

RICE UNIVERSITY

**FAT FACADE : VERTICAL PUBLIC SPACE**

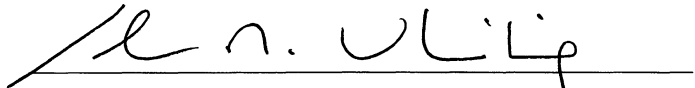
by

**Jessica Hope Tankard**

A THESIS SUBMITTED  
IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE DEGREE

**Master's of Architecture**

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HOUSTON, TEXAS

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# ABSTRACT

## FAT FACADE : VERTICAL PUBLIC SPACE

by

Jessica Hope Tankard

This thesis proposes that the facade of a building, typically seen as a boundary, can become volumetric and inhabited with program. Shanghai's library, currently a sprawling, horizontal megaform, is reconfigured as a thin vertical envelope that attaches to the facade of an existing building. The inner, existing tower uses the efficiency of stacked floor plates for office and book storage, while the facade becomes a cultural interface with the city, bringing porosity and collectivity to the high-rise. The new nested tower typology invigorates Shanghai's crowded city center with an institution that lacks space on the ground plane, while providing a layer of climate control for the tower through a programmed, structural façade. Two latent byproducts of capitalism, skyscrapers and skin systems, are exploited to produce a typology for a high visibility, but low-footprint, institution for the city.

## ACKNOWLEDGEMENTS

To my advisor, Sarah Whiting, for her wisdom, guidance, and infinite patience.

To all of the faculty at Rice for their knowledge and leadership.

To my classmates for always being there.

To my mom and my sisters for their constant support and feedback, and for being my role models whether they know it or not.

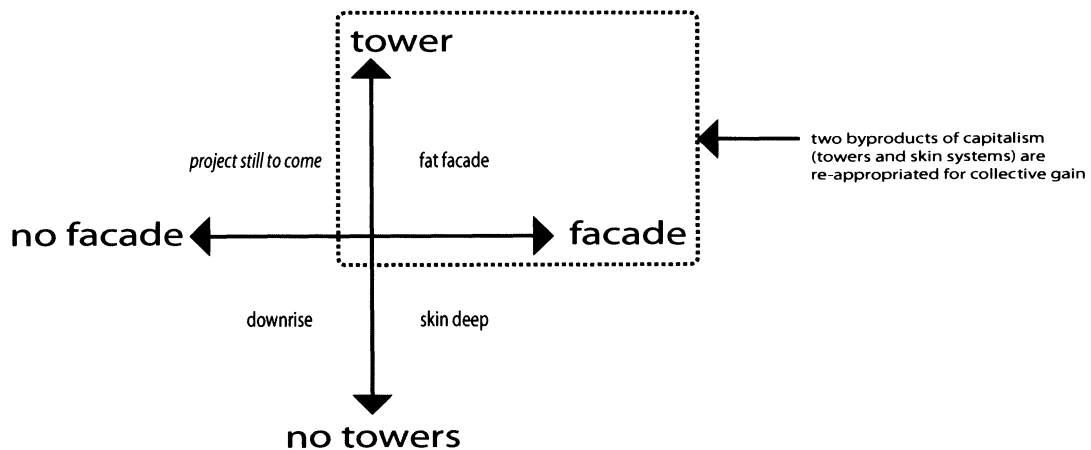
To my mom for teaching me the value of immaculate grammar, and to my dad for instilling in me a curiosity about life and a thirst for knowledge and invention.

# TABLE OF CONTENTS

PREFACE		1
RESEARCH AND DESIGN PROPOSAL		3
1. RESURFACING AS CITY GROWTH	4	
2. REWORKING THE TOWER TYPOLOGY	10	
3. VERTICAL INSTITUTION	13	
DESIGN DETAILS AND RENDERINGS		18
BIBLIOGRAPHY		26
APPENDIX		27

# PREFACE

This thesis is both a culmination of, and a step along the way, in a lineage of thinking that has developed over my time at Rice in relation to the tower and the facade, their relationships to capitalism, and their roles in the city. My project for Neyran Turan's *Islands and Voids* studio, "Downrise," took the stance that towers can be invisible from afar, capitalizing on the dropping topography at the edge of the city in order to embed inverted towers in the ground, the only facades being internalized. My project for Troy Schaum's *Megaform and the Swarm* studio, "Skin Deep," turned to the building envelope (both in terms of overall massing and skin system) as a place for innovation that can guide an architectural intervention as a whole. With my thesis, I attempted to re-envision the highrise typology by amplifying the role of the facade as a thickened interface between city and institution.



Architectural figures who influenced my exploration of the facade include Corbusier with his *Maison Domino*, which minimized the role of the facade (this project's antithesis), Piano and Rogers' *Centre Pompidou*, an important precedent for the dream of walking on a facade, and Alejan-

dro Zaera Polo's recent writings on the envelope. Architectural figures who influenced my explorations of the tower include Corbusier with his horizontal "groundscrapers" and vertical cities; Greg Lynn with his thesis, *Stranded Sears Tower*, which delaminated the bundled tube structure of the existing tower and reconfigured it horizontally; and more contemporary work by Rem Koolhaas' firm OMA, Joshua Prince Ramus' firm REX, and Bjarke Ingels' firm BIG, which have all begun to explore reconfigurations of the typical tower/podium scheme to benefit the public and the city as a whole.

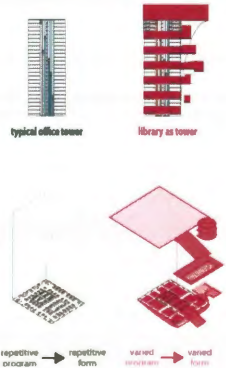
Key to explanatory diagrams (expanded upon in more detail in the following pages)

### vertical institution



cultural amenities hidden inside podium books inaccessible in towers

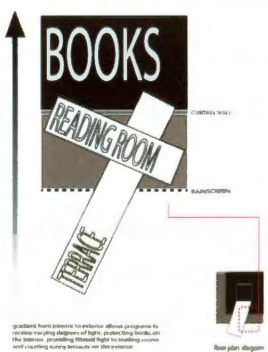
verticality as a barrier to public access



vertical program → vertical form

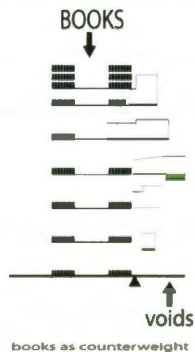


vertical program → vertical form

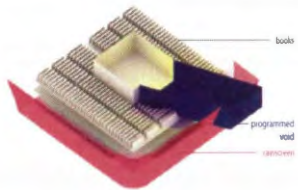


gradated from generic to specific allows programs to create varying degrees of light, providing books with the interior, providing 'street light' to reading rooms and creating space between with the exterior

floor plan diagram

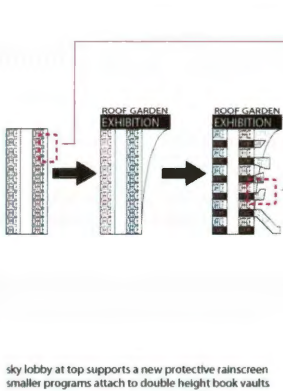


books as counterweight

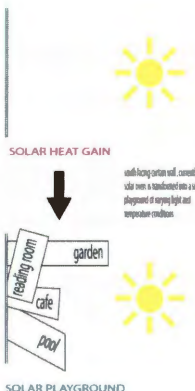


books  
programmed void

### tower typology remix

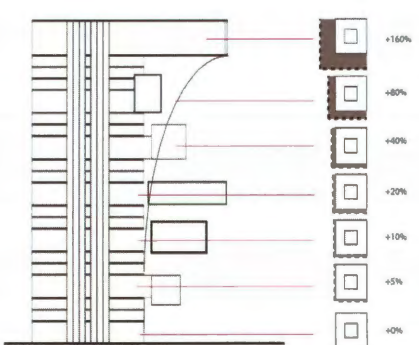
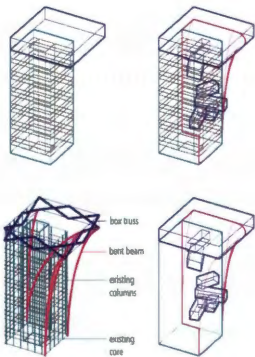


sky lobby at top supports a new protective rainscreen smaller programs attach to double height book vaults



SOLAR PLAYGROUND

east-facing curtain wall, canopy a solar screen is transformed into a solar playground of varying light and temperature conditions

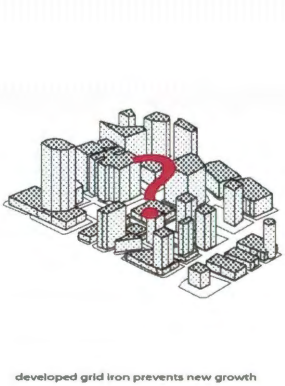


100% tower

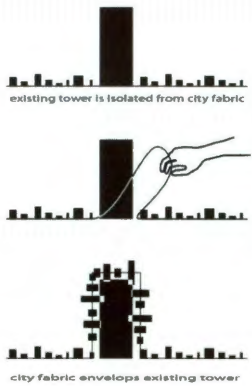
127% tower

155% tower

### resurfacing as city growth



developed grid iron prevents new growth

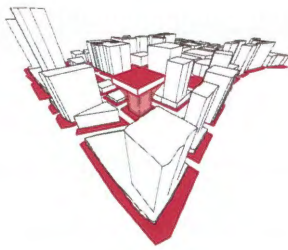


existing tower is isolated from city fabric

city fabric envelops existing tower



city as facade



existing building envelope :: new surfaces for cultural amenities



new program gains elevated views while shading existing tower

## RESEARCH AND DESIGN PROPOSAL

## 1. RESURFACING AS CITY GROWTH

China expects 12 million people to move from rural to urban locations by the year 2020. This thesis explores a mode of vertical urban growth that expands out from towers to open up new opportunities for city life in dense Asian cities.



Shanghai is a rapidly growing city of skyscrapers, resulting in an abundance of vertical surfaces but a lack of open space.

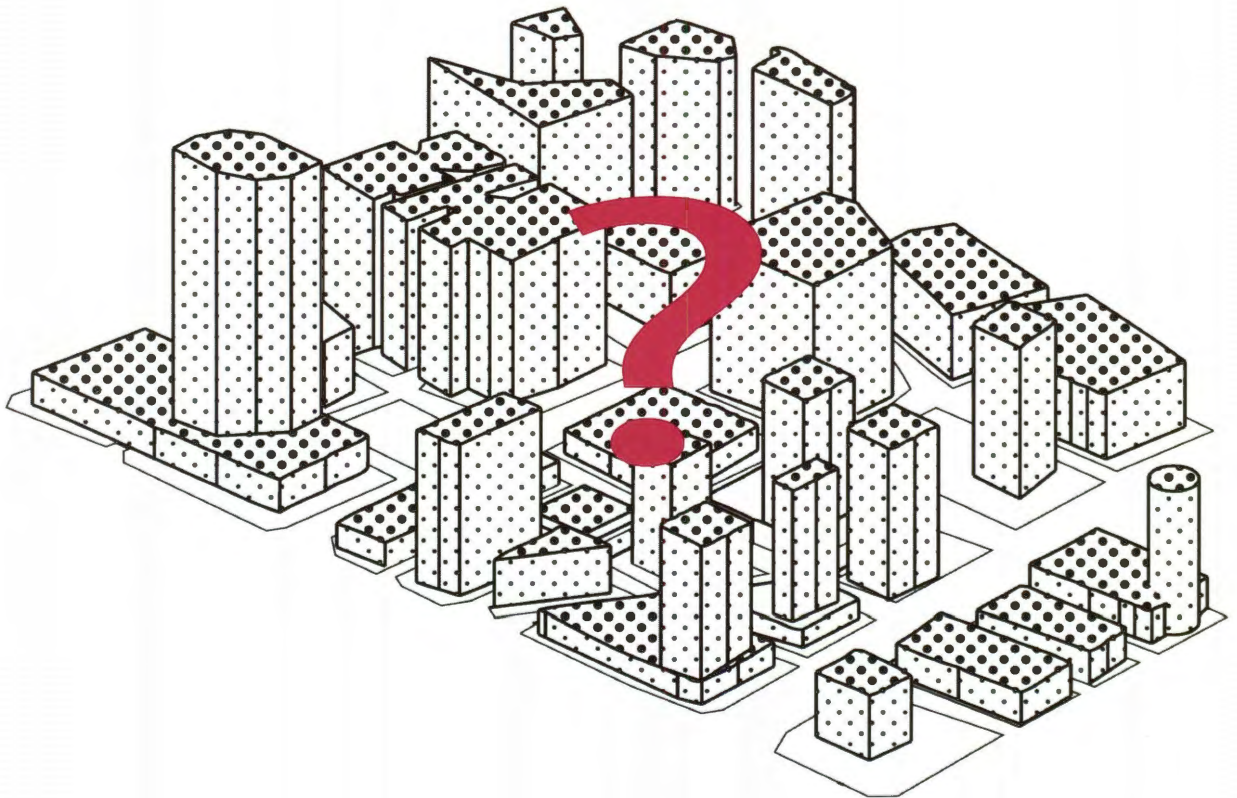


This thesis proposes that the city can densify vertically by folding the ground plane upward.

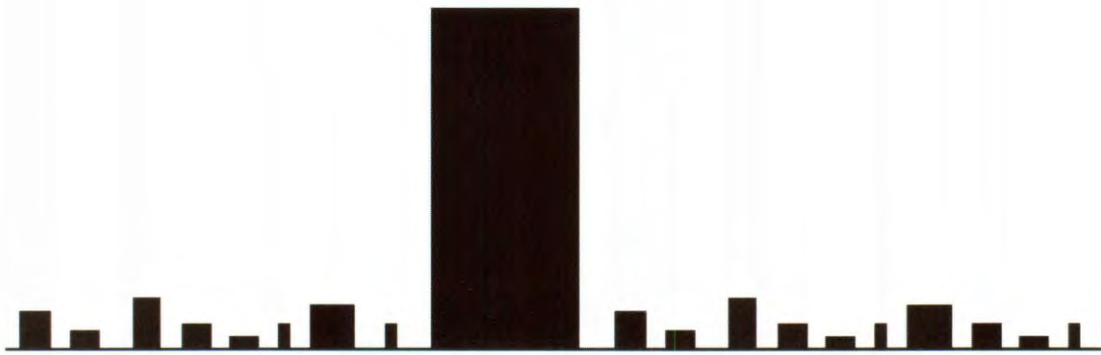


GROUND PLANE

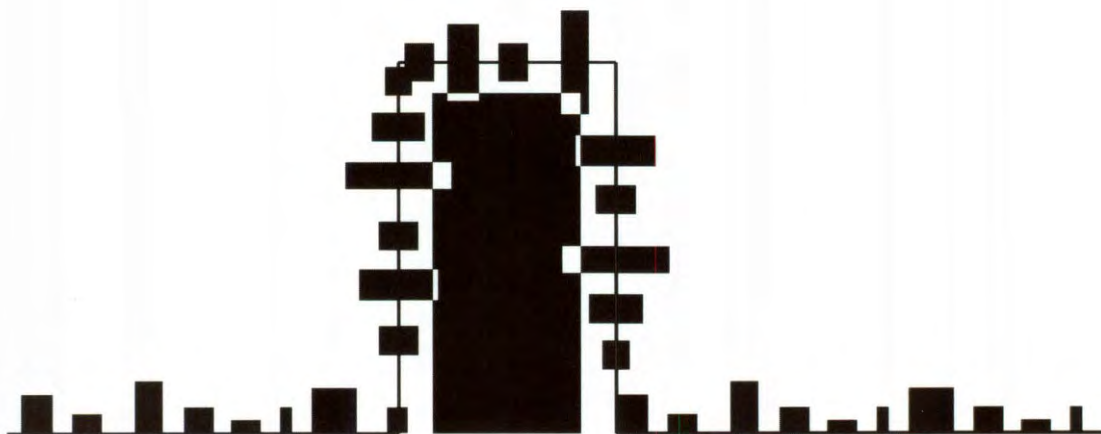
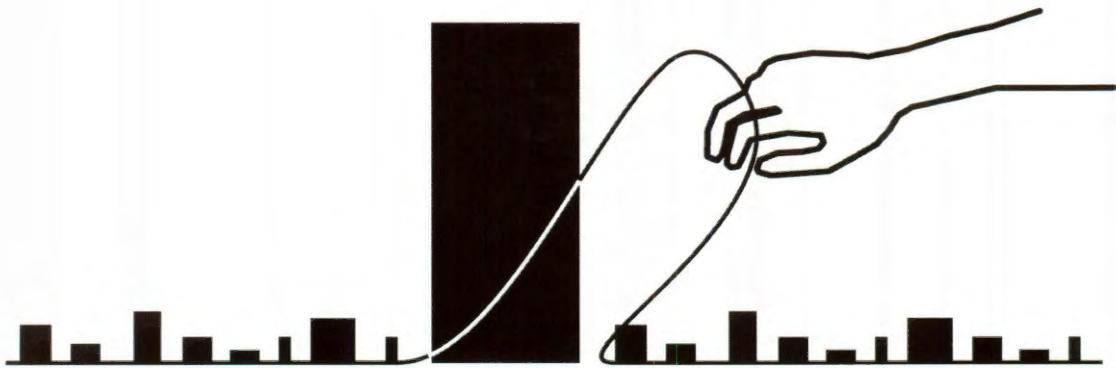




Currently the developed grid iron prevents growth.



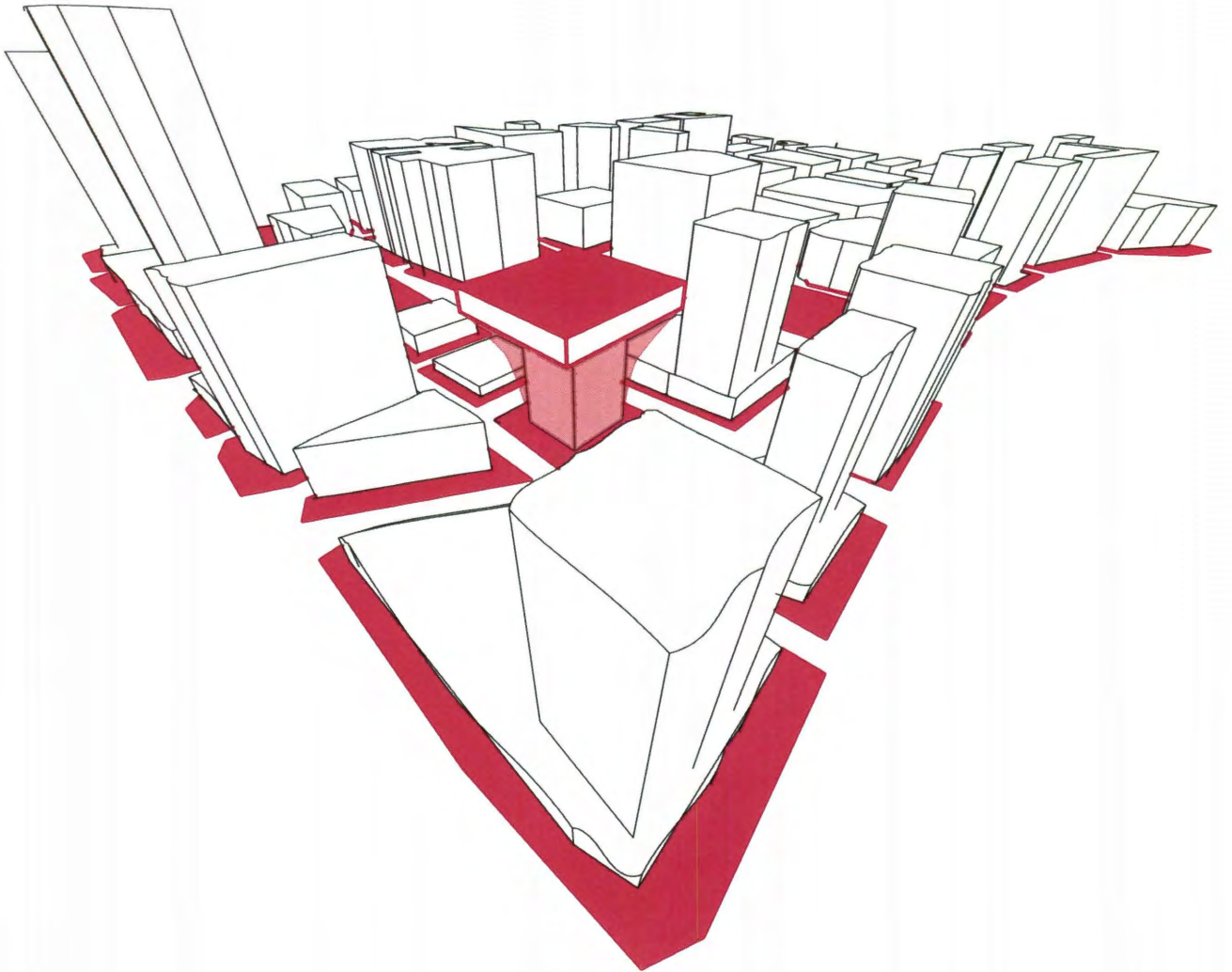
Existing tower is isolated from city fabric.



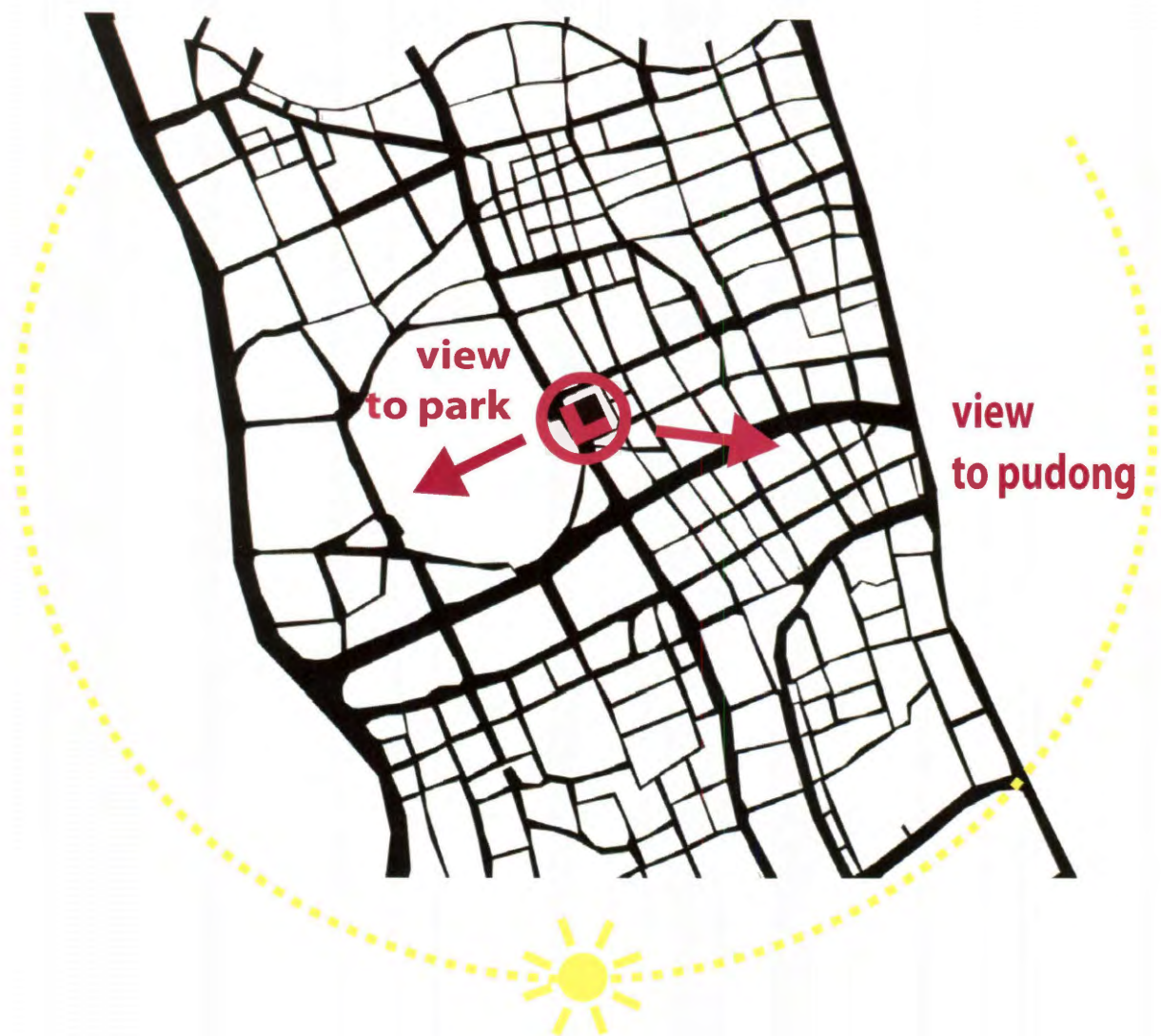
City fabric envelops existing tower.



The city itself as facade.



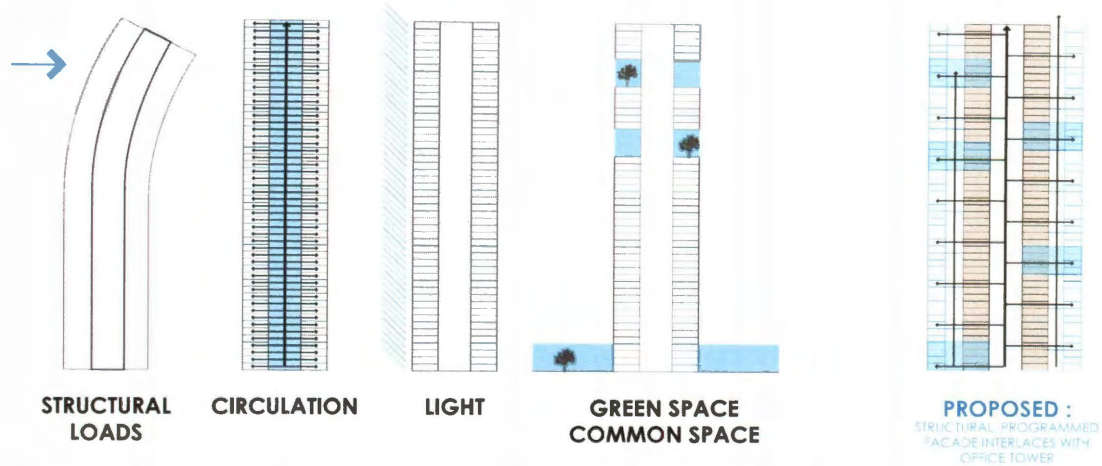
The existing building envelope provides new surfaces for cultural amenities.



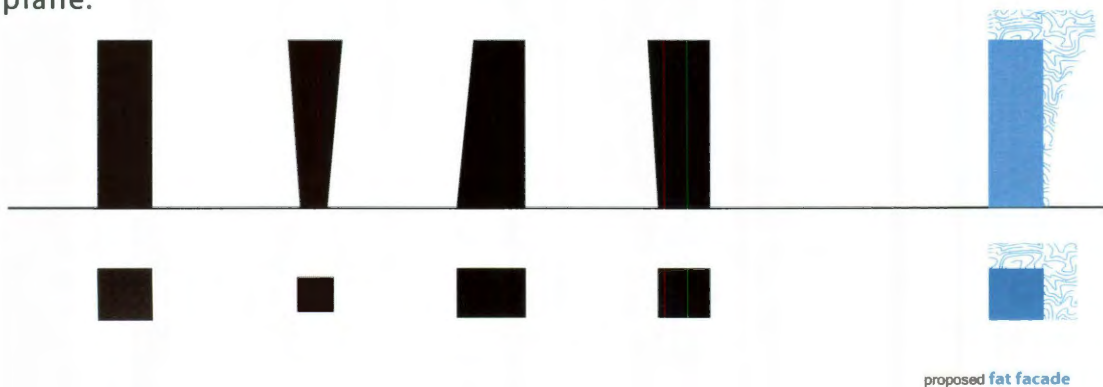
New program gains elevated views while shading the existing tower.

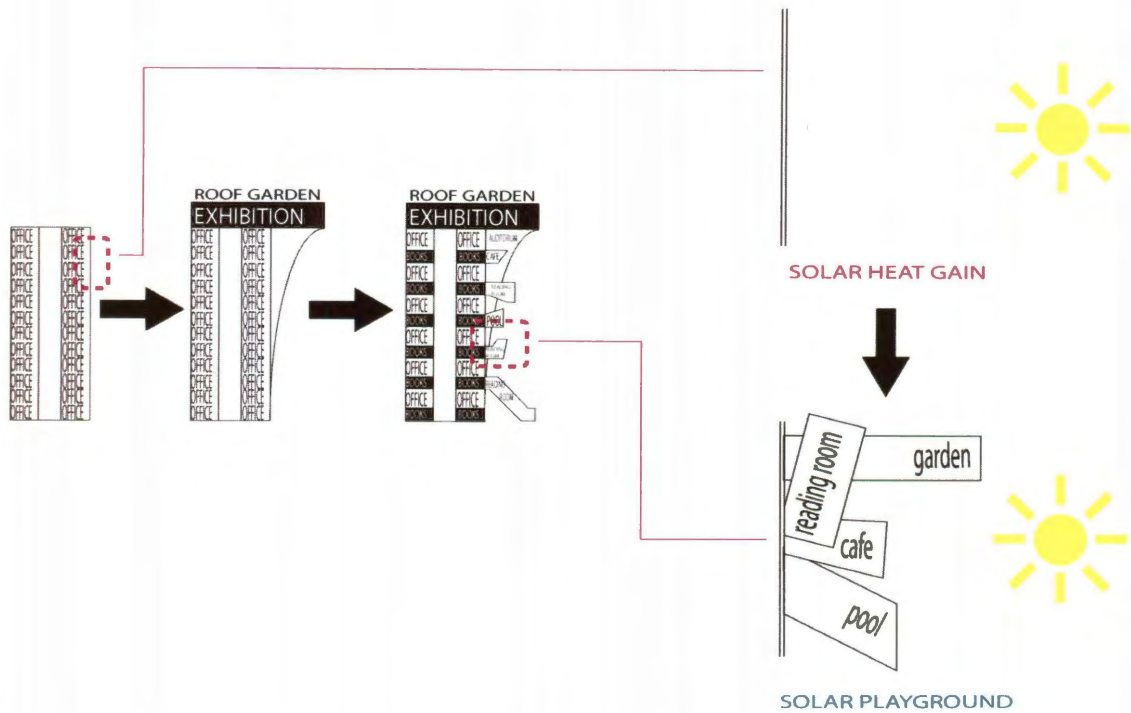
## REWORKING THE TOWER TYPOLOGY

The high-rise, in all of its shapes and forms, arose as a formal solution for density, but remains a highly constrained architectural intervention. The high-rise is constrained by several key issues: structural loads, circulation, light, and access to greenspace.

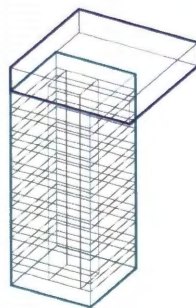


This thesis is predicated on the idea that the facade, though often underutilized and dismissed architecturally in the past as a purely decorative surface, is best positioned to accommodate innovation in the tower typology. A "fattened" facade is introduced to Shanghai as a programmed, structural sleeve that wraps a generic tower core. Working within the constraints of the existing highrise, the reworked tower typology densifies the city without occupying new sites by invigorating urban centers with cultural programs that lack the necessary space on the ground plane.

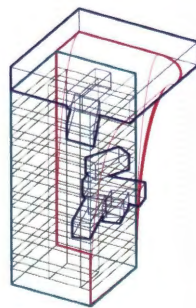




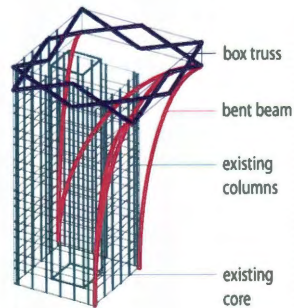
A sky lobby above the existing tower holds double height exhibit spaces and supports a protective rainscreen. The south facing curtain wall, currently a solar oven, is transformed into a solar playground of varying light and temperature conditions.



EXISTING TOWER PLUS NEW EXHIBIT BOX AT TOP



RAINSCREEN HANGS BELOW WITH SMALLER PROGRAMS OCCUPYING SHADED ZONE AND PUNCHING THROUGH FOR SUN EXPOSURE



STRUCTURAL COMPONENTS

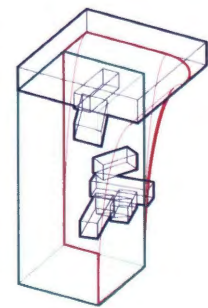


DIAGRAM HIGHLIGHTING ALL NEW PROGRAM AND SKIN

Axonometric diagrams of new skin and program (blue, turquoise, and pink) and existing tower (black).

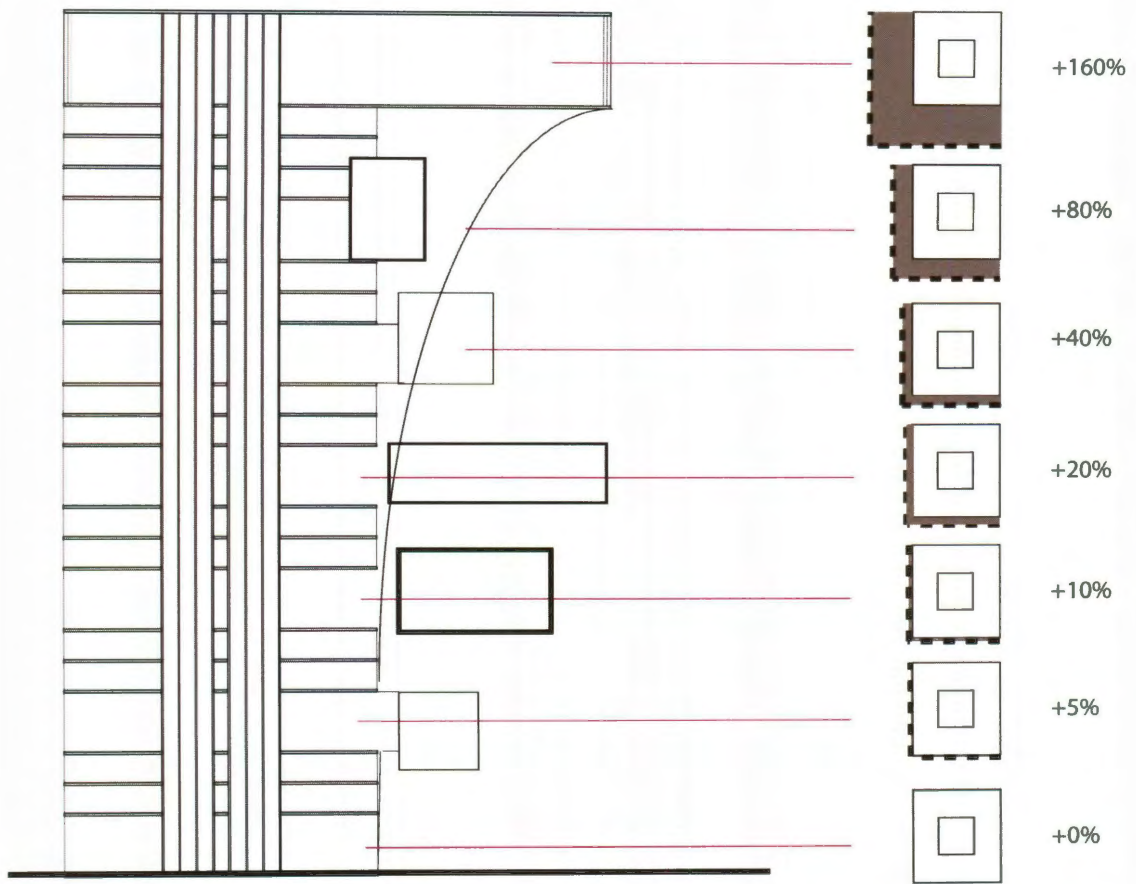


Diagram showing how much intermediate space (and potentially occupiable space) is added to the tower between new and old skins in relationship to existing floor plate.



**100% TOWER**

**127% TOWER**

**155% TOWER**

Axonometric diagrams illustrating how much potential square footage the tower gains in total.

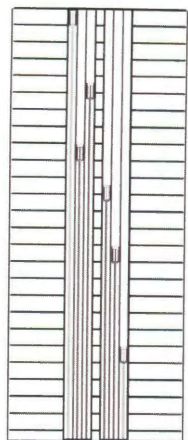


## VERTICAL INSTITUTION

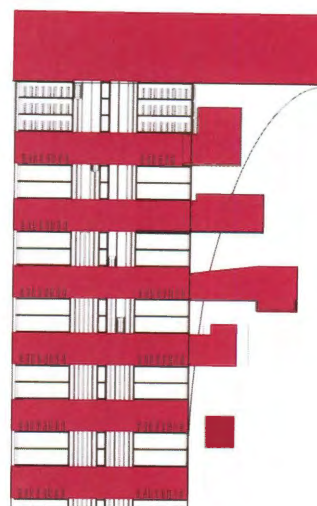
The strategy of accommodating program vertically involves interlacing collective programs with the constraints of an existing high-rise. The starting point is a generic tower, built based on a formula of efficiency through stacked floor plates. The skyscraper typology has developed as vertically striated space around a load-bearing core. This thesis encrusts one such generic tower with a new architectural typology, a cultural and climatic skin. The outer layer offers a new prototype for an institution: reinterpreting the public library as a sleeve of collective programs that cantilever over the city: gardens, reading rooms, auditorium, and exhibition.



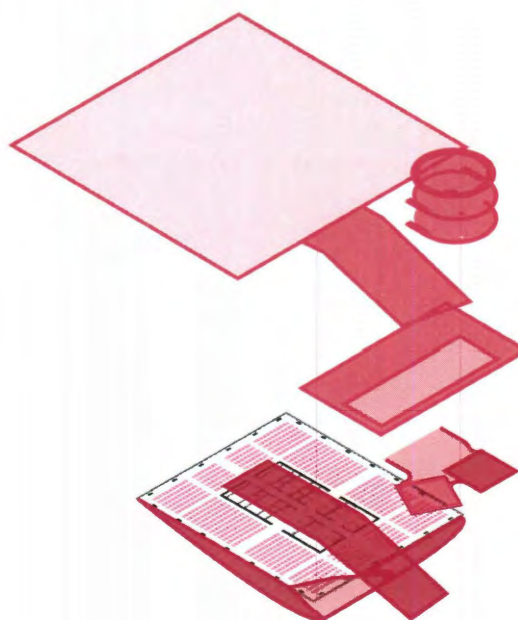
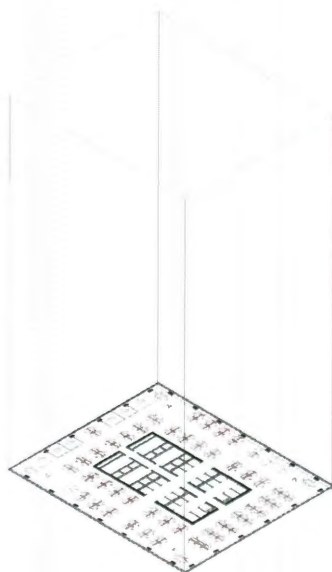
Nesting dolls as a model for the vertical reorganization of an institution as a concentric tower.



typical office tower



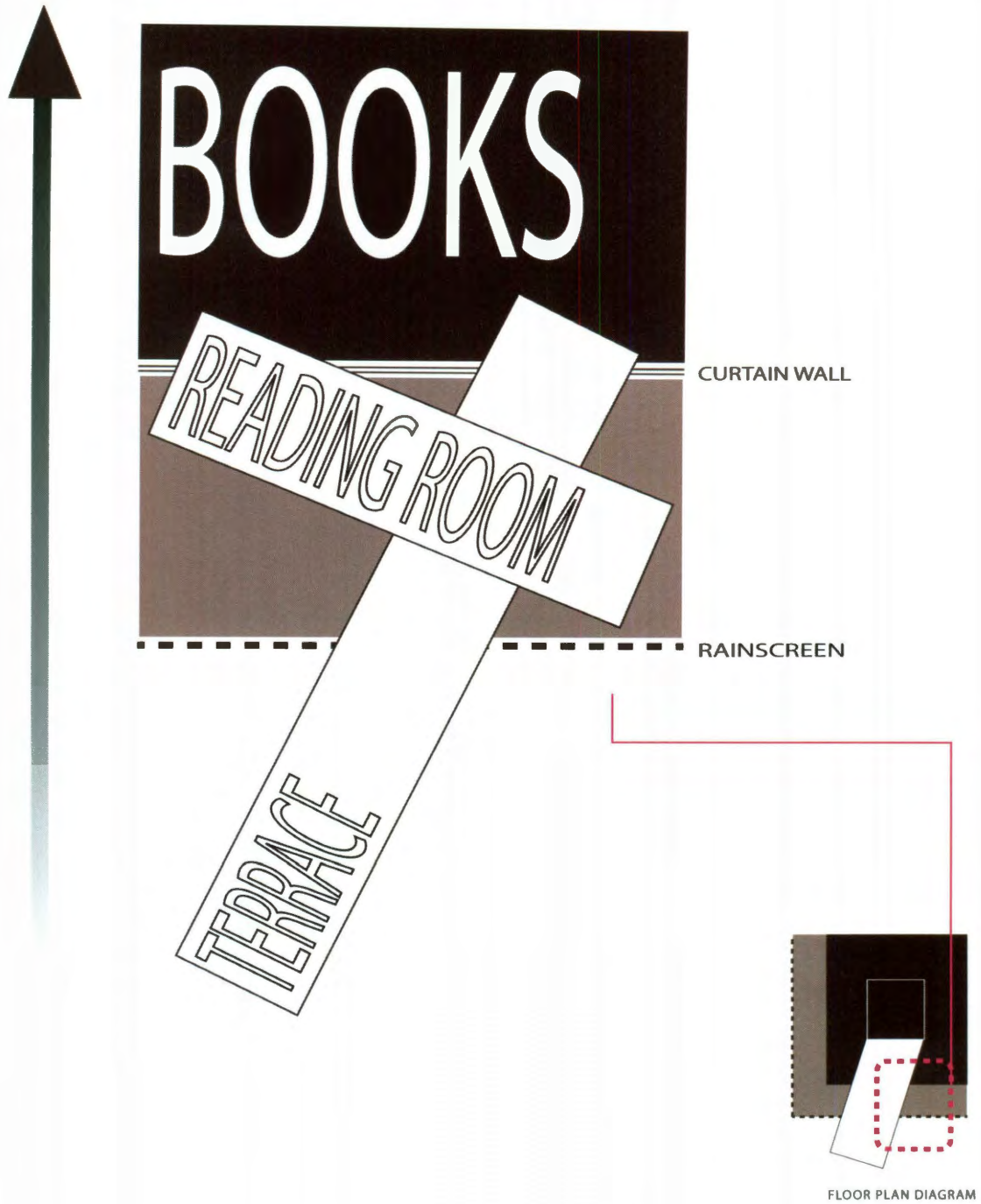
library as tower



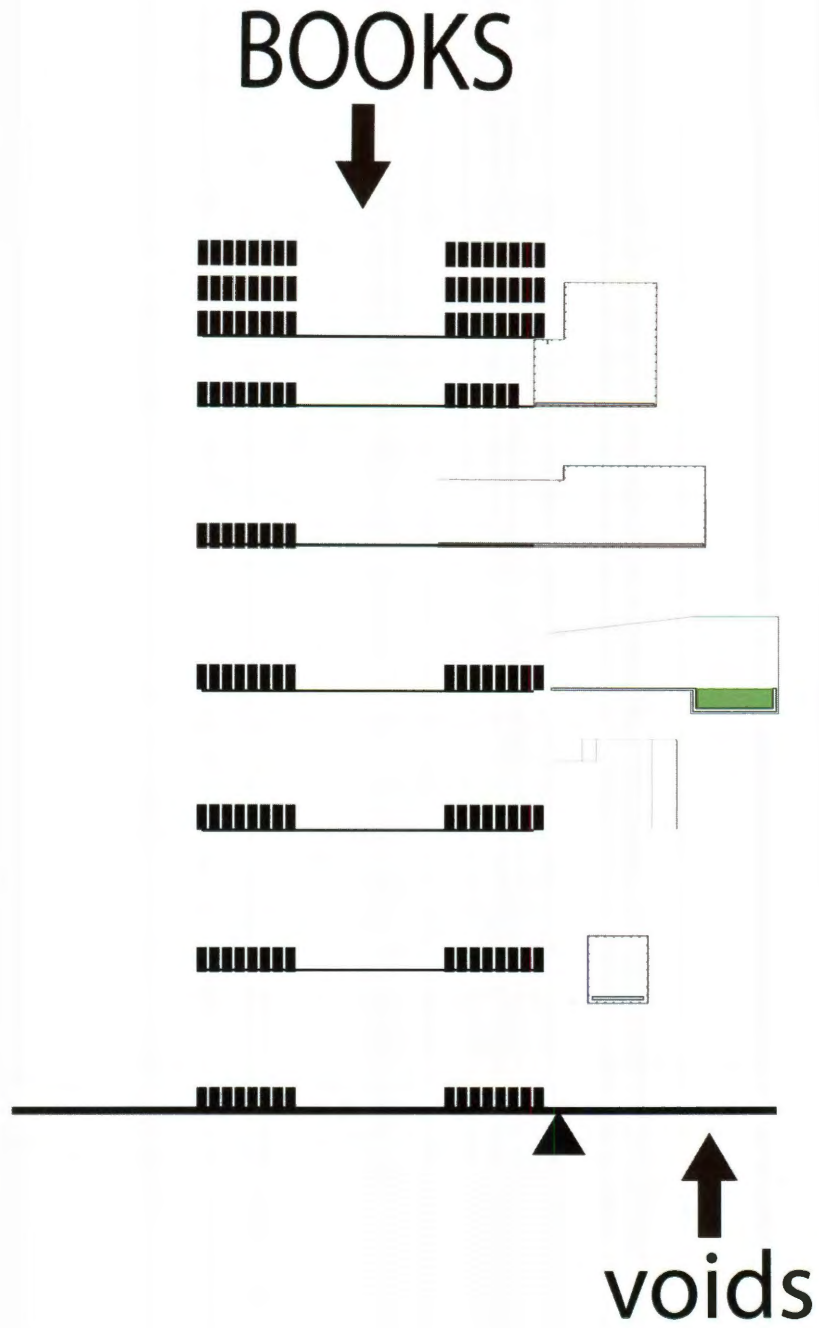
The typical office tower is composed of repetitive programs that directly lead to repetitive form. A library is composed of varied programs, which, in this thesis, present themselves as a variety of forms on the outside of the existing tower. The splicing of double height book voids into the existing tower sets up a regular gridiron that allows these voids to cantilever out from the tower over the city.



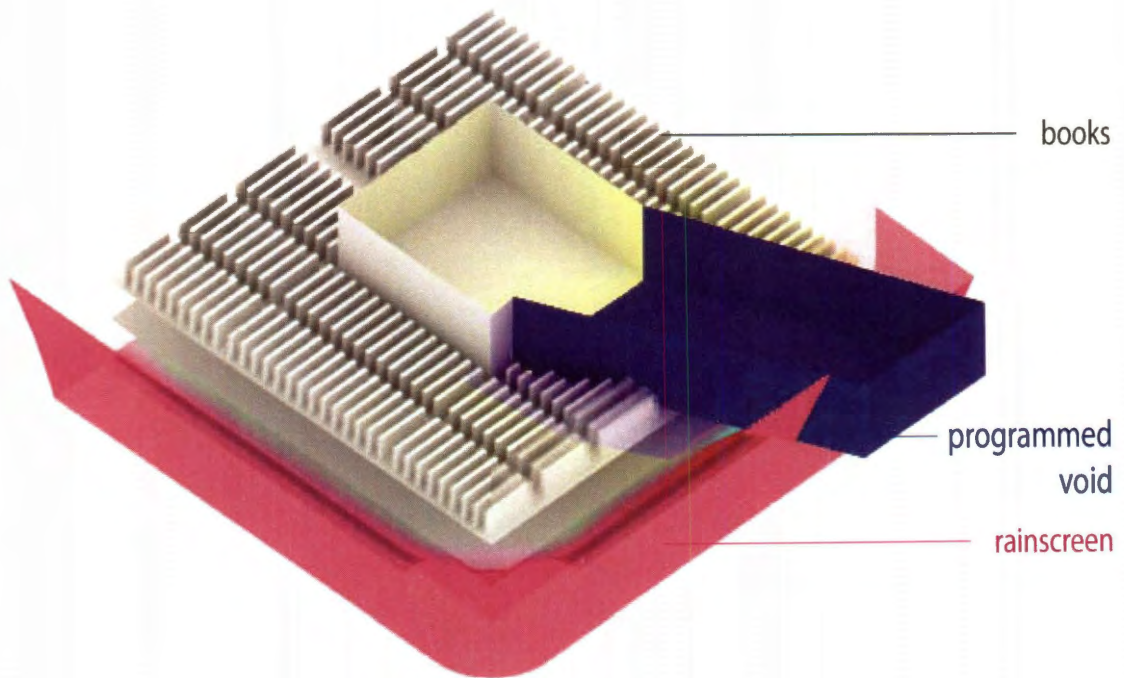
In the existing central library, cultural amenities are hidden inside the podium, and books are inaccessible in two towers. The proposed library as tower pulls the public up around the entire archive, making cultural amenities visible on the exterior.



A gradient of light from interior to exterior allows programs to receive varying degrees of light, protecting books on the interior, providing filtered, even light to reading rooms, and creating sunny terraces on the exterior.

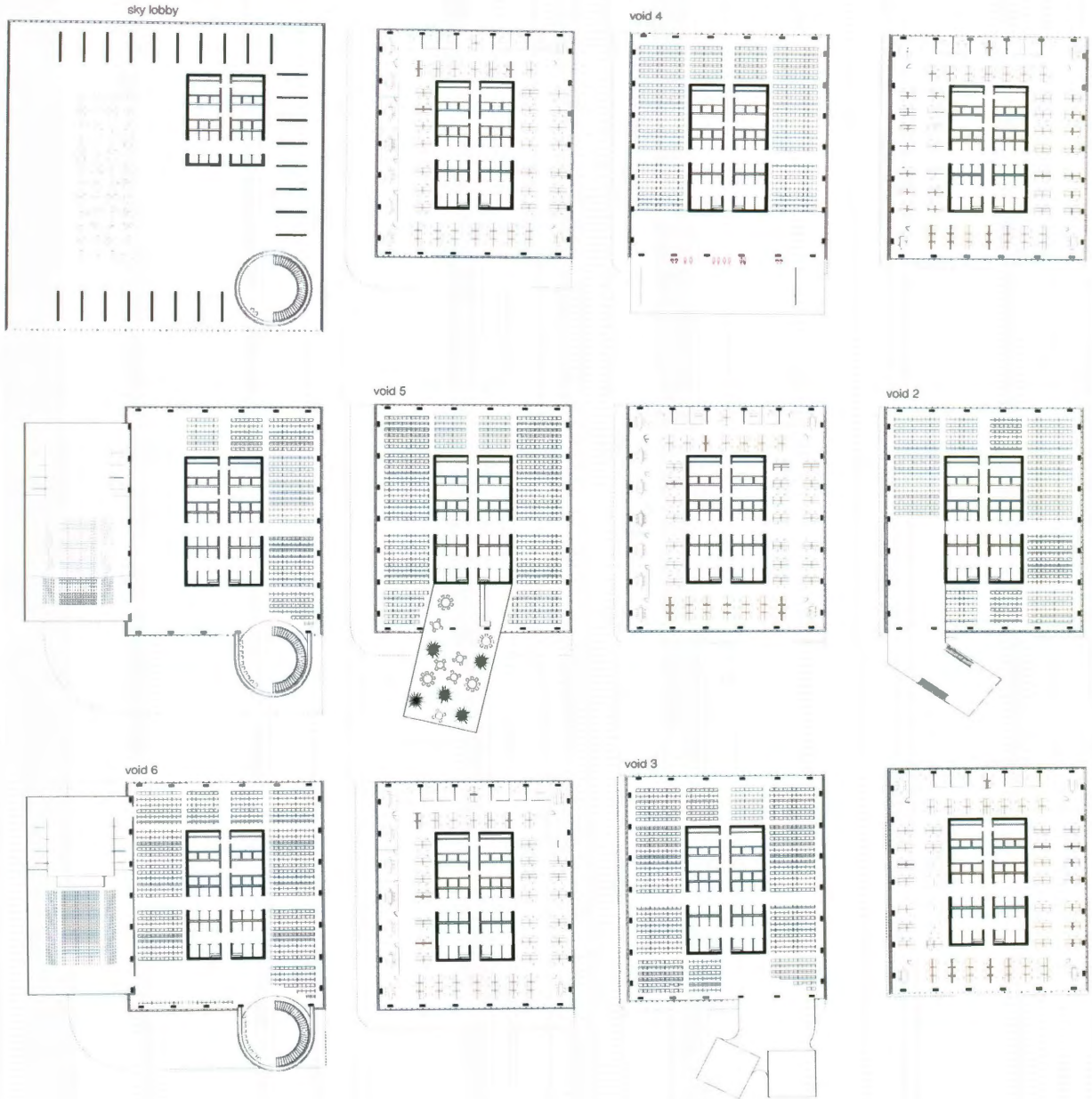


Books are used as a counterweight for the cantilevered library programs.



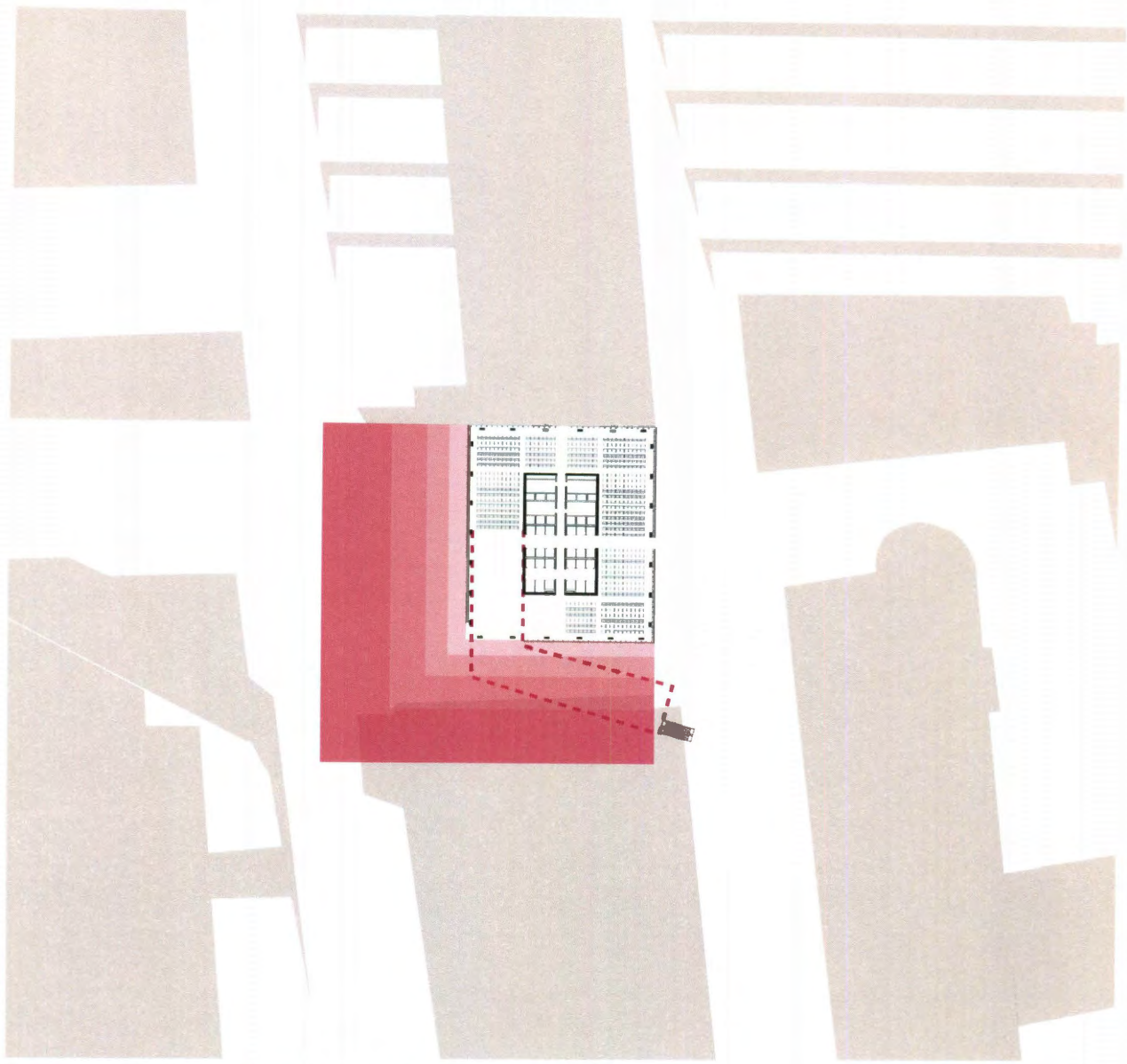
Axonometric diagram of one double height book vault.

**DESIGN DETAILS AND RENDERINGS**

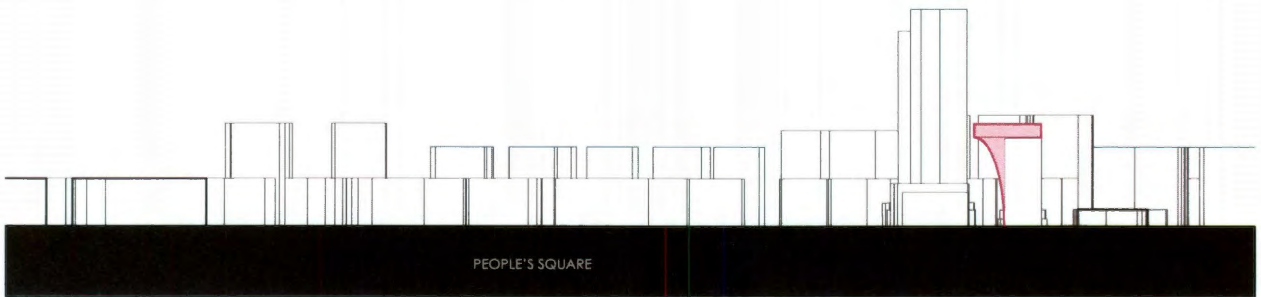


SELECTED FLOOR PLANS



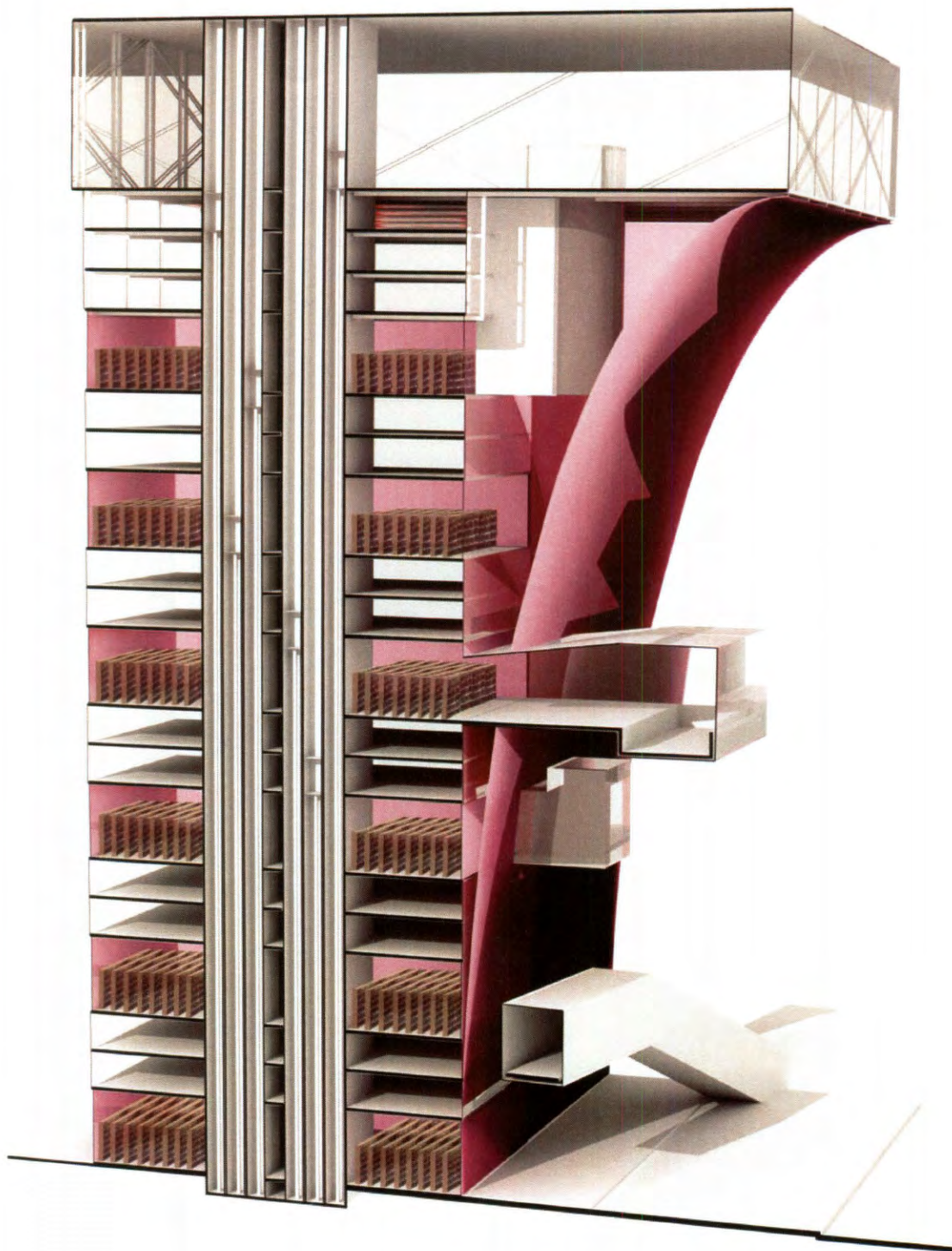


SITE PLAN WITH SHADOWS OVERLAID



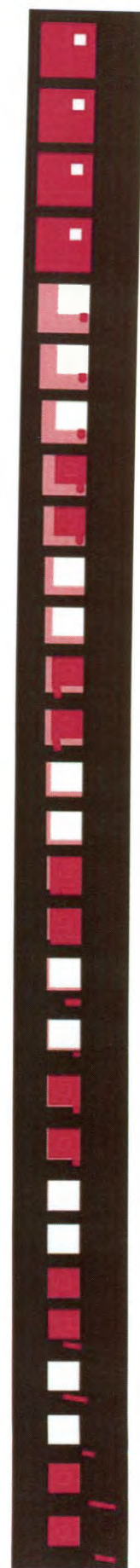
SITE SECTION LOOKING NORTH

PEOPLE'S SQUARE



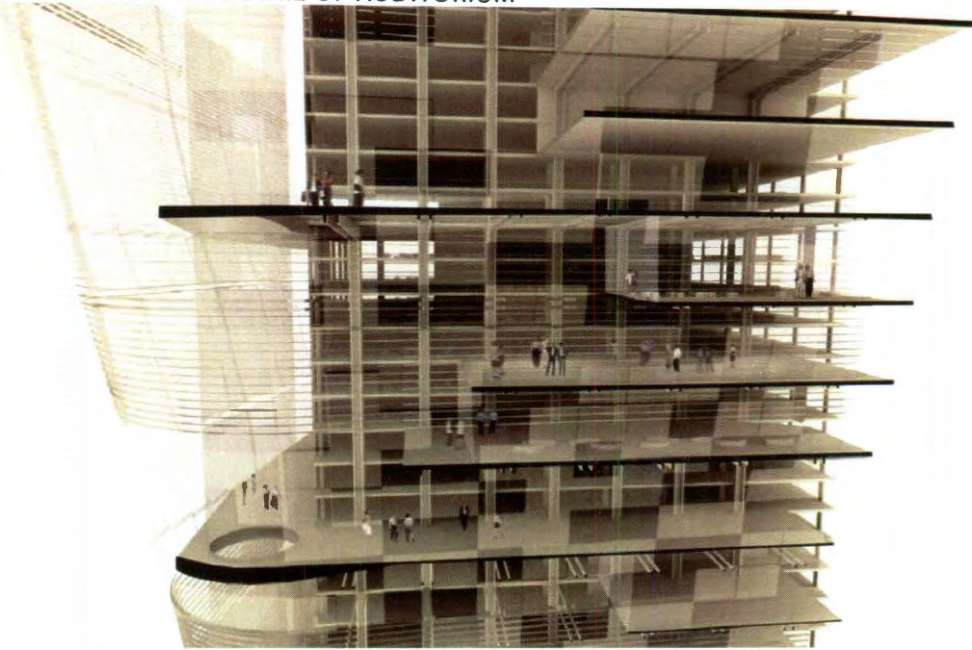
SECTION CUT THROUGH TOWER CORE LOOKING EAST

FLOOR PLAN DIAGRAMS SHOWING OFFICE SPACE IN WHITE, NEW PROGRAM IN DARK PINK, AND NEW ENVELOPED SPACE IN LIGHT PINK





SECTION PERSPECTIVE DETAIL OF AUDITORIUM



SECTION PERSPECTIVE DETAIL OF READING ROOMS



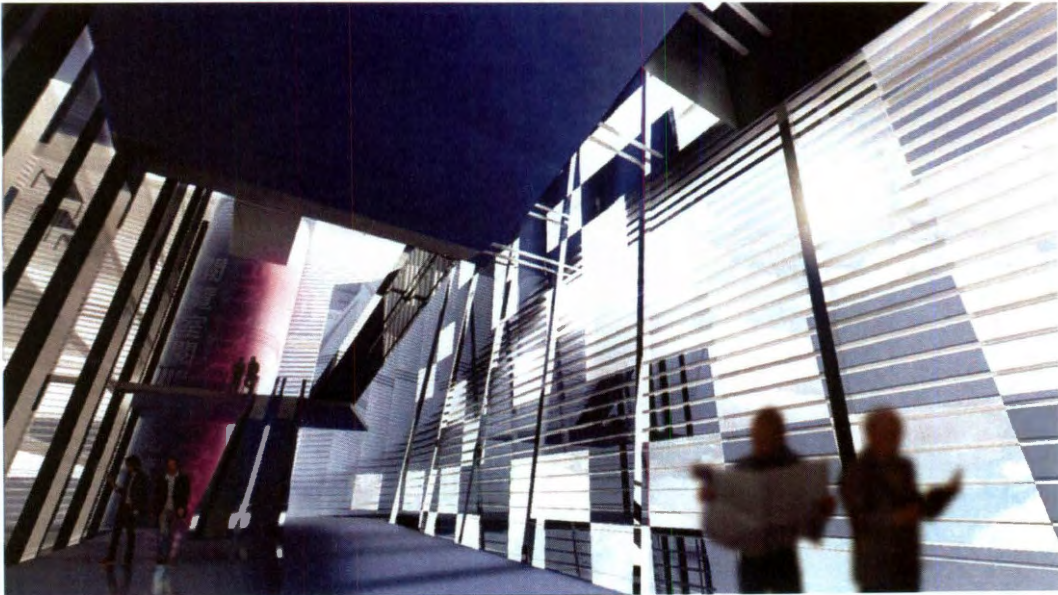
PERSPECTIVE DETAIL OF EXHIBIT SPACE



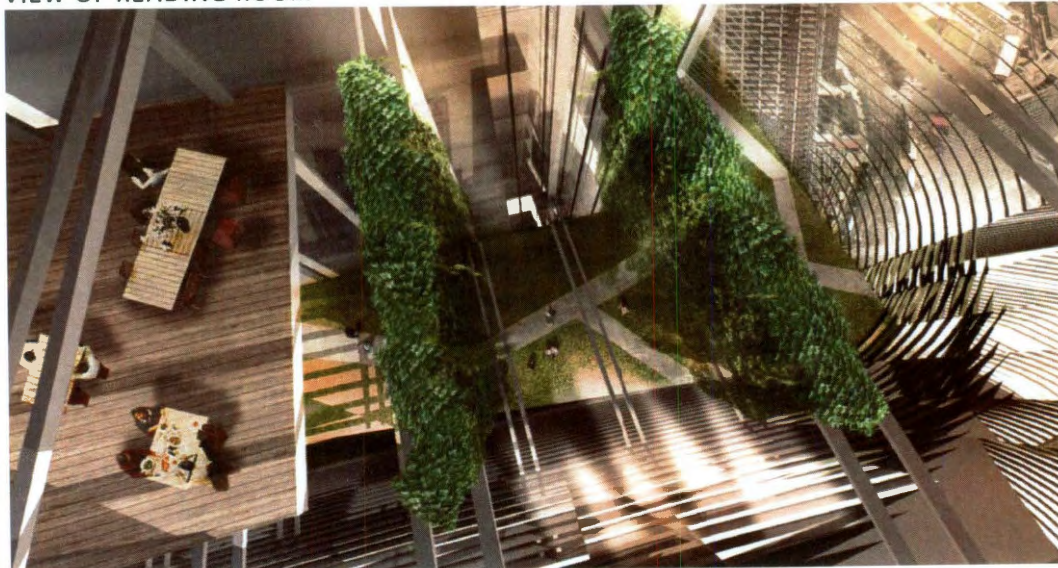
VIEW OF TOWER FROM BELOW



VIEW OF AUDITORIUM OVERHANGING STREET BELOW



VIEW OF READING ROOM



VIEW OF HANGING GARDEN

## BIBLIOGRAPHY

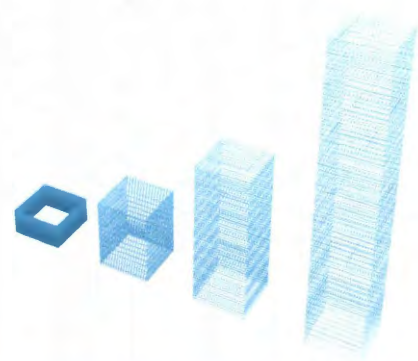
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# APPENDIX

## APPENDIX 1: INITIAL THESIS RESEARCH



as cities around the world density, they fill up with many more exterior vertical surfaces than horizontal



between 1992 and 1997, over 2,500 high rises were built in Shanghai alone, of which 1,000 rise to over 20 floors



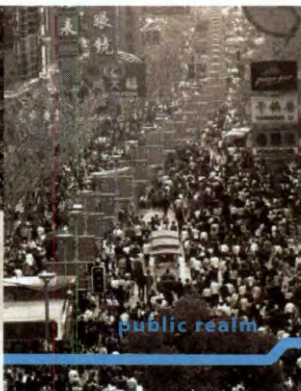
high rises in China are often torn down after 20-30 years, generating a huge amount of waste upon demolishing



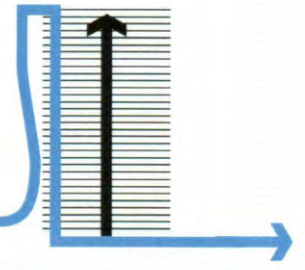
what if the facades of existing high rises were seen as dormant tabula rasas? buildings as commodities gain a longer life



the horizontal public realm can extend upwards



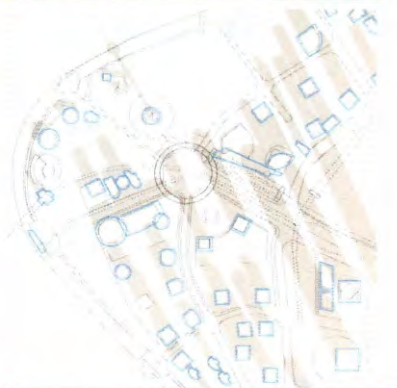
by creating a feedback loop next to an existing facade



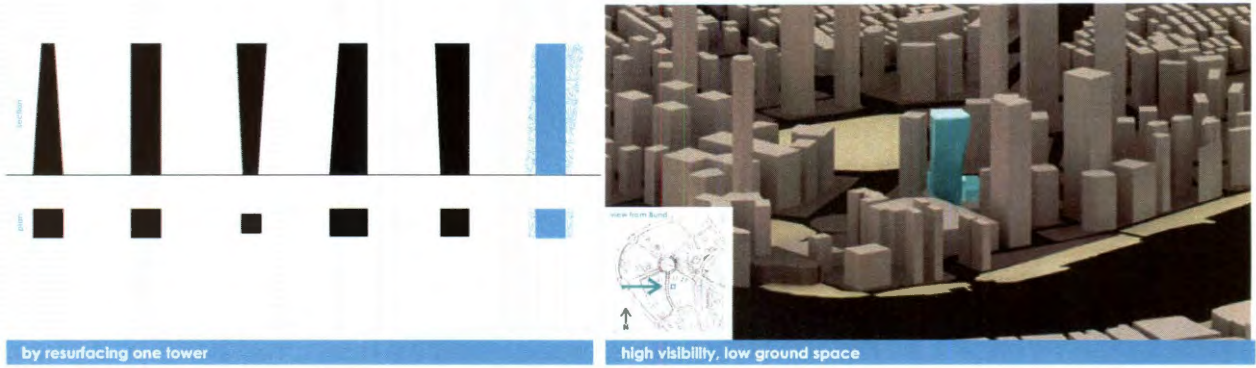
China has been building skyscrapers since the 1980s



any number of public programs could be placed on a facade

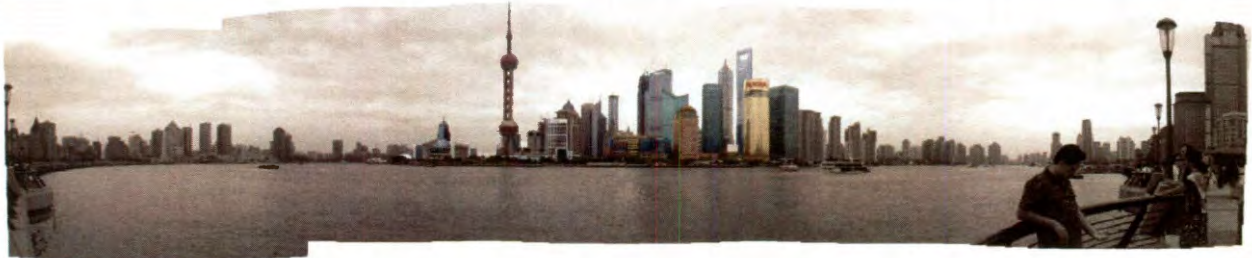


creating a new fatter city



by resurfacing one tower

high visibility, low ground space



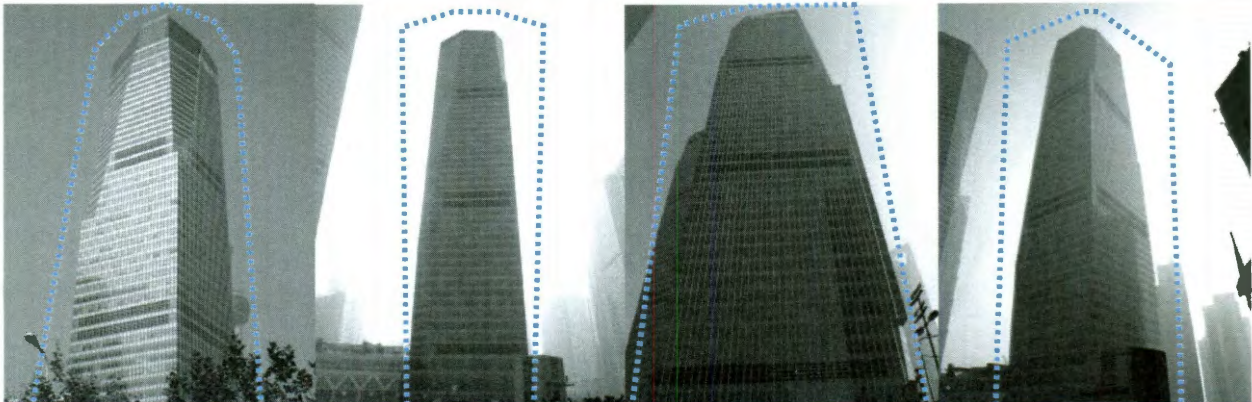
drawing the public realm upwards begs the question of how can the public realm coexist in an environment of commercial architecture?



the institution of the public library provides a programmatic vehicle for extending the public realm onto a facade



the library provides program malleable enough to be placed on a facade



existing office tower





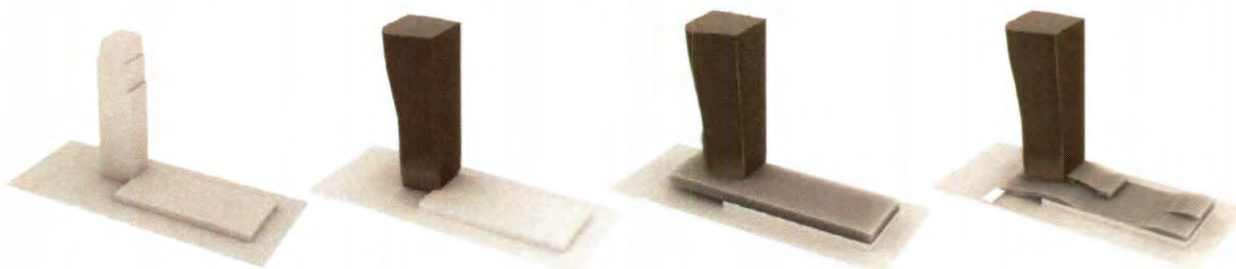
circulation by elevator



**existing central library**

**public annex**

the existing central library gains a public annex in the area of supertall skyscrapers in the form of a sleeve that wraps around an existing building

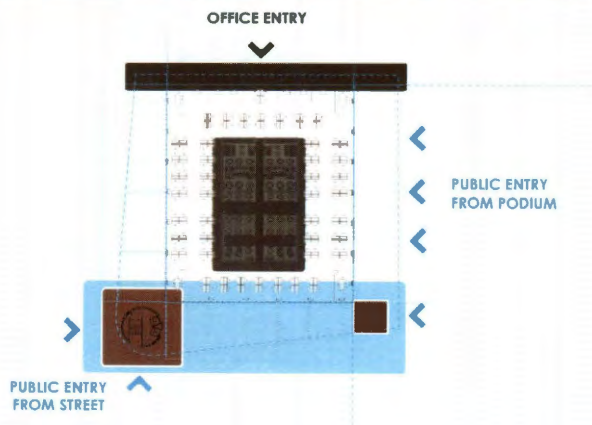
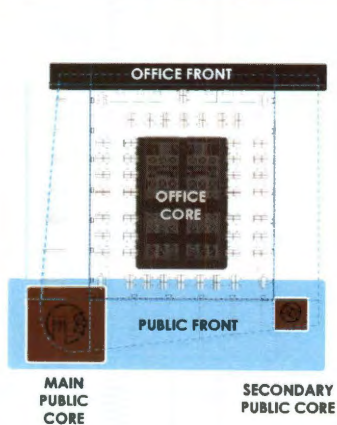


existing office tower

new facade

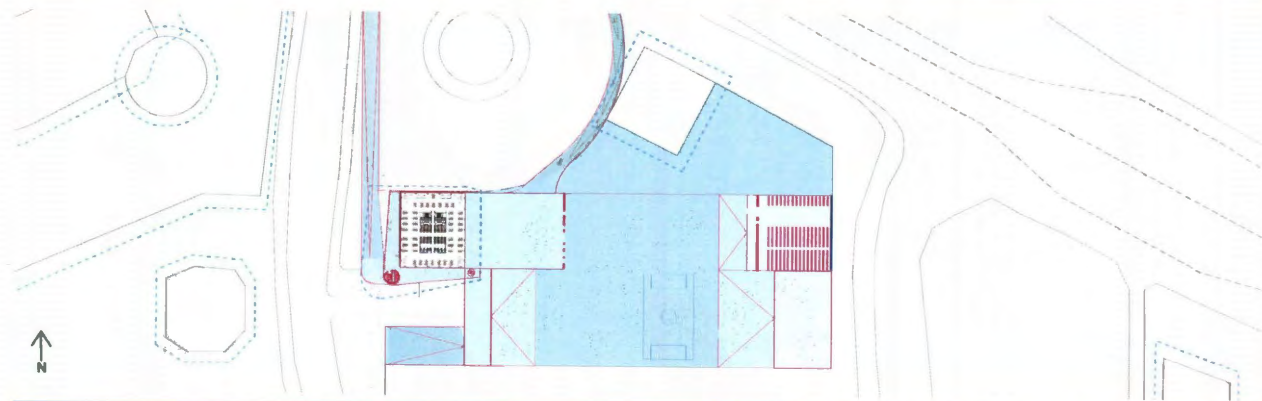
podium resurfaced

bowl for pedestrian access

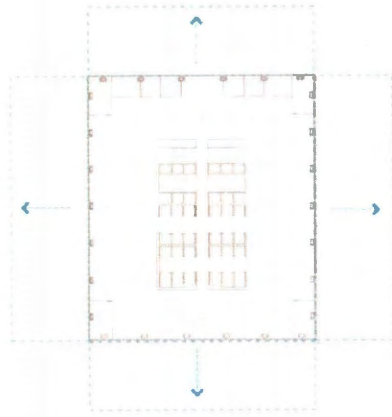


Circulation cores

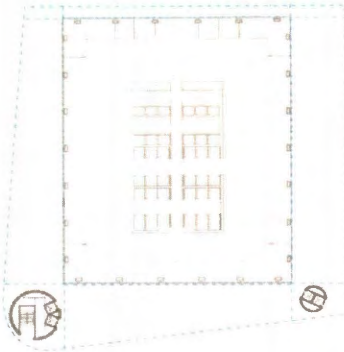
Entry points



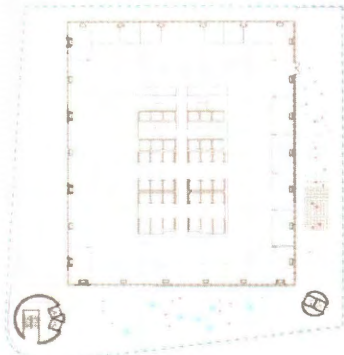
Site plan



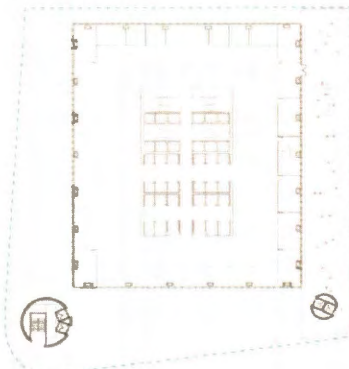
AIR RIGHTS EXTEND OUTWARD



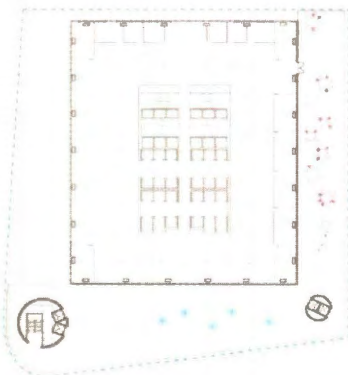
GRID IS CROPPED



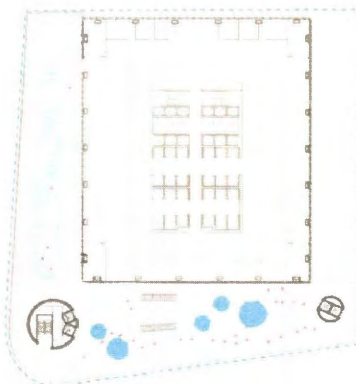
TYPICAL LOWER FLOOR PLAN



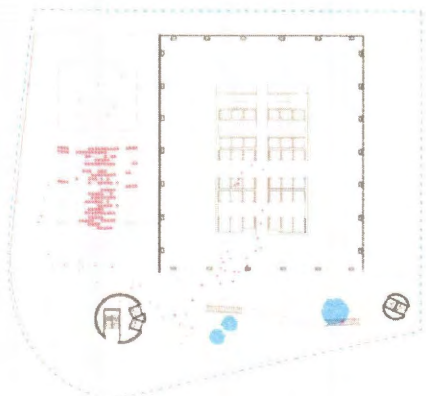
MEDIA LEVEL



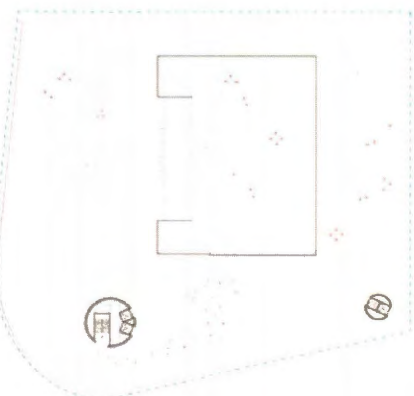
CAFETERIA LEVEL



TYPICAL UPPER FLOOR PLAN



AUDITORIUM LEVEL



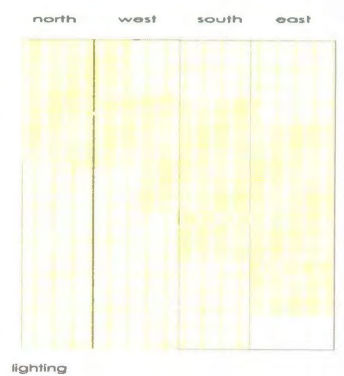
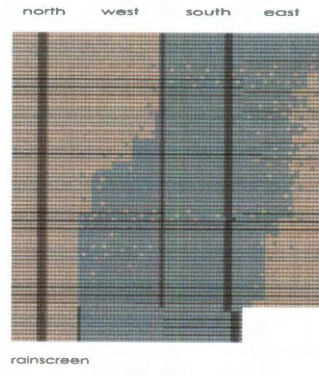
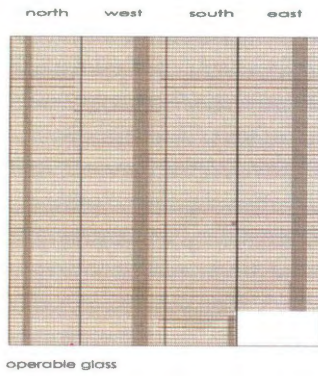
LOBBY LEVEL OVERLOOKING CITY

LEFT: TYPICAL FLOOR PLANS

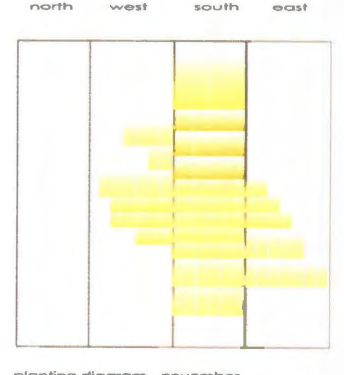
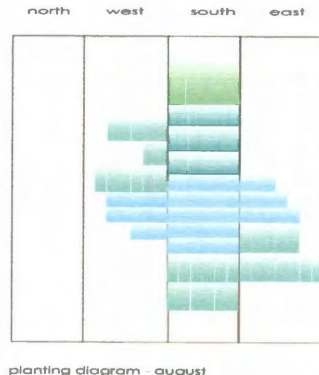
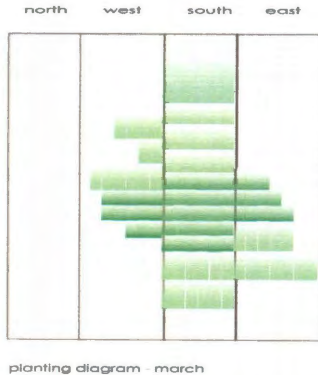
RIGHT: DIAGRAM OF EVERY FLOOR, SHOWING EXISTING TOWER IN WHITE, NEW PROGRAMMED SPACE IN DARK PINK, AND NEW ENVELOPED SPACE IN LIGHT PINK



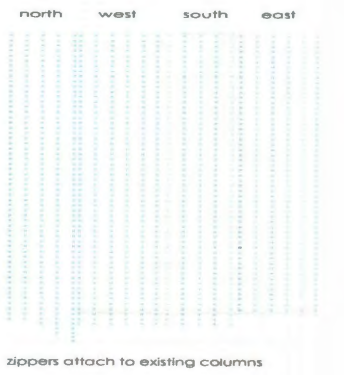
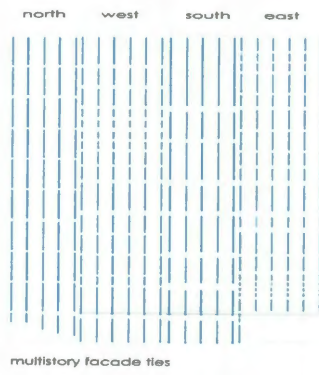
BREATHABLE SKIN



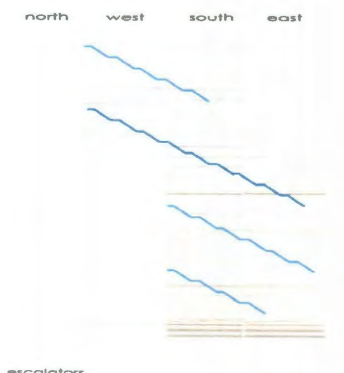
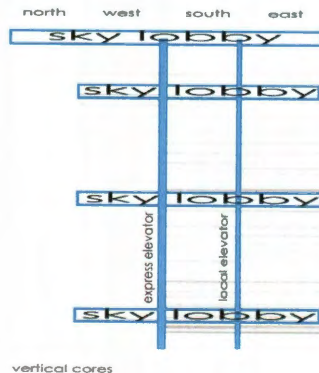
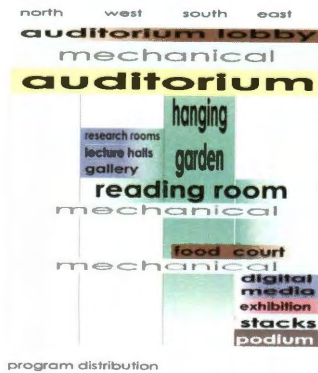
PLANTING



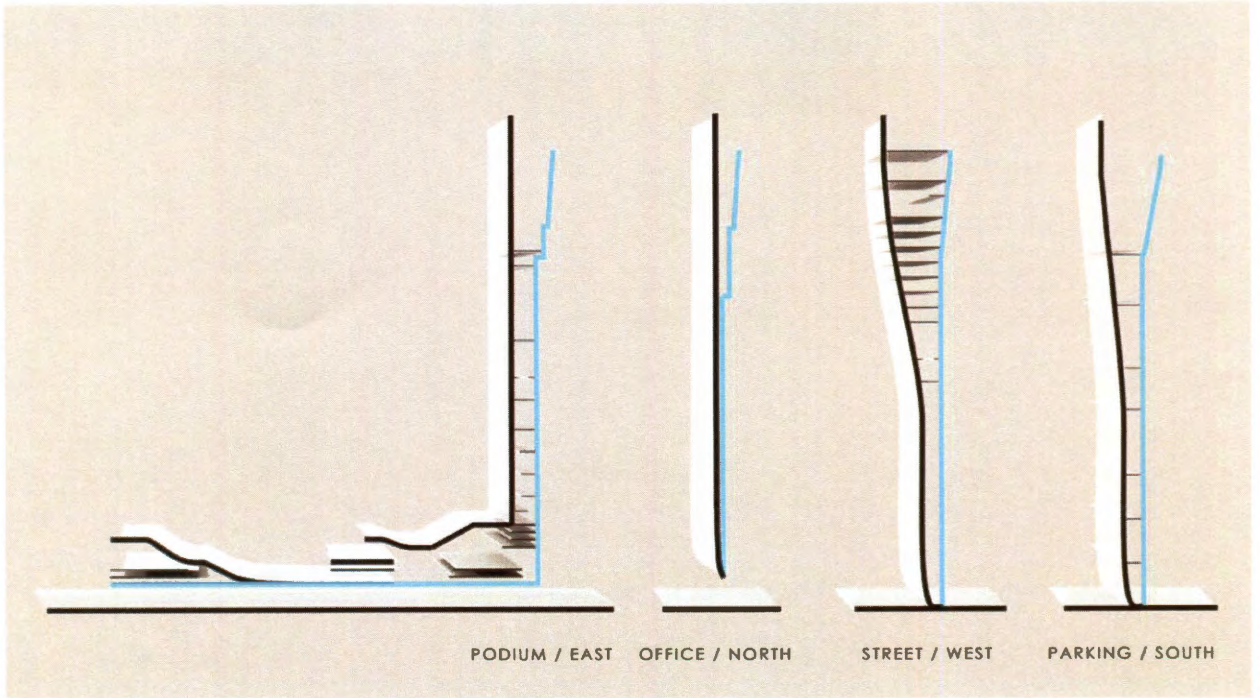
MICROSTRUCTURE



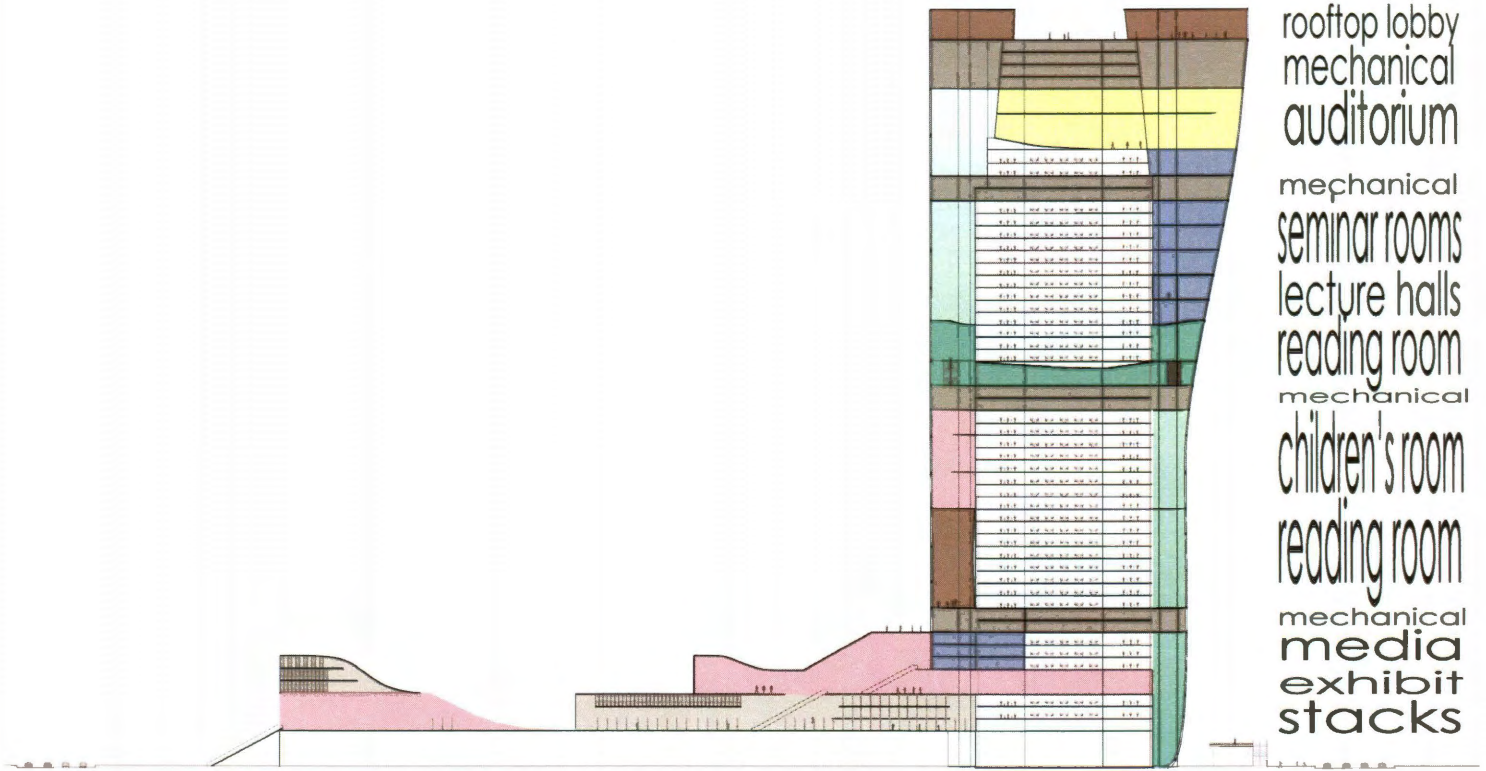
PROGRAM AND CIRCULATION



UNROLLED ELEVATION DIAGRAMS



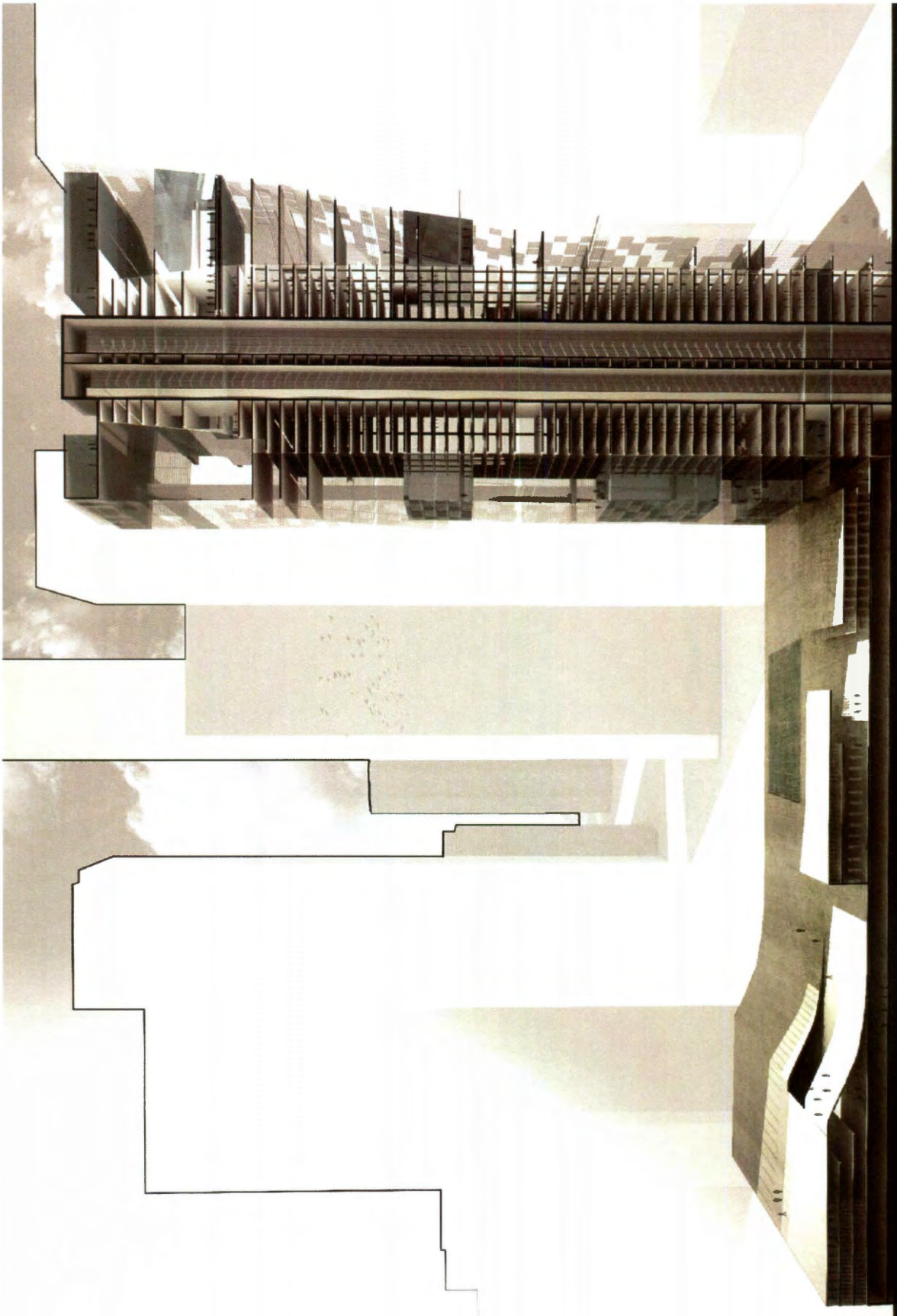
SECTIONAL DIAGRAMS THROUGH EAST, NORTH, WEST, AND SOUTH FACADES



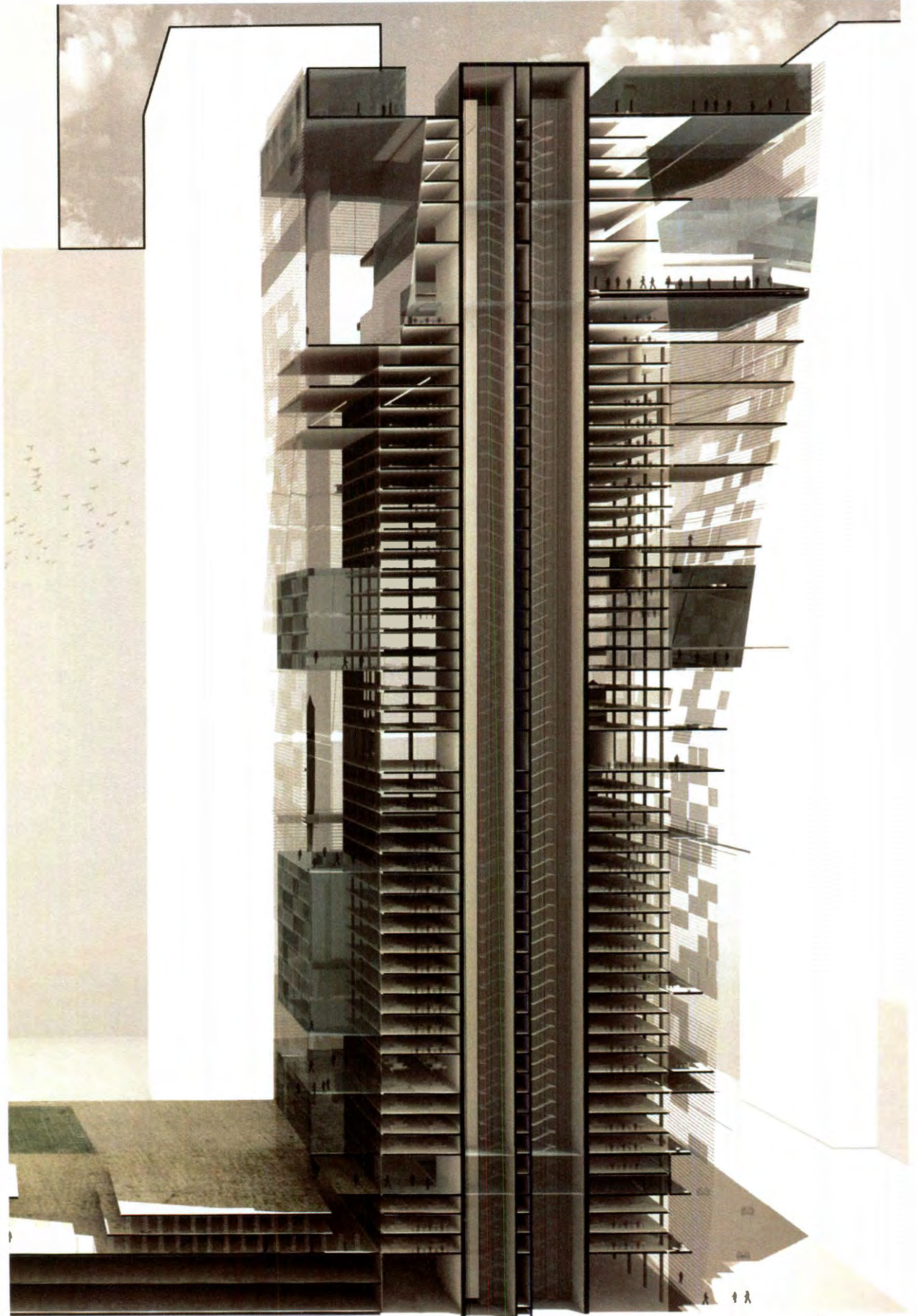
SECTIONAL PROGRAM DIAGRAM LOOKING SOUTH



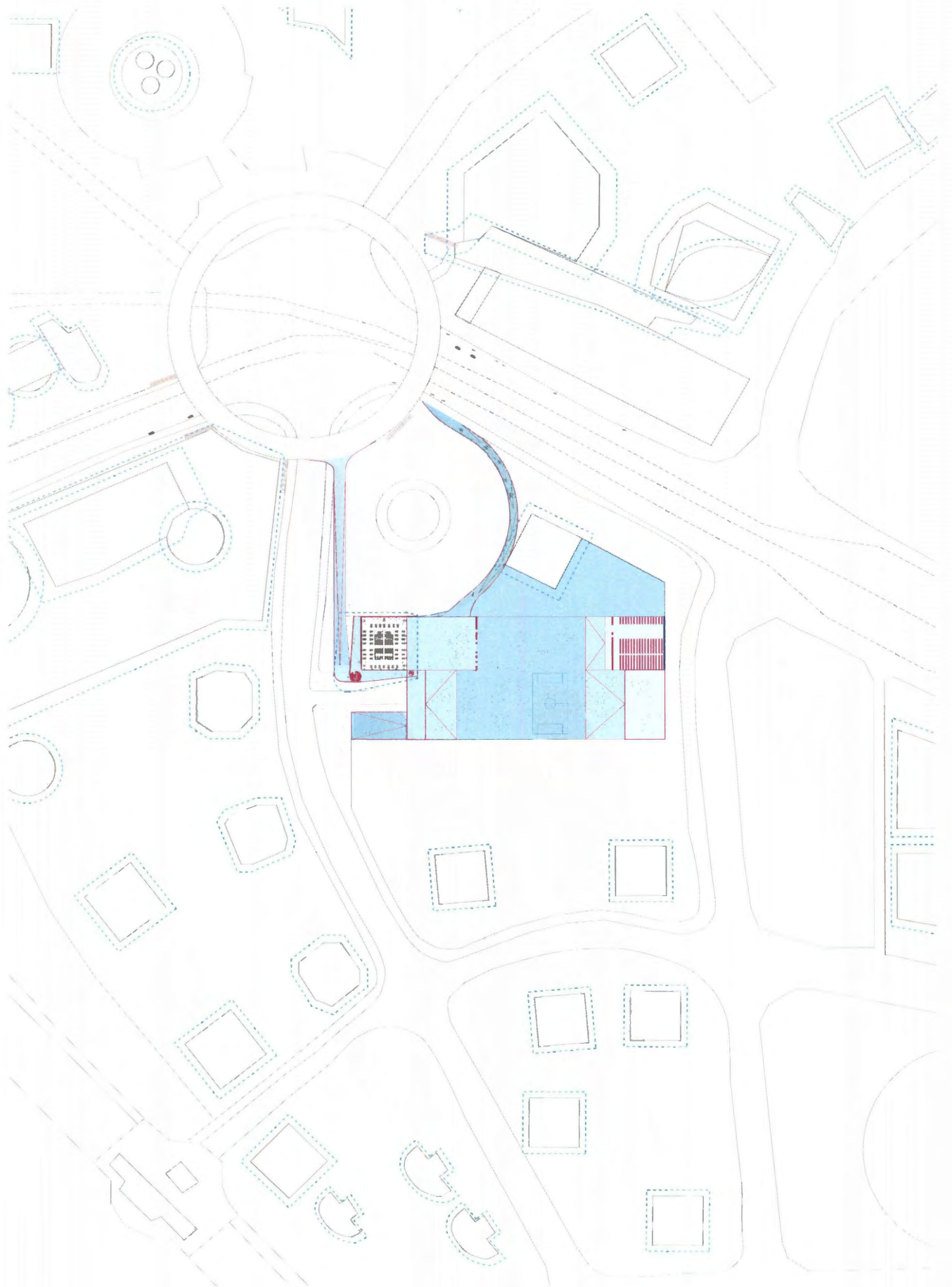
Program occupies the space between a new outer skin of operable glass and louvers, and the existing inner skin of curtain wall.



SECTION LOOKING SOUTH

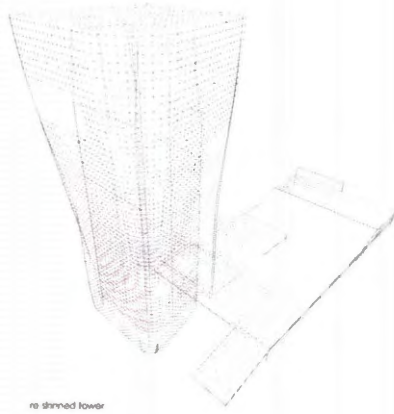


CLOSE-UP OF SECTION LOOKING SOUTH

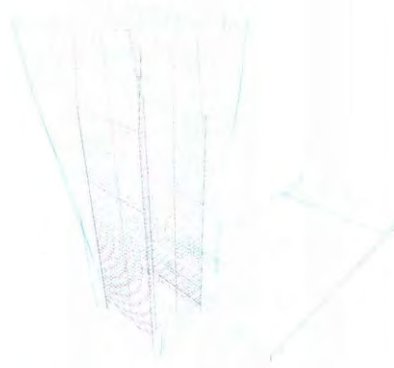


SITE PLAN OF PUDONG AREA

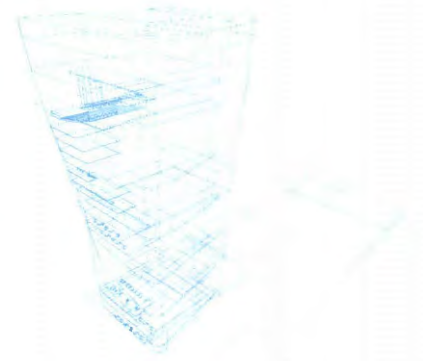




no shinned lower



existing office lower



existing office lower



new program



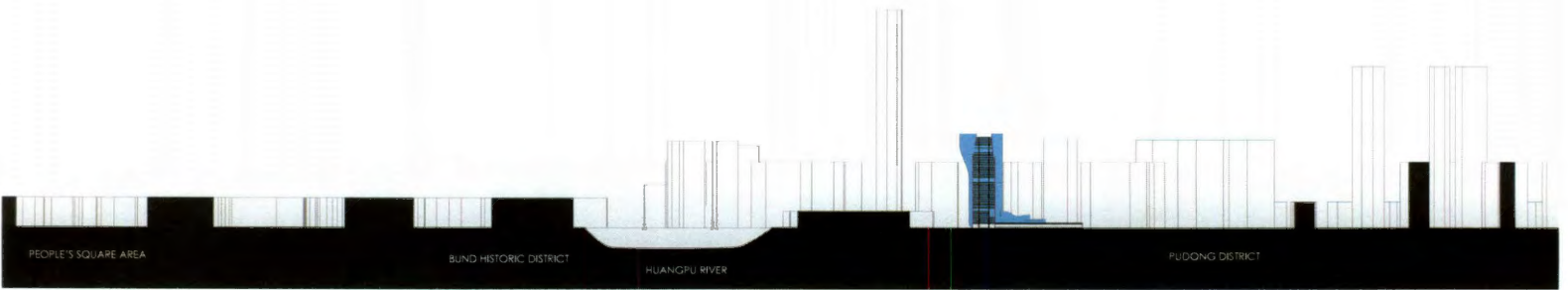
- A. auditorium lobby
- B. auditorium
- C. reading room
- D. collage reading room
- E. media
- F. exhibit
- G. stacky

new program

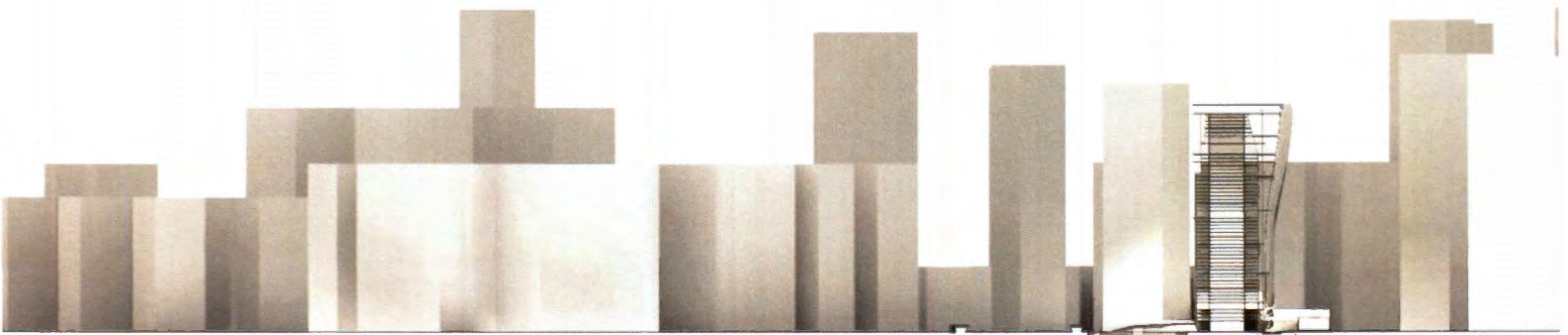


existing columns

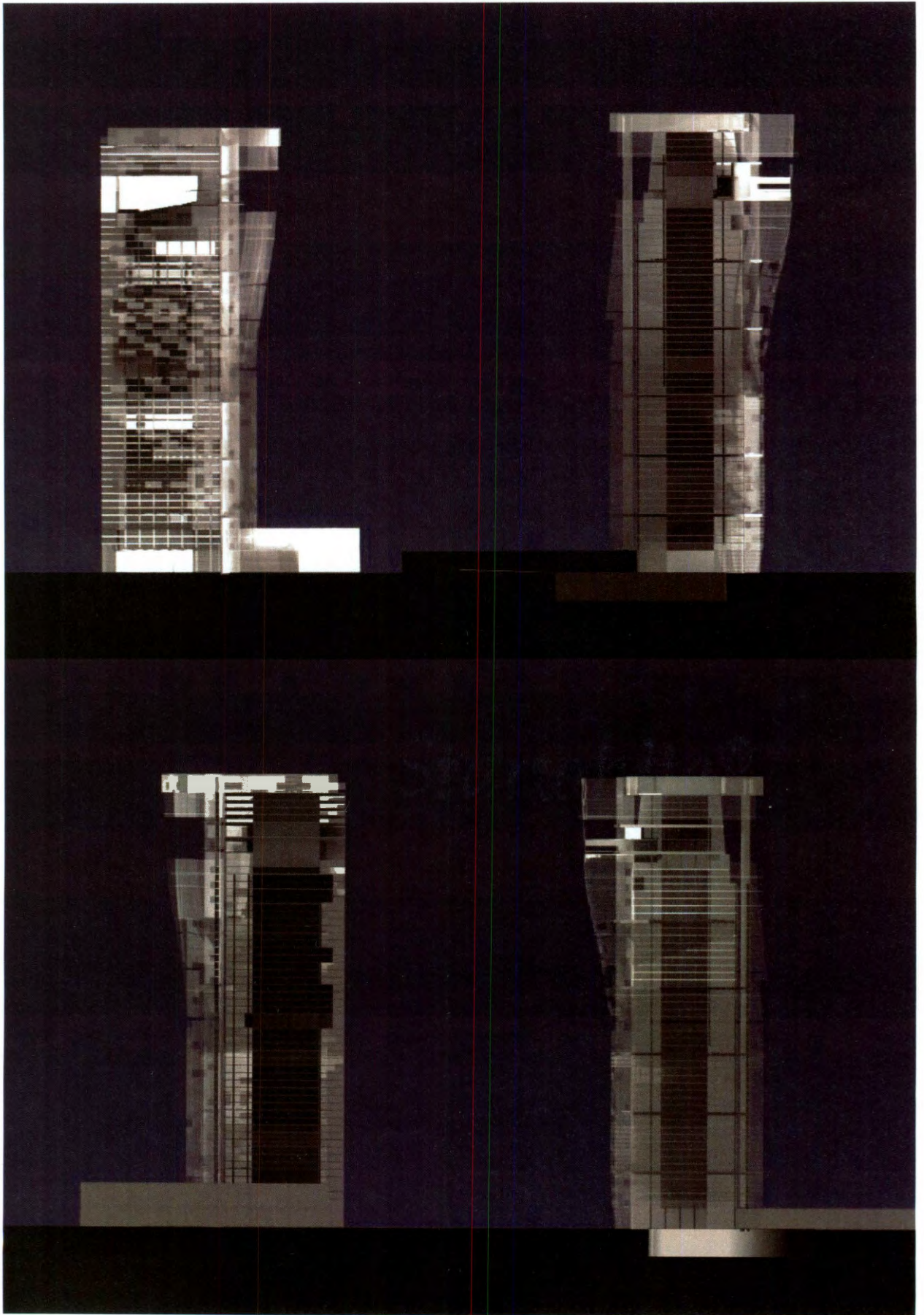
### PROGRAM DIAGRAMS



### SITE SECTION LOOKING NORTH



### SECTION LOOKING EAST



NIGHT ELEVATIONS : WEST, NORTH, EAST, SOUTH