241 parking spaces.[8] Collectively, these six buildings surrounding the new campus site amount to 3,409 residential units, 2,936 parking spaces and 86,700 square-feet of commercial retail space with tall towers to the east

Figure 3.8
Diagram of existing site uses. Dashed lines indicate proposed development

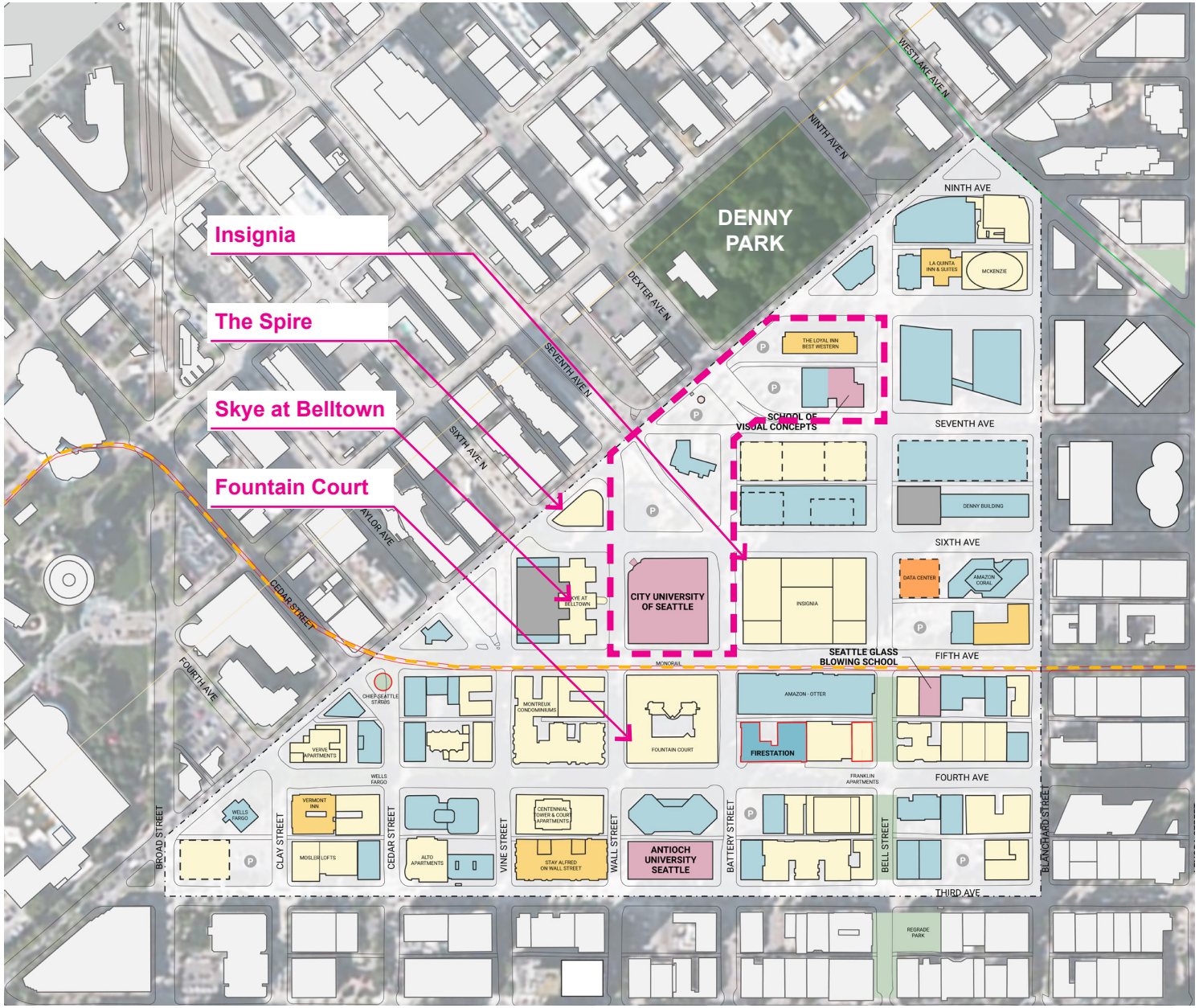

Insignia
The Spire
Skye at Belltown
Fountain Court
DENNY PARK
NINTH AVE N
WESTLAKE AVE N
DEXTER AVE N
SEVENTH AVE N
SIXTH AVE N
AYLOR AVE
CEDAR STREET
FOURTH AVE
NINTH AVE
SEVENTH AVE
SIXTH AVE
FIFTH AVE
FOURTH AVE
THIRD AVE
BROAD STREET
CLAY STREET
CEDAR STREET
VINE STREET
WALL STREET
BATTERY STREET
BELL STREET
BLANCHARD STREET
THE LOYAL INN BEST WESTERN
LA QUINTA INN & SUITES
MCKENZIE
SCHOOL OF VISUAL CONCEPTS
DENNY BUILDING
SKYE AT BELLTOWN
CITY UNIVERSITY OF SEATTLE
INSIGNIA
DATA CENTER
AMAZON CORAL
SEATTLE GLASS BLOWING SCHOOL
MONORAIL
CHIEF SEATTLE STATUES
MONTREUX CONDOMINIUMS
FOUNTAIN COURT
AMAZON - OTTER
FIRESTATION
VERVE APARTMENTS
WELLS FARGO
FRANKLIN APARTMENTS
VERMONT INN
MOSLER LOFTS
ALTO APARTMENTS
CENTENNIAL TOWER & COURT APARTMENTS
STAY ALFRED ON WALL STREET
ANTIOCH UNIVERSITY SEATTLE
REGRADE PARK
LEGEND
RESIDENTIAL/MIXED USE
HOTEL
COMMERCIAL/OFFICE/RETAIL
CIVIC/INSTITUTIONAL
SURFACE PARKING
PARKING STRUCTURE
OPEN SPACE
INFRASTRUCTURE
FUTURE/PROPOSED
UNDER CONSTRUCTION
CITY LANDMARK
0 20 50 150 250

Figure 3.9 (top)
City University of Seattle at 521 Wall Street. Courtesy of cityu.edu

Figures 3.10
Opening reception at CityU grand opening on 2012. Courtesy of cityu.edu

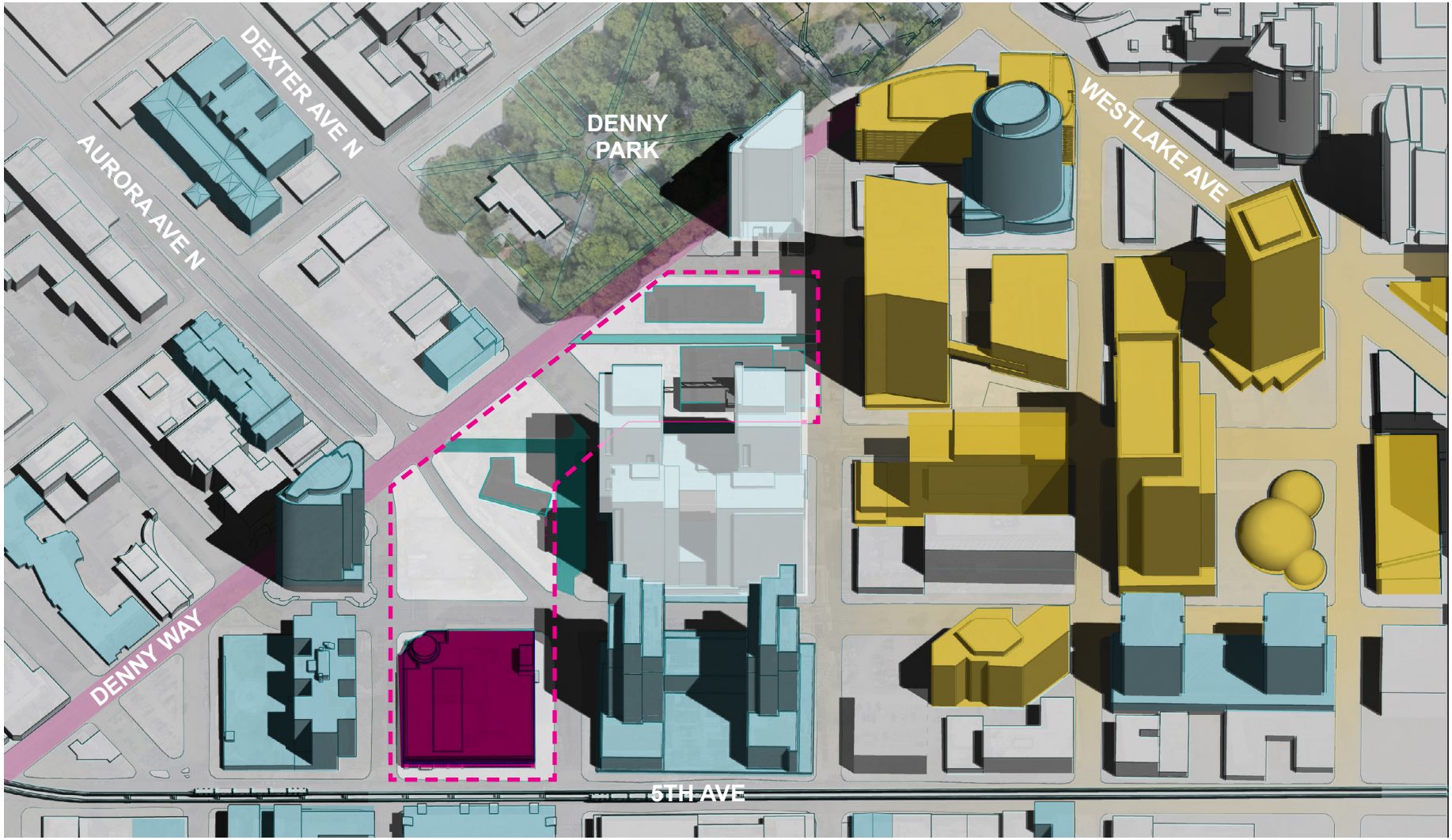
Figures 3.11
Diagram of residential buildings and Amazon's campus around selected site.

and southeast. Four parcels adjacent to one another were selected as the 7.5-acre site for this thesis project due to their prominence along Denny Way, visibility along several main arterial streets, and for their development opportunity. Owners of the parcels include the Sabey Corporation and Clise Properties, neither of whom has submitted plans to the city for redevelopment of these sites (Spring 2020). Existing buildings include the Loyal Inn, a two-story commercial building, Elephant Car-Wash, and the City University of Seattle (CityU) headquarters.

3.2. City University of Seattle

CityU is mostly an online university with locations in multiple cities. The school is the flagship tenant at 521 Wall Street, with prominent signage at its primary north-facing entrance. The building includes 18 interactive and live-streaming classrooms, 21 breakout conference rooms, a large conference center plus offices and a central atrium. Other tenants in the building include the Whole Foods regional offices and a Starbucks located at the corner of 5th Avenue and Battery Street.

As a location of converging city grids, the area is also a nexus of education, research and corporate entities. The proposal for a this future technical institute and campus at this location incorporates the existing building at 521 Wall Street, which has already been adaptively reused, to give a tangible connection between the proposed campus addressed to the city's history and culture.



RESIDENTIAL HOUSING

AMAZON

NORTH

Figure 3.12
Aerial view of the Seattle Post-Intelligencer headquarters, 1953. Courtesy of MOHAI library archvies.

Figure 3.13
Timeline of alterations to the former P-I headquarters.

3.3. 521 Wall Street

521 Wall Street is a three-story concrete and steel frame structure that occupies a full city block in the Denny Triangle neighborhood. Constructed in 1947 as the new headquarters of the *Seattle Post-Intelligencer* (P-I) newspaper, it was designed by the New York firm Lockwood and Greene with Henry Bittman as the local associate architect. Lockwood and Greene, now a subsidiary of CH2M, had previously completed several large industrial buildings and likely had prior experience with newspaper facilities and their requirements.[9]

Alterations were made to this building, approximately every 20 years, beginning in 1969, with the addition of the third level. In 1987, the building was converted into an office building (and the press hall was converted into an atrium). Most recently, from 2006 to 2007, vertical cement board pilasters and steel and glass canopies were added to the facade.

This property was inventoried in 2007 by the Seattle Department of Neighborhoods as part of a Downtown Historic Resources survey. Although it is not a designated landmark, it was identified belonging to Category 2, which are resources eligible for consideration as Landmarks. According to the staff serving the Landmarks Preservation Board, a landmark nomination application has not been submitted.

1947 Initial Construction

1948 Globe Installation

1969 Third level Addition

1986 Departure of P-I
Conversion to
office building
Group Health
Cooperative

2016 City University
of Seattle

2020 Cybernetic
Campus

Figure 3.14-3.15 (above)
Newsroom (top) and darkroom (above), pictured in 1949 Courtesy of seattlepi.com

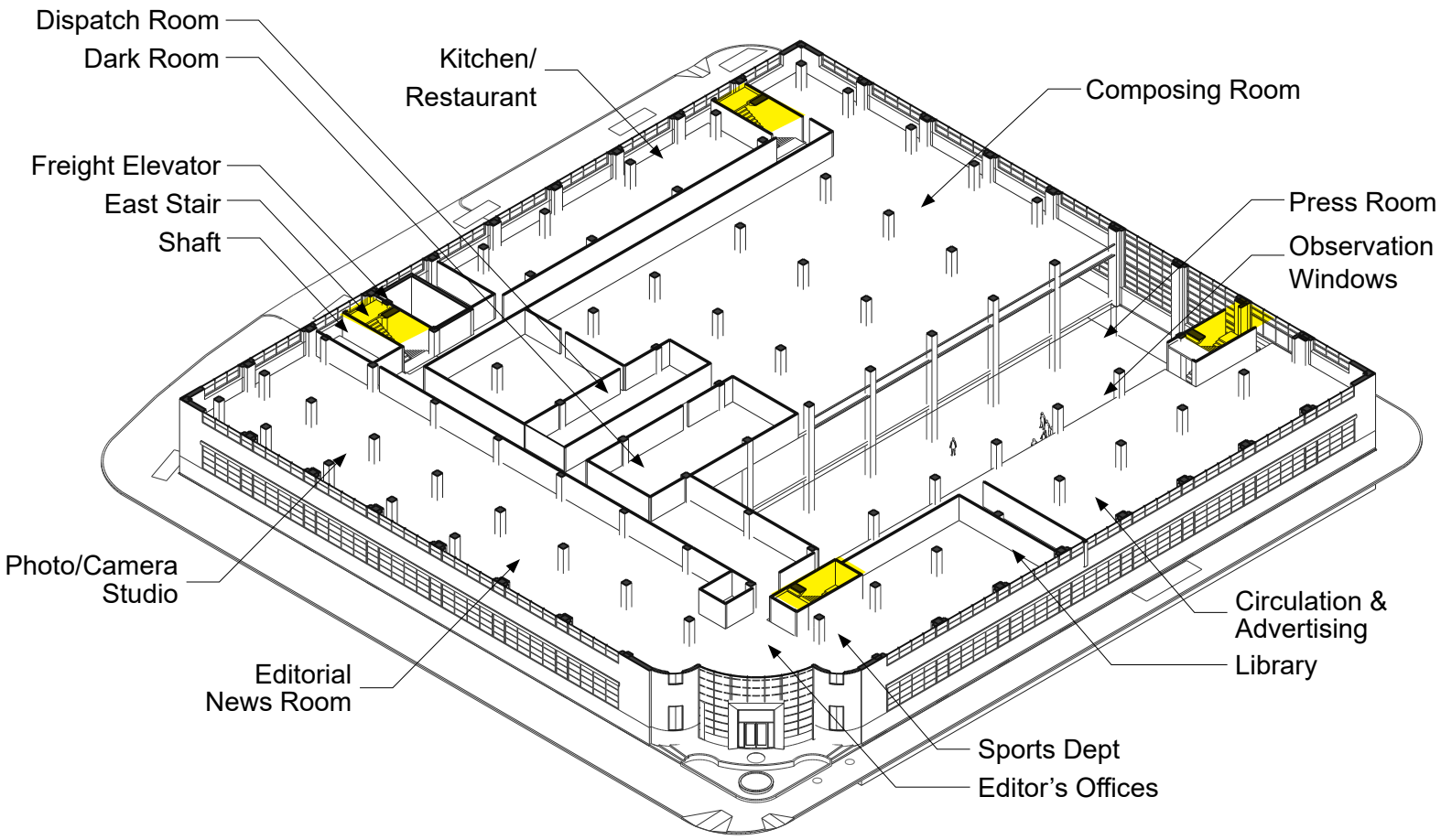
Figure 3.16 (right)
Level 2 Axon, based on as-built drawings.

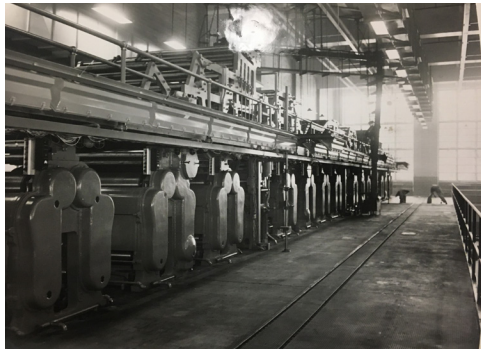
3.4. The Seattle Post-Intelligencer

The P-I was headquartered at 521 Wall Street for thirty-six years, a relatively short period given the newspaper's circulation for nearly 150 years with roots dating back to 1863. Having entered a joint-operating agreement with the *Seattle Times* in 1983 and no longer in need of a large facility with its own printing presses, the P-I relocated to the downtown waterfront and the P-I building was sold and converted into office space in 1986.

The building is bounded by 6th and 5th Avenues to the northeast and southwest, and Wall and Battery Streets to the northwest and southeast, respectively. The overall site slopes gently to the north, with approximately five feet of grade change between 5th and 6th Avenues. The elevated Seattle Monorail, constructed for the 1962 World's Fair, runs along Fifth Avenue past the building's southwest side. Although the rounded monumental entry at the north corner continues to serve as the primary entrance, the building's original Fifth Avenue entrance at the west corner no longer remains intact. This had served as an entrance to the auditorium and exit for the west stair and had featured an overhead canopy with rounded corners clad in stainless steel.

As both a newspaper headquarters and printing plant, the P-I's interior had a combination of both large, open industrial spaces and smaller, enclosed office spaces. The printing press room originally occupied a volume two structural bays wide and seven bays long, with exterior windows at the southwest side facing Fifth Avenue. The Press Hall was originally daylit to the southwest with double-height windows. The


Dispatch Room
Dark Room
Kitchen/
Restaurant
Composing Room
Freight Elevator
East Stair
Shaft
Press Room
Observation
Windows
Photo/Camera
Studio
Circulation &
Advertising
Library
Editorial
News Room
Sports Dept
Editor’s Offices



Figures 3.17 - 3.18
Images of the Printing Press hall, pictured in 1949 Courtesy of seattlepi.com

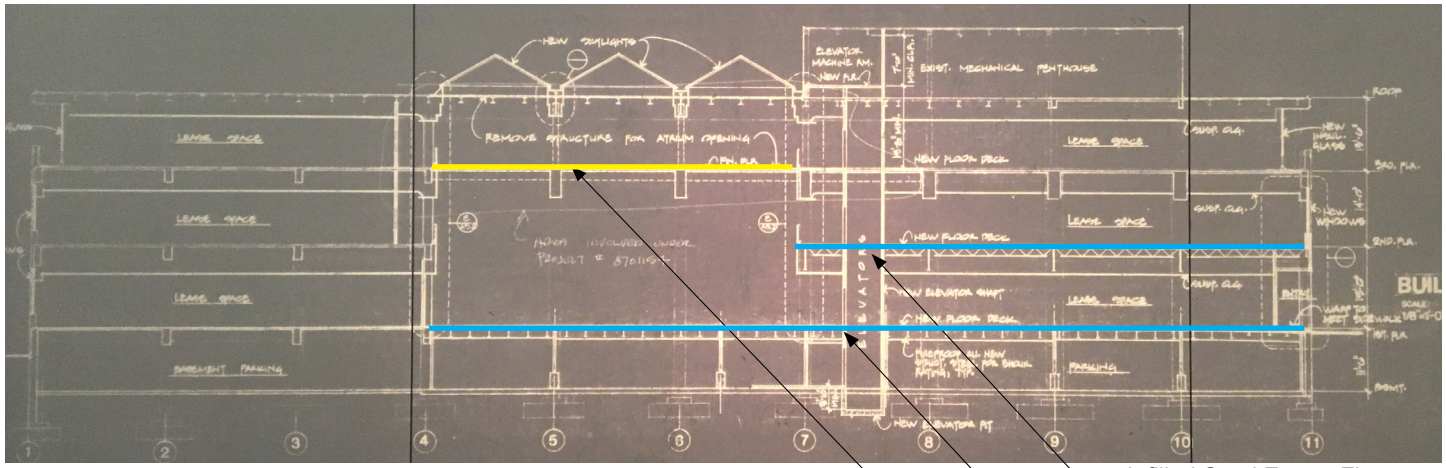
Figure 3.19 (right)
Building Section from 1987 conversion to office building.

second level contained the composing room, dispatch room, dark room, a library, the sports department, the editorial newsroom, the photo department, payroll offices as well as locker rooms and a lunchroom. The basement level originally had storage, carpentry and electrical shops, ink tanks and a pump and the reel mechanism of the printing press located above. Today, the basement level serves as a parking garage, with 95 stalls. The garage is accessible from Battery Street, adjacent to the loading dock.

In 1969, a third level, designed by Naramore Bain Brady & Johanson, was added to the building. The addition maintained the integrity of the original building's architectural style, and its glass and steel structure was distinguished from the original sandstone facade by a five-foot setback, leaving the original building below largely unaltered. According to an article published in the P-I Building on June 10, 1969, the expansion cost $5 million, and the original building's original design had anticipated a future addition.[10]

The P-I was generally known for as a more liberal and inventive alternative to the *Seattle Times*, which was considered conservative and staid. The two maintained a strong rivalry until entering into the joint operating agreement in 1983. While under the ownership of the Hearst Corporation, the paper was put in the national spotlight in 1936 when President Franklin D. Roosevelt's daughter became editor of the women's page and her husband was appointed publisher.

The paper ceased print production on March 17, 2009 but continues to operate



Infilled Steel Frame Floor

Removed section of Level 3

Figure 3.20 (above)
North corner and entry pavilion, 1948
Courtesy of MOHAI digital archives.

under a web-only format. Following the departure of the P-I from the building, Group Health Cooperative's offices occupied the building from 1987 until 2006, when they relocated to a new building in South Lake Union.[11]

3.5. Streamline Moderne

521 Wall Street was designed in the Streamline Moderne mode, which is generally considered the second phase of the movement broadly called "Art Deco." The first phase of Art Deco emerged by the mid-1920's as an attempt to create a modern vocabulary for design. Streamline Moderne is generally considered to have emerged in the early 1930's and reflects the "streamlining" of new automobiles, passenger railroad trains, intercity buses and new passenger airplanes.[12] The visual features of streamlining were soon applied to new buildings and new household appliances to convey a sense of modernity, efficiency and service. The mode peaked before America's entry into World War II and declined thereafter.[13]

As a building style, Streamline Moderne often emphasized horizontality and smooth, curvilinear forms which rejected the angular ornamentation of the first phase of Art Deco as well as the rectilinear formal character of the International Style. As seen in historic photos, the form of the P-I headquarters, highlights the horizontal plane with windows, bands and often a grouping of horizontal lines near the top.[14]

The P-I Building's prominent rounded north corner at 6th and Wall Street is a common characteristic found in Streamline Moderne buildings, including the Hecht Company Warehouse in Washington D.C. (built 1937, expanded 1948). Streamline Moderne buildings can be found

Figure 3.21 (top left)
Former coca-cola bottling plant, now part of Seattle University. Courtesy of PCS Engineers.

Figure 3.22 (bottom left)
Hecht Warehouse, Washington D.C. Courtesy of atlasobscura.com

Figure 3.23 (top right)
500 Westlake Avenue/ Philco Building. Courtesy of Seattle Department of Neighborhoods

throughout Seattle. In Belltown, the building at 500 Westlake Avenue (currently Uptown Espresso) was built during the same year as the original P-I building in 1947 and also features a rounded corner entry.

While the 1969 addition maintained the integrity of the original building's Streamline Moderne exterior, significant alterations to both the interior and exterior have been made since the departure of the P-I, and the building no longer conveys its original style or significance as a major newspaper office and printing plant.

3.6. Restoration and Adaptive Reuse

Today, few, if any, elements of the original building's Streamline Moderne character remains. All windows have been replaced and cement board cladding incorporated into the facade has introduced vertical elements that break up the horizontal banding of the original design.

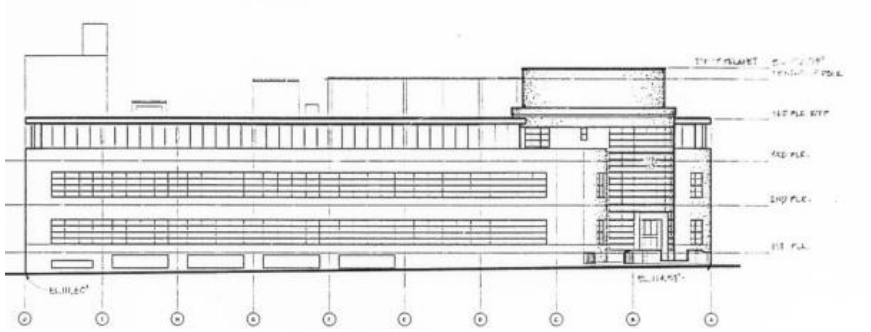
Two ongoing development projects in Seattle have proposed to retain historic structures while incorporating them into new high-rise development. The Firestone Tire Building in South Lake Union, known as the 400 Westlake N project, and the Federal Reserve Bank Building in downtown are both development projects by Martin Selig Real Estate designed by Perkins and Will currently under construction. While the facades of both projects are protected under landmark status, the Federal Reserve Bank Building's landmark designation also includes interior elements including a vault and the entry lobby, and the 400 Westlake N project proposes to salvage steel columns and the roof car decking.[15]

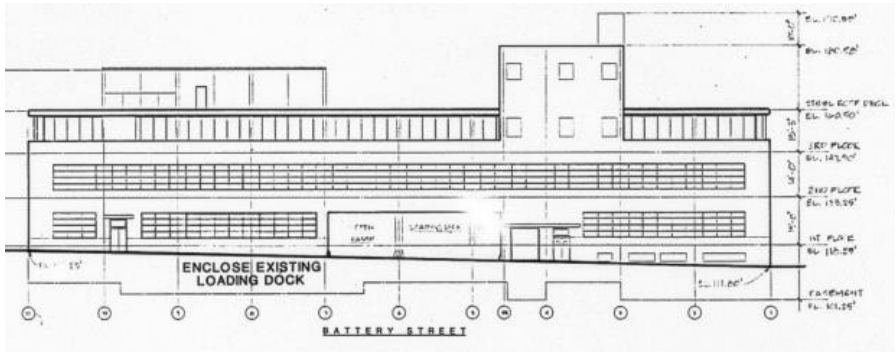
Figure 3.24 (top left)
Elevation at Sixth Avenue, 1995
Elevation at Battery Street, 1995
Courtesy of Seattle Department of Construction and Inspections Microfilm Library

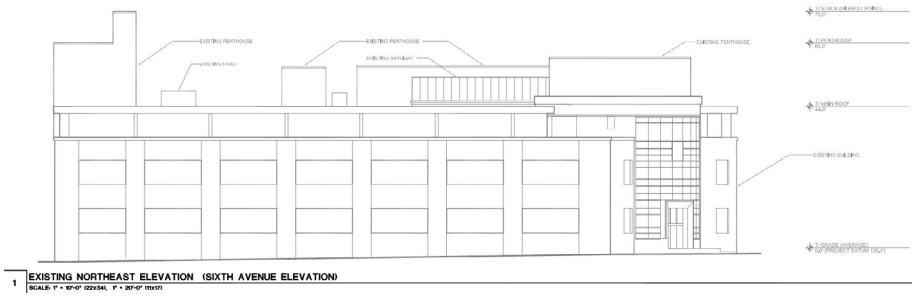
Figure 3.25 (bottom left)
East corner of P-I headquarters, 1948
Courtesy of seattlepi.com

Figure 3.26 (top right)
Elevation at Sixth Avenue, 2014
Elevation at Battery Street, 2014
Courtesy of Seattle Department of Construction and Inspections Microfilm Library

Figure 3.27 (bottom right)
Current view of east corner







1 EXISTING NORTHEAST ELEVATION (SIXTH AVENUE ELEVATION)
SCALE: 1" = 10'-0" (22x34), 1" = 20'-0" (11x17)

1 EXISTING SOUTHEAST ELEVATION (BATTERY STREET ELEVATION)
SCALE: 1" = 10'-0" (22x34), 1" = 20'-0" (11x17)

Figure 3.28 (top left)
Rendering of Proposed Addition over Firestone Tire Building
Courtesy of Perkins Will, public domain from City of Seattle

Figure 3.29 (bottom left)
Existing Facade shored for construction
Courtesy of skyscrapercity.com

Figure 3.30 (top center)
Rendering of approved proposed addition over Federal Reserve
Image by Perkins Will, public domain from City of Seattle

Figure 3.31 (bottom center)
Current photo of construction progress

Figure 3.32 (top right)
Rendering of Proposed Towers at 1120 John Street.
Image by Perkins Will, public domain from City of Seattle

Figure 3.33 (bottom right)
Seattle Times Building Historic Facade shored for construction.
Courtesy of seattlepi.com

However, the interiors of both projects are largely being removed to accommodate a new structural grid as well as setbacks of new construction from the historic façade. These examples demonstrate that sometimes even a Landmarked building may be altered retaining only the exterior facades, almost as a "veneer" to an entirely newly constructed building. This is often due to the requirement that an owner be able to get a reasonable economic return even if a property is Landmarked.

3.7. Facadism

The incorporation of historic facades into new development, referred to as "facadism," has been criticized from preservation professionals for lacking authenticity and being a poor compromise between preservationists and developers. According to Eugenia Woo, Director of Preservation Services at Historic Seattle, increasing commercial and residential development pressure has led preservation efforts to give into market-driven development, and well-defined neighborhoods are experiencing unprecedented growth and density. Woo argues that in Seattle, the result has been a strange hybrid of new and old that does not serve either well, and the higher rent costs drive out small businesses. Recent development projects in Seattle cited as examples of facadism include the Troy Laundry Block and Boren Investment Building in South Lake Union, both redeveloped as part of an 800,000 square-foot office building in 2014, and the Foley Sign Company building on Capitol Hill.[16]

The P-I's former rival, the *Seattle Times*, previously occupied a complex of


2 ONNI | 1120 John St. | SDCI PROJECT #3030079 RECOMMENDATION MEETING | June 12, 2013


ROAD
CLOSED

buildings in South Lake Union, including a 1931 Art Deco building designated a city landmark in 1995. Onni Group, a Vancouver, B.C. based developer which also owns several properties around the 521 Wall Street site, has proposed to integrate the facades of the Seattle Times building into office towers, a revision of an earlier design which proposed residential towers. The demolition of the historic Seattle Times building in 2017 was expedited by Seattle City Council due to unsafe conditions caused by squatters who had broken into the building numerous times since it became vacant in 2013. Although these two surviving facades no longer fully convey the integrity of the original building's design, their incorporation into new development provides the opportunity to acknowledge the past existence of the former Seattle Times offices and printing press and tell the public the story of its significance at this site.[17]

3.8. The Value of Preservation

While the former P-I Building is not a local or national landmark and may not even meet the necessary criteria, there is an great opportunity in finding a compromise between its preservation and the restoration of historic elements that are no longer intact. Unlike some historic buildings which convey architectural significance but leave very little record of its significance in use, a great deal of information, stories and photographs have been maintained due to its nature as a newspaper headquarters.

To restore the building entirely back to its original state would not only require a great deal of resources, it would also ignore the building's evolution of the workplace from a industrial printing plant, to a corporate office, to institutional use and leave little room for interpretation.[18] The building's story may become even more valuable when

Figure 3.34 (right)
Construction photo of sandstone facade, quarried 60 miles southeast of Seattle. Courtesy of MOHAI Library.

the newspaper and media industry becomes more automated and very different.

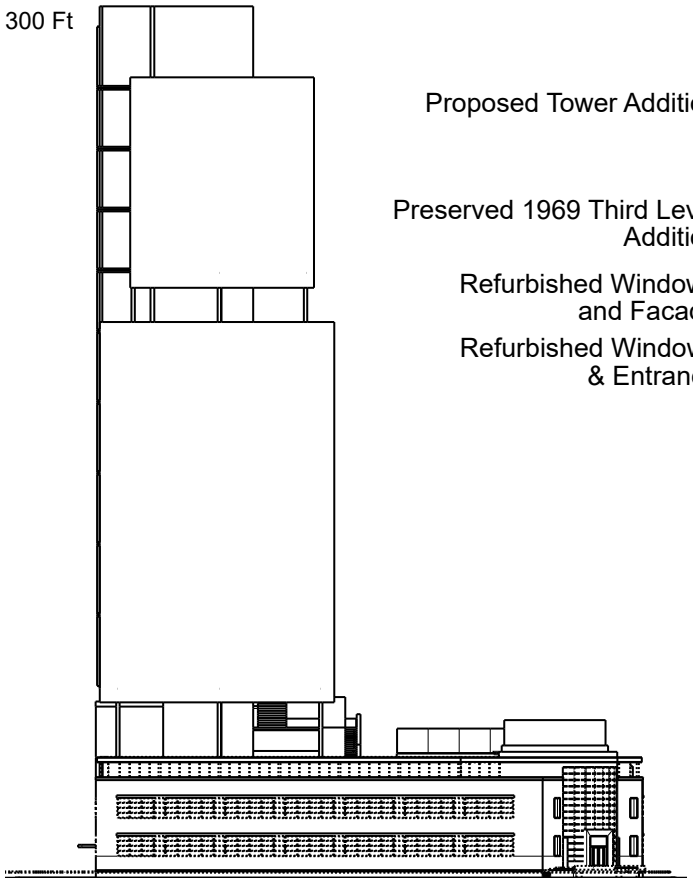
The demolition of the former P-I Building would result in a significant loss of embodied energy and demolition waste given the building's concrete structure, which extends across a full city block, regardless of whether the facade was preserved or not. A responsible approach to reusing this structure while maximizing development opportunity would be to construct a new structure within the former P-I Building, unlike the historic *Seattle Times* Building and the Firestone Tire Building which only preserved the exterior material of the historic facade.

To convey the sense of this building as an evolution of the workplace due changes in technology, the new addition should be compatible but differentiated. This guidance for contemporary additions to historic buildings is outlined in the Secretary of the Interior's Standards for the treatment of Historic Properties. Author de Teel Patterson Tiller discusses the impacts of changes made to this standard since its conception in the late 1970's. Tiller discusses the impacts of removing the word "contemporary" from the standard in 1995, speculating that the notion of contemporary buildings in historic contexts were not desired and considered a risk. New additions should be distinct and not overpower the historic building, but regardless of whether they are bold and controversial, they are representative of "design and architectural imperatives of our own time."[19]

This project's proposal to incorporate this historic building as part of an institutional campus not only extends its life as an institution but creates the opportunity to highlight the role of technology in early media and journalism.

Figure 3.35 (left)
Northeast Elevation with proposed tower addition.

Figure 3.36 (right)
Rendering of restored facade at north corner entry.

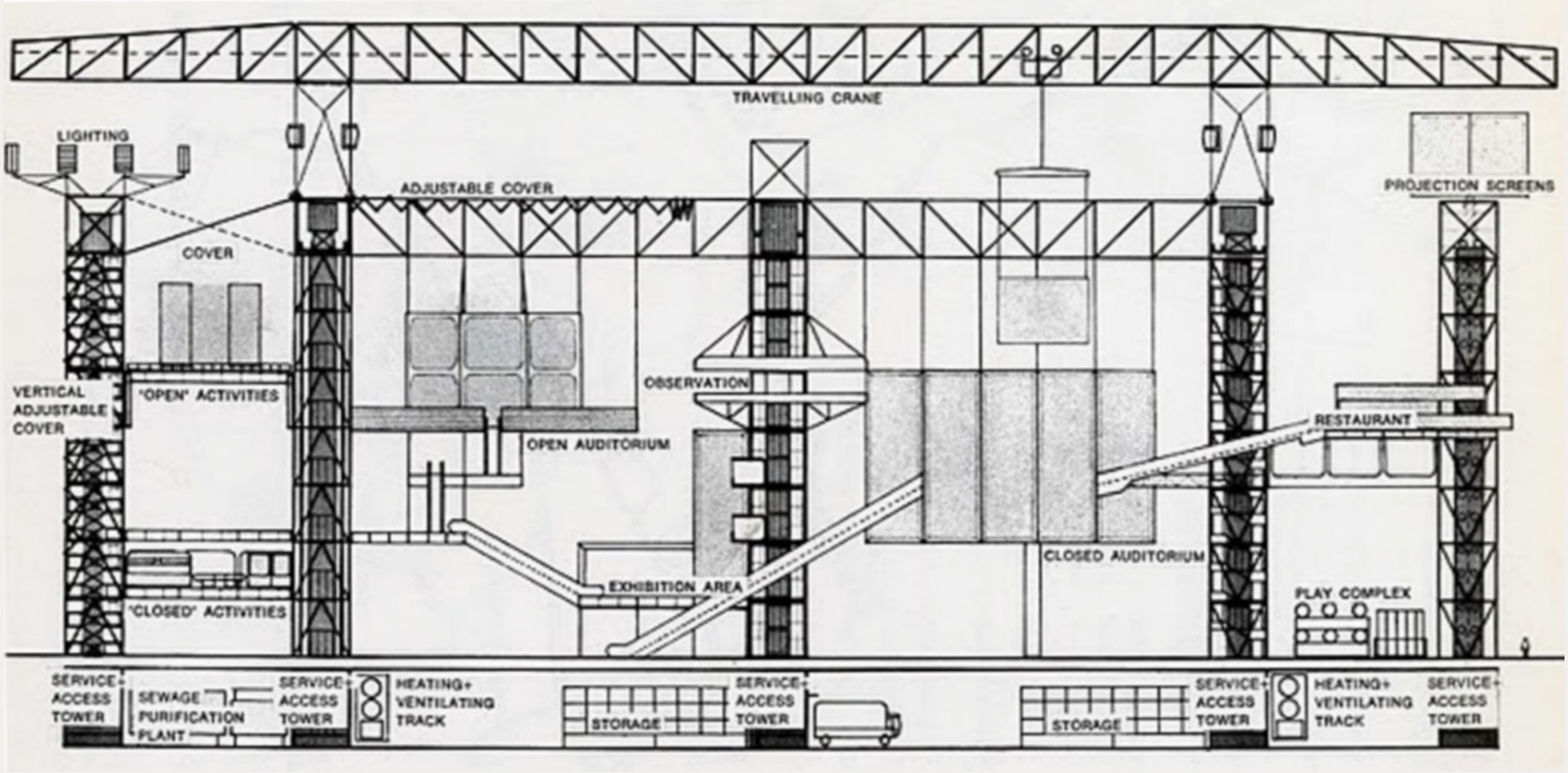


Proposed Tower Addition

Preserved 1969 Third Level Addition

Refurbished Windows and Facade

Refurbished Windows & Entrance


TRAVELLING CRANE
LIGHTING
ADJUSTABLE COVER
PROJECTION SCREENS
COVER
VERTICAL ADJUSTABLE COVER
'OPEN' ACTIVITIES
OBSERVATION
OPEN AUDITORIUM
RESTAURANT
CLOSED AUDITORIUM
EXHIBITION AREA
'CLOSED' ACTIVITIES
PLAY COMPLEX
SERVICE+ ACCESS TOWER
SEWAGE PURIFICATION PLANT
SERVICE+ ACCESS TOWER
HEATING+ VENTILATING TRACK
STORAGE
SERVICE+ ACCESS TOWER
STORAGE
SERVICE+ ACCESS TOWER
HEATING+ VENTILATING TRACK
SERVICE+ ACCESS TOWER

04. Proposal

The Cybernetic Campus

In 1964, British architect Cedric Price and theater producer Joan Littlewood designed the *Fun Palace,* a vision for a building that was improvisational and interactive, responding to constantly shifting cultural and social needs. During this time, London was an experimental city for architecture and pop culture, notably for Archigram's provocative and psychedelic imagery of "plug-in" and "instant" cities that conceptualized temporarily bringing a city to a village through assembly and disassembly.[1] The *Fun Palace* is less like a building and more like virtual architecture that acted as a social experiment.[2] Price believed technology and public architecture should serve the public to further human freedom and allow give people personalized control over their environment. His drawings depicted giant enclosed spaces with pivoting escalators and movable wall panels that would allow limitless variation and flexibility in its configuration.

The *Fun Palace* was not only a major influence for the Centre Pompidou in Paris, built in 1976 and designed by Richard Rogers and Renzo Piano, but also recognized for its influence in cybernetics.[3]

Figure 4.1
"Fun Palace" conceived by Cedric Price with Joan Littlewood at University of Brighton in 1964.
Courtesy of medium.com

4.1. Cybernetics

The term "cybernetics" emerged during the early 19th century, initially referring to an idea of governance. It originated from the Greek word *kybernētike,* meaning to steer or navigate, and evolved into Latin as "governor." As a concept, cybernetics is about navigating, with purpose, towards a goal, and correcting or steering based on a feedback loop.[4]

During the post 1945 era, the term became mainstream when it was applied to technology as an approach to studying regulatory or control systems across various disciplines. Among many early pioneers of modern cybernetics, the mathematician Norbert Wiener is widely credited for establishing the foundations of cybernetics after publishing the book *Cybernetics: Or Control and Communication in the Animal and the Machine*. The origins of modern cybernetics was trans-disciplinary; its principles were applied circular feedback loops in both biological and social systems.[5]

Figure 4.2
Etymology of the terms "cybernetic" and "campus." While cybernetics is responsive and adaptive, campus represents the centuries-old academic ideals of American universities. Definitions from Oxford Languages.

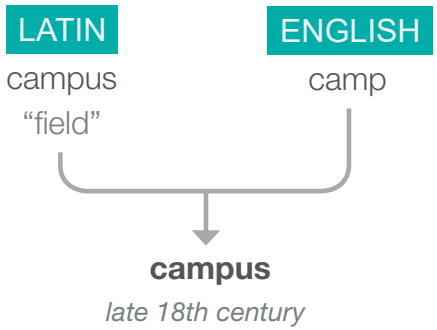
cy·ber·net·ics
/ˌsībərˈnediks/
noun

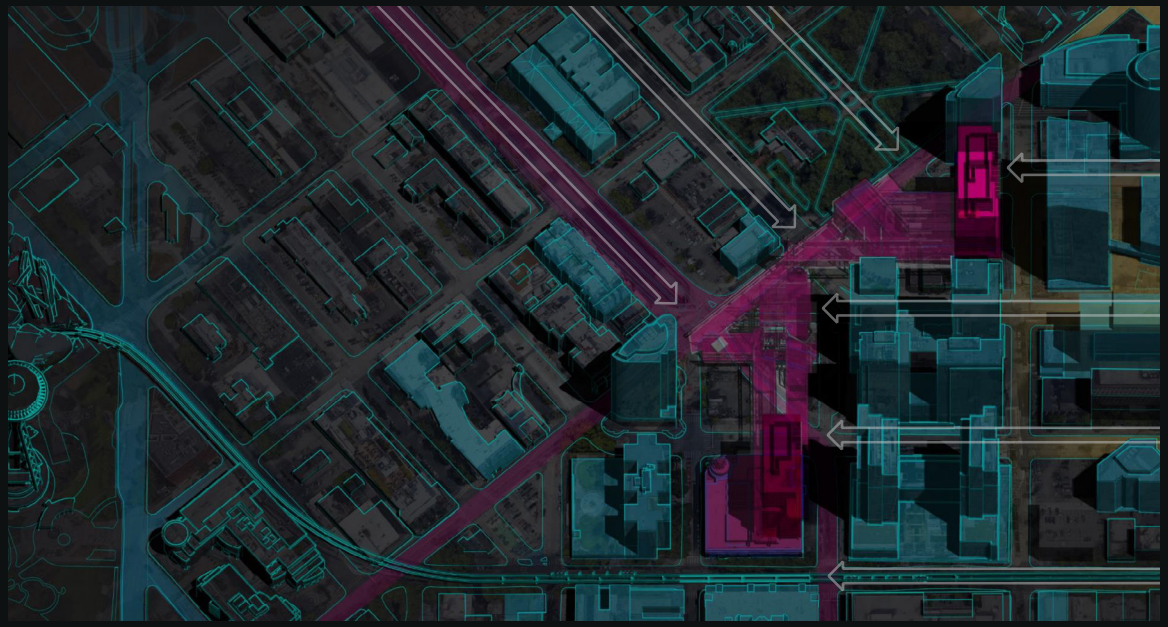
the science of communications and automatic control systems in both machines and living things

As a predecessor to A.I., cybernetics established the framework for communication and feedback between humans and machines. Paul Pangaro, a professor and leading researcher of cybernetics, argues that the future of cybernetics will be in the use and application of robotics and A.I., but they they are distinct fields.[6]

This new institute in Seattle applies cybernetics, as a system of communication and feedback, to the planning principles of an urban campus that is designed to facilitate collaboration amongst humans and machines. This framework does not propose a full departure from the pedagogical models of academic campuses, but instead a means for it to respond, evolve and adapt both spatially and systematically in order to best support research towards solving urgent global issues and the discovery and creation of new jobs.

cam·pus
/ˈkampəs/
Origin



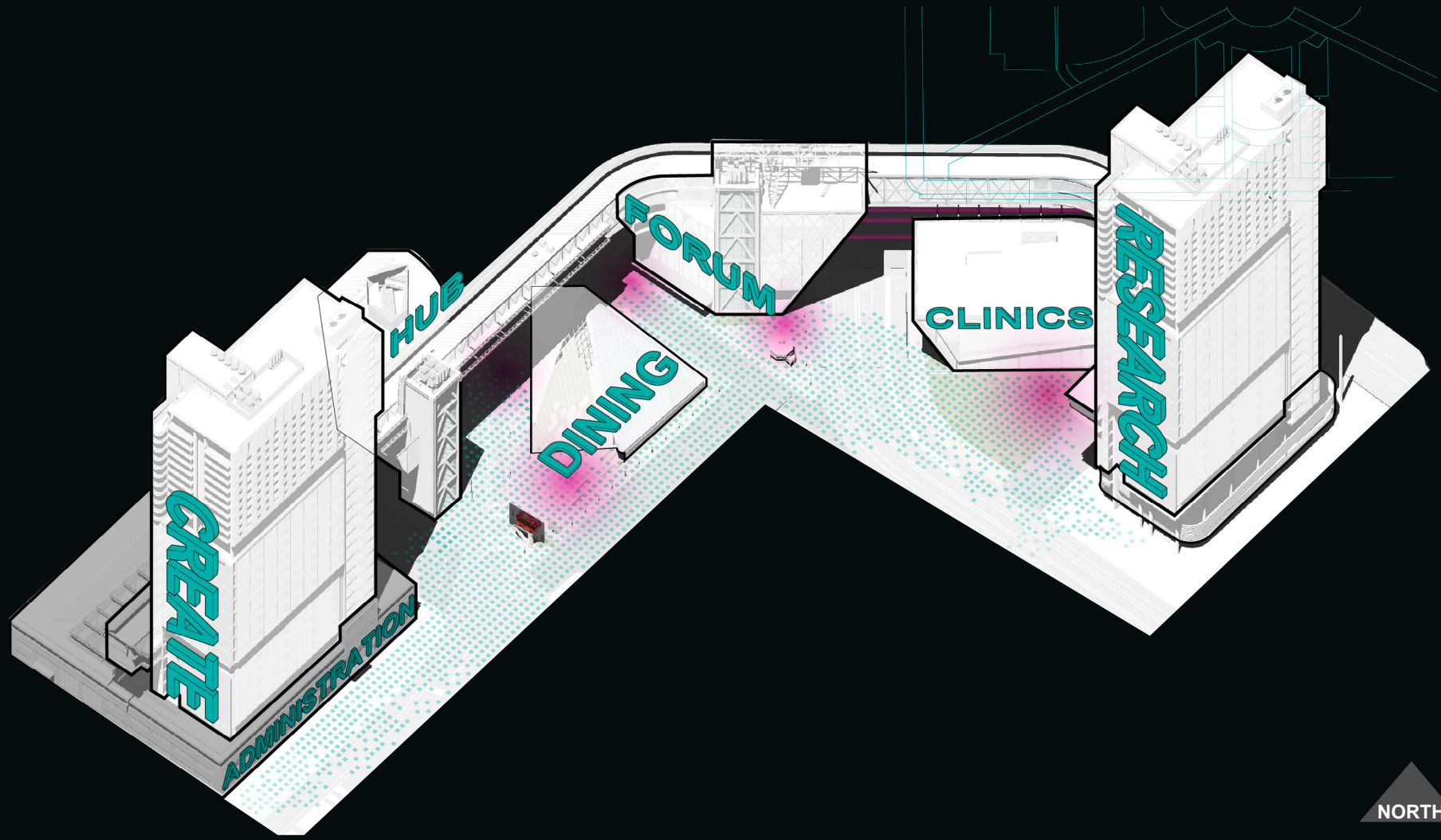


4.2. Proposed Massing and Program

The P-I Building is the base of one of two primary towers that bookend the new campus, linking the new focus on future communication, technologies and new ways of thinking with the historic past and with the culture of this particular place in Seattle. At the street-level, the campus engages users and visitors with gathering. event and demonstration spaces in three centrally located, smaller scale buildings: the Dining Hall, Hub, and Forum. The concentration of these activities at the ground plane not only supports the development of knowledge but also its dissemination.

Figure 4.3
Aerial Site Diagram

Figure 4.4
Massing and Program


HUB
FORUM
DINING
CLINICS
RESEARCH
CREATE
ADMINISTRATION
NORTH

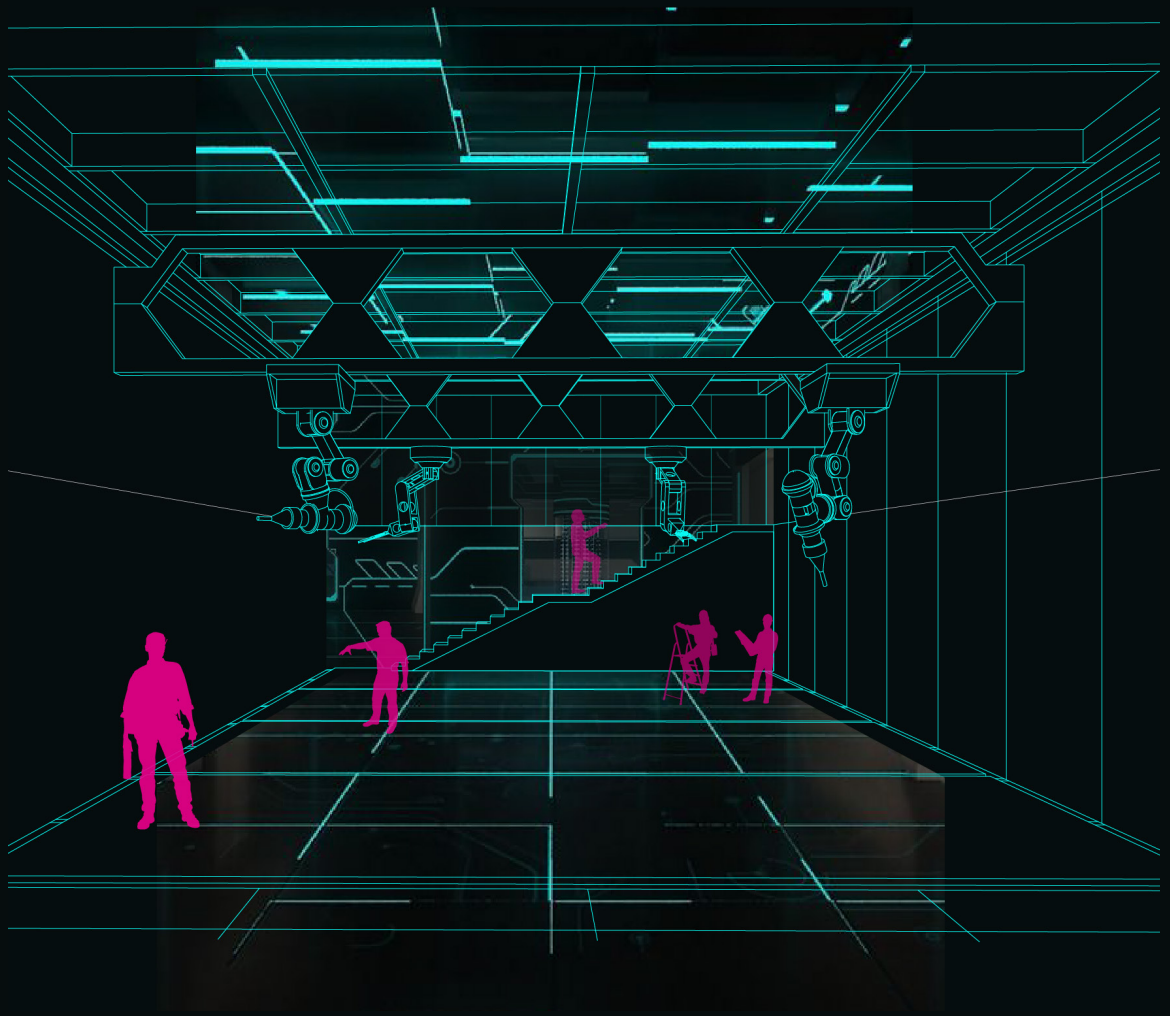
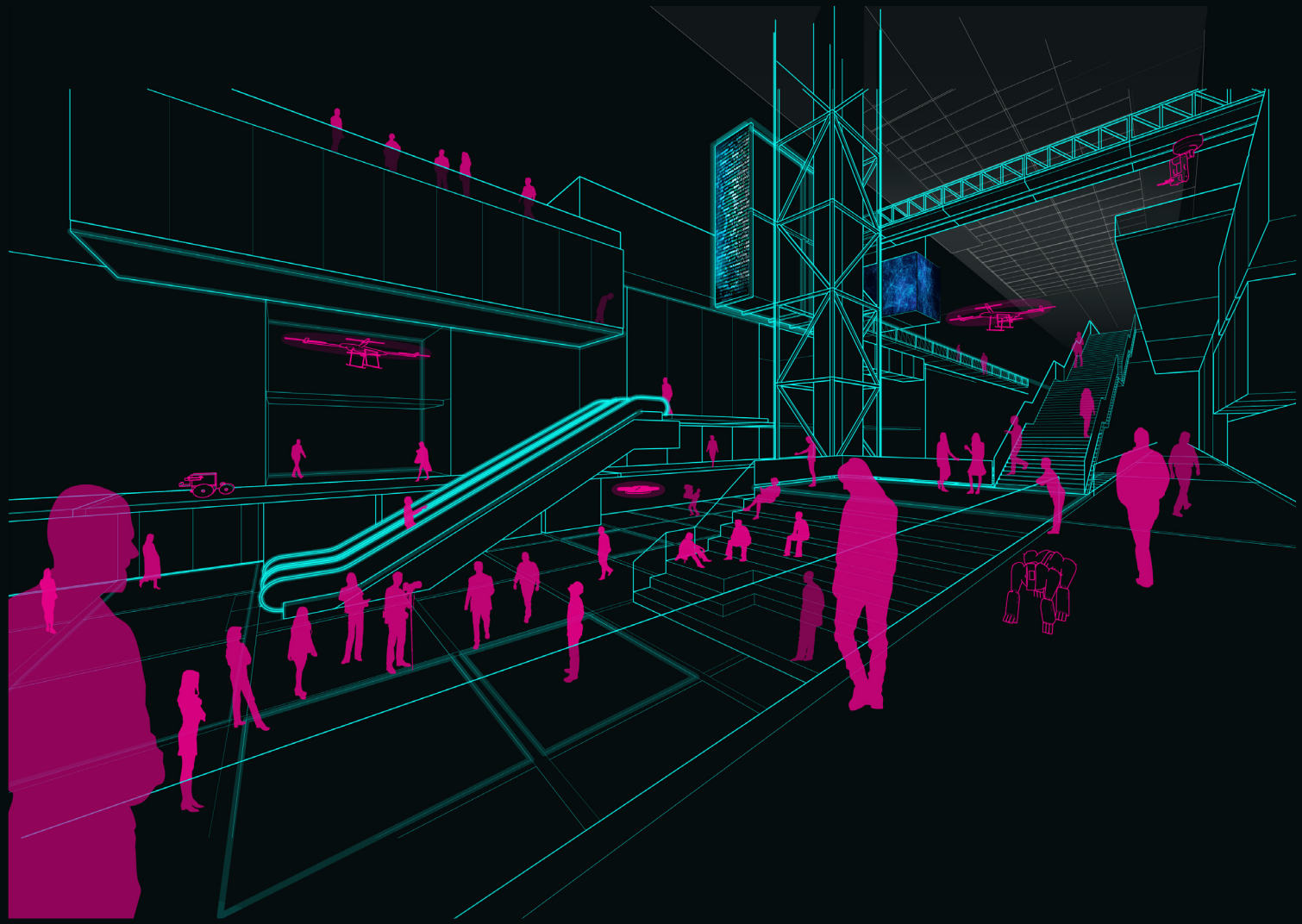


Figure 4.5
Preliminary study of robotics lab space.

Figure 4.6
Preliminary study of experimental exhibition hall



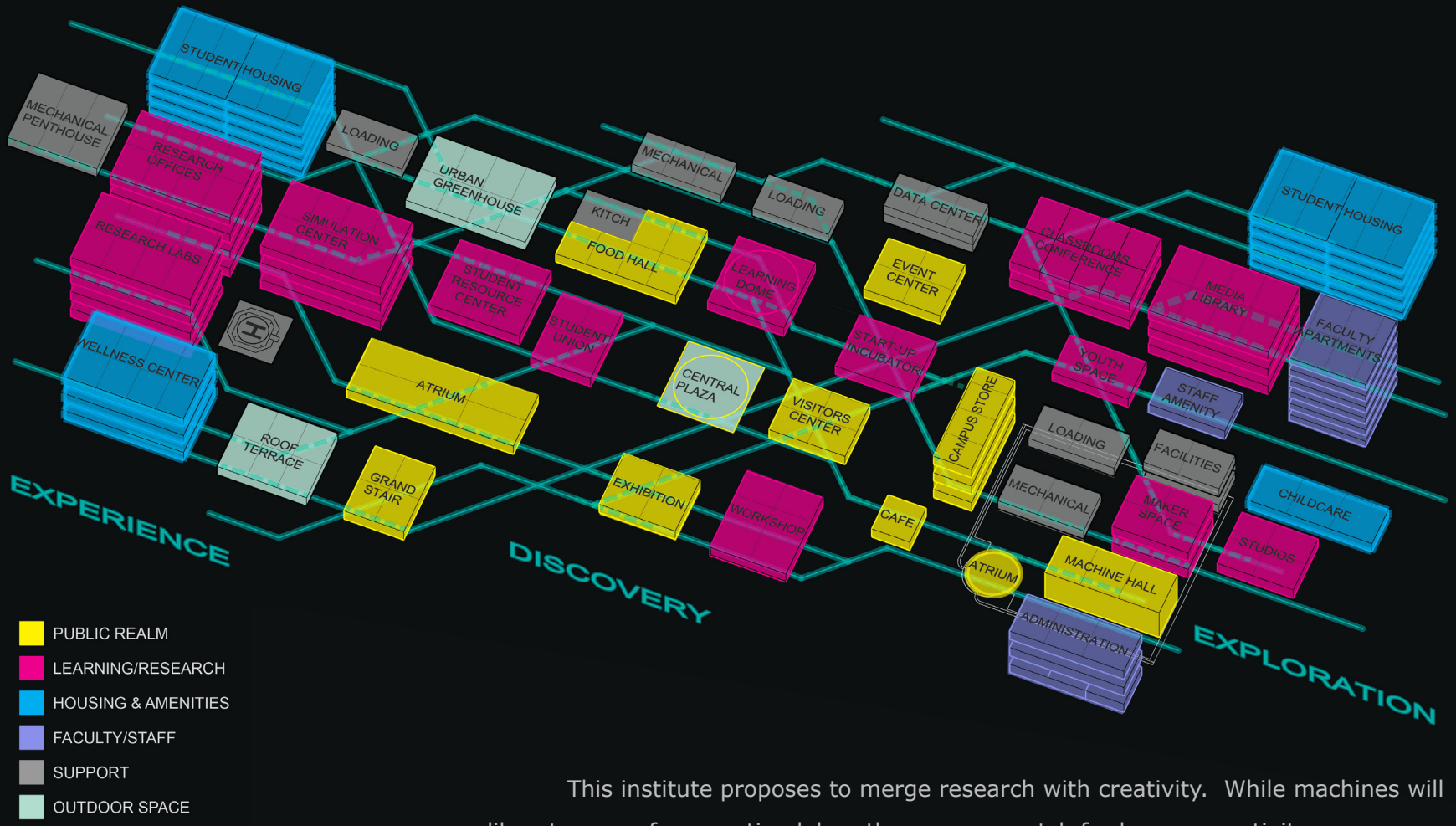
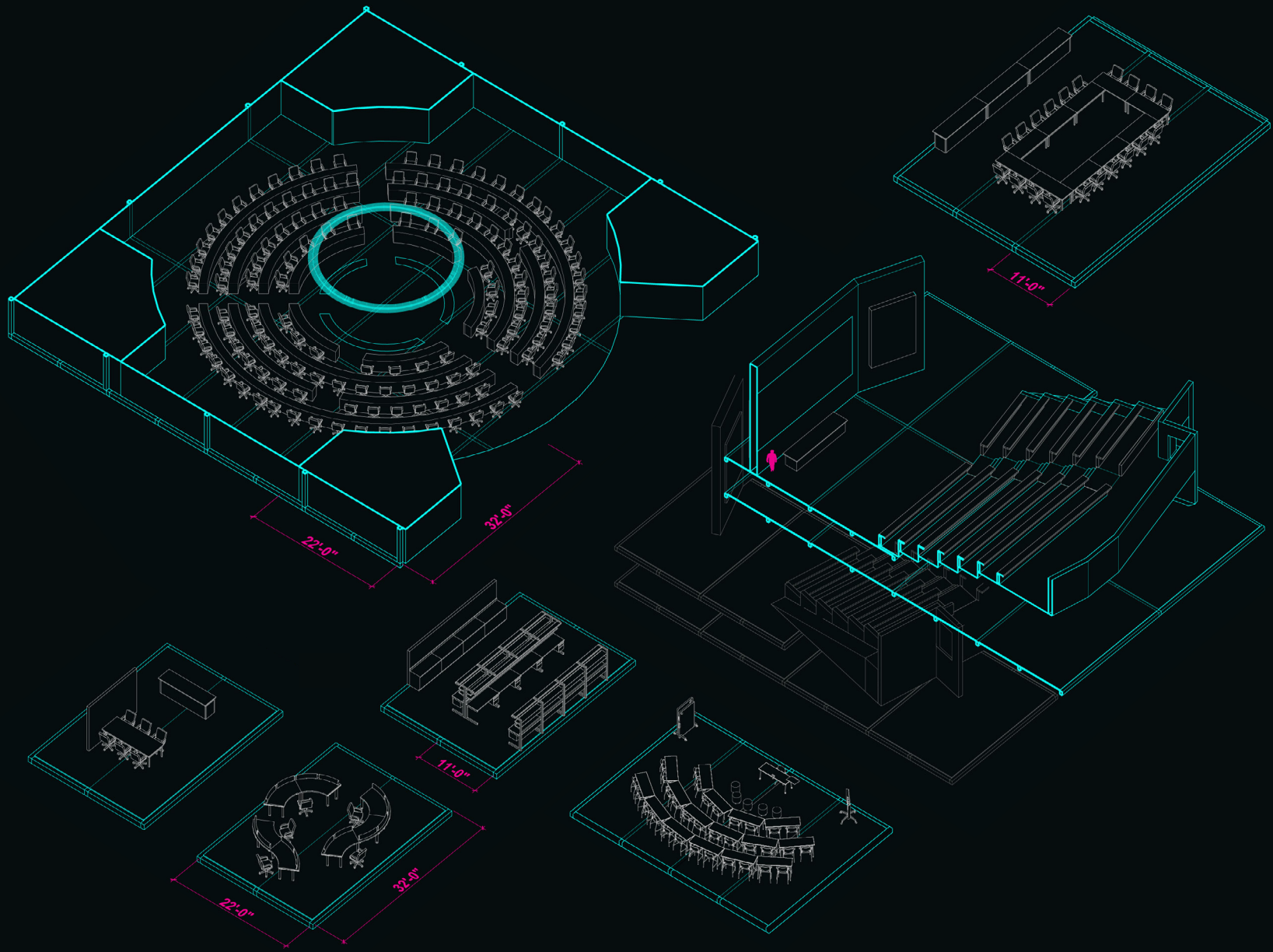


Figure 4.7
Program blocking for a total of 1.2 million SF.

Figure 4.8
Preliminary modular study of collaboration spaces

This institute proposes to merge research with creativity. While machines will liberate many from routine labor, they are no match for human creativity.

The program for this campus includes traditional campus space types such as offices, student housing and assembly spaces of various scales for conferencing, active learning classrooms, presentations, break-out and collaboration spaces. Advanced research facilities for wet, dry and computational programs that are high-energy intensive spaces are stacked to consolidate services for efficiency.


22'-0"
32'-0"
11'-0"
11'-0"
22'-0"
32'-0"

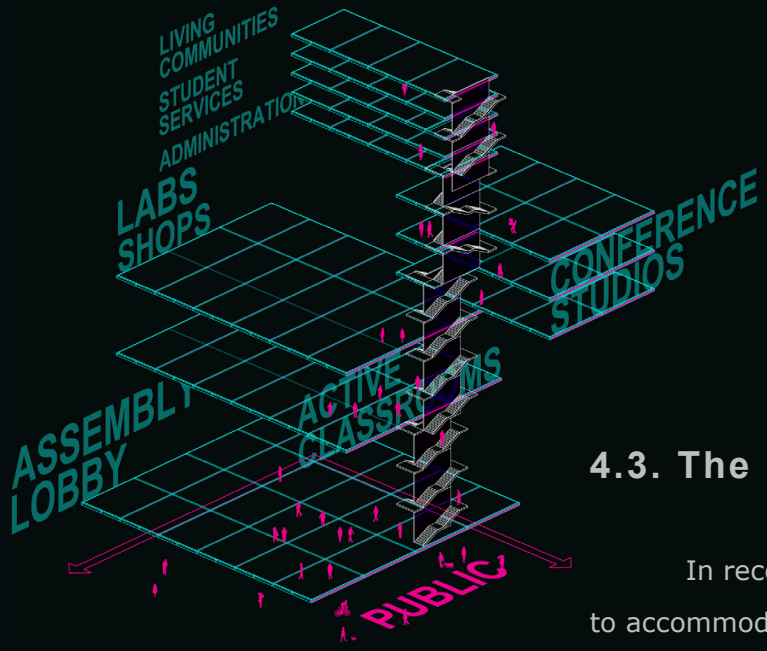


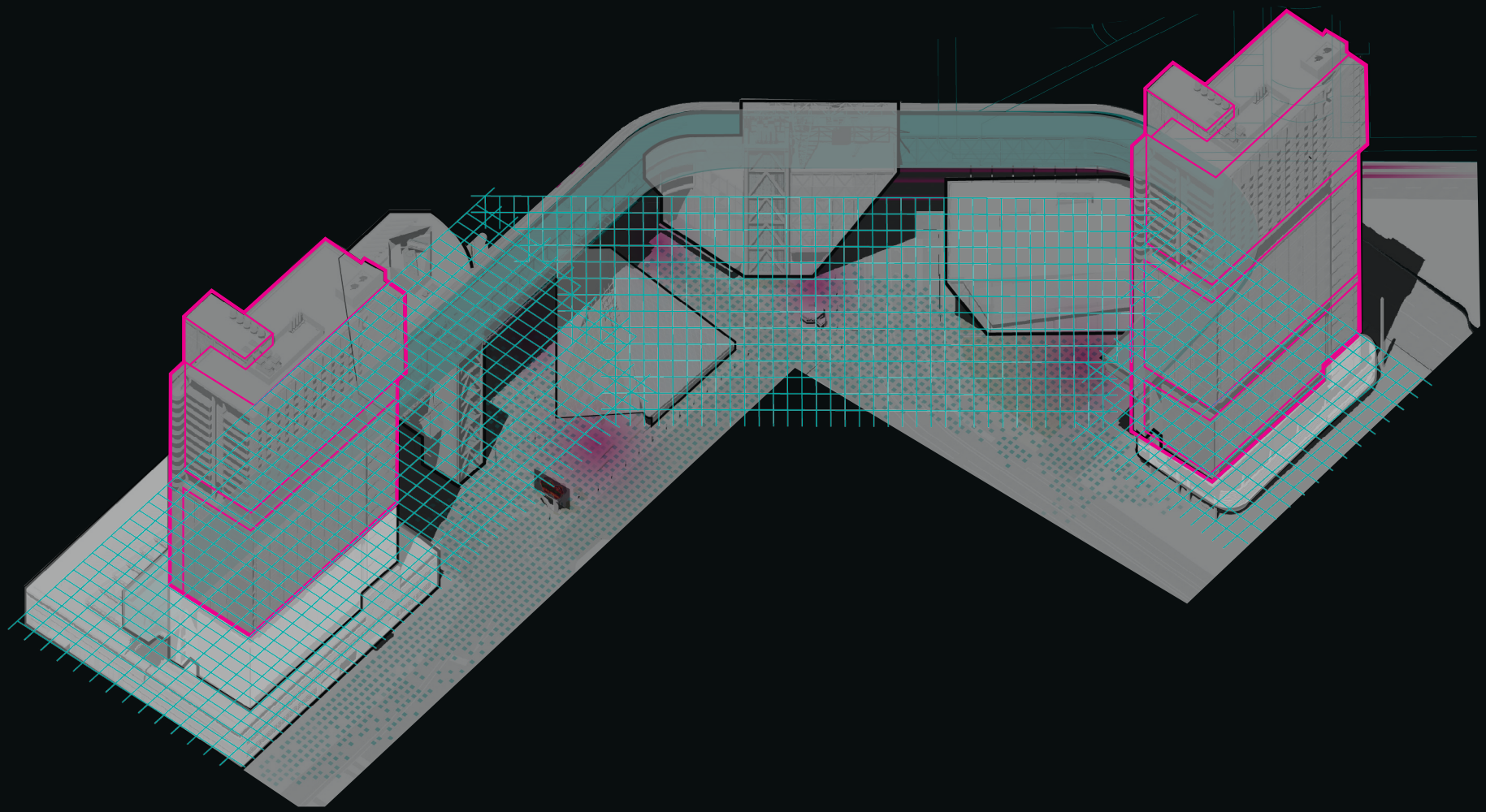
Figure 4.9
Diagrammed distributions of campus spaces from public to private

Figure 4.10
Superimposed institutional grid on site massing

4.3. The Institutional Module

In recent years, campus planning has been based on spatial modules intended to accommodate flexibility and change. In this new campus, various space types that fit a single module or require multiple sets of that same module establish a grid that is modular for both research lab bench spacing as well as the depth and height to be compatible with different structural systems. When aggregated together, they can accommodate both repetitive and distinctive spaces.

Campus spaces that support traditional and fine arts programs have an open plan and high bay studio spaces. The robotics spaces that are increasingly being introduced to campuses have similar spatial requirements. This institutional grid proposes a flexible unit of modules for maker spaces or fine arts studios with clear spans and adjacent support spaces. This allows for the movement of both humans and machines while also accommodating large groups to observe and collaborate. The proposed universal grid is 16’-0” by 32’-0”, or 10’-8” x 8’-0” at the individual office or lab bench module.



A.I. and biomechatronics have become a major industry in health and medical technology. University campuses today are often also centers for clinical sciences, bringing in test subjects from the public. This presents a great opportunity for students to work alongside researchers for experiential learning. The proposed modular clinical units require both individual exam rooms as well as larger, open debrief and meeting rooms for trainings, group exercises and presentations.

Examples of high-rise, multi-program campus buildings, including the University Center at the New School discussed in chapter 2, often incorporate student housing at the top levels due to the restriction of most research lab uses on higher floors of a highrise. In addition, the access and egress requirements of large assembly spaces generally require immediate access to exit at street level. The proposed residential unit stacks three 10’-8” floor-to-floor residential levels to comprise the 32’-0” modular height. These three levels are connected at common areas such as a lounge or workspace, which allows students to bring projects and materials home and access resources all on their residential floor.

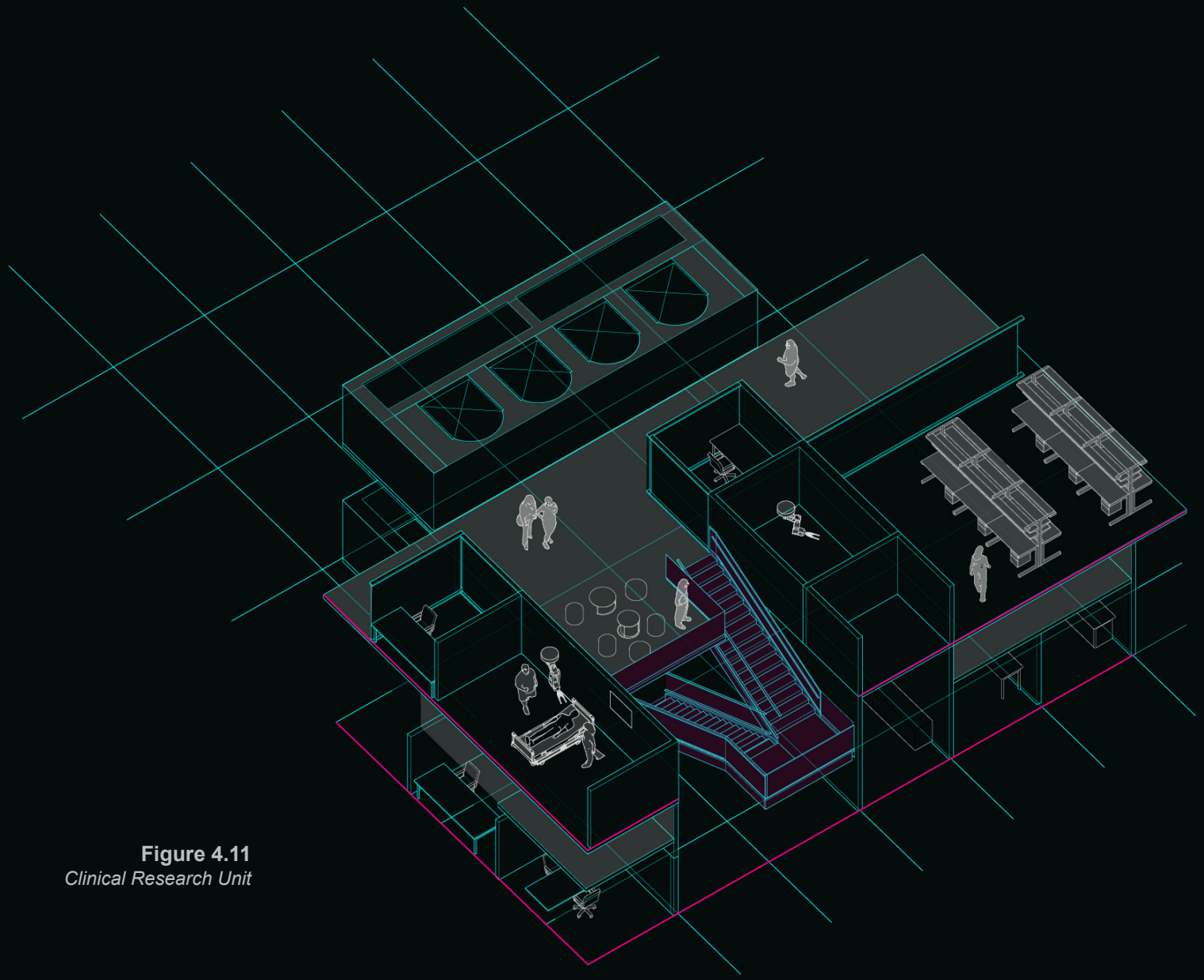


Figure 4.11
Clinical Research Unit

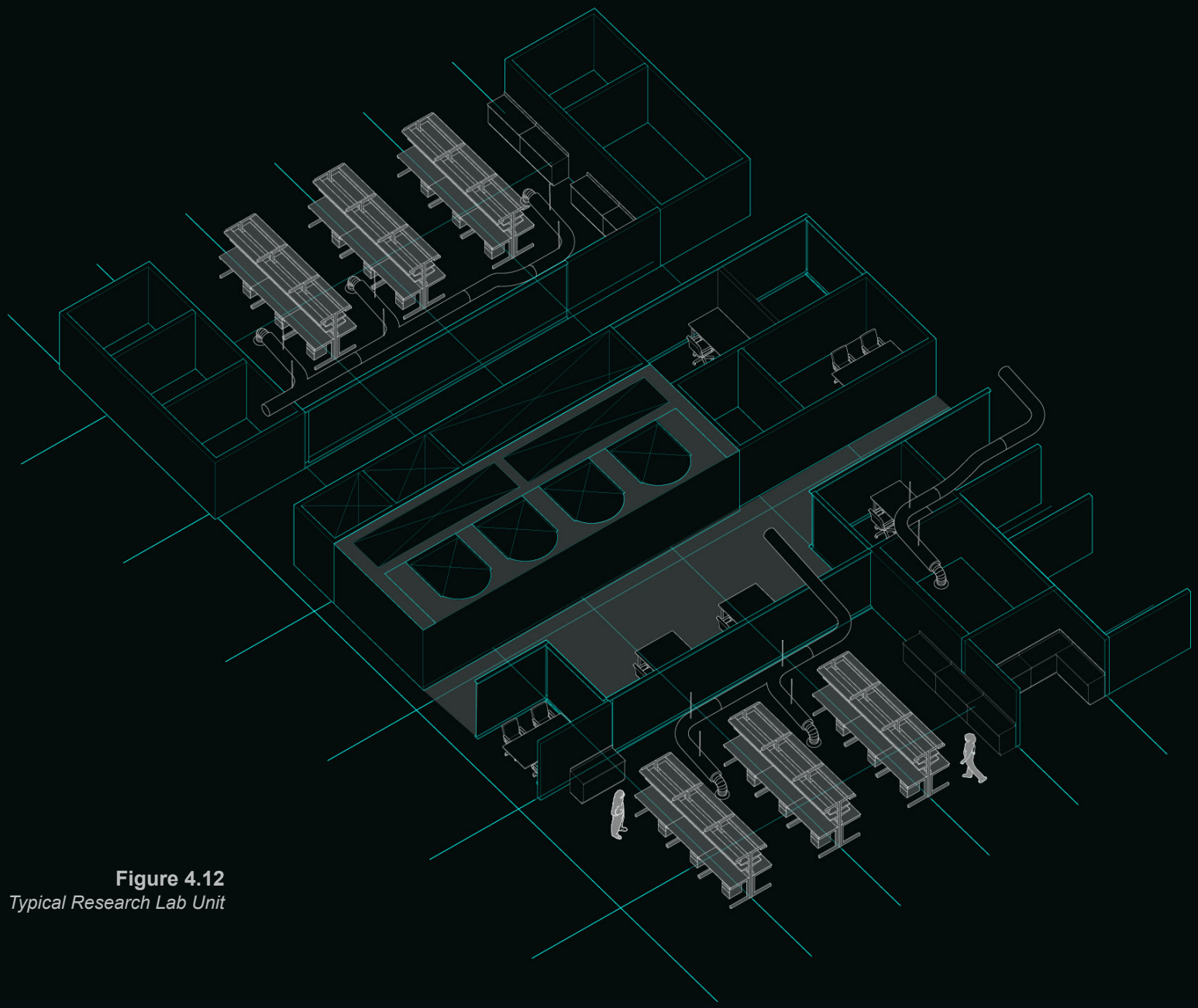


Figure 4.12
Typical Research Lab Unit

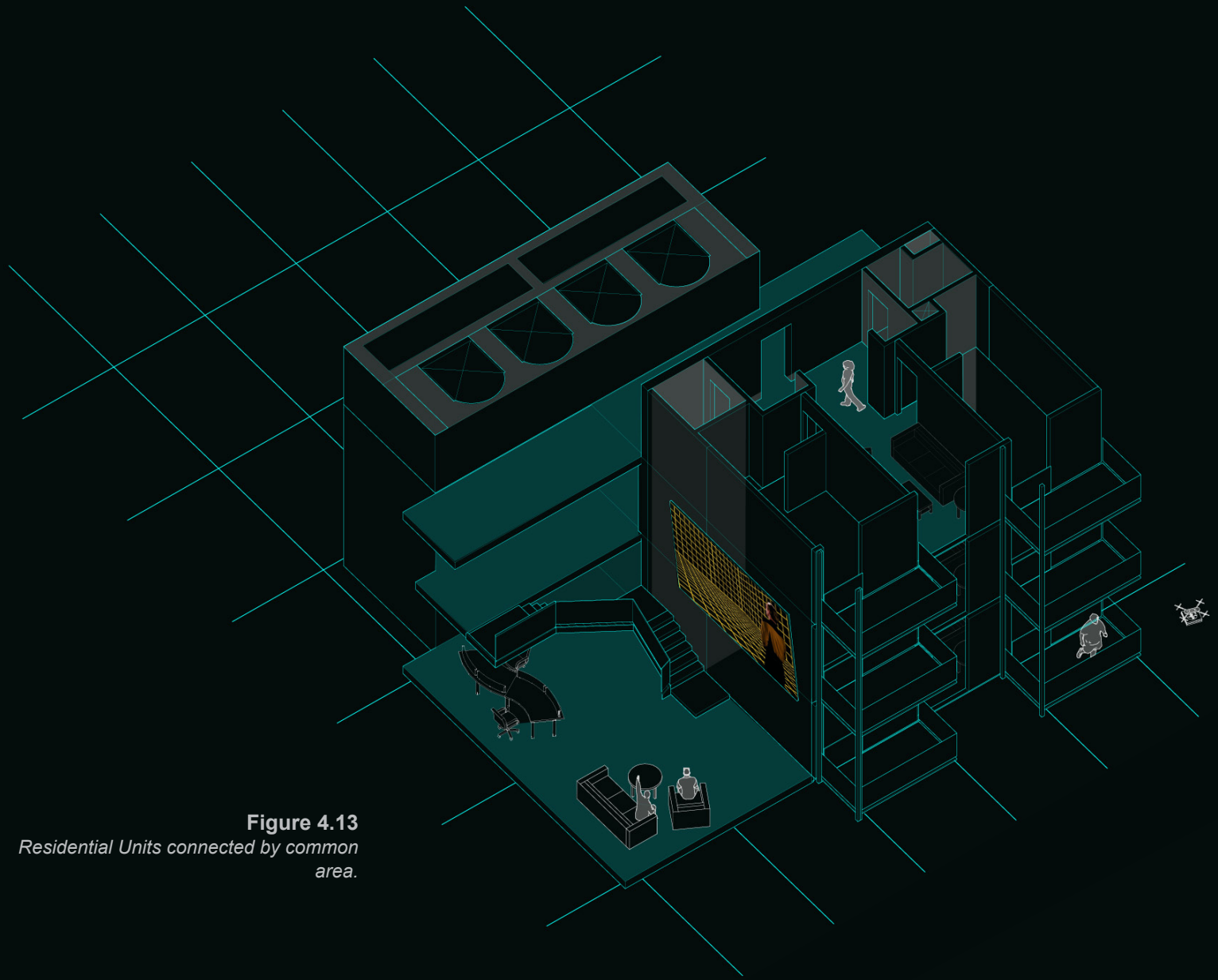


Figure 4.13
Residential Units connected by common area.

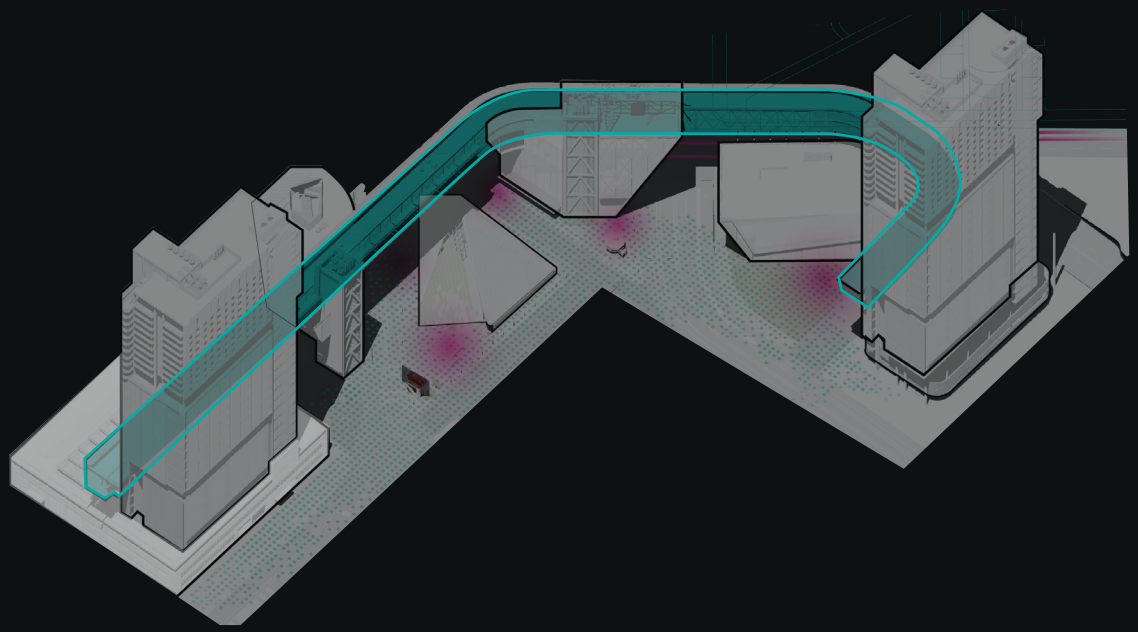


Figure 4.14
Massing diagram of Arcade

Figure 4.15 (facing page)
Perspective of Arcade corridor. The four-way elevator core is pictured to the right, with the historical reference to the campus arcade depicted on the left.

4.4. The Arcade

As an urban campus that is embedded in the city, this design lacks the connective open spaces that are strongly associated with the traditional campus environment. A linking element called the "Arcade" connects the buildings at the 7th and 8th floors. With this relatively flat site, this campus maintains floor levels at a consistent datum across its buildings. This "Arcade" element borrows from the traditional campus archetype and provides circulation space that is so vital to the chance encounters and social collisions that lead to discoveries.


LEVEL 07

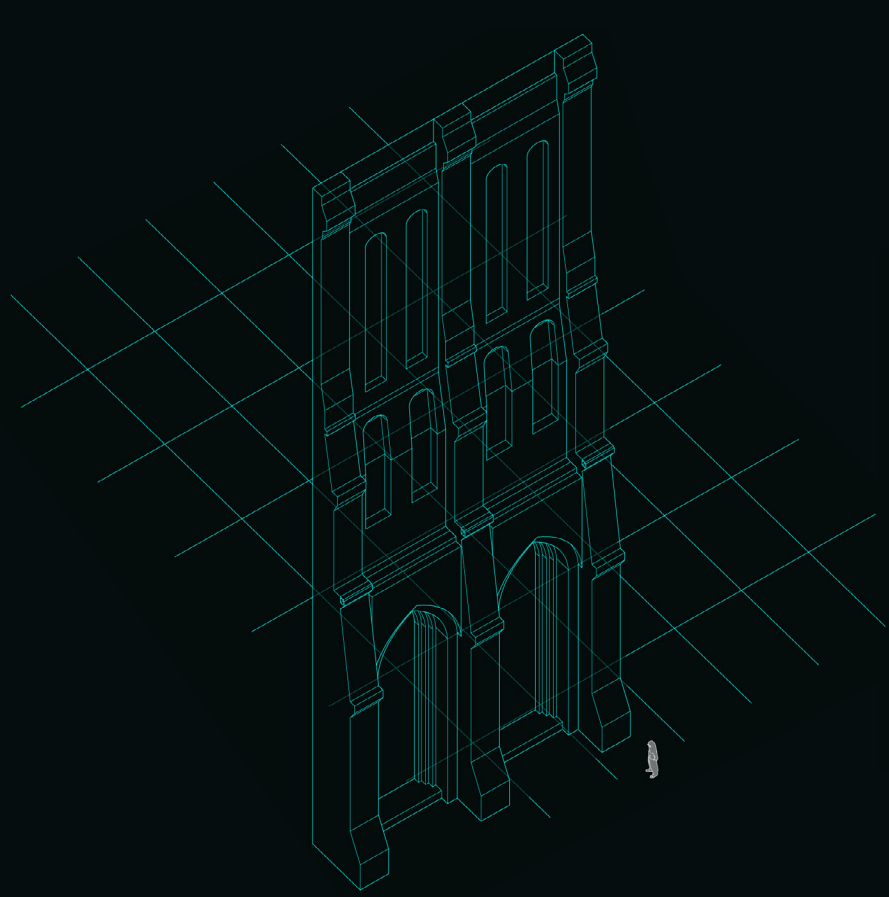


Figure 4.16
Conceptual diagram representative of the traditional “ivory tower” in contrast to the proposed elevated Arcade and four-way elevator system.

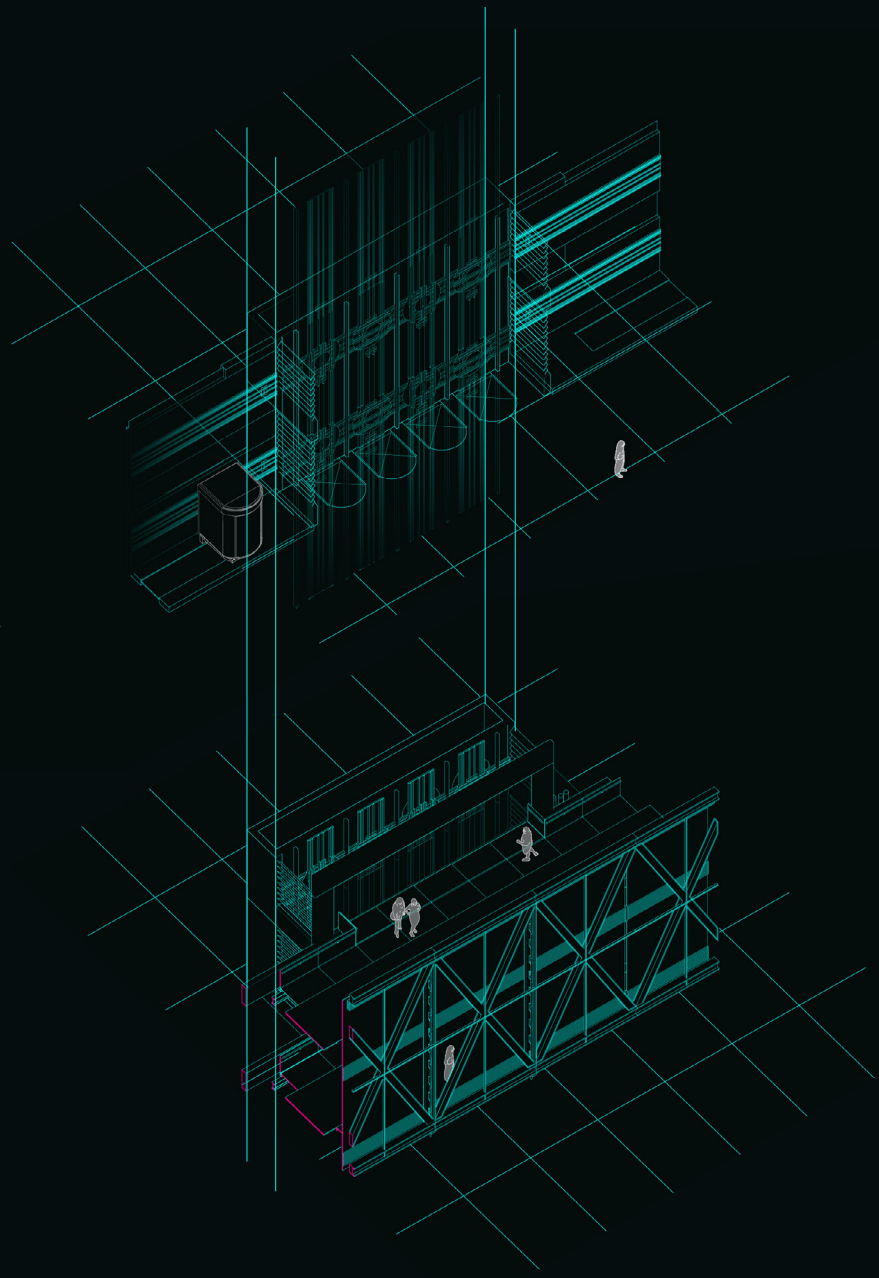
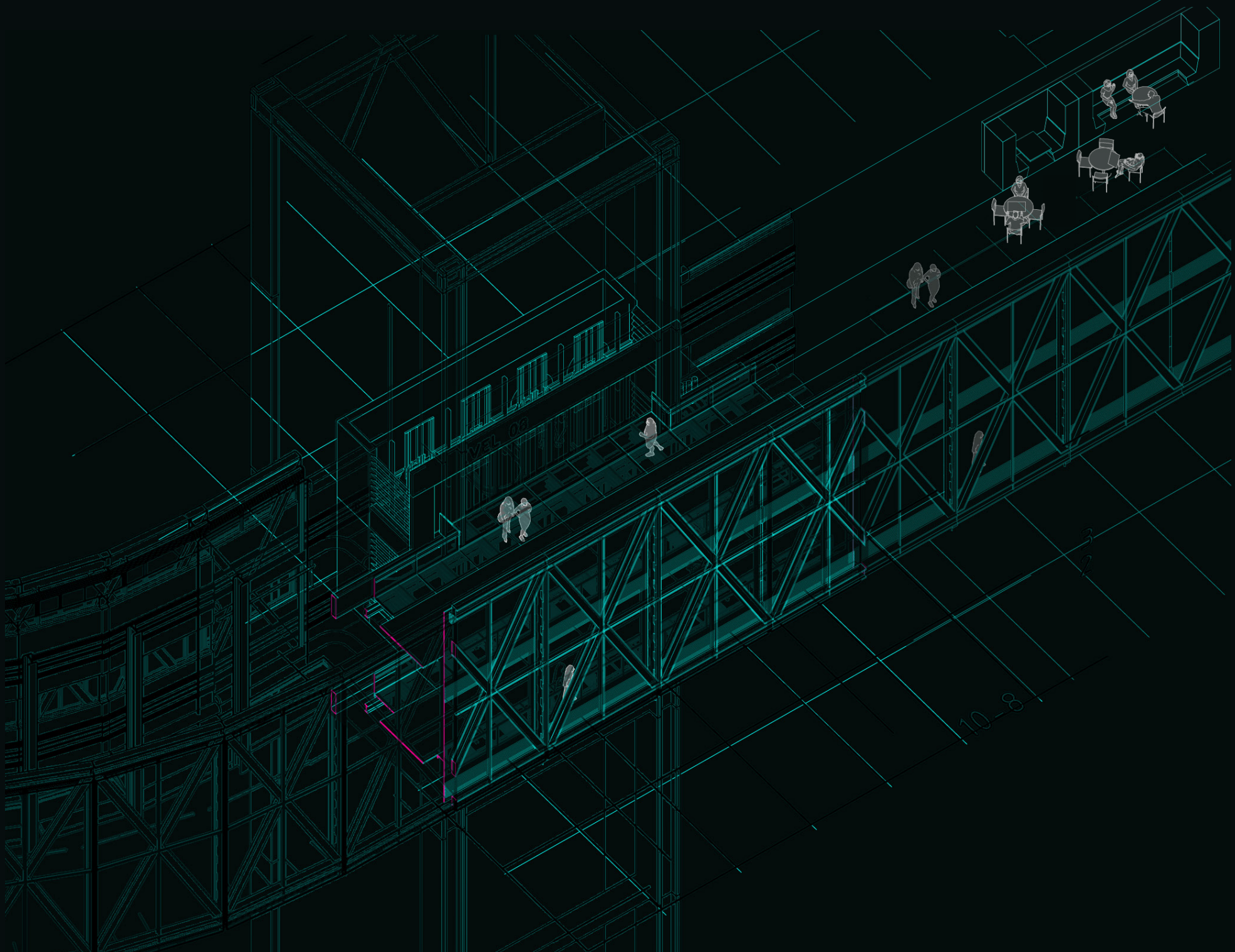


Figure 4.17 (facing page)
Diagram of the proposed elevated Arcade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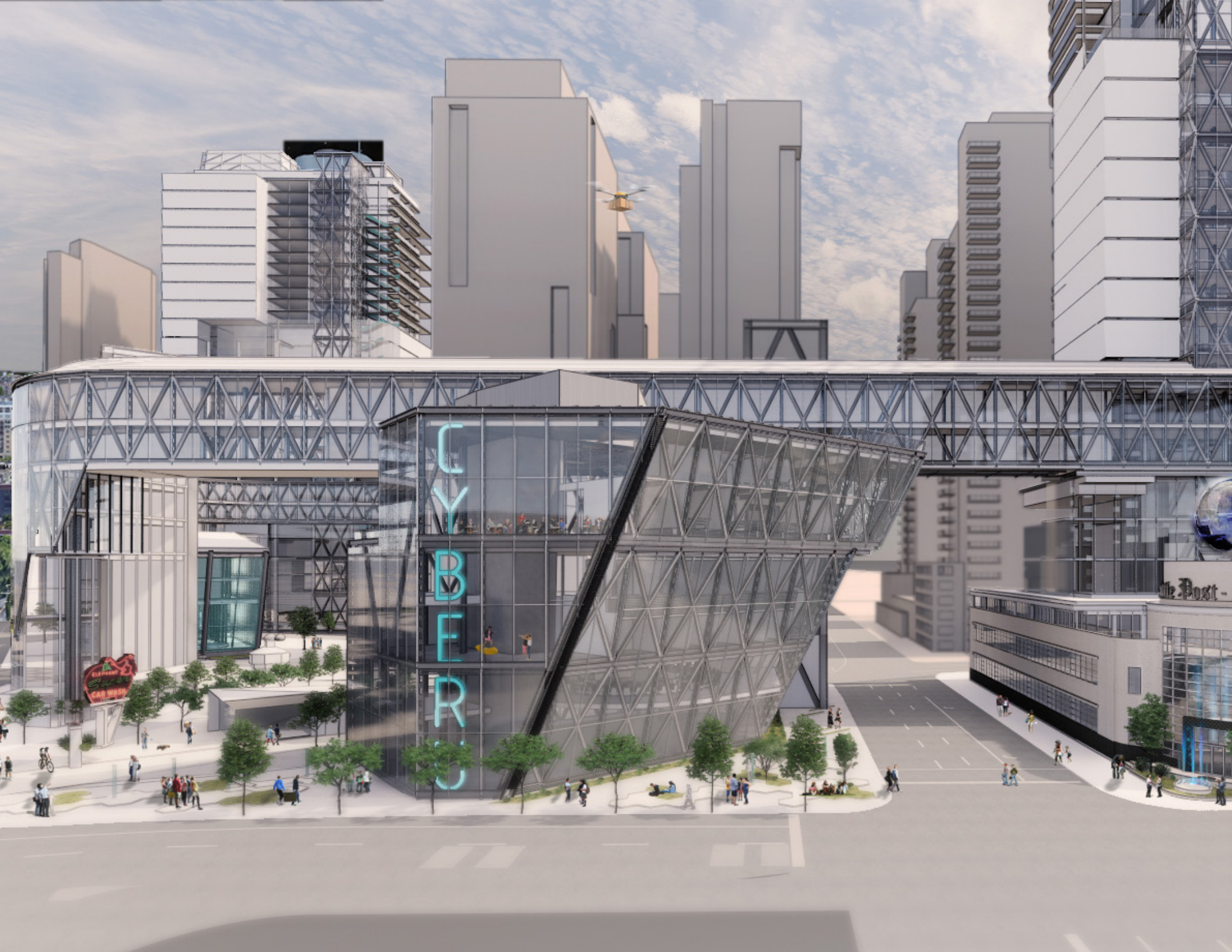
10_8

The Arcade provides vertical circulation but also connects the buildings horizontally with a four-way elevator system. With this infrastructure, both people and machines, along with projects and materials, can transfer from a research lab to a maker space for fabrication, then to a clinical research unit for tests and trials. The vertical cores become distinctive elements that serve as connection points for people in the city rather than privileged exclusion of an "ivory tower". The Arcade is programmed to support spontaneous encounter but also spaces for respite and refuge as well as galleries and the technology to support collaboration or individual needs.

While the Arcade is elevated, separating the internal circulation from the street, the circulation of this campus functions as a loop that links public and gathering spaces at the ground plane with more private and sensitive campus spaces on upper levels. This mode of circulation makes it possible for this type research institute that is embedded in the city to conduct projects which may require the transfer of people, projects and materials between different specialty spaces that would otherwise be impractical to bring out into the elements and the public environment. While the towers that bookend the campus contain residential levels and research lab modules that support more private functions, program such as the dining hall, visitor's center, event space and exhibition are concentrated around the central open space and the heart of campus.

Figure 4.18
View of campus from 6th and Wall Street, looking southeast towards downtown.


CYBERS
CAR WASH

4.5. Campus Architecture

The campus module shapes the structure that appears throughout the site as an exo-skeletal shell. This structural expression conveys a sense of permanence and protection to what is a responsive and fluid inner shell. The exo-skeletal shell displays a deliberate use of a uniform architectural language. Prior to the Modern Movement's influence that led to campuses with stand-alone buildings, campus buildings usually employed a consistent set of forms and materials to achieve cohesion and distinction. The buildings on this campus form unique moments throughout the site as the they bend in response to shifts in the street grid, slant to engage views between occupants and the street and peel away at corners to reveal landmarks and outdoor spaces.

The north corner and entrance of the restored P-I building faces a new six-story "Hub" building which showcases specialty fabrication labs and reconfigurable space for start-ups as an incubator for ideas. The campus is intended to be in close partnership with nearby institutions such as the Allen Institute for Brain Science and the Fred Hutch Cancer Research Center; these institutions may claim modules or entire floors to co-locate satellite projects, in order to collaborate and engage researchers with students on the proposed campus.

In place of the historic P-I globe that has been relocated to the Seattle waterfront is a holographic replica to tell the story of this significant Seattle institution. In addition to the P-I, existing site elements such as the Elephant Car Wash Signage and the Black Market Skate kiosk shop have been preserved or re-purposed to link the new campus to the past life and culture of the city.

Figure 4.19
View of restored P-I building north entry at 6th and Wall Streets, facing the Hub.

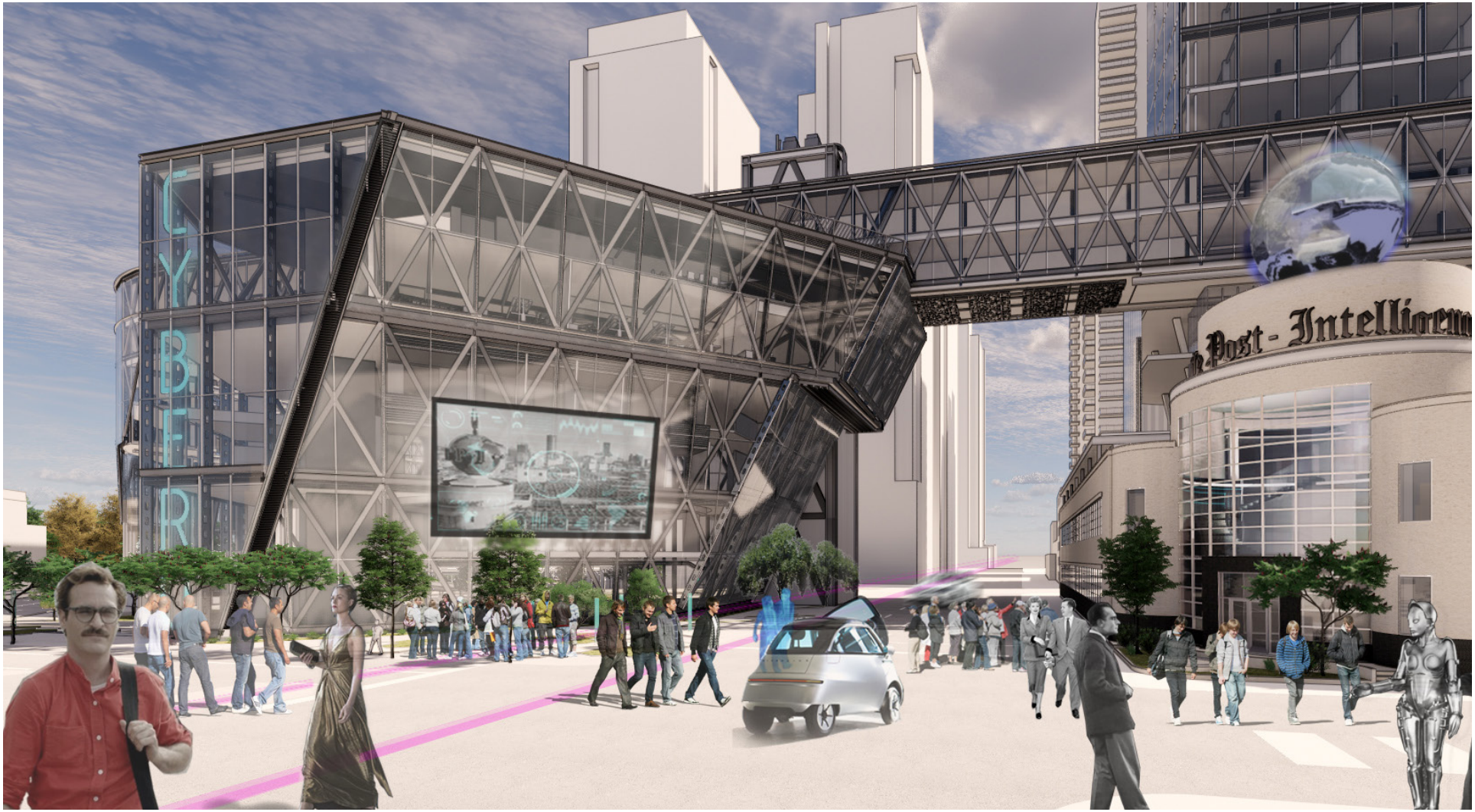

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Figure 4.20
Mutli-Robotic Fabrication Laboratory, levels 5-6 of the Hub.

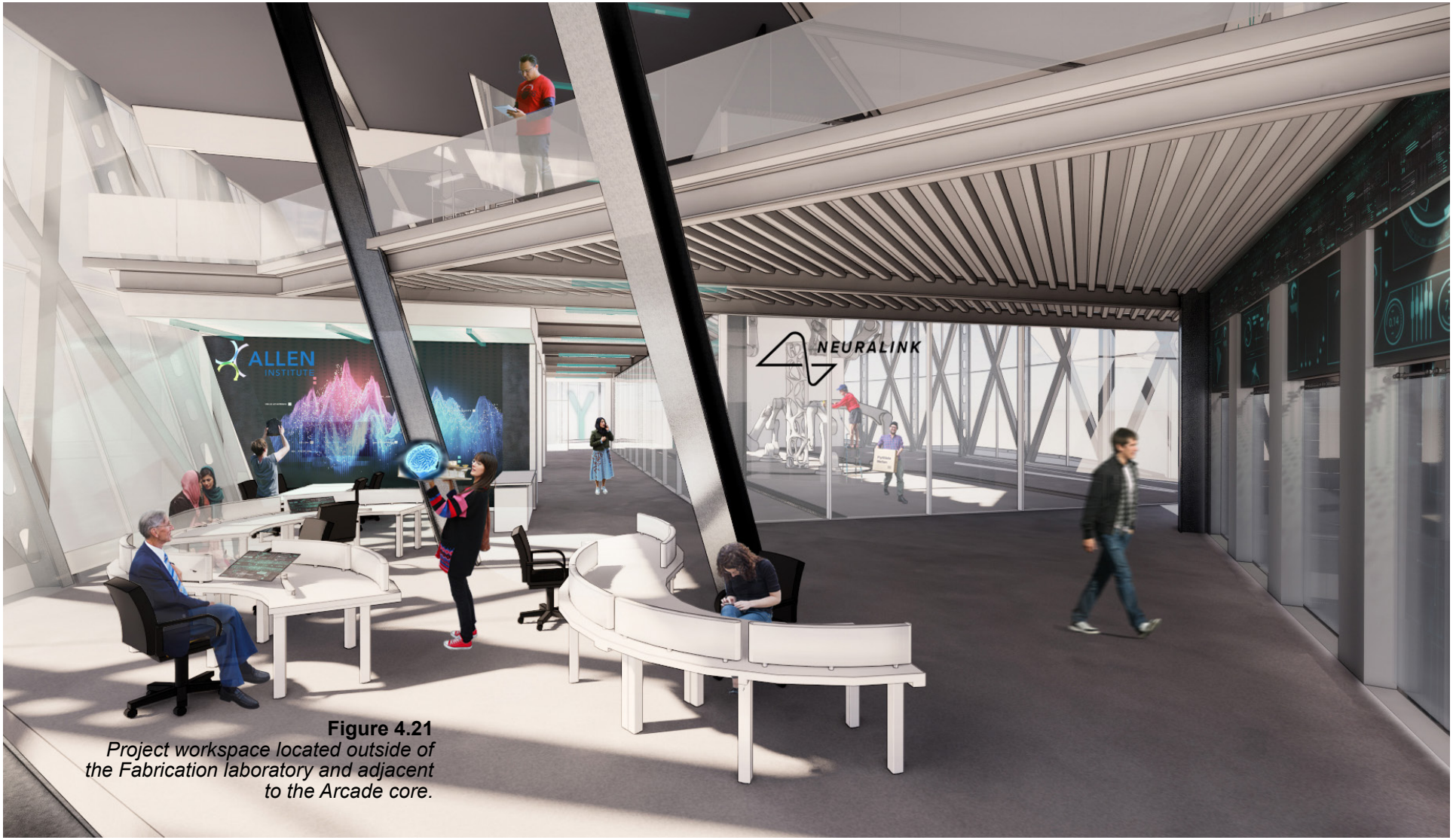


Figure 4.21
Project workspace located outside of the Fabrication laboratory and adjacent to the Arcade core.

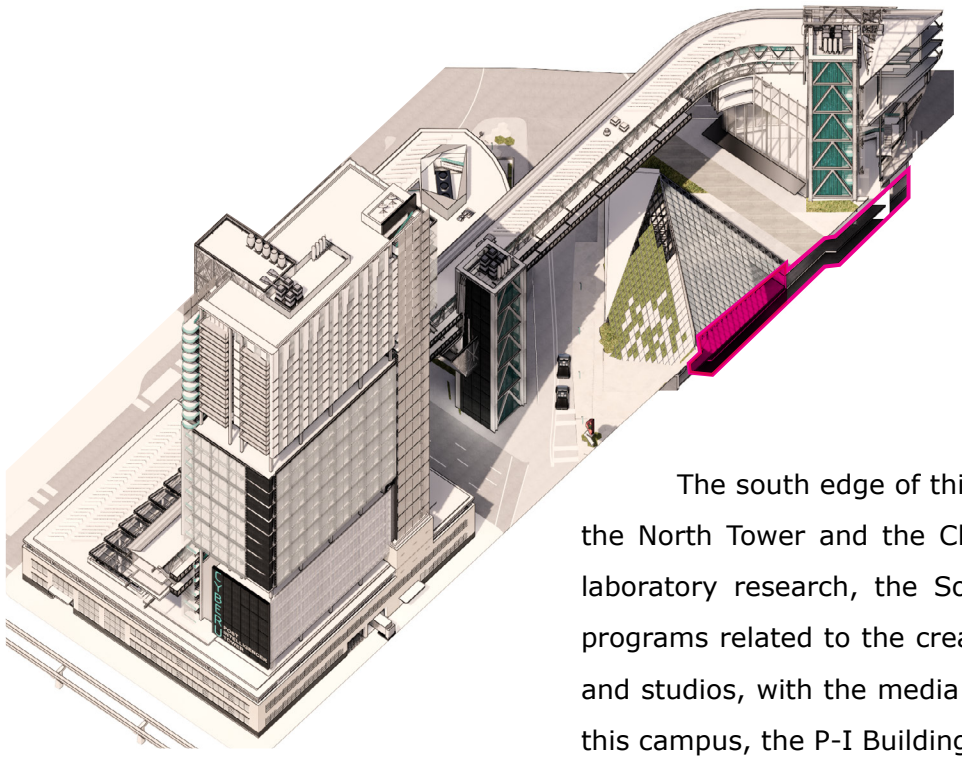


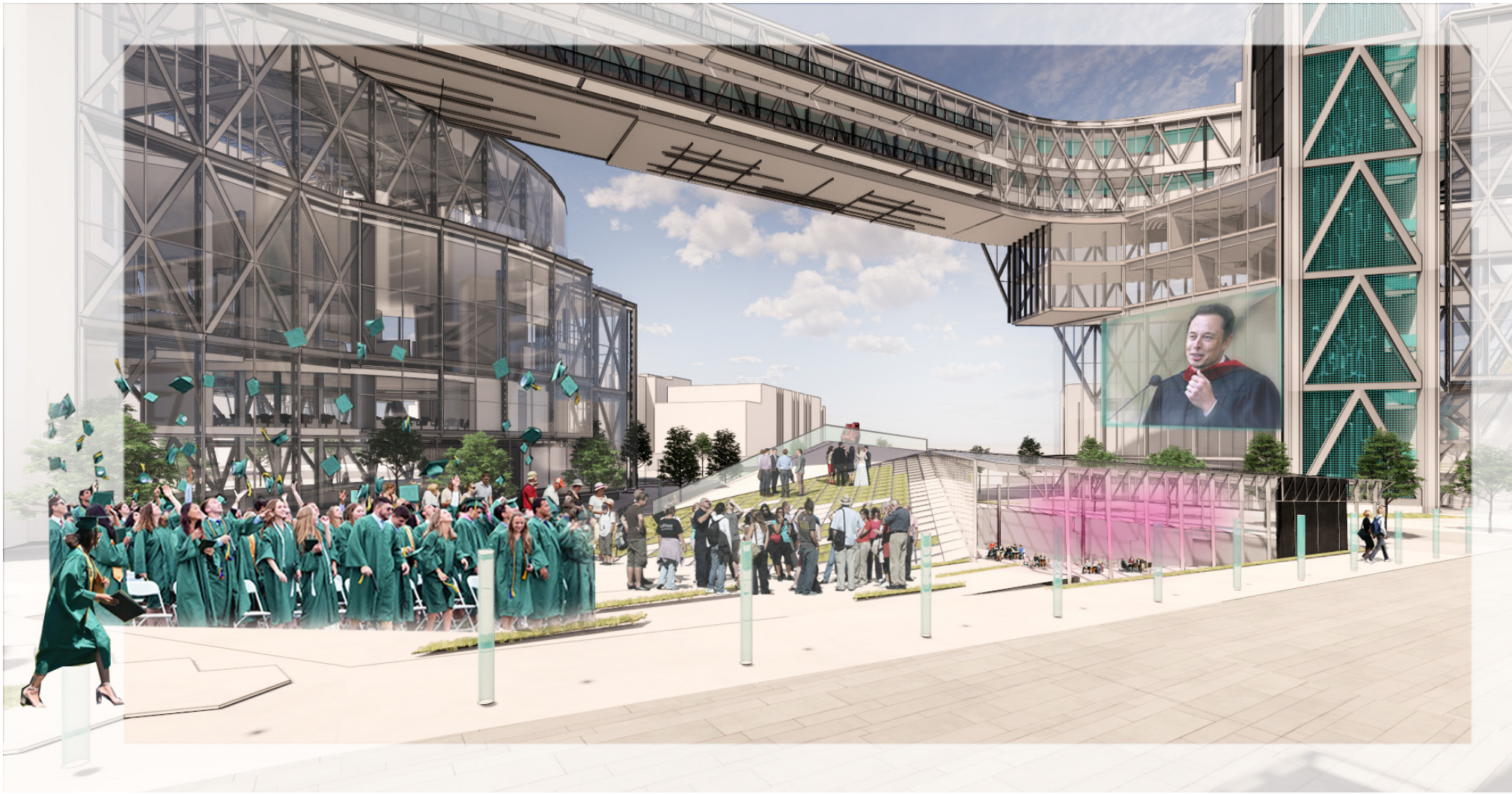
Figure 4.22
Site section showing sunken central dining hall and below-grade connection to the Forum building.

Figure 4.23
View of central plaza and sunken dining hall, depicted during commencement celebrations

The south edge of this campus aligns with the monorail on 5th Avenue. While the North Tower and the Clinical Sciences Wing at its base focuses on clinical and laboratory research, the South Tower addition to the historic P-I Building houses programs related to the creative arts, media and design, consisting of maker spaces and studios, with the media library and atrium at its base. As the oldest building on this campus, the P-I Building is also home to the institute's administration.

At the heart of campus is the central plaza and sunken dining hall. Due to the dense development of tall residential towers to the south of this space, the campus massing is intentionally lower in bulk height and scale to optimize natural light access throughout the day.

The Forum, centrally located on Denny Way, is the front door to campus, with an event and visitor's center that makes a below grade connection to the dining space.



4.6. Campus in the Cybernetic City

The proposed Cybernetic Campus offers a new paradigm for a place-based institution. It draws on the work of others who have previously applied the conceptual framework of cybernetics to institutions, including Robert Birnbaum, who published the article "The Cybernetic Institution: Toward an integration of governance theories," in 1989. He proposed that by following cybernetic principles, institutions could become "self-correcting" organizations that, by monitoring functions and data, could "steer" towards important issues and balance changing values with changing priorities.[7]

This design proposal is not set in the future. It is meant for today. It is intended, with a sense of urgency, to provoke questions of the institutions we have today that are based on outdated models. Will AI have a role in how the university functions? Will there be a population of robots on campus to assist in education, administration and student life? The answer to both is "yes," but this is far from the main issue.

Figure 4.24
View of campus down Battery Street from the monorail.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The Cybernetic Campus is both a physical construct and a system of planning. Recent discussions regarding higher education have often been centered on transformation and reform. Campuses have indeed transformed, but the transformation has too frequently been limited to architectural style and responding to competition to offer the best amenities and student life experience. In contrast, this design not only promotes transparency and engagement with the city over "gated enclaves" and "ivory towers," but it also prioritizes attention to technology now being developed, utilized and questions how this technology will be used and who it will serve.

Figure 4.25
View from Battery Street towards Denny Way and North Tower Clinical Sciences Wing.


OPEN
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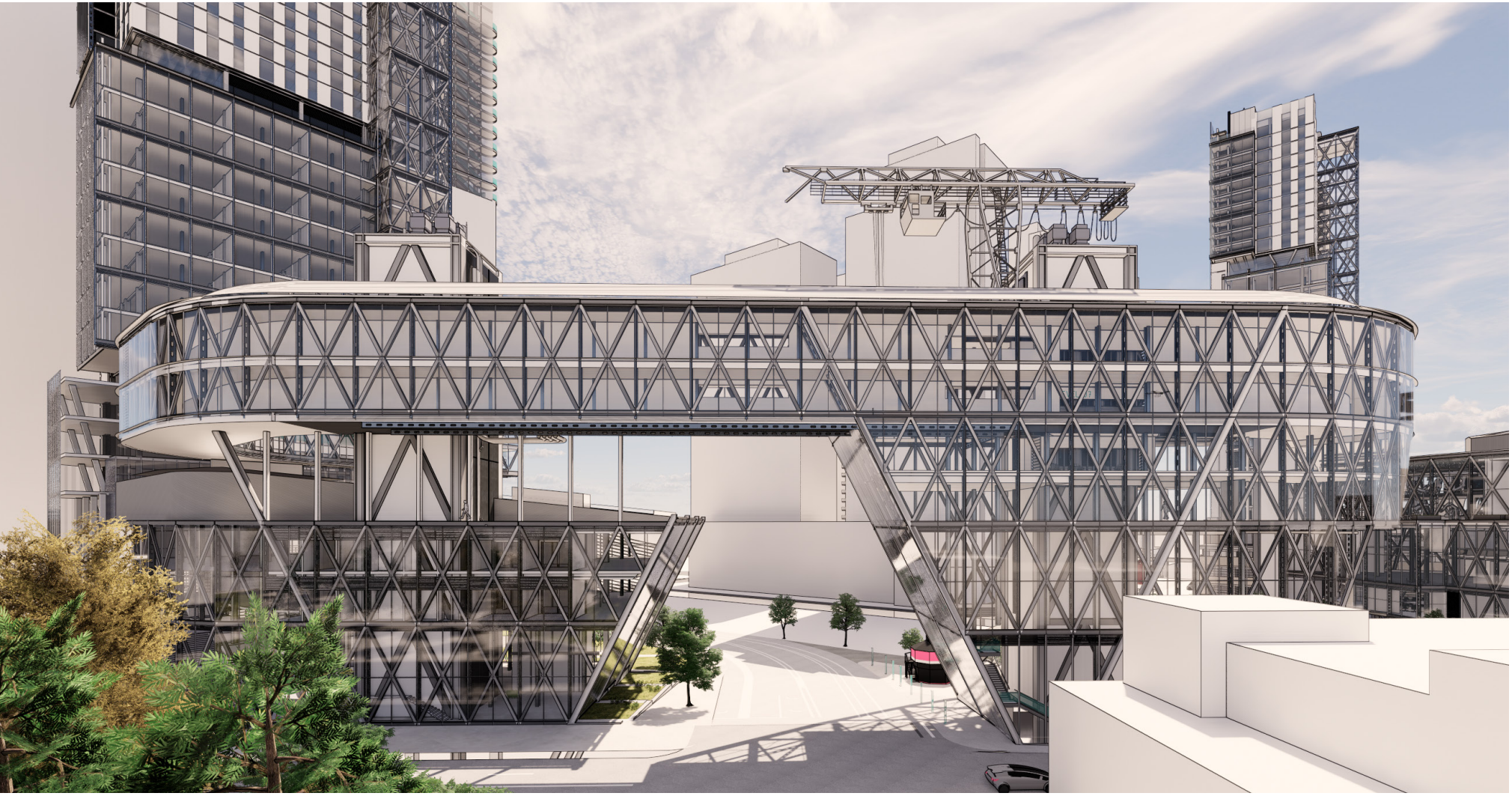
Figure 4.26
Aerial view of the Cybernetic Campus looking south.
Background courtesy of Matteo Colombo Travel Photography



05. Conclusion

Towards a Future We Want

The Cybernetic Campus is informal and experimental. It is distinctively different from its surroundings, yet it is integrated and embedded int the city. Urban universities and research institutions are drivers of economy, but they are also a form of social structure that provides stewardship beyond academics. In this Fourth Industrial Revolution, the Cybernetic Campus is envisioned to guide society in adapting to new forms of technology for current and future generations in a way that supports societal values. The unknown potential of technology raises numerous ethical issues, and how we respond to them cannot exclude certain members of society. Therefore, the Cybernetic Campus is not an "ivory tower," but rather an institute for society at large to train professionals and grow leaders to ensure intergenerational well-being. As space within the city, the campus provides a forum to debate and advocate for changes we need while fostering a strong sense of community.

If implemented under the guidance of institutions and societal values, A.I., machine learning and robotics have the potential to improve the quality of human life, fight climate change and help to further human potential and discovery. The Cybernetic Campus can prepare society for an uncertain future by acting now before technology takes total control.

Figure 5.1
View of campus facade at Denny Way and 7th Avenue

Notes from chapters

Chapter 01 - Towards Digital Equity

1. Chandler, David L. "British Prime Minister David Cameron visits MIT." MIT News Office, Massachusetts Institute of Technology. 14 May 2013. http://news.mit.edu/2013/david-cameron-visits-mit-0514

2. Osborne, Michael and Frey, Carl Benedikt. "Automation and the future of work - understanding the numbers." *Oxford Martin School*, University of Oxford, 13 April 2018, www.oxfordmartin.ox.ac.uk/blog/automation-and-the-future-of-work-understanding-the-numbers/.

3. "The Eliza Effect." 99% Invisible, Public Radio Exchange Radiotopia. 10 December 2019. https://99percentinvisible.org/episode/the-eliza-effect/

4. Aoun, Joseph. *Robot-Proof: Higher Education in the Age of Artificial Intelligence.* The MIT Press, 2017.

5. Copeland, Michael. "What's the Difference Between Artificial Intelligence, Machine Learning and Deep Learning?" NVIDIA. 29 July 2016. https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/.

6. Schwab, Klaus. "The Fourth Industrial Revolution." *World Economic Forum*. 14 January 2016. https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab

7. "The Fourth Industrial Revolution." *The World Economic Forum*. 13 April 2016. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

8. Villard, O. G. Jr. "Frederick Terman." Southwest Museum of Engineering, Communications and Computation. https://www.smecc.org/frederick_terman.htm

9. Whittington, Jan. "Lecture 2: Country Overview of the USA: Evaluating the Role of Local Government." 25 April 2019. Global Planning Course, University of Washington. Accessed 16 May 2020.

10. Scott, Kristin. "Smart City Seattle and Geographies of Exclusion." The Digital City and Mediated Urban Ecologies. Palgrave Macmillan, 2016.

11. Ibid.

12. Arbes, Ross and Bethea, Charles. "Songdo, South Korea: City of the Future? *The Atlantic*. 27 September 2014

13. Krivý, Maroš. "Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control." Planning Theory, vol. 17, no 1, 2018, pp. 8-30.

14. Aoun, xx.

Chapter 02 - Campus: University in the 21st Century

1. Paul Turner Venable. *Campus, An American Planning Tradition*. Architectural History Foundation; MIT press, 1984.

2. Haar, Sharon. *City as Campus, Urbanism and Higher Education in Chicago*. University of Minnesota Press, 2011.

3. Deplazes, Andrea. "The Campus as Location and Strategy: Thumbnail Sketches of Science City." *Campus as the City, Urban Design for the Knowledge Society*. Hoeger, Kerstin and Christiaanse, Kees. Gta, 2007. 35-43.

4. Wills, Antoinette and Bolcer, John D. *The University of Washington*. Arcadia Publishers, 2014.

5. Ochsner, Jeffrey Karl., and Andersen, Dennis Alan. Distant Corner: Seattle Architects and the Legacy of H.H. Richardson. University of Washington Press, 2003.

6. Haar, xxiii.

7. Ibid, xxiv.

8. Diner, Steven J. *Universities and Their Cities: Urban Higher Education in America*. Johns Hopkins University Press, 2017.

9. Haar, 1.

10. Temple, Paul. *The Physical University: Contours of Space and Place in Higher Education*. Routledge, 2014.

11. Campbell, Bryan, Franke, Cuno, Randel. "Shapers of the City: Cultural Institutions and Universities." Bulletin of the American Academy (Spring 2009): 28-29. *American Academy of Arts and Sciences*. www.amacad.org.
12. "2018 State of Facilities in Higher Education: 6th Annual Report." Sightlines, A Gordian Company.

13. Marcus, Jon, "Why Colleges are Borrowing Billions

14. Stern, Robert A.M., et al. *Robert A.M. Stern : on Campus: Architecture, Identity and Community*. 1st ed., Monacelli Press, 2010.

15. Nimmo, Andrew. The city campus and urban agency [online]. Architecture Australia, Vol. 105, No. 4, Jul/Aug 2016: 52-56. Availability: <https://search.informit.com.au/documentSummary;dn=168179642802110;res=IELAPA> ISSN: 0003-8725.

16. Beha, Ann. "Ivory Powers, Dynamic Urban Campuses Promote the Common Good." Architecture Boston. 01 March 2016.

17. Groesbeck, Christopher. "Creating a Vertical University in an Urban Environment." Council on Tall Buildings and Urban Habitat Journal. 2013 Issue I.

18. "University Center - The New School." *Top Ten Projects*. The American Institute of Architects. 22 April 2015. https://www.aiatopten.org/node/442.

19. Reed, Bob., et al. *The Urban Community College, 1969 : a Study of 25 Urban Community College Systems*. Caudill Rowlett Scott, 1970.

20. Ibid, 8.

21. "Facebook invests $4M to expand Northeastern University's Align computer science master's program."

22. Stern, Robert A.M., et al. 14.

23. Block, India. "ETH Zurich robots use new digital construction technique to build timber structures." Dezeen. 16 April 2018.

24. "IRIS - Institute of Robotics and Intelligent Systems." ETH Zurich. https://www.iris.ethz.ch/

25. "The Atlantic, October 10, 2017 and "2018 State of Facilities in Higher Education, 6th Annual Report." Sightlines, a Gordion Company.

26. "Top 20 Robotics Engineering Schools in the U.S. *Grad School Hub*. April 2016. https://www.gradschoolhub.com/best/robotics-engineering-schools/

27. “MIT’s Building 20: The Magical Incubator.” nanopdf.com 23 June 2018. https://nanopdf.com/download/celebrating-mits-building-20_pdf

28. “Ray and Maria Stata Center for Computer, Information, and Intelligent Sciences.” MIT Department of Facilities. https://web.mit.edu/facilities/construction/completed/stata.html

Chapter 03 - Site: Denny Triangle, Seattle

1. Luoma, Andrew. *The Triangles of Denny Triangle.* The University of Washington. 2007

2. “Context Statement, Denny Triangle, Historic Survey and Inventory.” Thomas Street History Services, June 2006.

3. Lloyd, Sarah Anne. “Amazon’s Block 21 project moves forward.” *Curbed Seattle*. 20 September 2017. https://seattle.curbed.com/2017/9/20/16340522/amazon-block-four-building-photos

4. “Property Report: Parcel Number 35900-0000.” King County Department of Assessments. 29 January 2019.

5. “2300 6th Avenue Design Recommendation Meeting.” VIA-Architecture. City of Seattle Public Domain. 19 April 2016.

6. “2301 7th Avenue Design Recommendation.” Clise Properties, Inc. City of Seattle Public Domain. 19 January 2019.

7. “600 Wall Street Downtown Design Review Board Recommendation Booklet.” Laconia Development LLC. 06 January 2015.

8. “Property Report: Parcel 069600-0250.” King County Department of Assessments. 29 January 2019.

9. “Summary for 521 Wall Street / Parcel ID 0697000064.” *Seattle Historic Sites*. Seattle Department of Neighborhoods. Accessed 13 February 2020.

10. Evans. “$5-Million P-I Expansion 30% Done, on Schedule.” 10 June 1969. Museum of History and Industry Collections and Research.

11. Mcnerthney, Casey. “Then and now: The old P-I building.” Seattle PI. 1 February 2013.

12. Ochsner, Jeffrey K. Personal Interview. 22 June 2020.

13. Hanks, David A., et al. *American Streamlined Design: the World of Tomorrow*. 1st ed., Flammarion, 2005.

14. Canipe, Martha L. "Streamline Moderne: Speeding into the Future!" *The Historic Dimension Series, a student publication series by the UNCG Department of Interior Architecture*. University of North Carolina at Greensboro, 2018.

15. "400 Westlake Avenue North Project 3022779 West Design Review Board Design Recommendation." Martin Selig Real Estate, Perkins and Will. City of Seattle Public Domain. April 18 2019.

16. Woo, Eugenia. "What Price Facadism? Authenticity and Integrity in Historic Preservation." ARCADE, Issue 33.2, 2015.

17. Berger, Knut. "Is landmarking a building all a facade?" *Crosscut*. 1 August 2018.

18. Merlino, Kathryn Rogers. *Building Reuse, Sustainability, Preservation and the Value of Design.* University of Washington Press, 2018. 23.

19. Tiller, de Teel Patterson. "Obey the Imperatives of Our Own Moment: A Call for Quality Contemporary Design in Historic Districts." *Forum Journal*. 21.4. 2007.

Chapter 04 - Proposal: The Cybernetic Campus

1. Hobson, Benedict. "Archigram's Instant City concept enables 'a village to become a kind of city for a week' says Peter Cook." Dezeen. 13 May 2020.

2. Mathews, Stanley. "The Fun Palace as Virtual Architecture: Cedric Price and the Practies of Indeterminacy." Journal of Architectural Education, vol. 59, no. 3, 2006, pp. 73-91.

3. Ibid, 73

4. Pangaro, Paul. "'Getting Started' Guide to Cybernetics." https://www.pangaro.com/definition-cybernetics.html

5. Pangaro, Paul. "The Future of Cybernetics." *World's Fair Nano*. 25 March 2018. https://youtu.be/fGTZU6bh2cc

6. Ibid.

7. Birnbaum, Robert. "The cybernetic institution: Toward an integration of governance theories. Higher Education 18, 239-253. 1989. https://doi.org/10.1007/BF00139183.

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Acknowledgments

On March 18th, 2020, the University of Washington announced that courses for the 2020 spring quarter would be held remotely due to the outbreak of COVID-19. My peers and I cleared our belongings from Architecture Hall, uncertain as to when we would be back in the studio again and how the imminent pandemic-induced recession would impact the profession we were so eager to enter. Over the course of the next few weeks we saw the devastating impacts to cities across the country and throughout the world. Yet the committed faculty and staff at the College of Built Environments (CBE) swiftly pivoted courses for distance learning, turning seminars and studios into virtual meetings and preparing events, messages and videos to reach out to students and keep us engaged. Fellow classmates set up video calls to share work and connect with each other.

I would like to express my gratitude and admiration to the community at the CBE and Department of Architecture for their dedication and committment to students during the most difficult and unprecedented times. I had the priviledge of learning from both of my committee members, Professor Dave Miller and Professor Jeffrey Ochsner, beginning with my first term in the program during fall 2018. I owe a great deal to them in learning about the story of Seattle, and working with them on this thesis project has been a delightful collaboration.

Before the end of the academic term, the racial injustice and systemic racism in our country resurfaced with the horrific loss of countless lives to police brutality. This continues to anger, hurt and concern us and we are

left without the national leadership to bring us together as we continue to fight the threat of this pandemic. I know the CBE community is fully united in extending our deepest sympathies to the families who have suffered and lost loved ones from the novel coronavirus and at the hands of police brutality and systemic racism.

During my time here, I have learned to view the built environment beyond structures, form and design, but for the sense of community and value of social equity in the spaces we design, build and inhabit. This will certainly stay with me as I continue onto practice.

I would not have applied to this program had it not been for the encouragement and support I have had from ZGF Architects, with whom I have had the privilege to work with over the last five years. Thank you for the opportunities that took me to campuses across several states, which set in motion so many of the ideas explored in this thesis project.

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Rainier Vista, The University of Washington