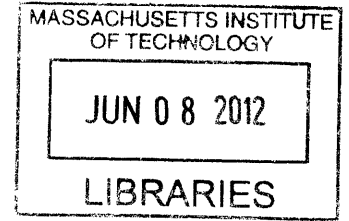


URBAN MECHANICS: THE PARKING GARAGE AS AN INSTRUMENT OF LEGIBILITY

by

Marcus E. Martinez
BArch, University of Houston 2005



SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTERS OF SCIENCE IN ARCHITECTURE STUDIES
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ARCHIVES

JUNE 2012

© 2012 Marcus E. Martinez, All Rights Reserved

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part in any medium now known or hereafter created.

Signature of Author: _____

Department of Architecture
May 24, 2012

Certified by: _____

Alexander D'Hooghe, MAUD, PhD
Ford International Career Development Associate Professor in Architecture
Thesis Supervisor

Accepted by: _____

Takehiko Nagakura
Associate Professor of Design and Computation
Chair of the Department Committee on Graduate Students

Urban Mechanics: The Parking Garage as an Instrument for Legibility

by

Marcus E. Martinez

Submitted to the Department of Architecture on May 24, 2012 in Partial Fulfillment of the Requirements for the Degree of Master of Science in Architecture Studies

ABSTRACT

No typology has fragmented urban space more than the parking garage. In fact, the city of Houston's parking contingent practice has resulted in a garage on 30% of the downtown district. The range from a few underground floors to 15 stories above ground make the garage both a defining contextual attribute and a testament to independently functioning sites.

This thesis speculates upon the parking garage typology as an instrument of urban legibility and future growth. When limited to the efficiencies of disciplinary conventions garages are distinct facilitative structures that are site adapted anywhere and predictably limited to the function of vehicle storage. Yet by focussing on the immense scale, the structural language of the garage can be configured as a structural infrastructure that can serve beyond the needs of the vehicle and exert higher-level roles for greater urban spaces.

THESIS ADVISOR

Alexander D'Hooghe, MAUD, PhD
Ford International Career
Development Associate Professor
in Architecture

THESIS READER

Michael Dennis, BArch
Professor in Architecture

URBAN MECHANICS

THE PARKING GARAGE AS AN INSTRUMENT OF LEGIBILITY

by
Marcus E. Martinez

THESIS COMMITTEE

THESIS ADVISOR
Alexander D'Hooghe
Assistant Professor in Architecture

THESIS READER
Michael Dennis
Professor in Architecture

ACKNOWLEDGEMENTS

I am indebted to many of my professors and colleagues that have supported and inspired my interest throughout my pursuits at MIT.

I am thankful to my advisor, Alexander D'Hooghe, whose firm guidance challenged me to develop an understanding of inquiry and representation.

This thesis would not have been possible if not for Michael Dennis whose advice and provocations will continue to guide my future explorations.

I would also like to thank Kent Larson and Ryan Chin of the MIT Media Lab for awarding me the privilege to participate in your research and to be changed by your perspective.

I owe my deepest gratitude to my wife, Amna who remains an inspiration for all I do. To my parents, who have always committed to my creative interest and education.

URBAN MECHANICS

THE PARKING GARAGE AS AN INSTRUMENT OF LEGIBILITY

Abstract

3

Acknowledgements

7

1	AN URBAN MEDIUM	11
2	AN ECOLOGY OF FLATNESS	15
3	TOWARDS A NEW TYPOLOGY	25
4	STRUCTURAL INFRASTRUCTURE	39
5	FUTURE ROLES FOR THE GARAGE	71

Bibliography

73

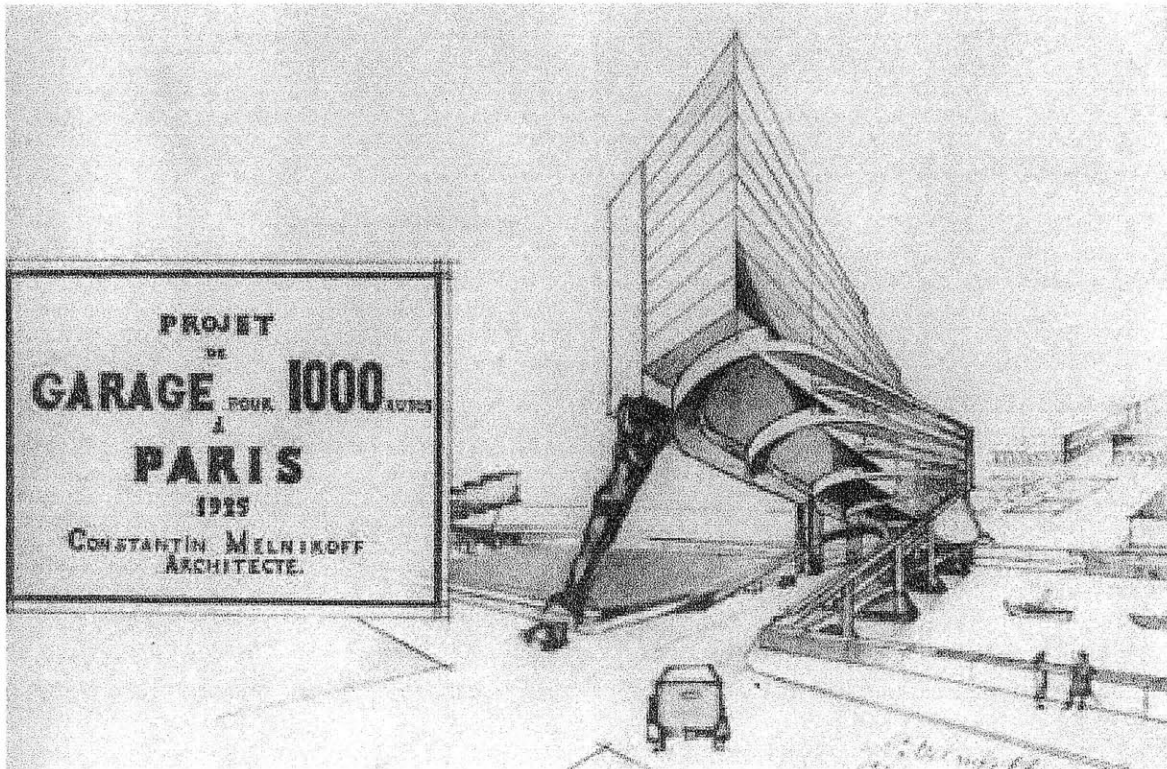


IMAGE: Constantin Melnikoff, 1925

AN URBAN MEDIUM

01

"I will build a car for the great multitude. It will be large enough for the family, but small enough for the individual to run and care for. It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise. But it will be so low in price that no man making a good salary will be unable to own one – and enjoy with his family the blessing of hours of pleasure in God's great open spaces"

- Henry Ford 1922, My Life and My Work

"..we must learn to see the hidden forms in the vast sprawl of our cities. We are not accustomed to organizing and imaging an artificial environment on such a large scale; yet our activities are pushing us towards that end." -

-Kevin Lynch, Imageability *The Image of The City* p9

When Henry Ford transformed the automobile from a novelty of the privileged few to an affordable tool for the masses it initiated a new pattern and pace for American modern life. By the 1930's, over 23 million cars were in circulation on America's roads. The automobile's spatial demand for both movement and storage created an opportunity for revenue and expansion in city centers and peripheries with suburban populations exceeding the growth of urban areas by 30% in the 1950's. The result was the adoption of the automobile that has dispersed nearly all American cities, and continues to today.

Louis Mumford said that the "right to have access to every

building in the city by private motorcar in an age where everyone possesses such a vehicle is actually the right to destroy the city” In contrast, historian Reyner Banham frames the notoriously mobile city of Los Angeles in a positive light, as a city that functions less formally. Through Banham’s narrative on Los Angeles he may have argued with the medieval Mumford that within these new radically mobile cities, permanence is traded continuous renewal and therefore new experiences, and types, carry a functional specificity that escapes formal definition.

As an extension to Banham’s theme of ecologies, this thesis views the parking garage as a sub-ecology of Houston, specifically in the downtown district where the ubiquity of parking garages is Houston’s ‘deep palimpsest’. It has become not only a character of the city, but a necessary integrative structure with untapped potential for inventing new spaces and experiences through this type. The sprawl of Houston also renders the parking garage as a unique climate response, in which case interconnected air conditioned sky-bridges and underground tunnels, serve to minimally disrupt the air conditioned driving experience.

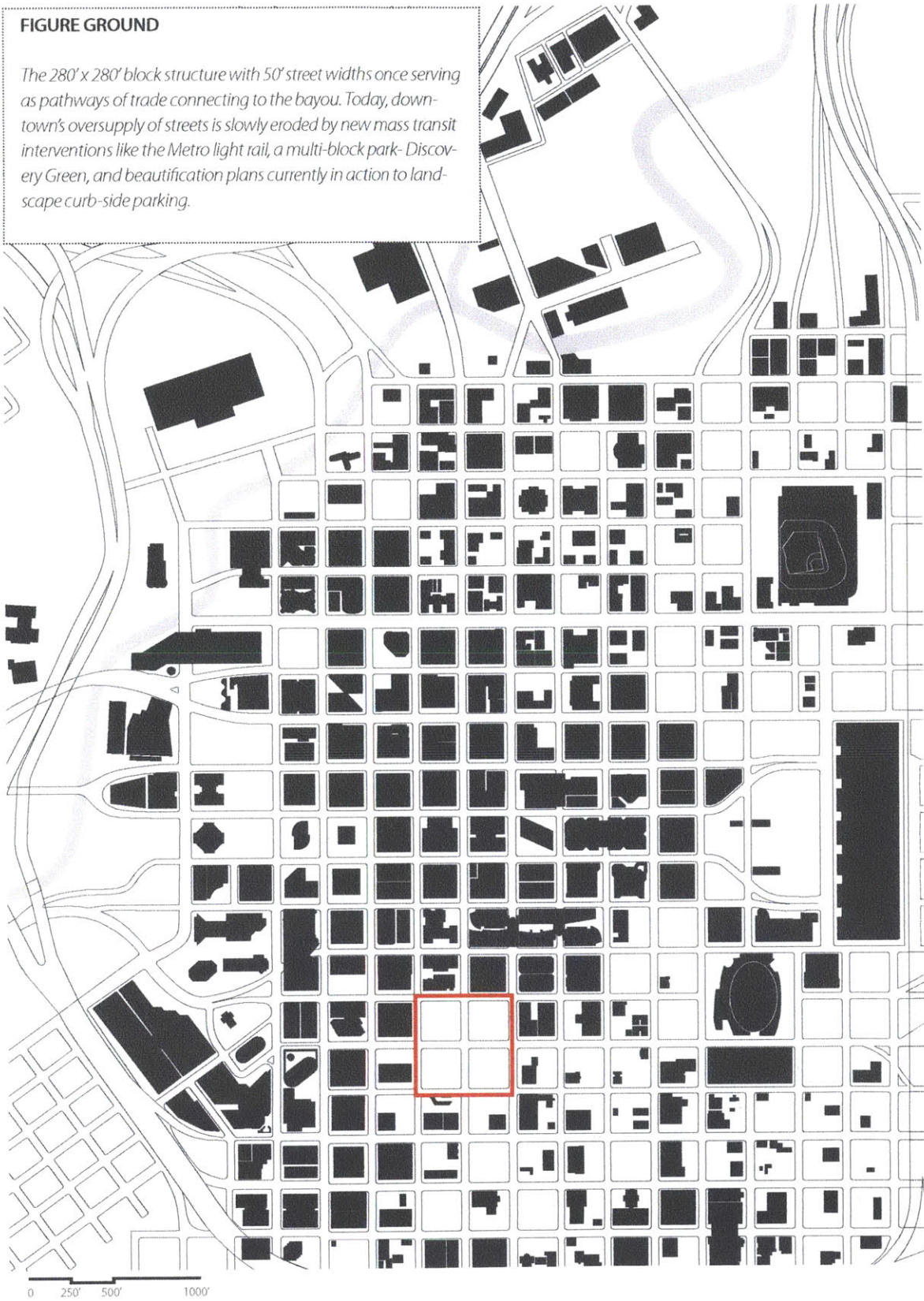
This research touches upon the garage typology as type that has historically been subject to experimentation in circulation and construction technique. In this thesis, the parking garage is a spatial strategy that serves as an instrument for making an urban structure legible . The design research proposal operates through the typology of the parking garage which is founded upon internal vehicular dynamics that is then made civilized by mapping new patterns of movement and connections that

liberate the ground through a structure that anticipates future urban program. Therefore The garage is transformed from a neutral facilitative player to an active urban medium, that gives to...etc etc (complete sentence with what it does and end it here)

1. Henry Ford, "My Life and Work," Public Domain Books, 2006, Kindle Edition
2. Lewis Mumford, "The Highway and the City," New American Library, 1964, p. 23
3. Reyner Banham, "Los Angeles: The Architecture of Four Ecologies" Harper and Row, 1971, p. 75

FIGURE GROUND

The 280' x 280' block structure with 50' street widths once serving as pathways of trade connecting to the bayou. Today, downtown's oversupply of streets is slowly eroded by new mass transit interventions like the Metro light rail, a multi-block park-Discovery Green, and beautification plans currently in action to landscape curb-side parking.



ECOLOGY OF FLATNESS

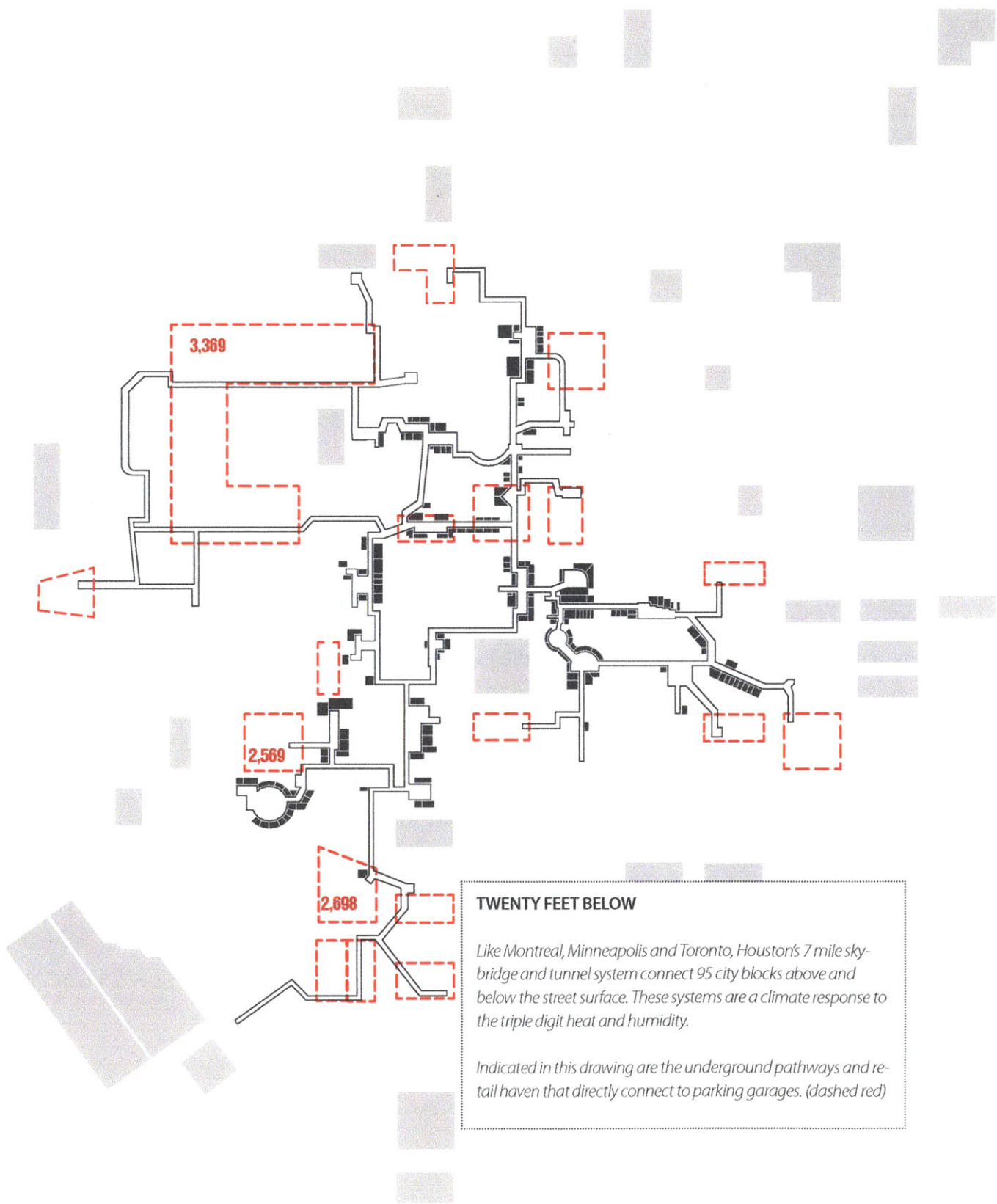
02

“we must learn to see the hidden forms in the vast sprawl of our cities. We are not accustomed to organizing and imaging an artificial environment on such a large scale; yet our activities are pushing us towards that end.”-

-Kevin Lynch, Imageability *The Image of The City* p9

In the condition of vast sprawl, parking and freeways embody a mode of life that is analogous with the growth of the city. Traditional squares and plazas give way to the parking space as the terminus and point of arrival within the metropolis.

Contrary to Los Angeles where the hills and ‘surfburbia’ were geological identities that are connected by the infrastructure of the ‘autotopia’; Houston’s identity is the infrastructure enabled by the condition of *flatness*. Flatness describes its overflow of water as well as population. It further expresses a disregard for hierarchy, planning and near frictionless expansion.



TWENTY FEET BELOW

Like Montreal, Minneapolis and Toronto, Houston's 7 mile sky-bridge and tunnel system connect 95 city blocks above and below the street surface. These systems are a climate response to the triple digit heat and humidity.

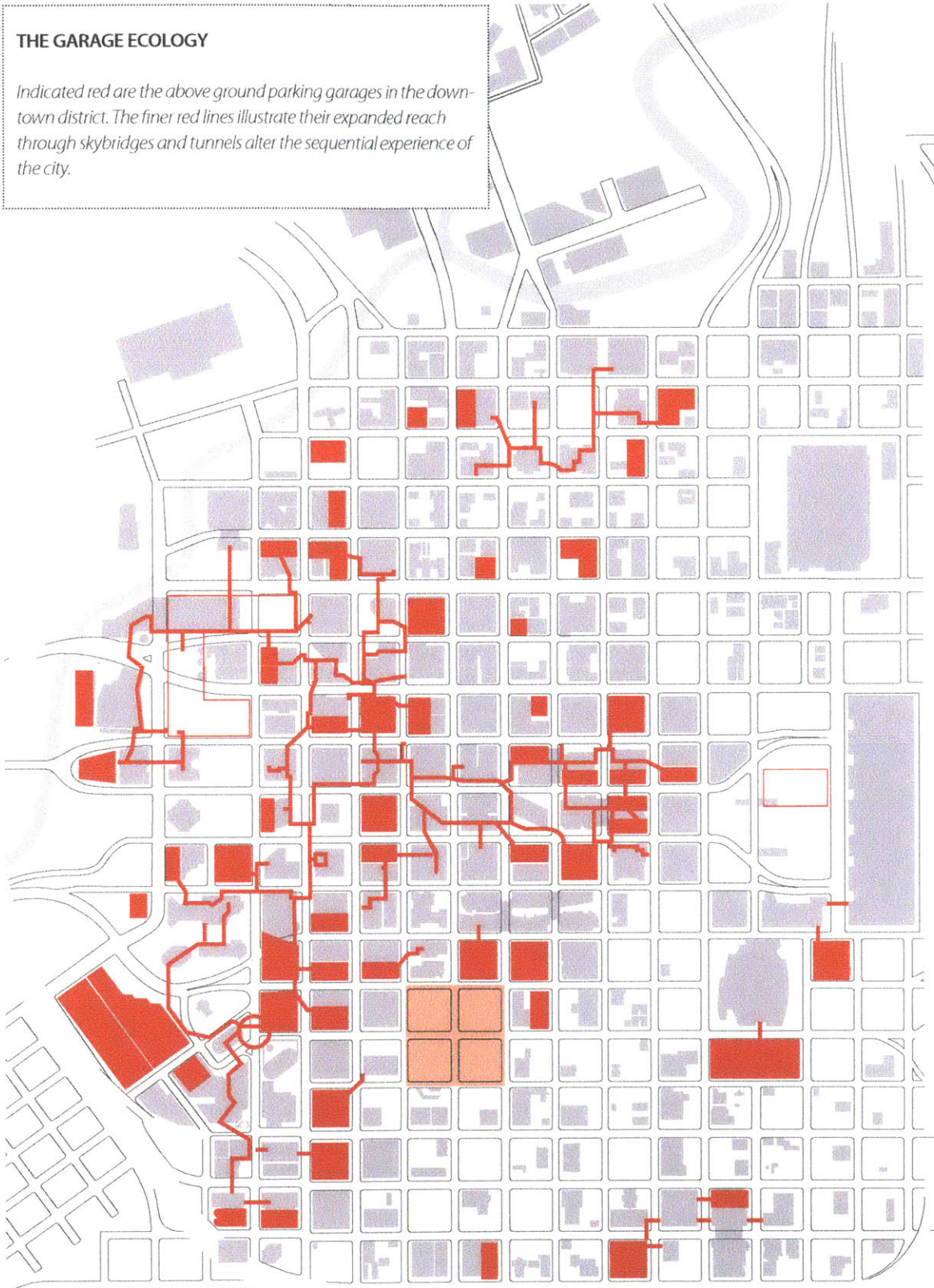
Indicated in this drawing are the underground pathways and retail haven that directly connect to parking garages. (dashed red)

GARAGES, TUNNELS AND SKYBRIDGES

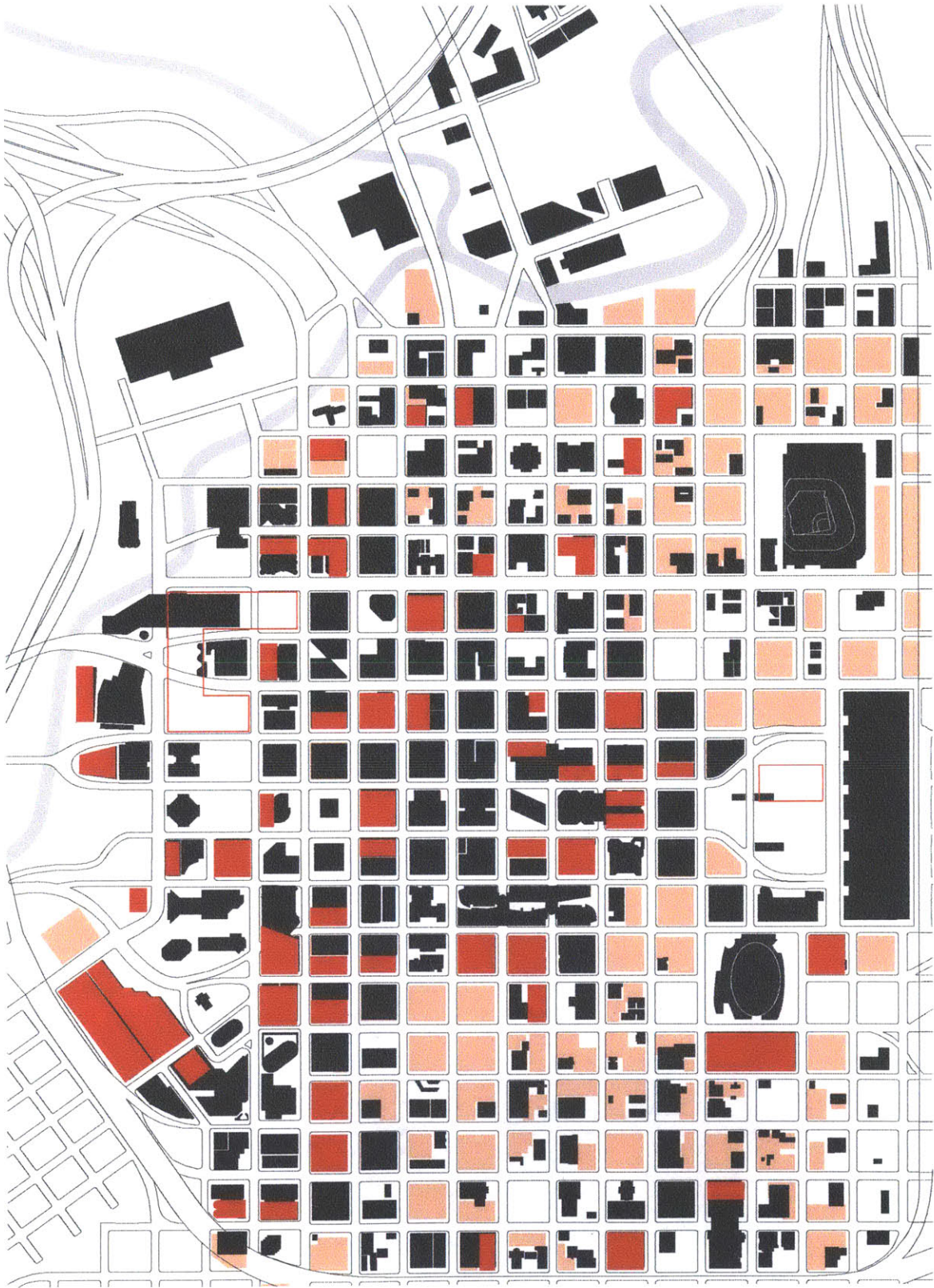
0 125 250 500

THE GARAGE ECOLOGY

Indicated red are the above ground parking garages in the downtown district. The finer red lines illustrate their expanded reach through skybridges and tunnels alter the sequential experience of the city.



-  PARKING GARAGE
-  PARKING LOT
-  BELOW GRADE PARKING GARAGE



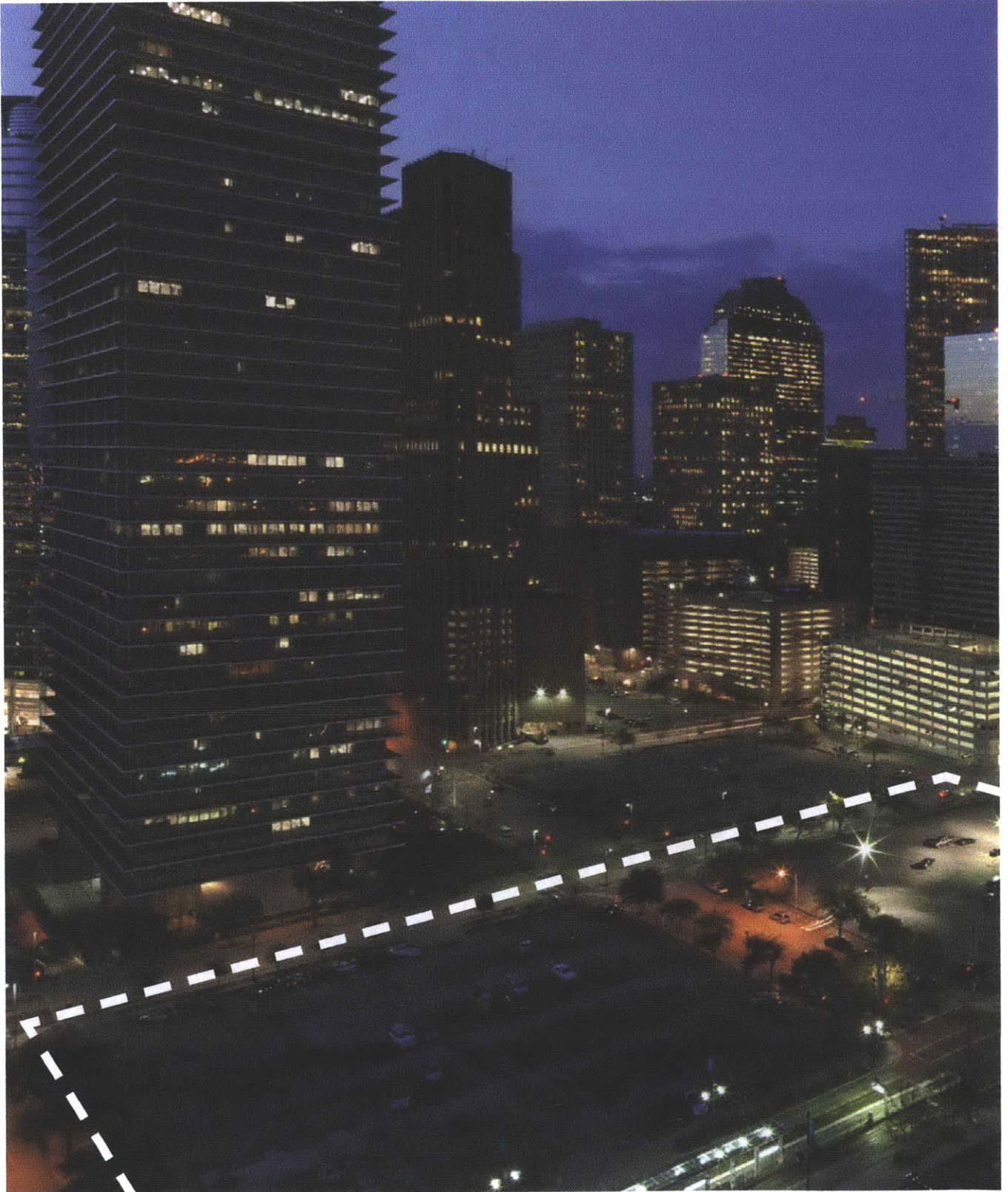
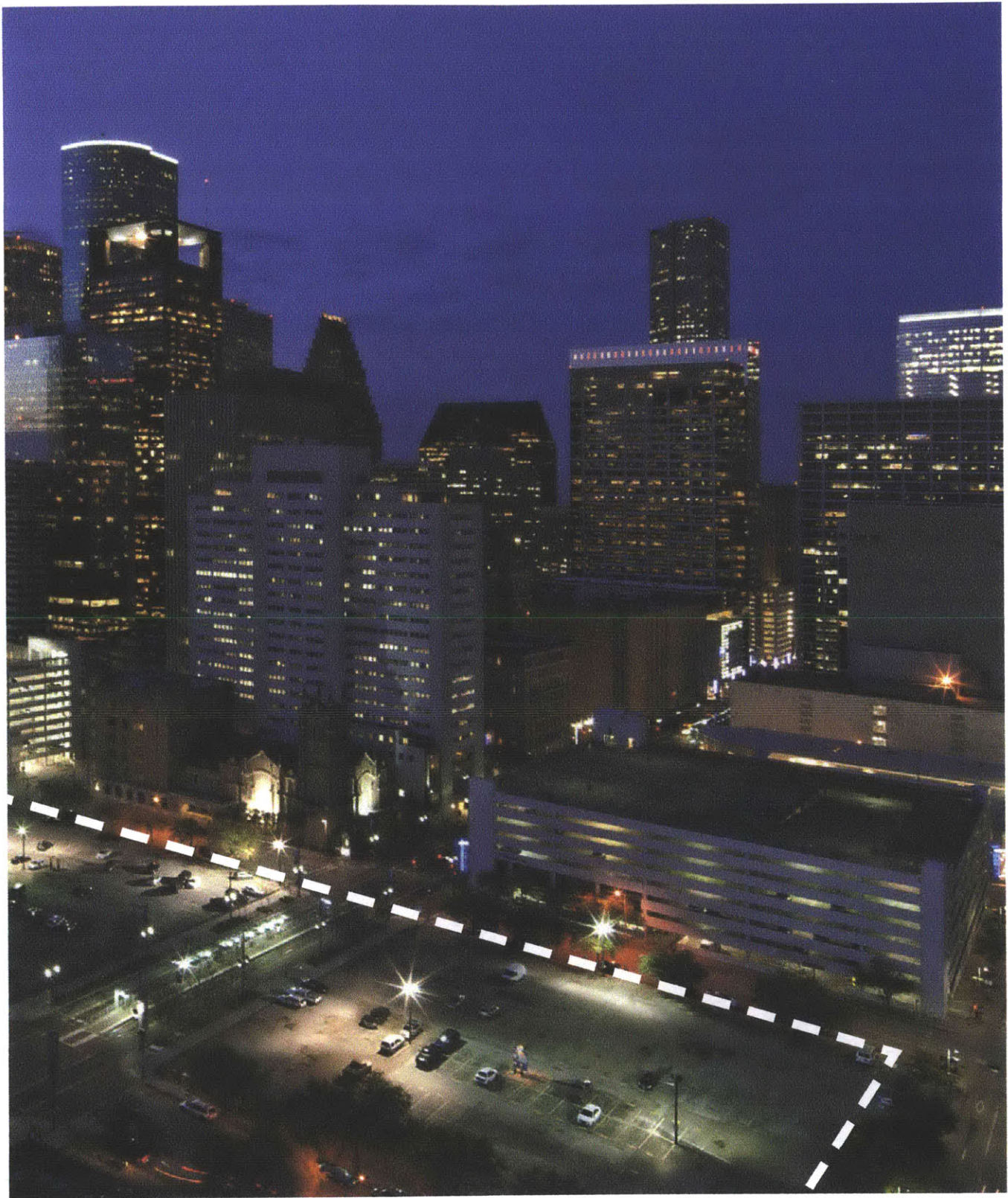
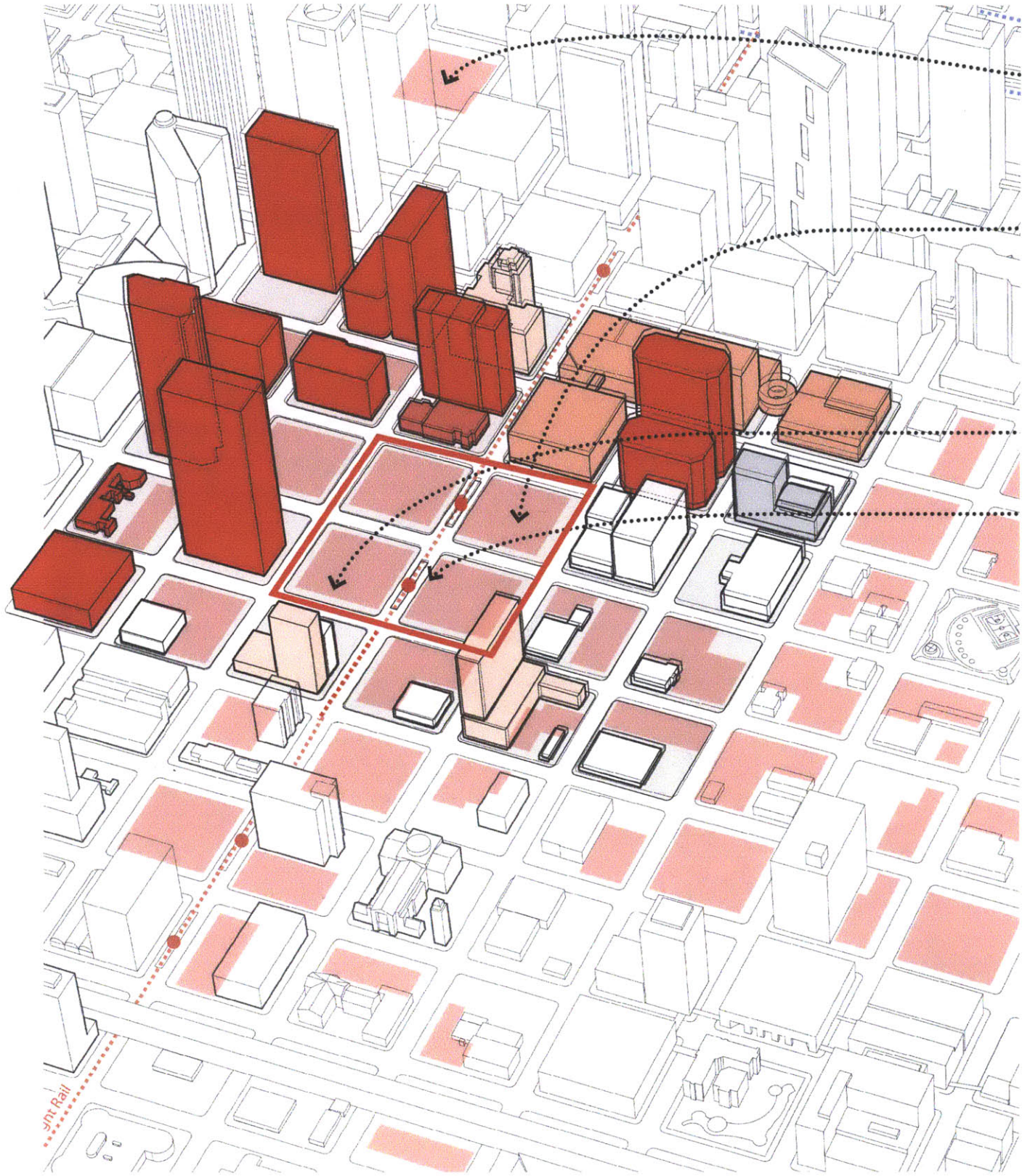


IMAGE Richard Payne 2011







PROSPECTIVE SITE FOR CITY OWNED MEGA-GARAGE

ACCORDING TO 2001 STUDY FOR CENTRAL HOUSTON INC. (PREPARED BY MOORE)

EXISTING 700 PARKING SPACES

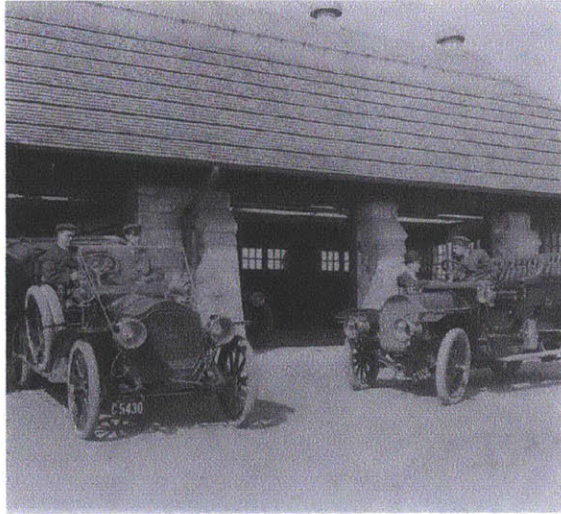
3,200 SPACES ON SURFACE LOTS

COMBINING 4 BLOCKS INTO ONE 610' x 610' SITE

UNTAPPED POTENTIAL IN METRO RAIL LOCATION

A CONTINUING LACK OF PARKING?

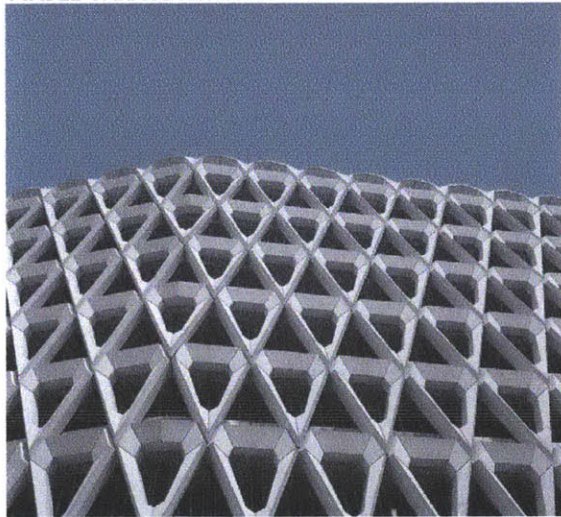
THE PROBLEM THAT PLAGUES DOWNTOWN HOUSTON AND MANY CAR ORIENTED CITIES IS NOT THE LACK OF PARKING. MUCH OF THE AVAILABLE PARKING IS ON THE AREAS OUTSIDE THE CENTRAL BUSINESS DISTRICT CORE AND A GREATER SHARE IS FRAGMENTED ACROSS A NUMBER OF SITES.



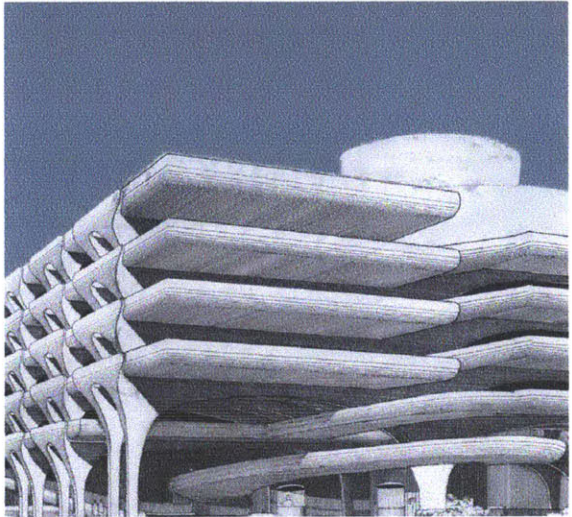
STABLE GARAGE RETROFIT



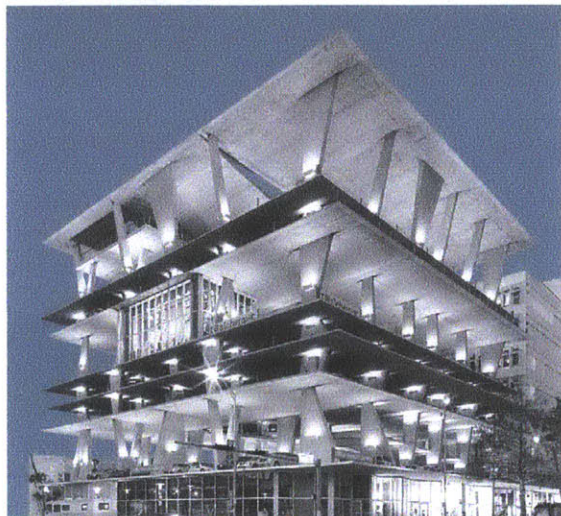
MARINA CITY - 1962



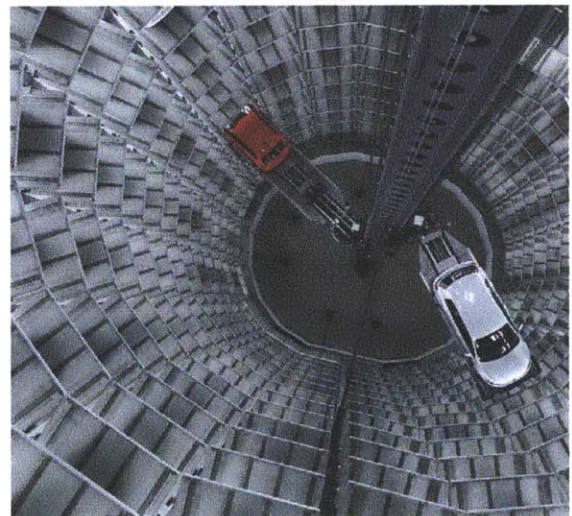
WELBECK STREET GARAGE - 1970



TEMPLE STREET GARAGE - 1963



1111 LINCOLN ROAD - 2008



VOLKSWAGEN STORAGE FACILITY

TOWARDS A NEW TYPOLOGY

04

MOBILITY ON DEMAND

As horses were phased out in favor of the automobile, stables and barns were readily available for retrofit. The combined stables across major cities of the US amounted to 1.454,000 in 1900.

These stables created a boom in employment, with owners noticing an opportunity in the delicate nature of the new vehicles built with open carriages, that required heavy maintenance and long term storage when not in use during the winter months. The same population that once tended horses and repaired bicycles now became an added value with on site amenities like service, repair, and fueling to these vehicles. Trained staff would store the cars on 'jack stands' to save the tires, drain gasoline, or battery acid (for electric vehicles), and cover them for months at a

time. The existing stable structures of mostly smaller single story footprints struggled to accommodate the growing driving public while housing routine services. Interventions like turntables and elevators made upper level floors available, but made retrieval slow and specialized, unable to keep up with demands, as in the case of New York City Taxi fleet of 1909.

Thus, the New York Taxi Cab influenced a need for structured ramps that quickly ascended the cars to top levels, at times making use of sliding on greased ramps. Hybrid combinations of ramp and elevators temporarily met the demand for faster vehicle return. However, similar to difficulty in meeting increasing demands in the past, compact storage methods like elevators and robotic garages of today cannot keep up with the immediate access demands of car oriented cities like Houston or Los Angeles.

Demand is a distinguishing factor that continues to influence the function, size and material of the garage. In the 1900s, the demand for rapid vehicle retrieval was quite low. The automobile's limitations in winter weather formed a need for "dead storage", where cars were stored for extended periods of time. The strategies that are employed to efficiently move and store cars within a structure is better understood as cyclical and regional (cultural) than a typological evolution. This is in part to changes in the automobile's dimension, transmission type, and energy source (gas, electric, steam), which all begin to mirror regional attitudes towards mobility, and through the garage the value of land.

A CONSTANTLY CHANGING TYPE

The parking garage has been profoundly transformed by building technique, behaviors towards mobility, and the automobile industry. The garage is overwhelmingly characterized by its vacancy and lack of elements which make it a subject to material experimentation with sculptural cast in place concrete structures like the Temple Street Garage by Paul Rudolph, and precast structural screens like the Welbeck Street Garage by Michael Blampied in 1970. Between those moments however, are the ones we are most familiar with; the sloped floors, dim lighting, shallow sections with a spatial air that cinema captures as a space for the perfect crime, conspiring rendezvous.

CAR CULTURE

Engineering accomplishments of automatic transmissions, knee action suspension, and power steering rapidly increased the adoption rate of vehicles across genders and the adoption of the self-park model between the 1940's-1950's. Driving in a parking garage became reminiscent of the freeways and exit ramps that were symbols of freedom and technology. Large spirals and arcing pathways were as much a result of a freeway culture phenomenon as it was a freeway construction adaptation.

FAST AND EXPANDABLE

The 'D'Hume System' was a organizational strategy that answered the demand of vehicle storage within limited space, and was proven the most efficient means of circulation versus the elevator.

SHARED PLATFORM

STABLES AND BIKE REPAIR

MULTI-PURPOSE GARAGE WITH SKILLED STAFF

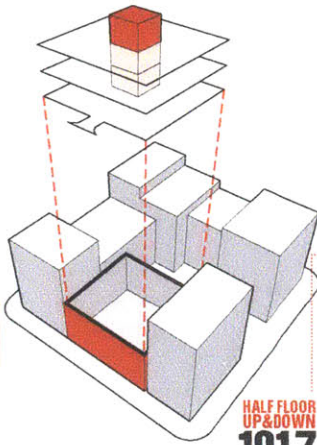


HIGH MAINTENANCE VEHICLES NEEDED STORAGE IN CITIES AND IN WINTER MONTHS

LONG TERM (DEAD STORAGE)

MECHANICAL RETROFIT

1896 1908



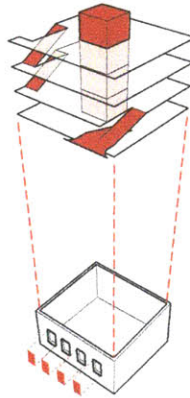
HALF FLOOR UP & DOWN
1917
ELEVATOR POWERED WITH RAMP TO MEET DEMAND

OVER 1,800 VEHICLE MANUFACTURERS

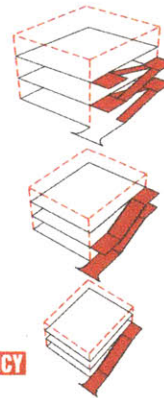
STANDARDIZATION VEHICLE DIMENSION

FEW SURVIVING VEHICLE MANUFACTURERS

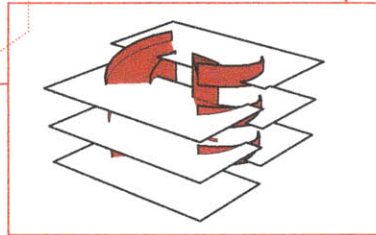
1930



EFFICIENCY



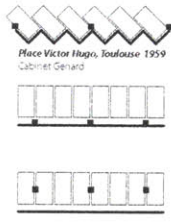
1927
D'HUME SYSTEM



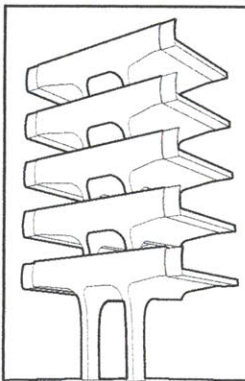
Baker Garage, Minneapolis 1927
Uses ramp for lift. Architects 10 floors - Expandable to 18 and 1 floor

VEHICLE AS STRUCTURAL CATALYST

ROW PARKING



UNIFIED VEHICLE DIMENSION WITH STRUCTURE



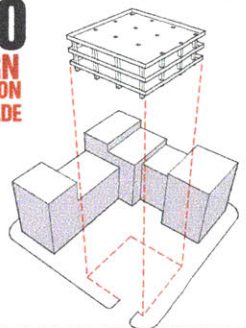
TEMPLE STREET GARAGE
NEW HAVEN
PAUL RUDOLPH
1959-1963

SITE CAST SCULPTURE
BARRIER TO SLAB
BEAM TO COLUMN

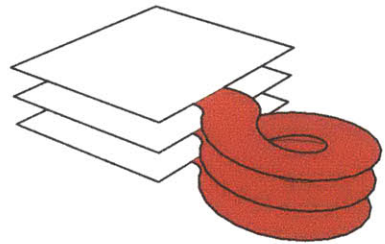
The garage typology awarded freedoms of experimentation that alternate forms could not.
New Haven's Temple Street Garage, by virtue of site cast concrete blended slab to barrier, and merged them to columns and beams.
Parking bias is contained by the skin. Alternatively, the 'Place Victor Hugo' garage presents a serrated edge as an elevation.

SECTIONAL DISPLAY

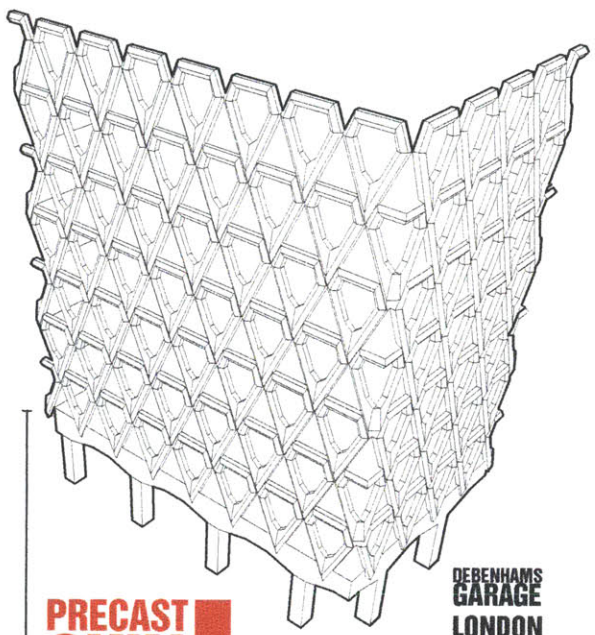
1950
MODERN EXPRESSION
FREE FACADE



FREEWAY NARRATIVE

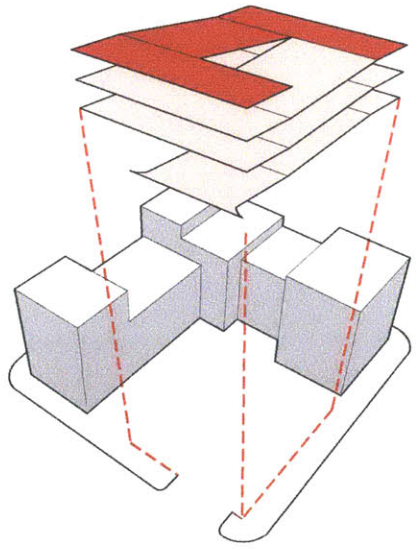


SELF PARK MODEL INCREASES SCALE



PRECAST SKIN CARRIES SLABS
COLUMN FREE THROUGH FLOORS

DEBENHAM'S GARAGE
LONDON
MICHAEL BLAMPED
1970



The efficiency was based on 100'x100' garage study that indicated that this ramp intervention would take 2 less parking spaces per floor than the elevator. The 'D'Hume inscribed a circular ramp through the section of offset floors. The arced ramps structurally framed by concrete walls afforded the operator a more panoramic view navigating between floors. Vertical expandability further aided in it's mass adoption. In 1927 the Baker Garage in Minneapolis was a testament to the D'Hume system boasting ten floors of parking that could be expanded another eighteen floors.

STANDARDIZATION VEHICLE INDUSTRY

The few remaining vehicle manufacturers post-depression presented the opportunity to define standards for vehicular dimension and maneuvering standards (turning radius). Narrowing the scope and future expectations for the physical presence of vehicles created new reliable organizational constraints for parking. Specifically, row parking became a catalyst that merged structure to vehicle dimensions.

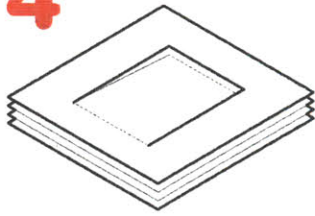
THE HOUSTON CONTEXT

The parking garage, an overlooked type in most urban investigations, but one which has been invested in with many inventions of spatial configurations to building technique, deserves consideration in calibrating its needs with those of the surrounding urban context and functions. Within the context of this research what became particularly interesting was not only the prevalence of the parking garage in Houston but the scale in which they

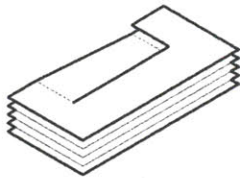
exist. The following pages are an index of 50 parking garages surveyed from 4 stories to over 15 stories. As the garages assume greater heights, they take on new roles as mechanical yards and even big-box fitness centers.

1. Simon Henley, "The Architecture of Parking" Thames and Hudson, 2007
2. Shannon Sanders Mc Donald, "The Parking Garage- Design and Evolution of a Modern Urban Form" ULI Urban Land Institute, 2007

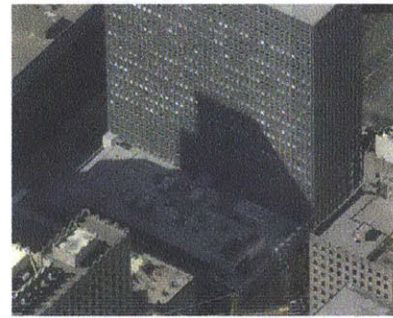
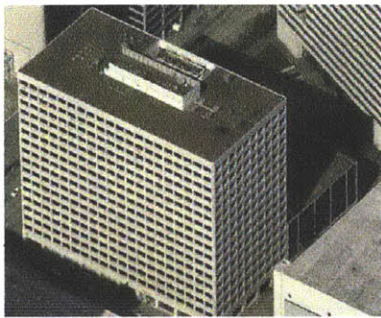
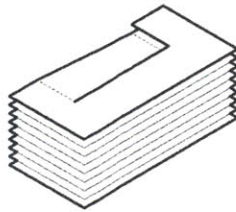
4



5



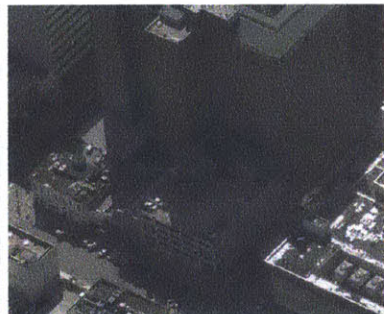
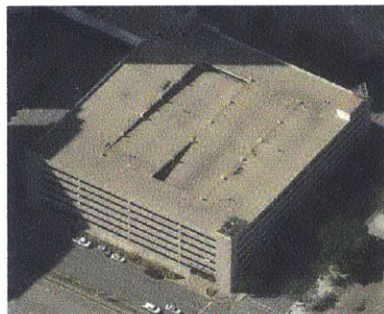
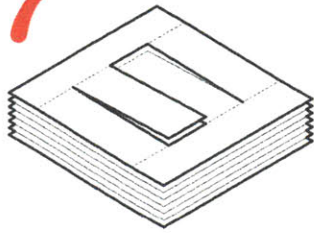
6



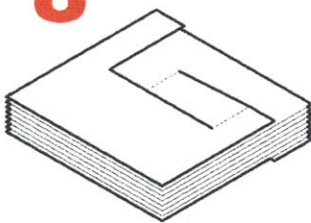
IMAGES: Bingmaps © 2010 Microsoft Corporation



7

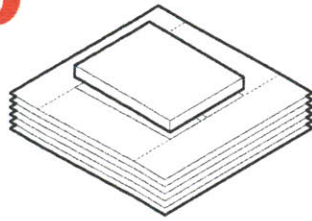


8

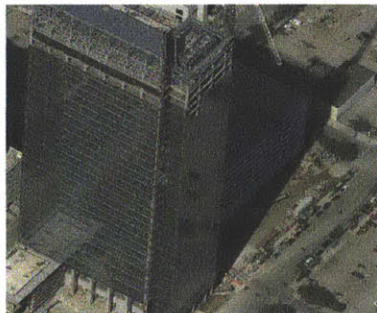
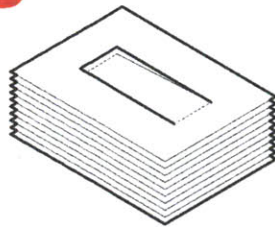




9



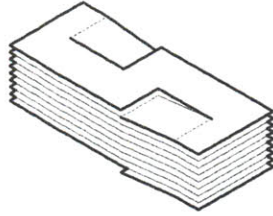
10



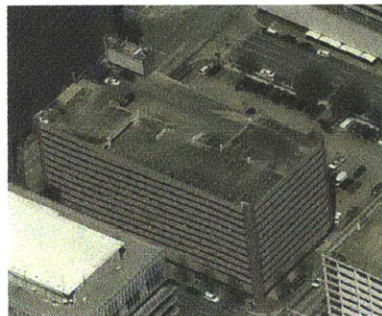
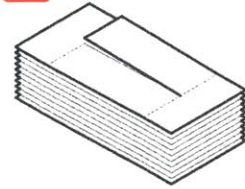
IMAGES: Bingmaps © 2010 Microsoft Corporation



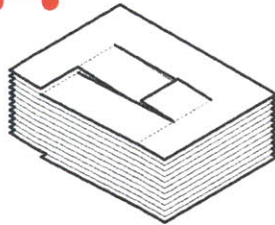
11



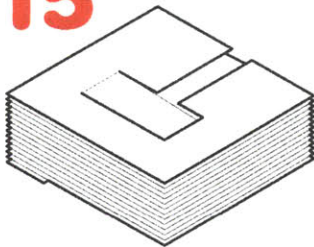
12



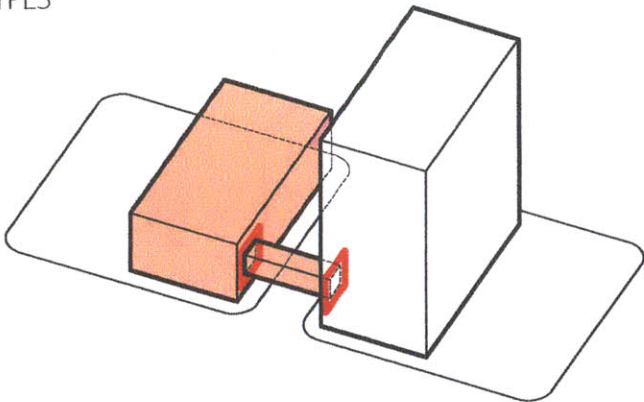
14



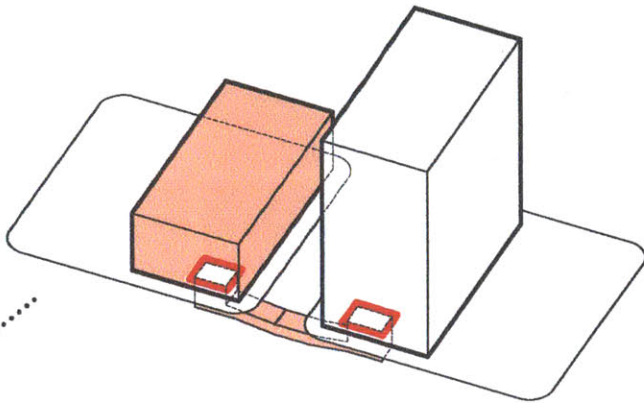
15



CONNECTION TYPES

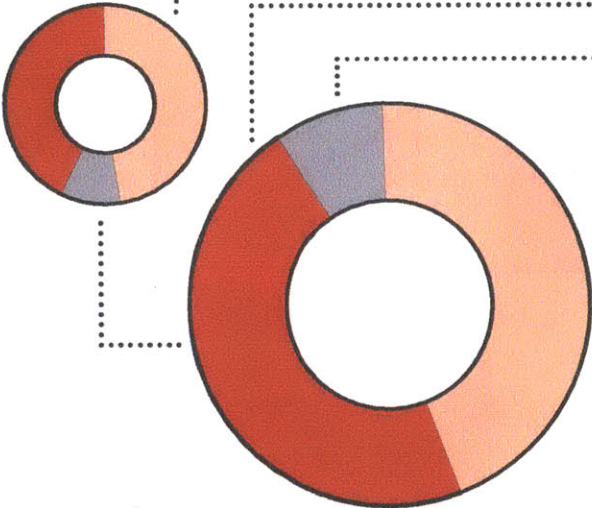


skybridge
ADJACENT BLOCK

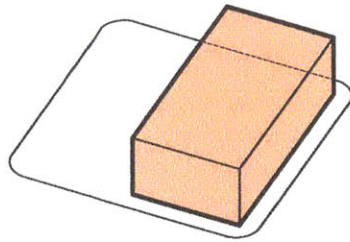


tunnel
ADJACENT BLOCK

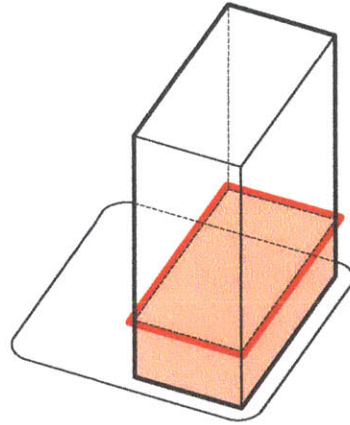
CONNECTED ADJACENT
BLOCK GARAGES



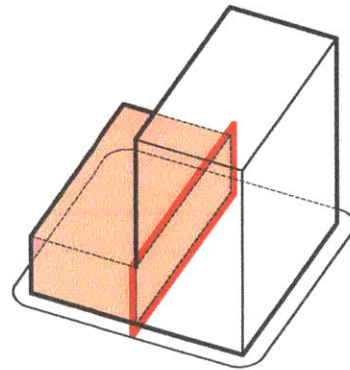
*50 GARAGES SURVEYED



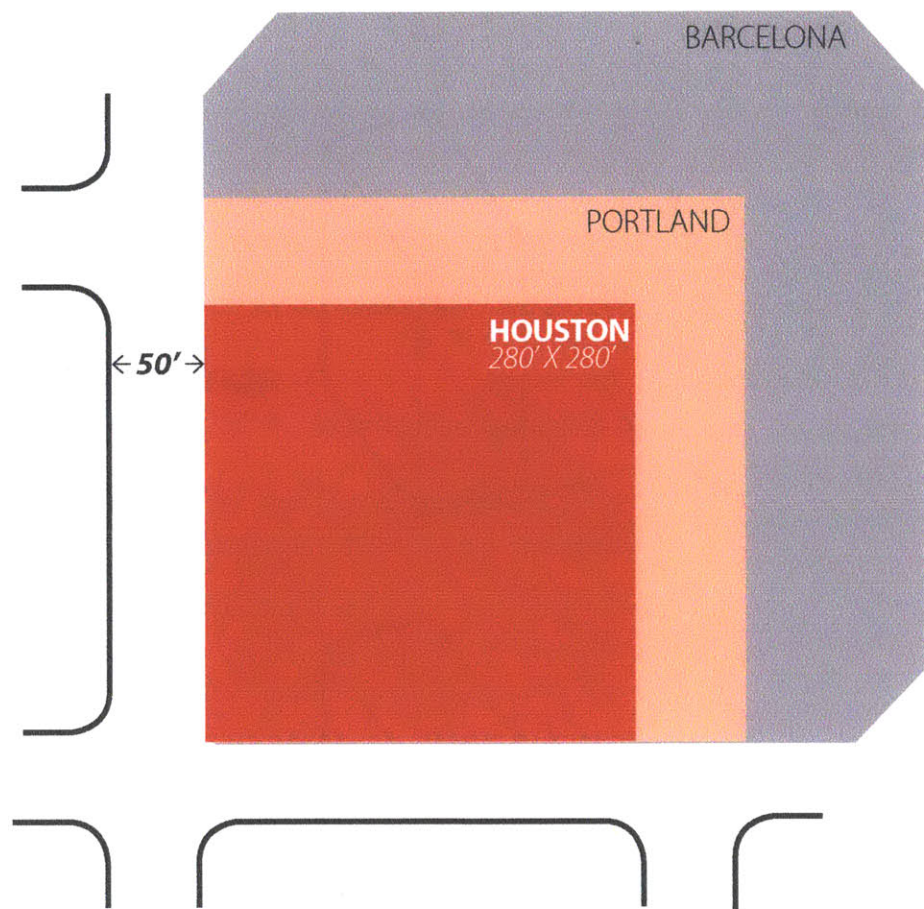
independent



above
SAME BLOCK



adjacent
SAME BLOCK



A STRUCTURAL INFRASTRUCTURE

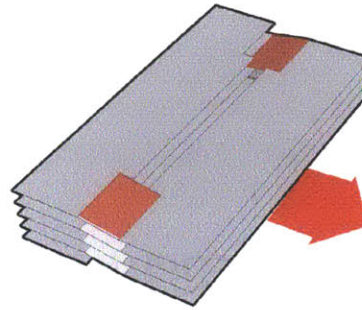
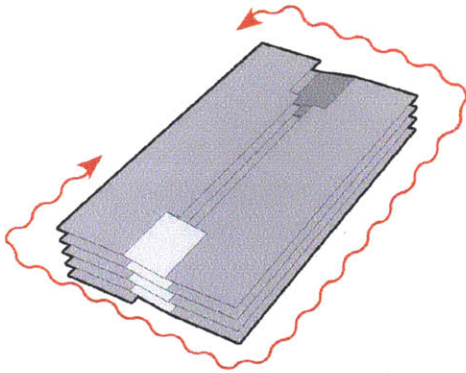
05

This proposal focuses on the two primary conditions: overcoming the 280x280 block structure, and fragmented parking which has perpetuated each site to become suburbanized zones each operating on their own accord. Economically this has long strained the quality of the structure requiring a substantial portion to be portioned to structured parking.

By combining blocks and centralizing parking specifically as an intermodal space, surrounding blocks can be appropriated for higher urban function, new urban grain, sequence and space.

The garage structures are re-imagined as infrastructures for future use, but not to the sacrifice of vehicular or pedestrian movement.

URBAN STRUCTURE

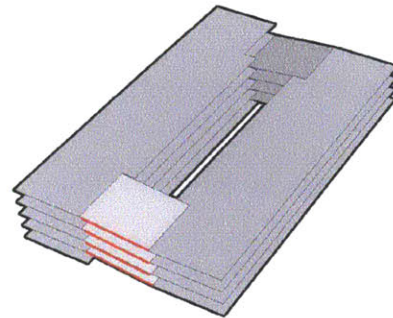
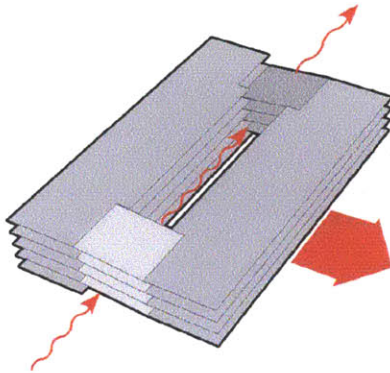


OBSTRUCTION

Typical solutions to integrate ground level program

RAMPS AND FLOORS

Steep vehicular ramps intend to minimize horizontal surfaces that cannot be programmed for parking. Maximum sloped code compliant ramps have a limited run of 30' and therefore constrain the achievable floor to floor height of garages.



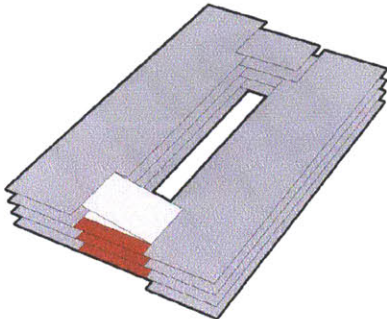
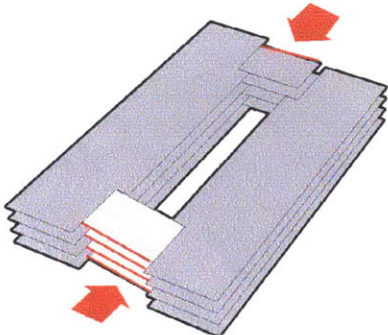
INTERNAL STREETS

Broadening the connection between parking bands allows a ramp strategy that can incorporate higher floor to floor heights for future use. Second, the new void becomes an instant internal street.

OBLIQUE ELEVATIONS

The elevation of a parking garage is unique in the way it exhibits its section and ramped elevations. This however perpetuates vacant elevations that offer little to define a street edge.

PEDESTRIAN CIRCULATION

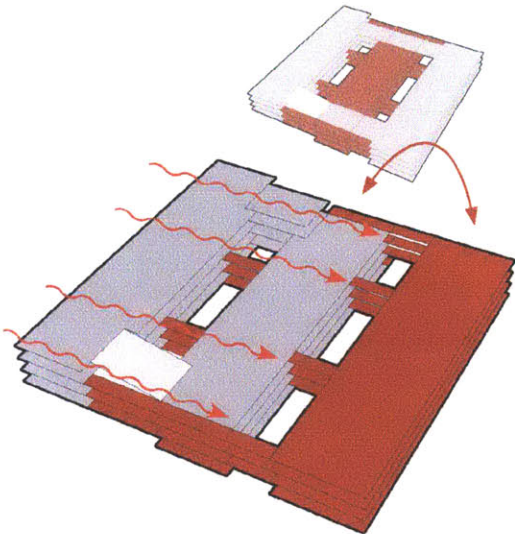
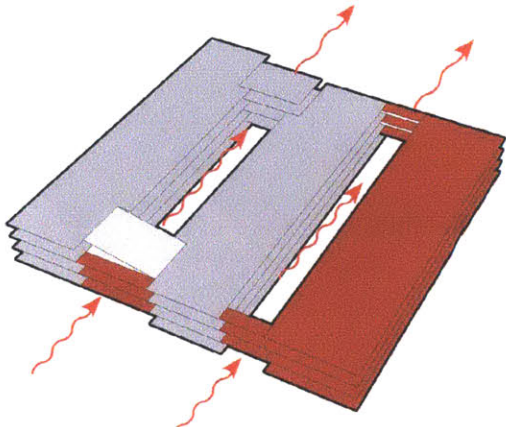


TRADING SPACES

At the cost of 4 parking spaces per floor the ramps retreat internally.

NEW PEDESTRIAN EDGE

The shifted ramps create an opportunity for a pedestrian elevation to connect vertical circulation.



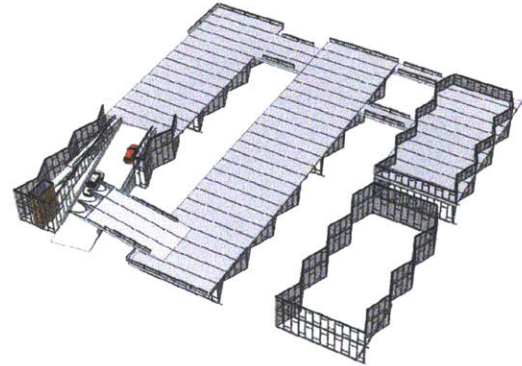
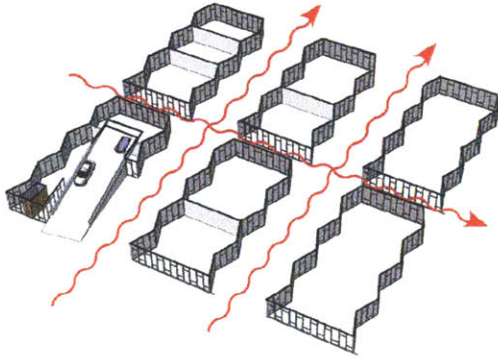
NEW STREET NETWORK

The new pedestrian edges enable new modes of connectivity between the ground, and adjacent current and future program

PEDESTRIAN CONTINUITY

Now, the parking garage has liberated the ground with internal streets, light penetration, integrated pedestrian walkways.

IMMEDIATE AND FUTURE PROGRAM

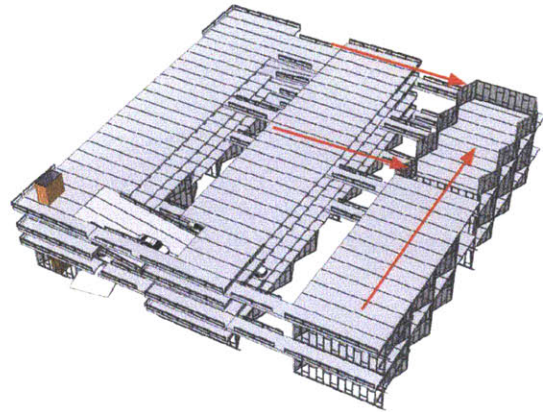
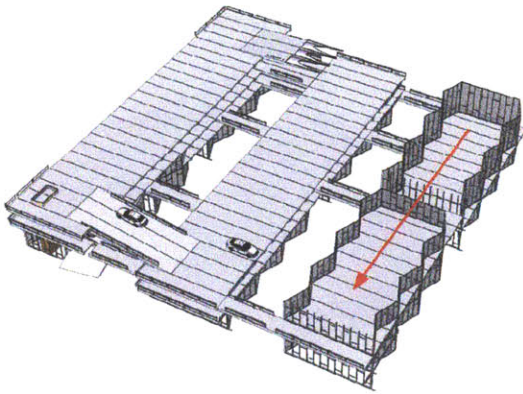


RECLAIMING THE GROUND

The new ground level achieves new pathways at a scale that attracts diversity in program.

VARIATION IN HEIGHT

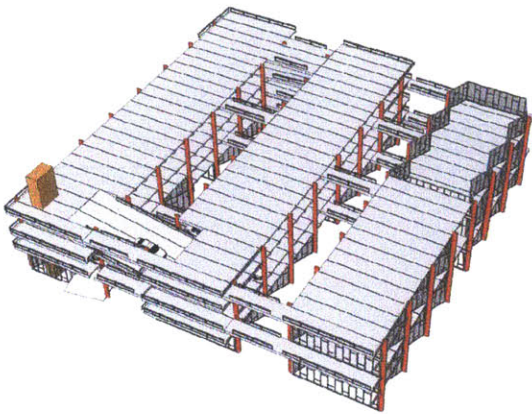
Double height spaces are accessible from the ground level and are accessible to adjacent garage levels.



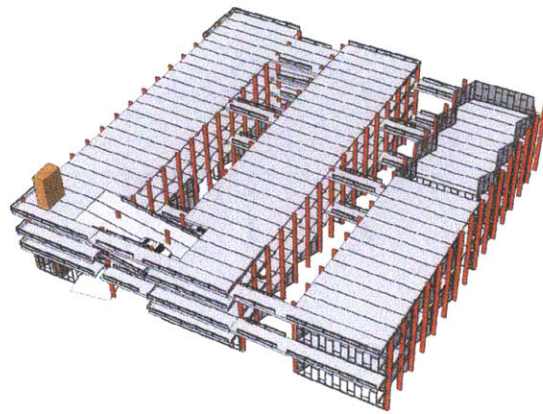
CONTINUOUS PROGRAM

DRIVE-UP PROGRAM

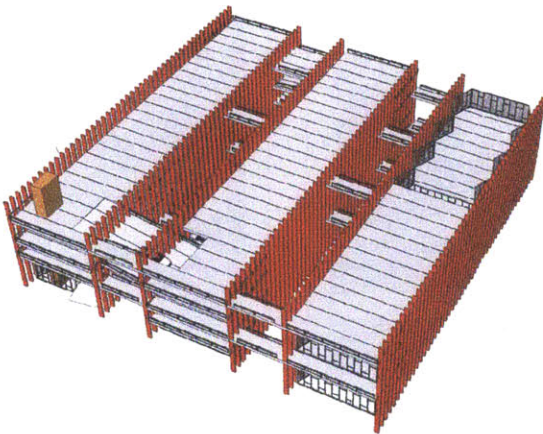
STRUCTURE



30' TYPICAL BAY

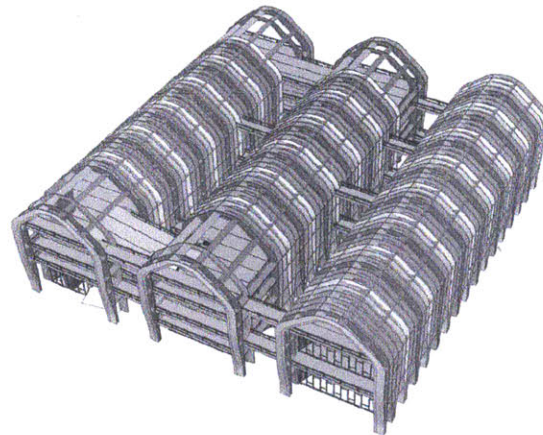


15' STRUCTURAL BAY



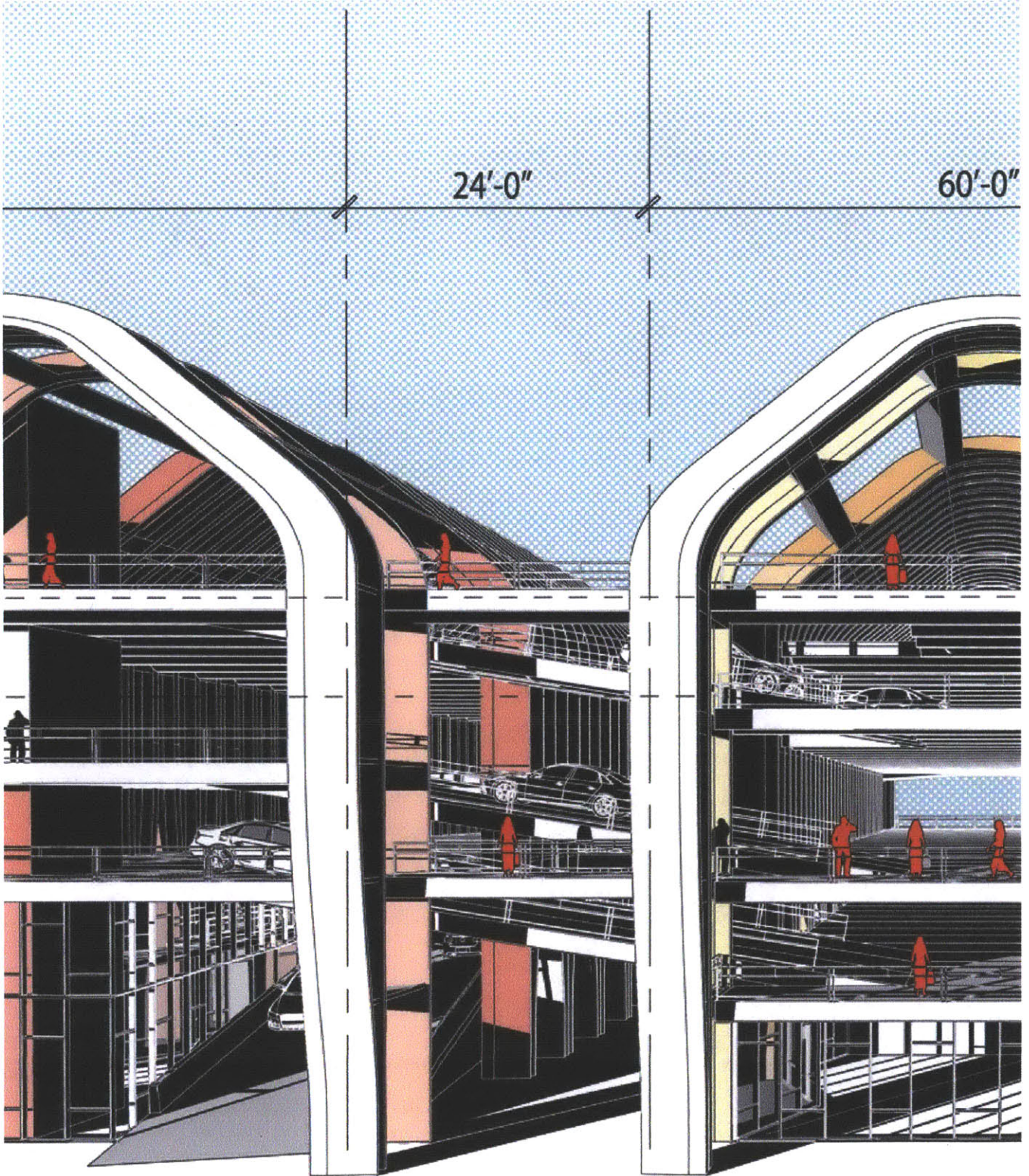
STRUCTURAL SCREEN

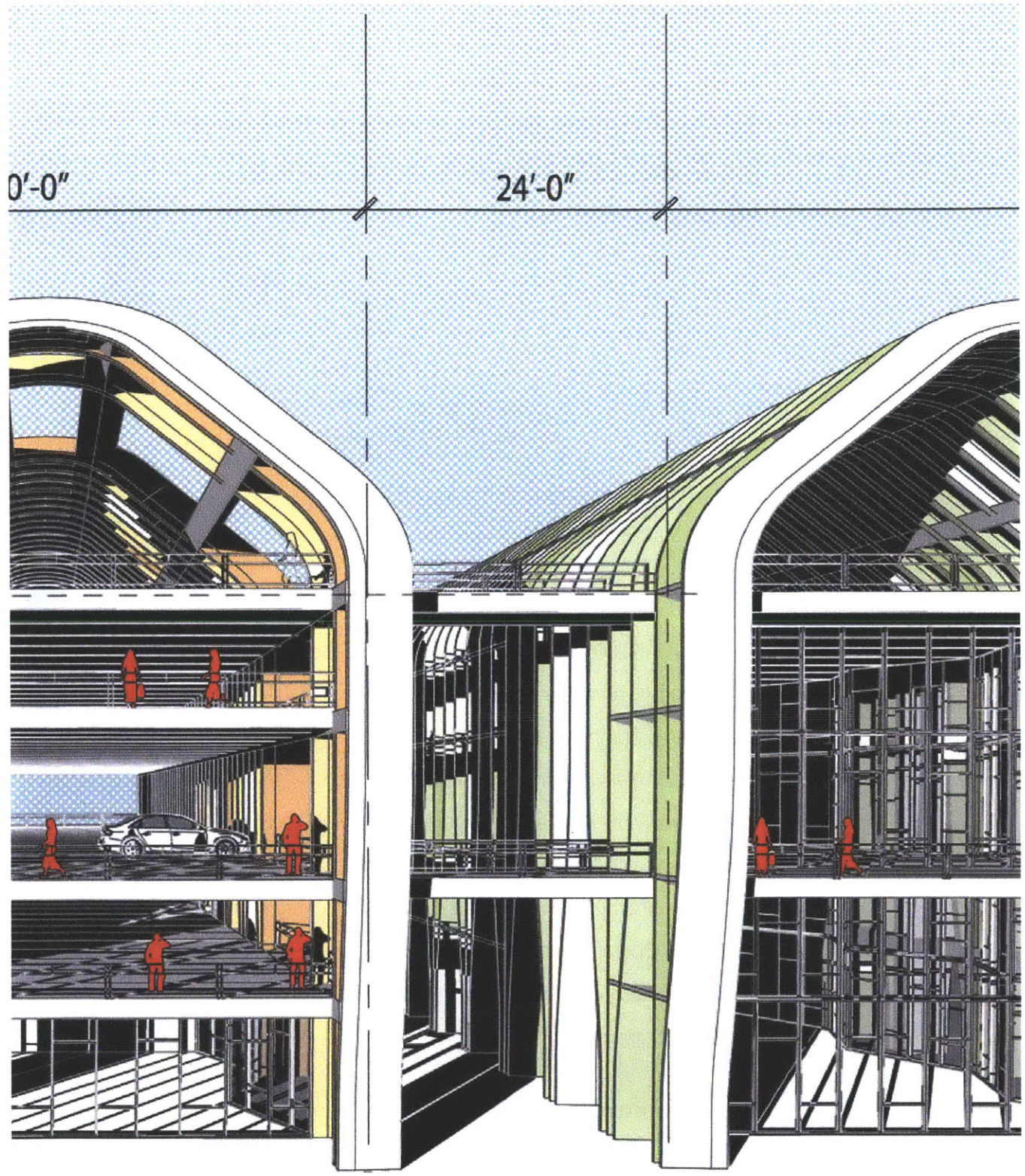
As a structural screen the elevation can be infilled in a variety of program. The spacing of the screen establishes a set of rules to invent within.



ROOF ARTICULATION

Within a city core, the parking garage is the lowest form in a developed block. By articulating the a structural roof, the garage communicates in a clear form, does not contribute as a heat island, and makes itself available for future program as a plug-in structure.





URBANISM FROM ABOVE

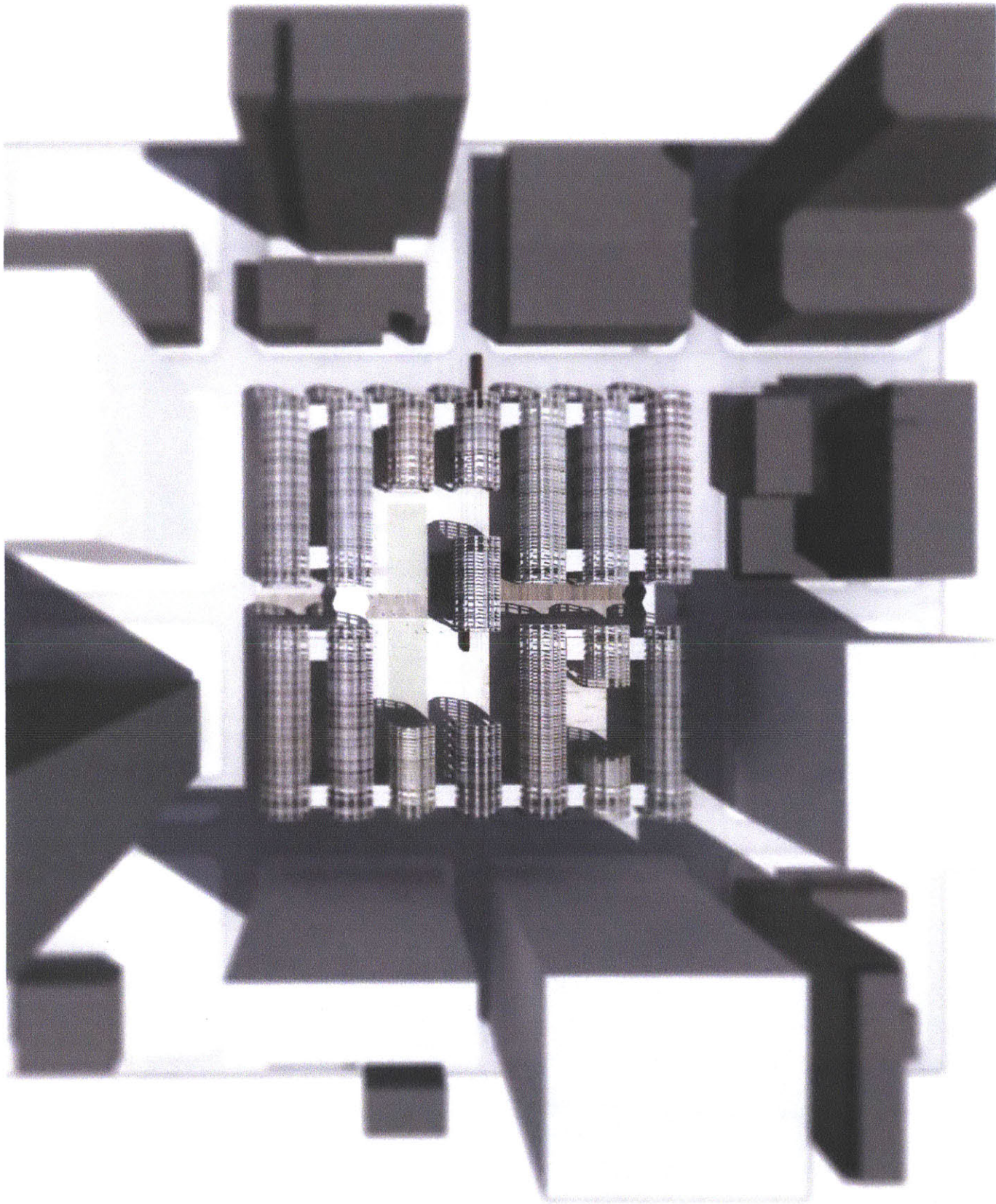
The fundamental persistence of the parking garage in city centers demonstrates an exhaustive exhibition of a type that presents an overlooked role for the garage to communicate to the architecture above.

As mentioned in a preceding section, the garage and its adjacent structure come in a variety of connection types. What is less acknowledged is the form from above and its potential to contribute as a complete structure.

A collection of garages are not unlike the spatial anchoring of massive European markets in the manner they generate distinct low urban pockets.

Completed in 2005, the renovation of Santa Catarina Market in Barcelona by Enric Miralles Benedetta Tagliabue-EMBT, presents themes of program diversity, detail, and urbanism by virtue of a large scale element. Prior to its recent renovation the market was originally the Convent of Santa Maria in 1845. Only three years later the convent was destroyed by a fire. With the structure intact, the city then converted it into the first covered market in Barcelona. Operating nearly another 150 years the market was failing in the early 90's and was commissioned for a renovation of the market square.

The roof structure of the renovated Santa Catarina market asserts the ideals of a large scale structure to (though artfully) communicate to its enclosing urban structure above..





Santa Catarina Market , Barcelona Spain- EMBT 2005 Photo by Naomi Schiphorst



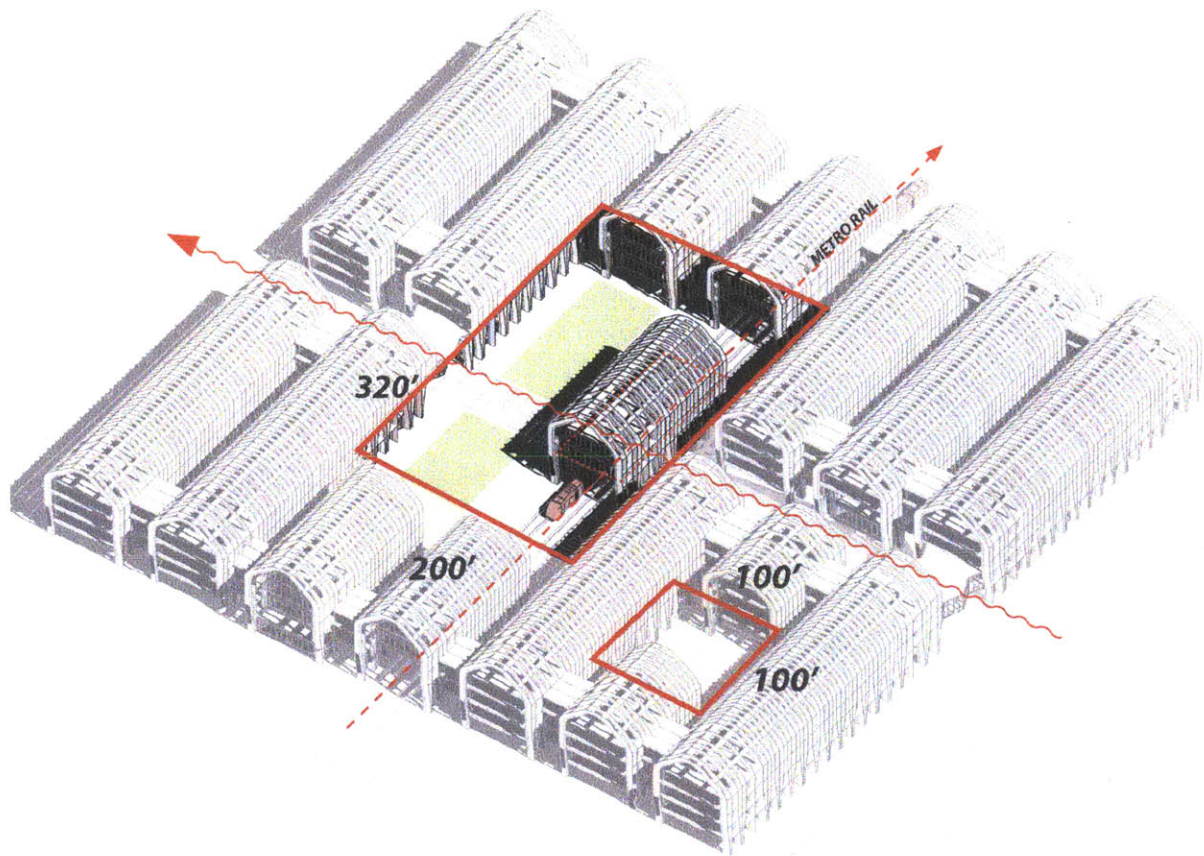
IMAGE: Modified by author from Bingmaps © 2010 Microsoft Corporation

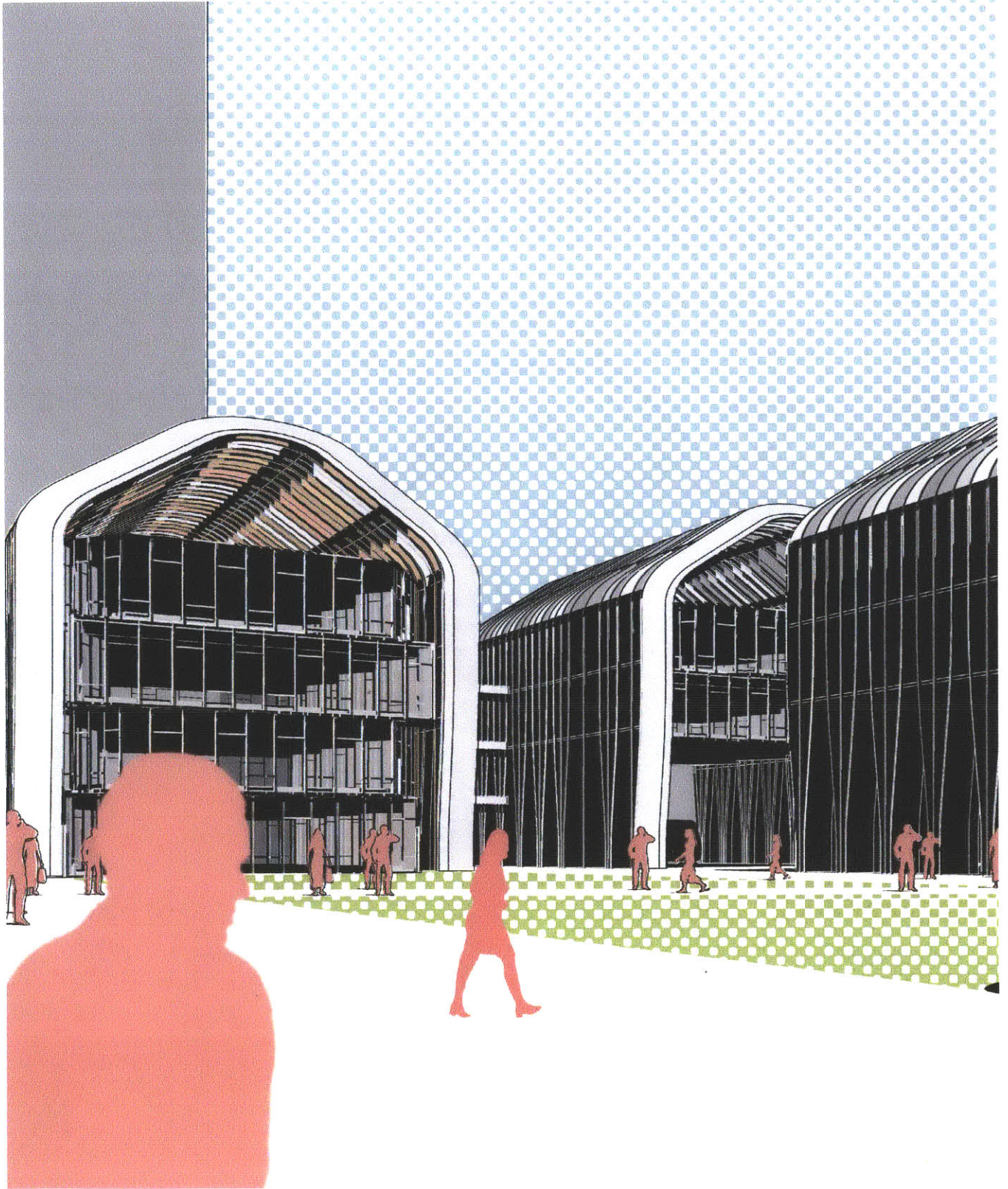


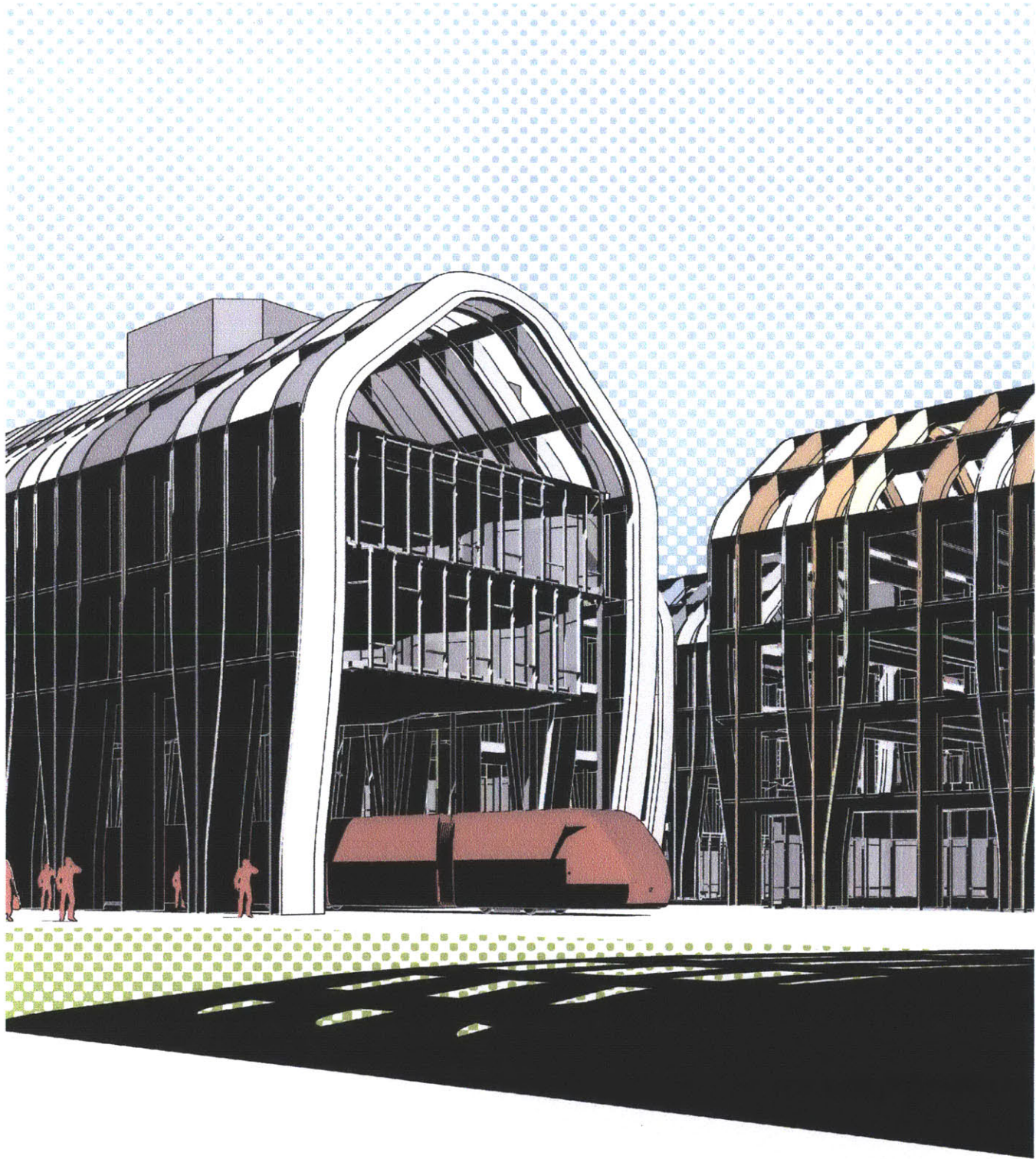
Piazza della Repubblica, Florence Photo by Creative Commons

RECLAIMING TRADITIONAL SPACES

The lightrail metro stop is the element that recaptures activity of the ground. This proposal finds opportunity in the scale and continuity of the garage to reclaim urban spaces through contemporary mechanisms vehicular demand.





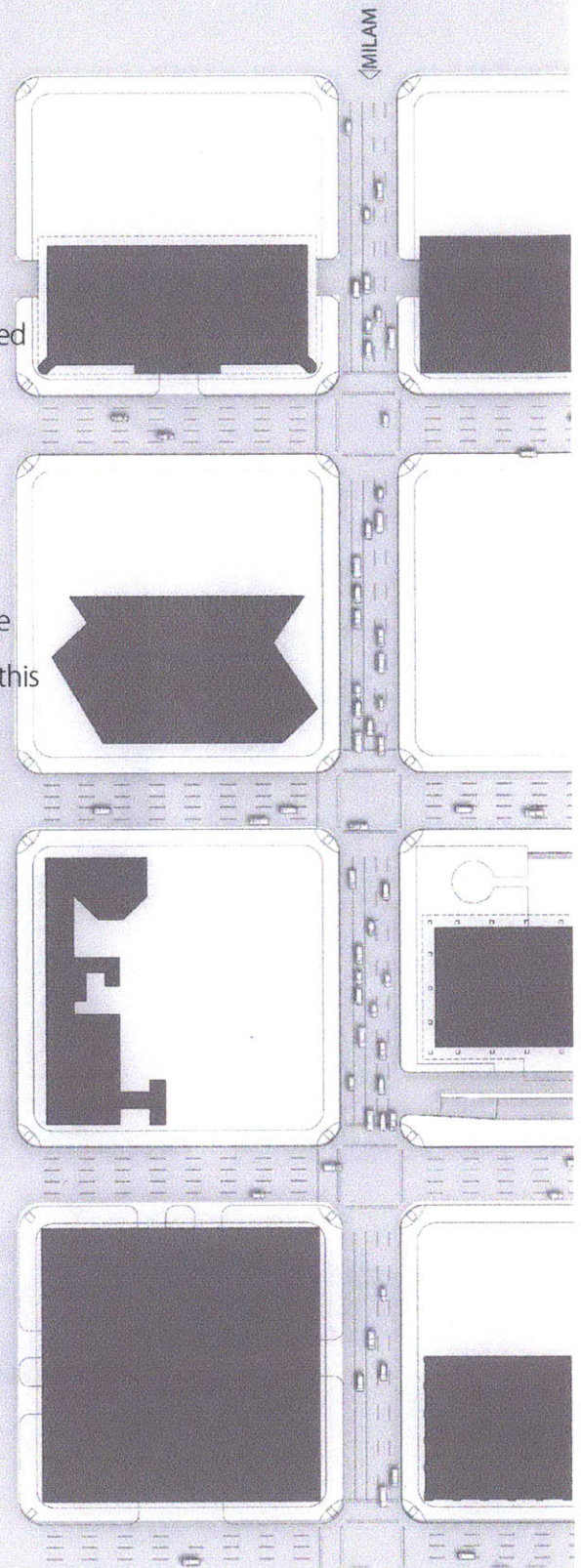


ALREADY A SUPERBLOCK

Combining blocks becomes necessary to liberate new spatial operations. Though Main Street continues to have vehicular flow through a single lane in each direction, the concentration of north and south bound traffic has rerouted to other streets. Closing Bell Street has little traffic flow repercussions with limited destinations immediately to the east.

LANDSCAPE

In this hot and humid context, landscape has a functional value to making an outdoor space viable and desirable. However, in this proposal, the area of focus was on the spatial implications that can be extracted from the garage type.



TRAVIS

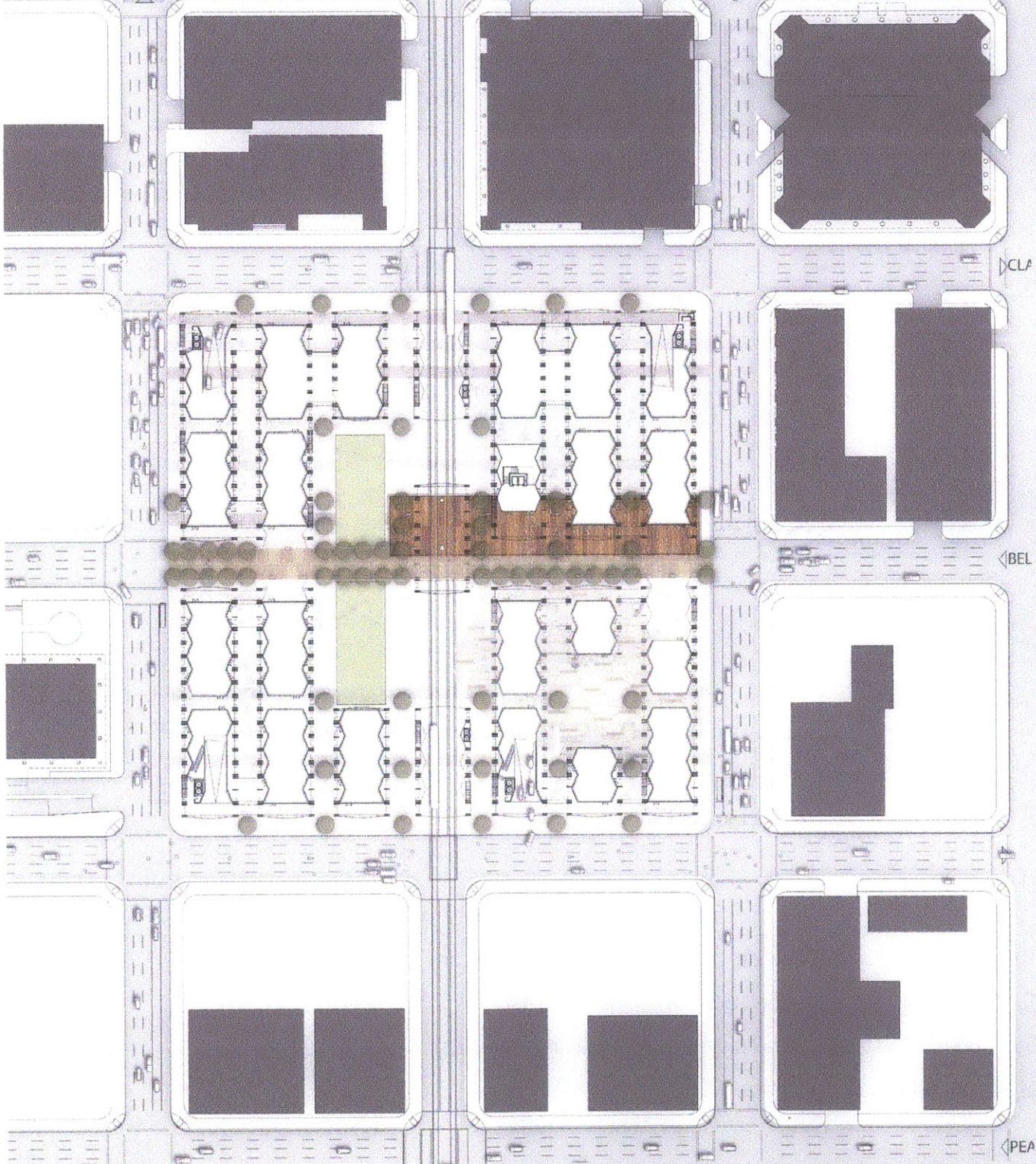
MAIN

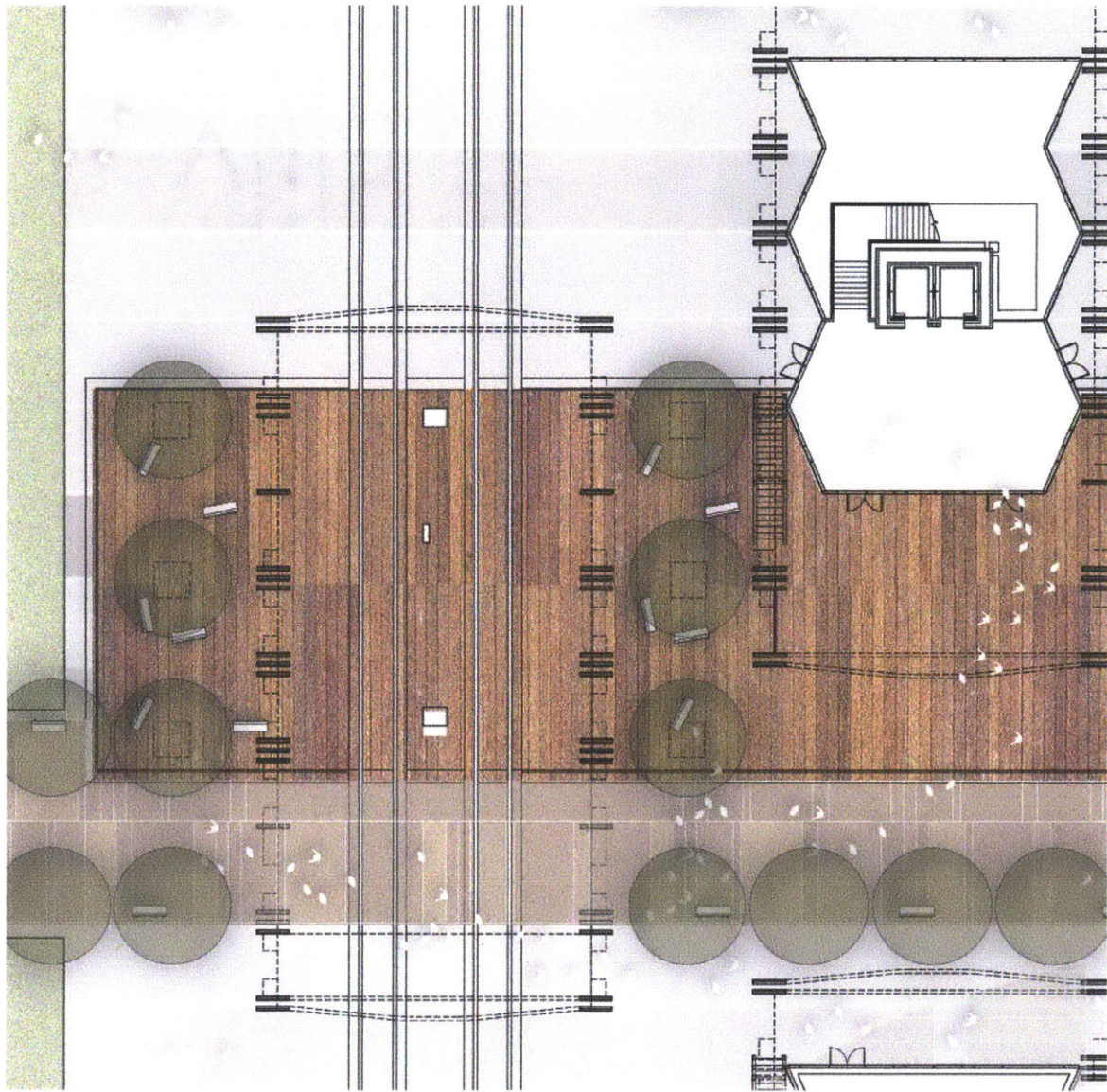
FANNIN

CLAY

BELMONT

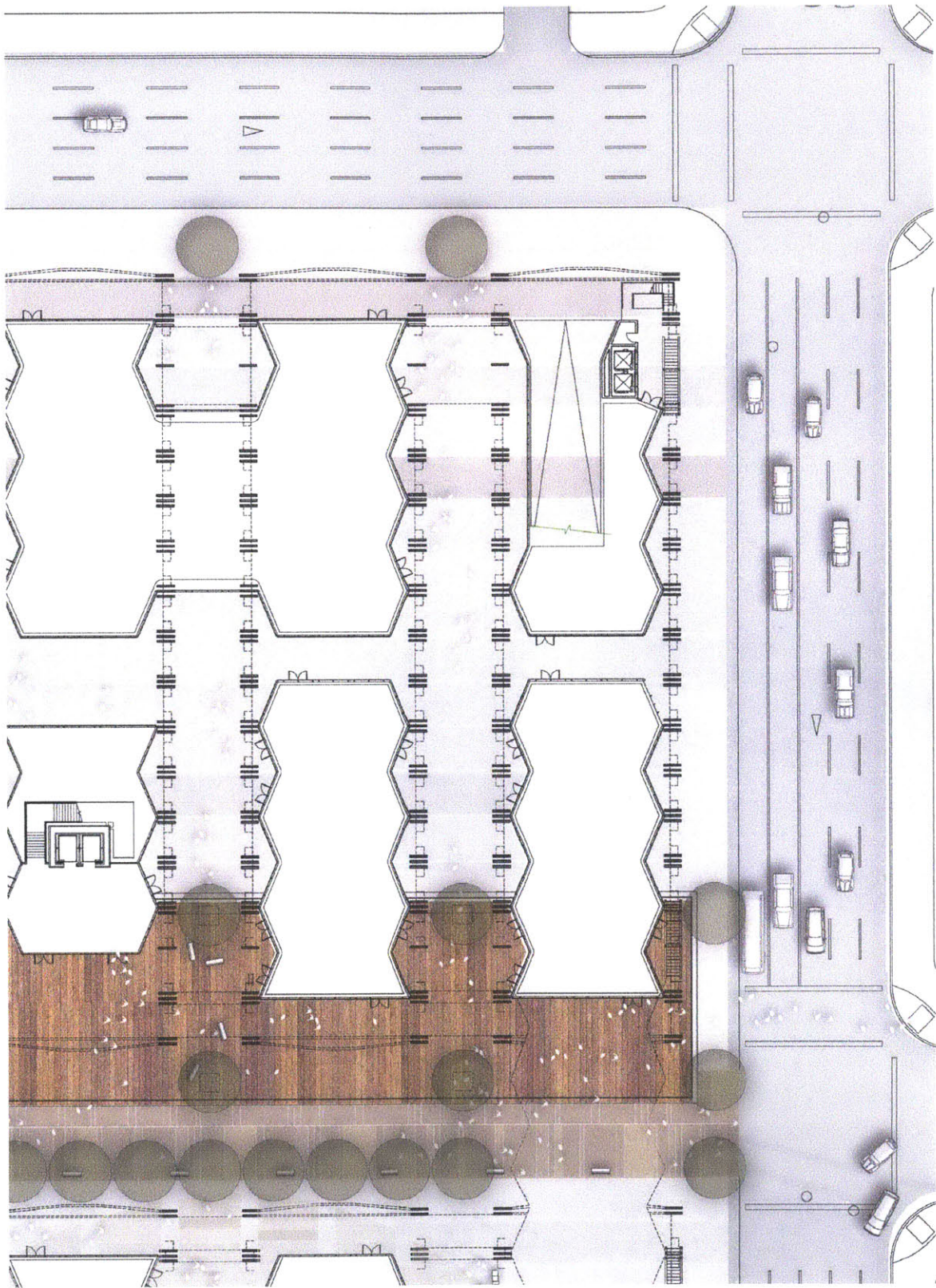
PEACOCK

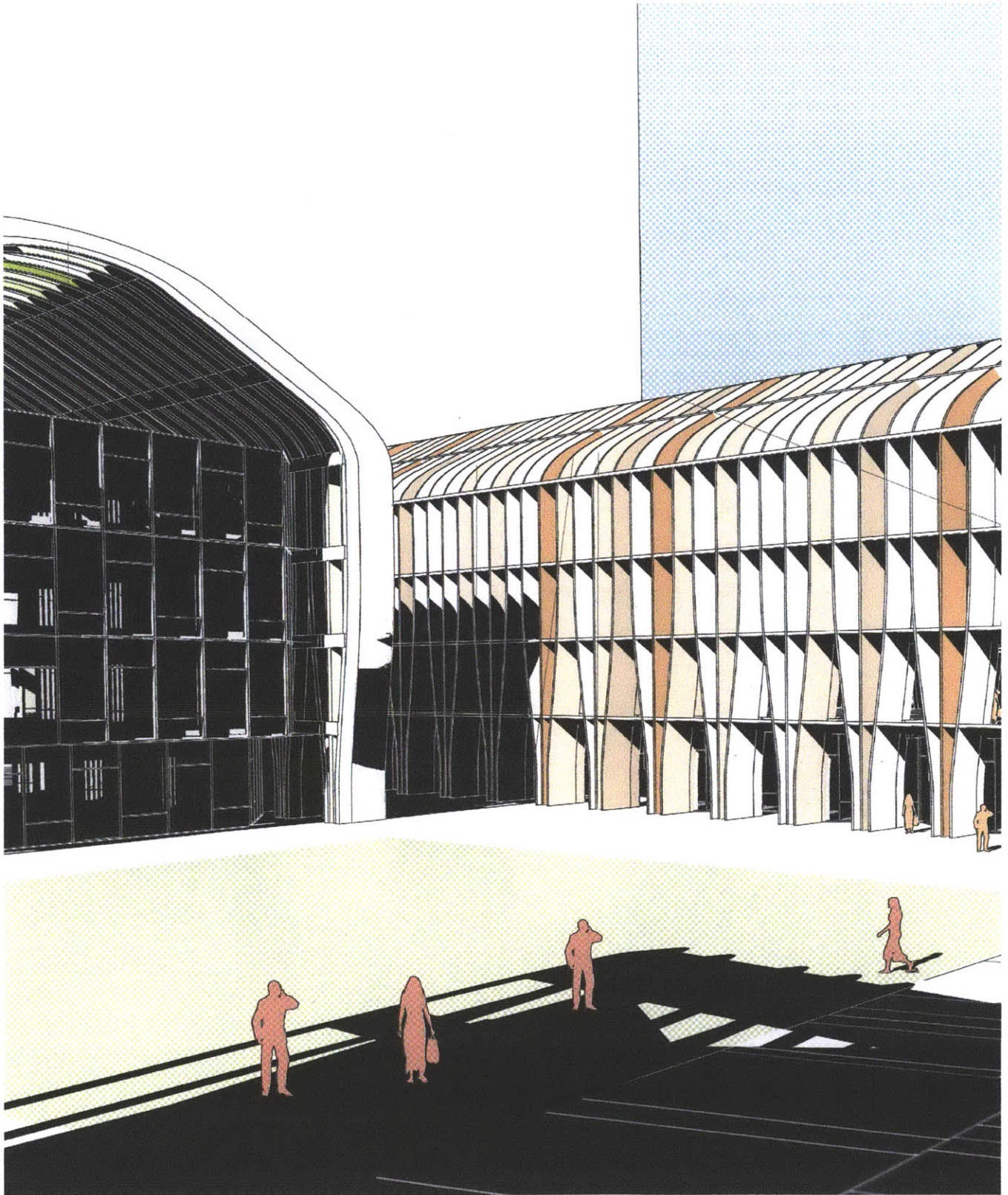


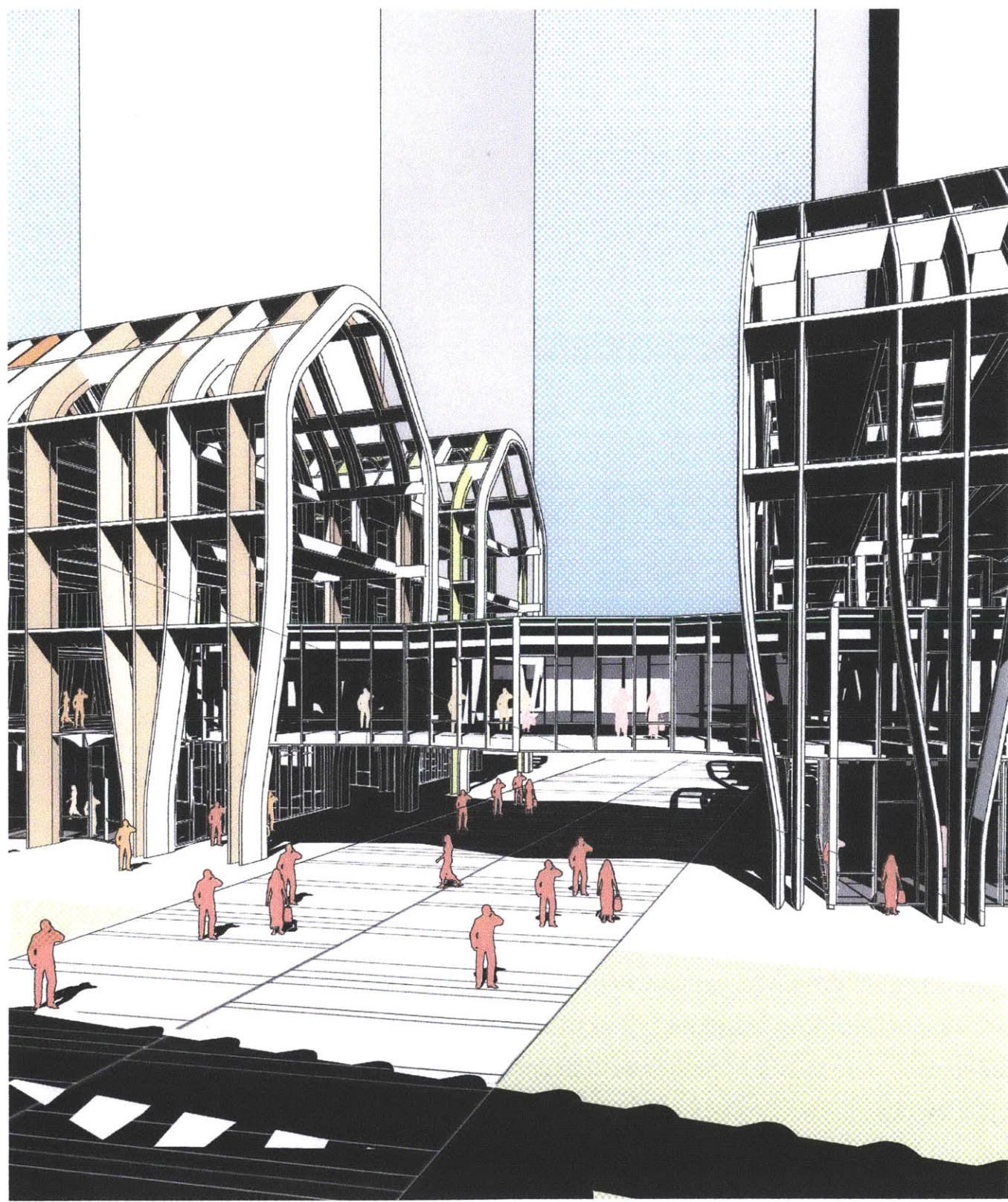


BELL STREET

The new pedestrian promenade on Bell Street links the Houston Tunnel network, Metro Platform and plaza. The North and Southbound Red Line Lightrail platform are coplanar to the plaza as a continuous walking surface.

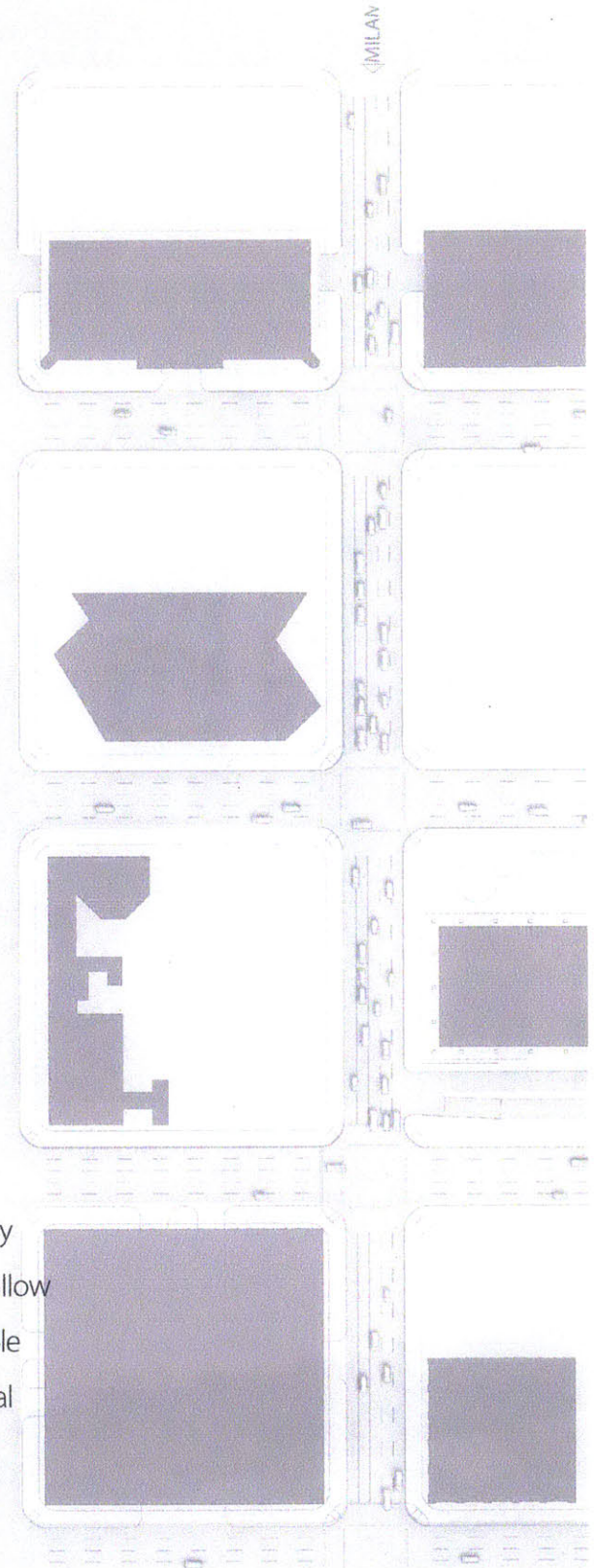






INTERLACED PROGRAM

The function of a garage is intended to be its most temporary program. Unlike the typical garages with deep plans and shallow sections, the narrow floor plate, access to daylight, and double height spaces make it a far less hostile space for the individual and create opportunity for future program.



TRAVI

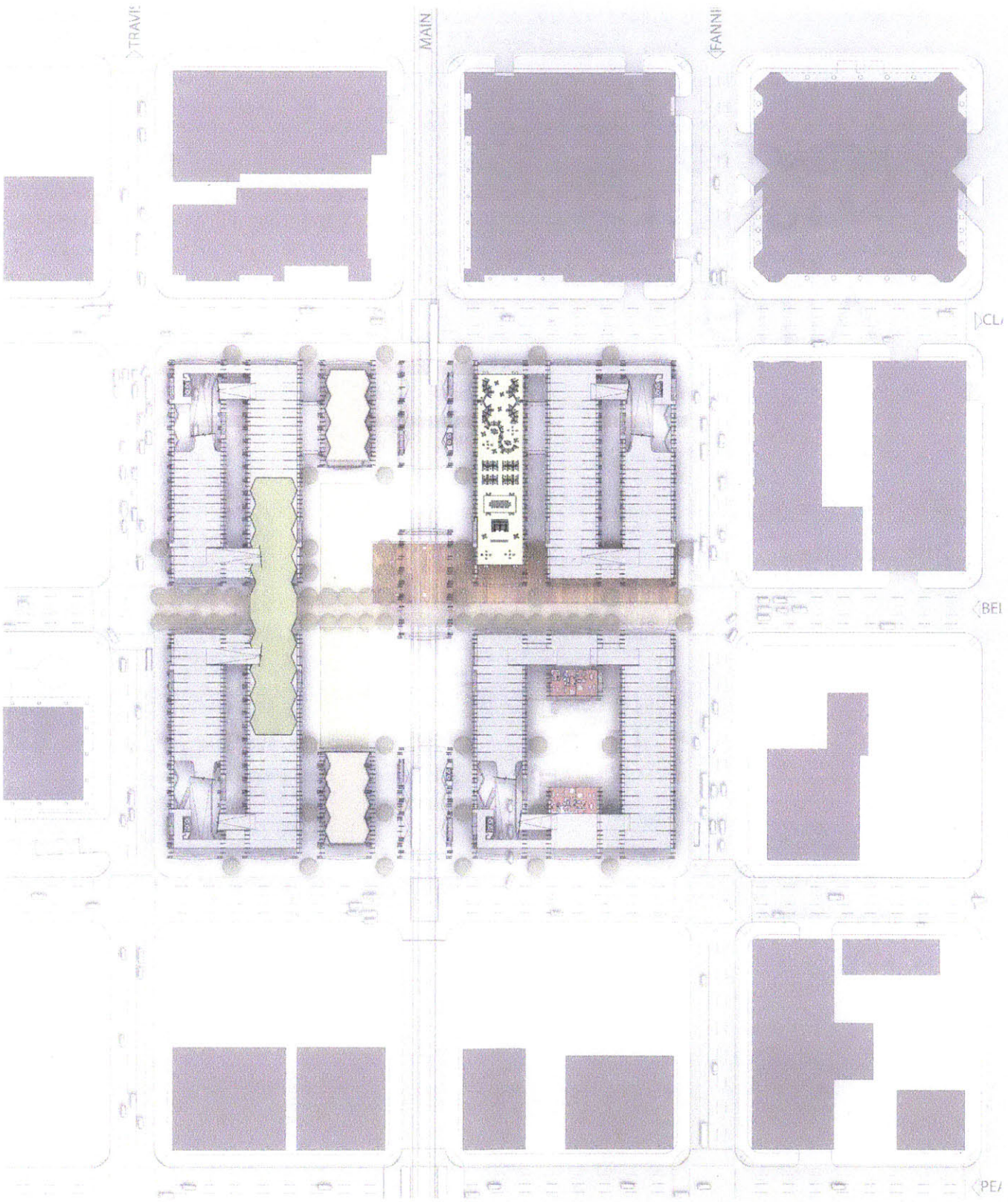
MAIN

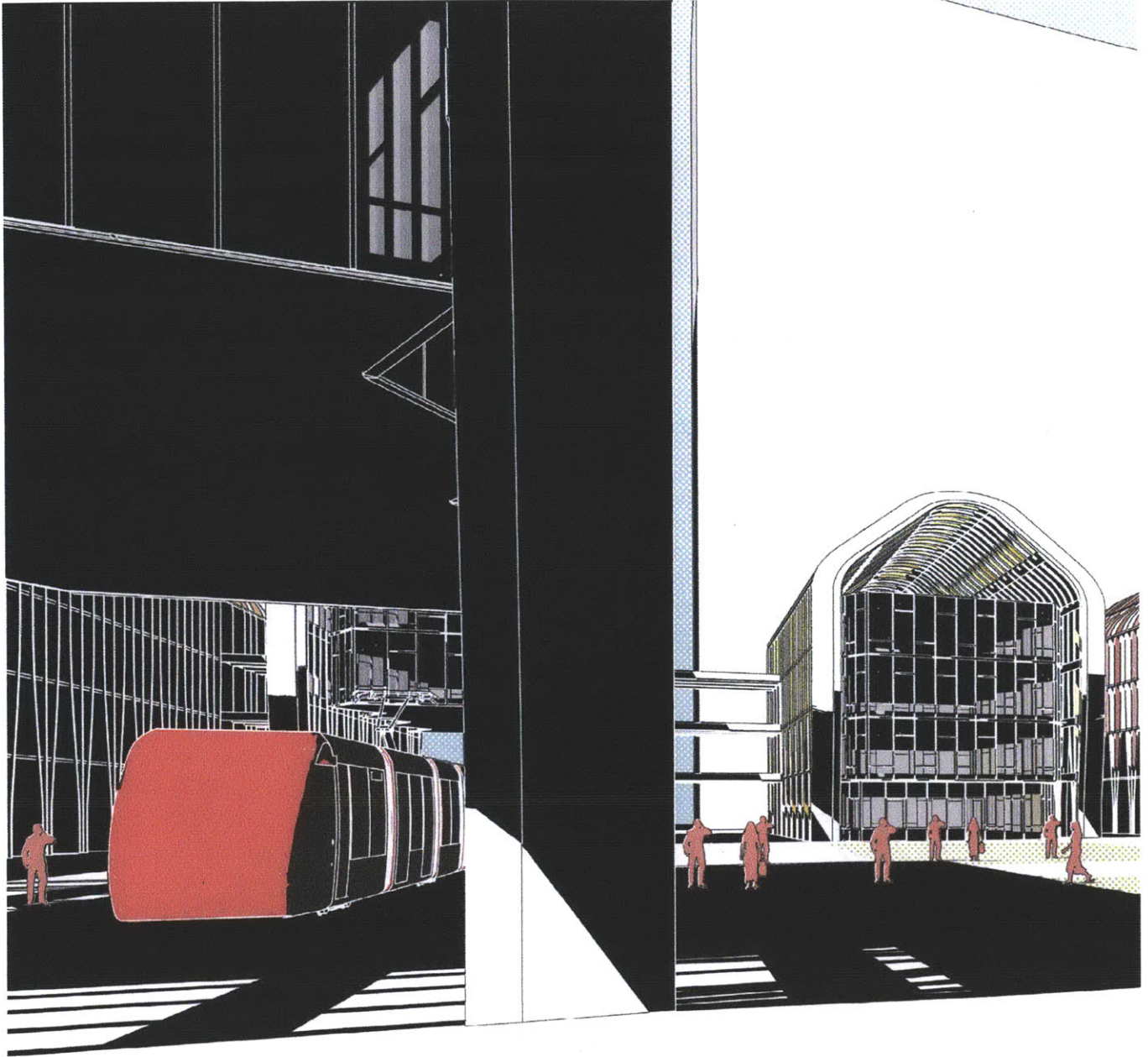
FANNI

DCL

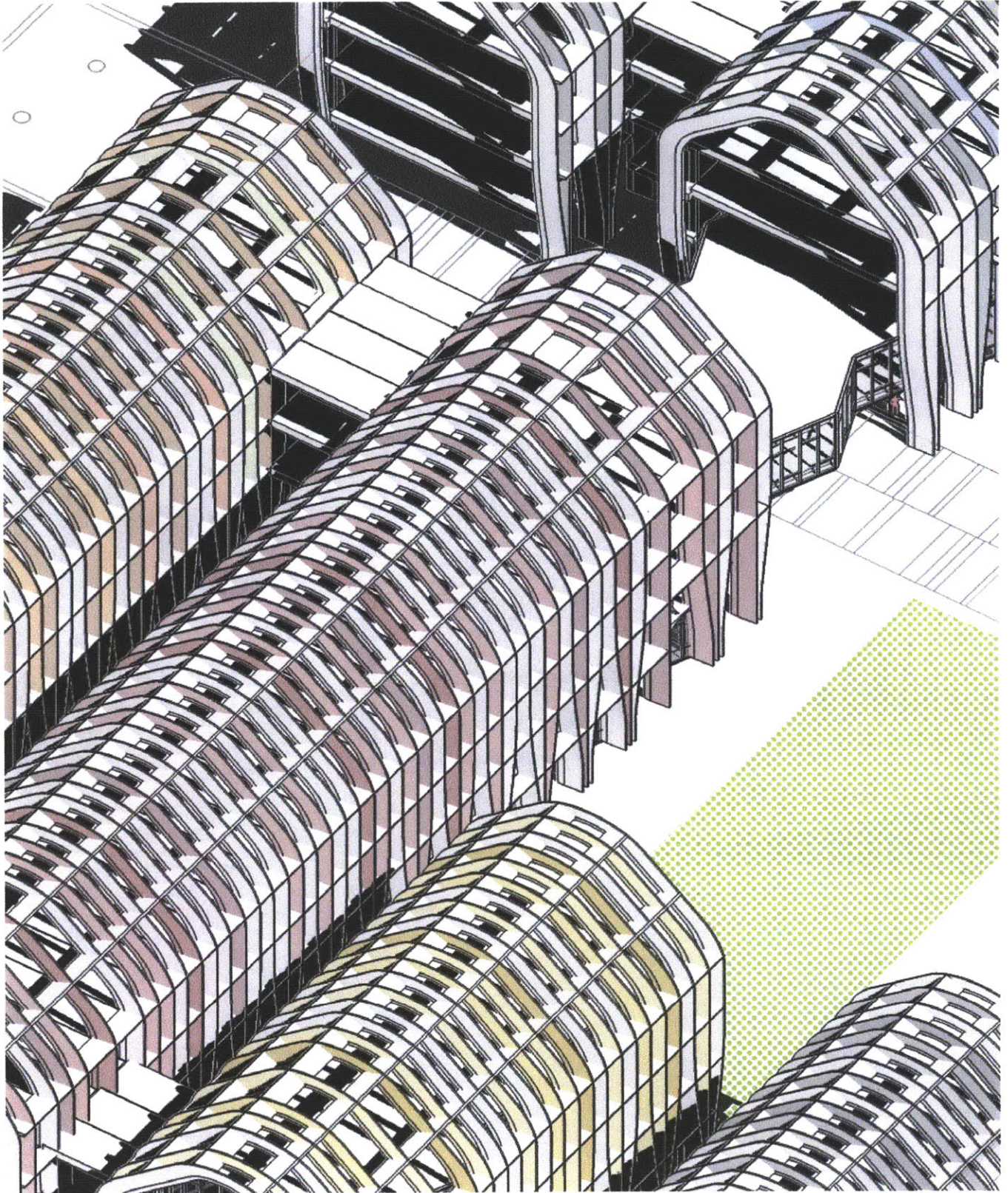
BEI

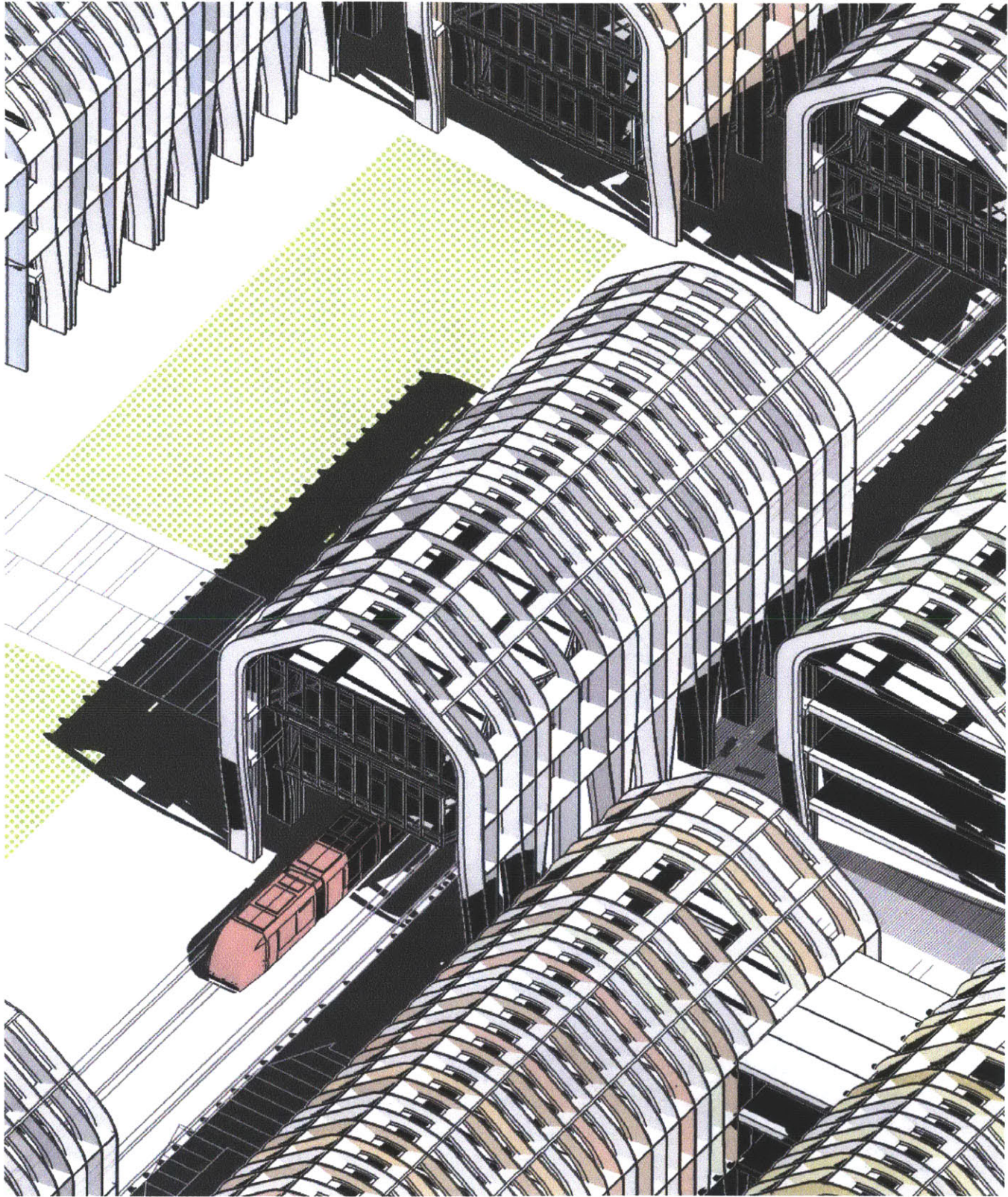
PEI

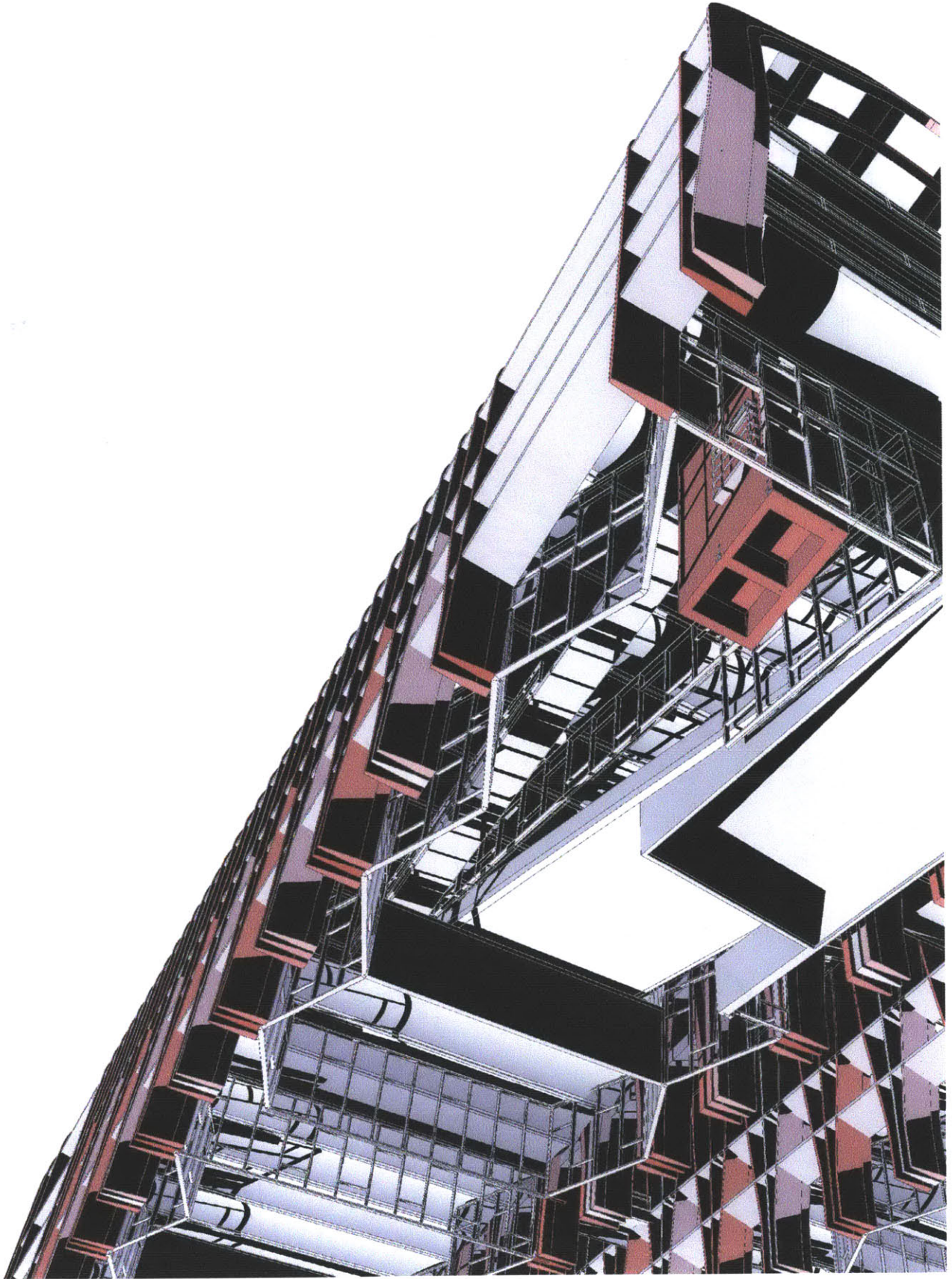


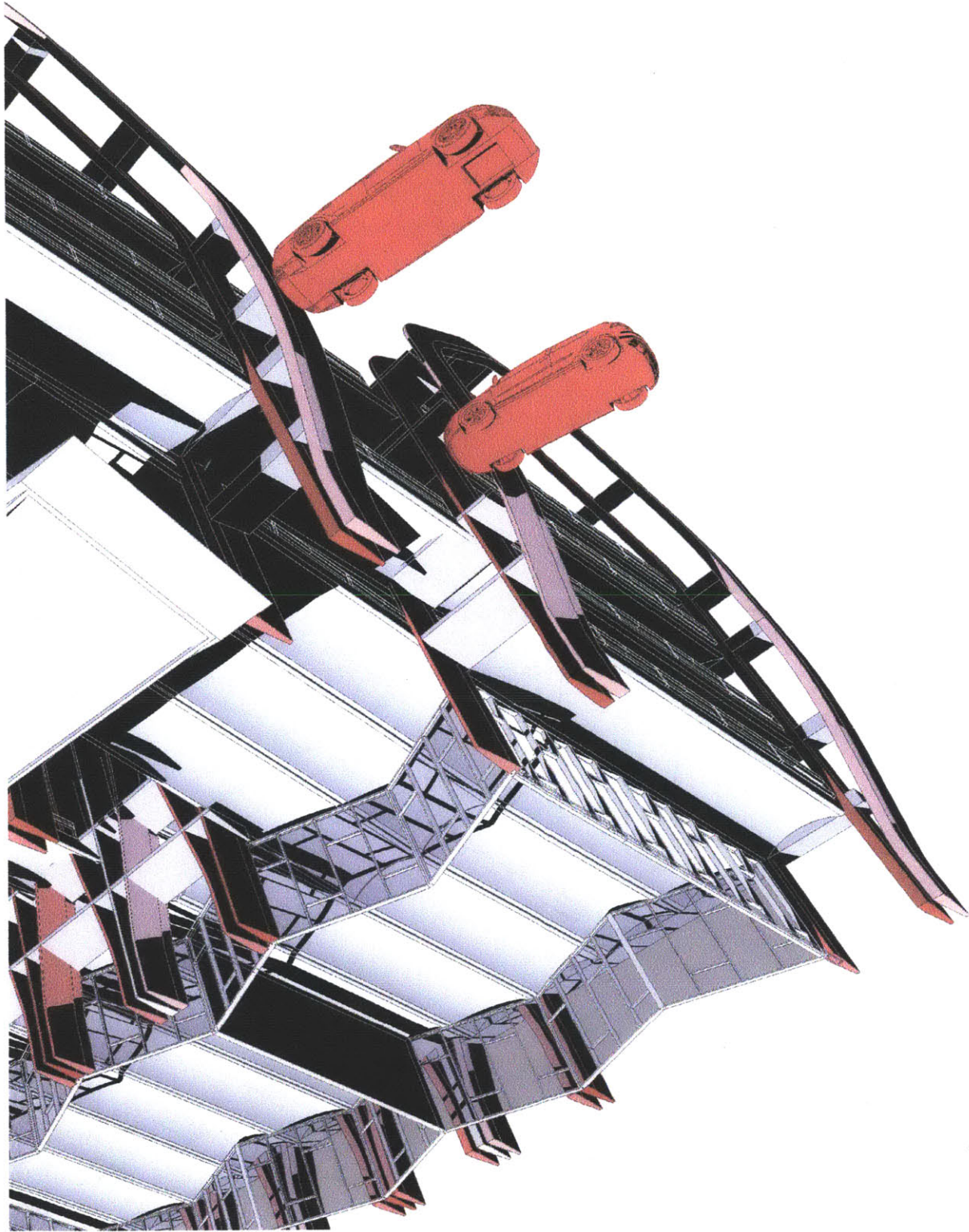


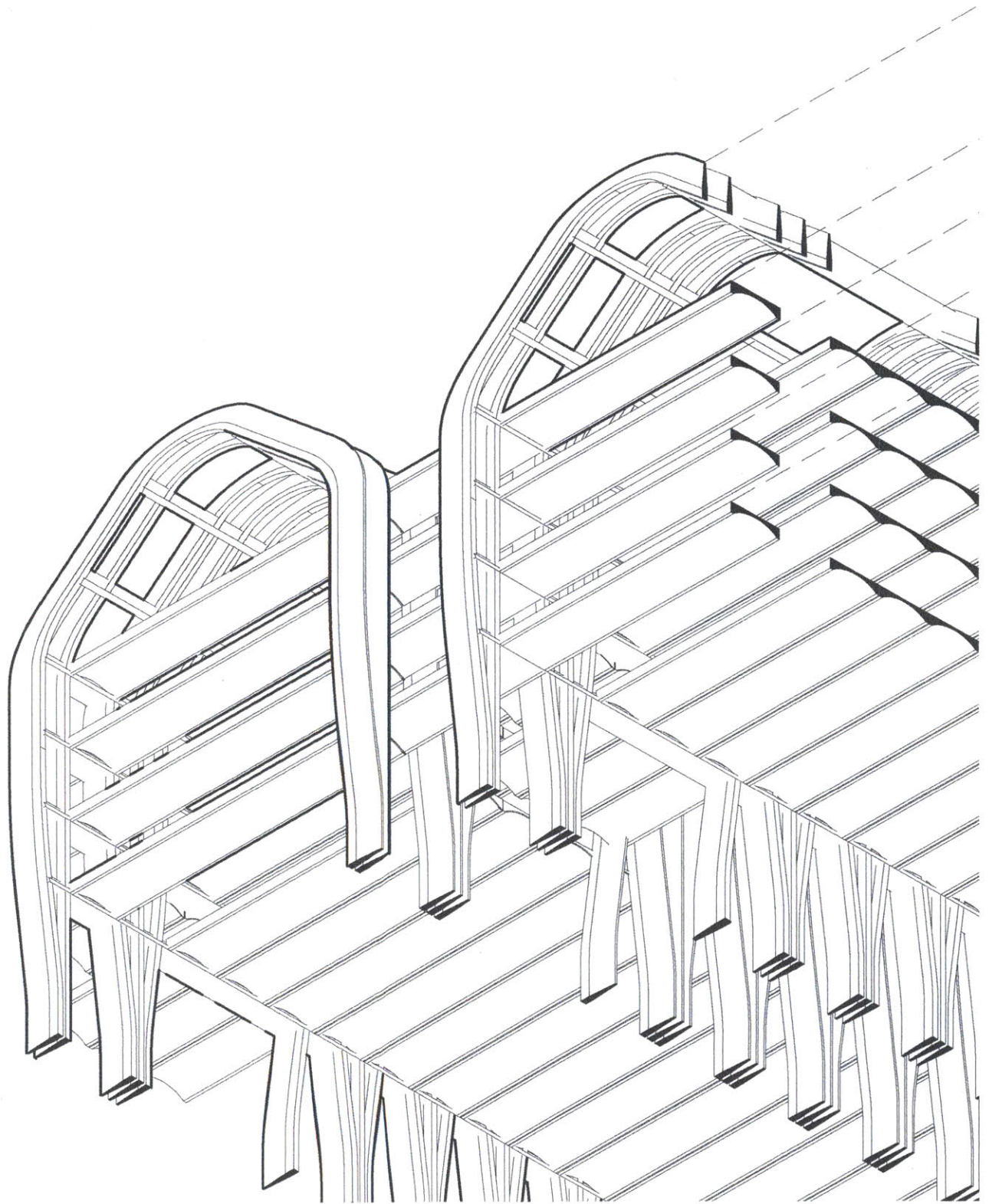


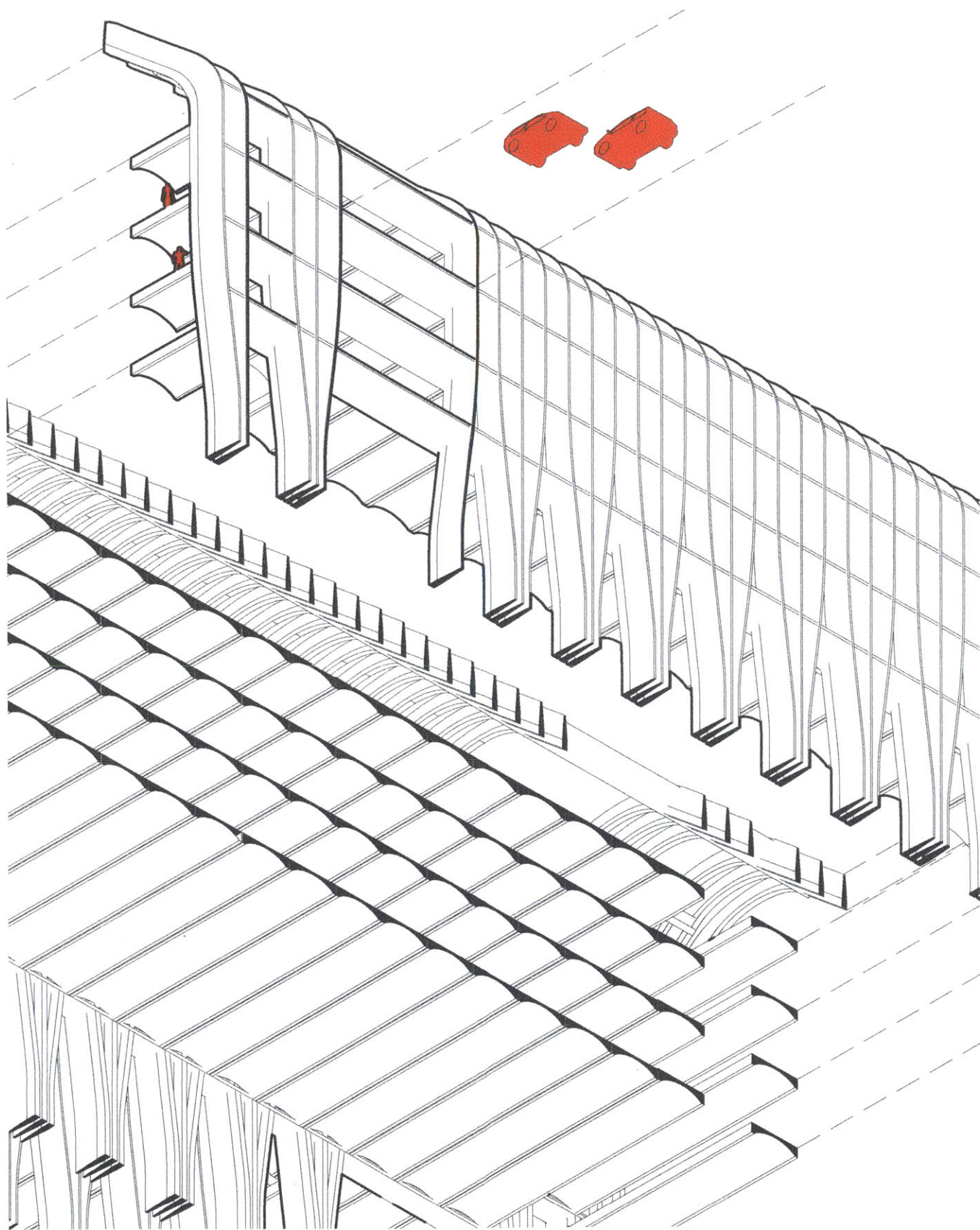


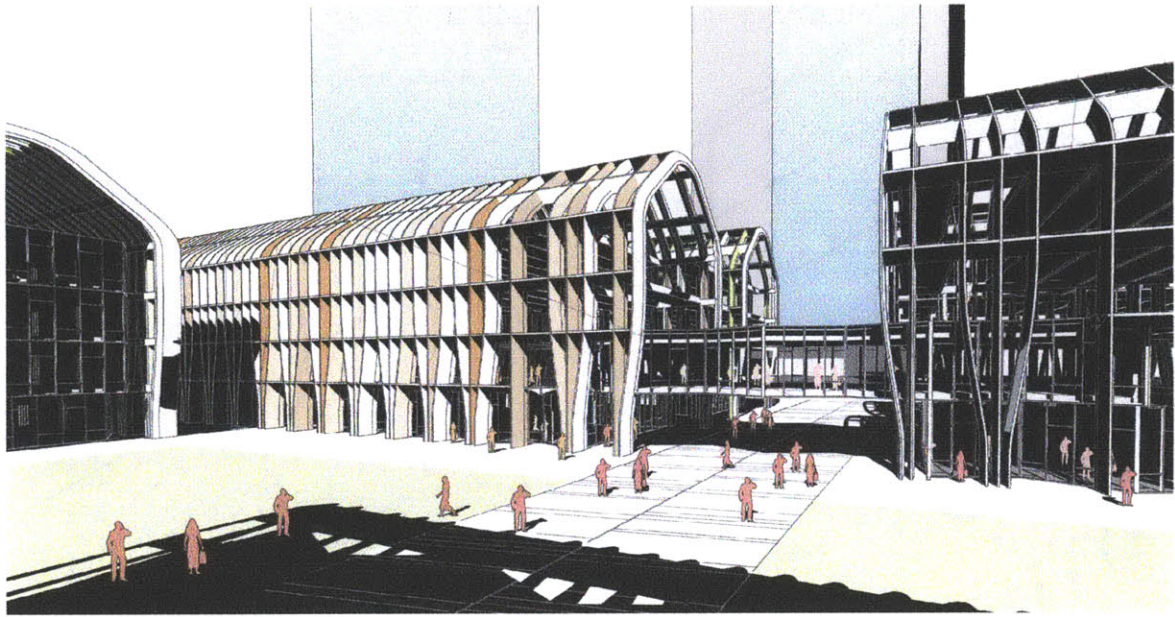












FUTURE ROLES OF THE GARAGE

05

While the garage takes on an atypical hybrid, the intention was to articulate the garage as a structural infrastructure. When articulated as a field this is understood through the integrative relationships between the program elements that create a structure with an internal clarity for both vehicles and pedestrians in a strategy that returns activity to the ground.

This proposal challenges the image of the garage by reconsidering its scale as an instrument of legibility by fully employing its form to generate future program and urban spaces.

BIBLIOGRAPHY

Lewis Mumford, "The Highway and the City," New American Library, 1964

Reyner Banham, "Los Angeles: The Architecture of Four Ecologies" Harper and Row, 1971

Simon Henley, "The Architecture of Parking" Thames and Hudson, 2007

Lars Lerup, "After the City" MIT Press, 2000

Jonathan Bell, "Architecture: When the Car and The City Collide" Birkhauser, 2001

Martin Wachs and Margaret Crawford, "The Car and The City" University of Michigan Press, 1992

Shannon Sanders Mc Donald, "The Parking Garage- Design and Evolution of a Modern Urban Form"
ULI Urban Land Institute, 2007

Kazys Varnelis, "Infrastructural City - Networked Ecologies in Los Angeles" Actar, 2008