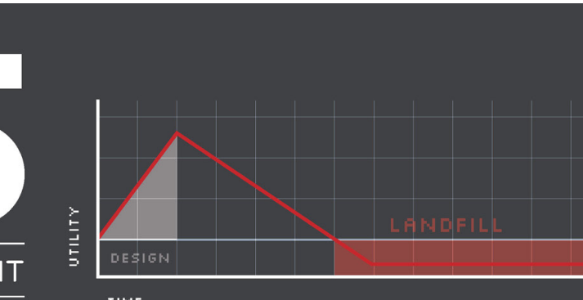
SYMBIOSIS

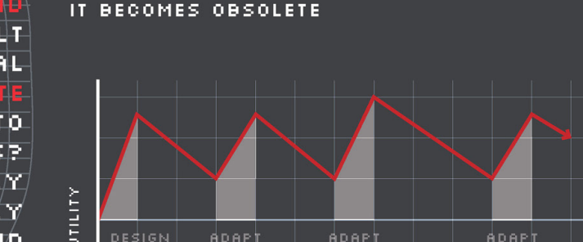
RECALIBRATING DESIGN THINKING FOR THE URBAN ENVIRONMENT

BEN RIPLEY
M. ARCH + M.C.P.

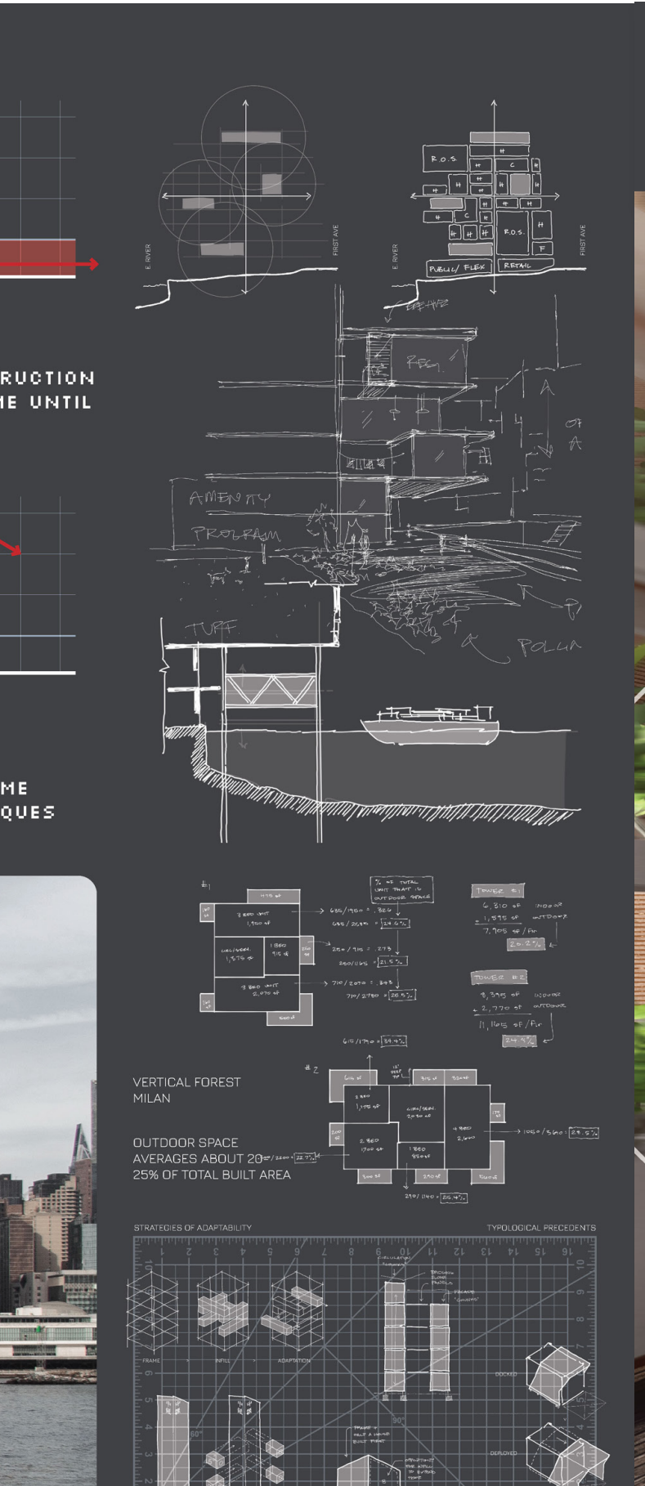
ARCHITECTURE IS STIFF, RIGID, AND TOUGH TO CHANGE, BUT IN AN EVER-CHANGING WORLD, OUR BUILT ENVIRONMENT NEEDS TO BE ABLE TO RESPOND IN KIND. WITHOUT PLANNING AND DESIGNING FOR ADAPTABILITY, THE BUILT ENVIRONMENT LAGS BEHIND THE NUMEROUS SOCIETAL AND ENVIRONMENTAL DYNAMICS THAT CHALLENGE OUR PRESENT TIME. IMPENDING ISSUES OF CLIMATE CHANGE AND RAPID URBANIZATION ARE NOW FORCING ARCHITECTURE TO REEXAMINE ITSELF AND ASK, HOW WILL IT RESPOND TO THESE COMPLEX DEMANDS? IN THE FACE OF THIS CHALLENGE, THIS THESIS WILL EXPLORE A CONCEPTUALLY DIFFERENT APPROACH TO THE DESIGN PROCESS THAT DEMANDS AN INHERENTLY DIFFERENT PRODUCT. THROUGH AN EMPHASIS ON SYSTEMS THINKING AND DEVELOPMENT, ARCHITECTURE CAN BE DESIGNED TO EXIST WITHIN A SYMBIOTIC RELATIONSHIP WITH THE NATURAL ENVIRONMENT WHERE OUR BUILDINGS COULD REACT AND INTERACT WITH THE SHIFTING NATURE OF OUR CULTURE AND NATURAL ENVIRONMENTS OVER TIME. THUS, THROUGH THIS STRATEGY INSPIRED BY ORGANIC ORGANISMS THE ARCHITECTURE IS ABLE TO BETTER EMBRACE THE CONTEXT OVER TIME AND BECOME A SUSTAINABLE MODEL FOR URBAN DEVELOPMENT.

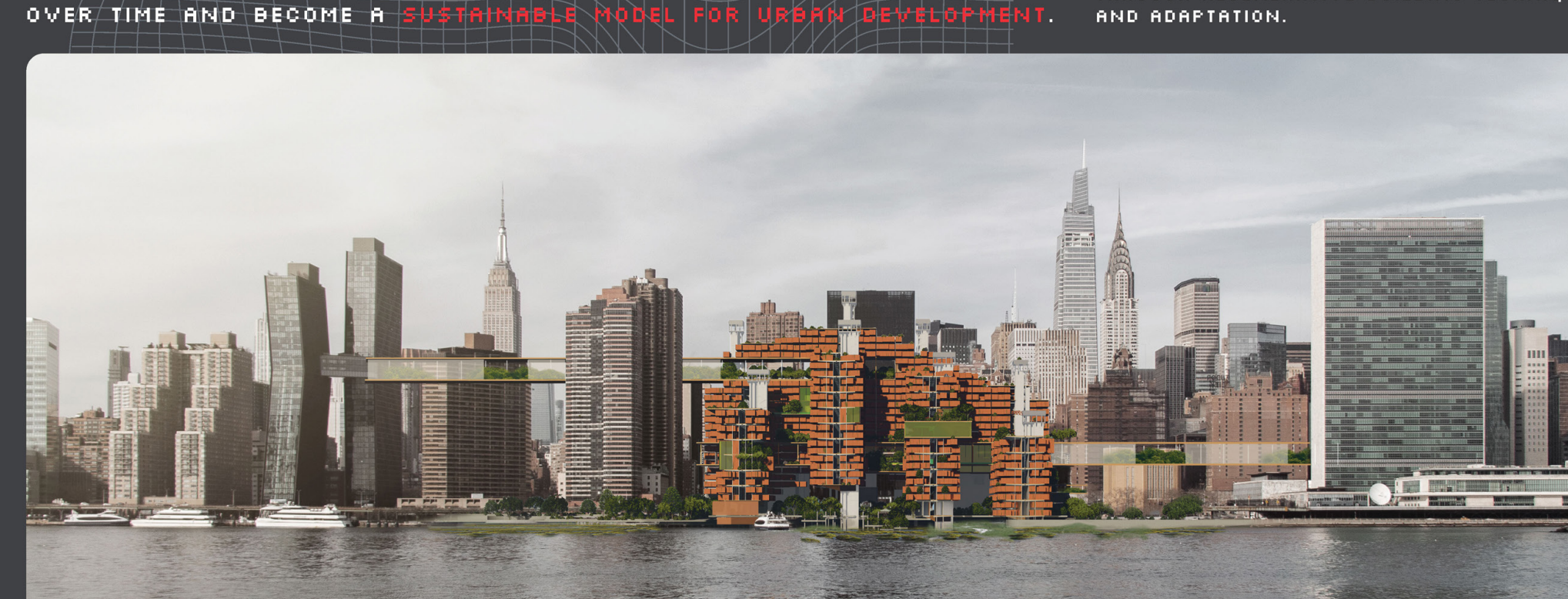


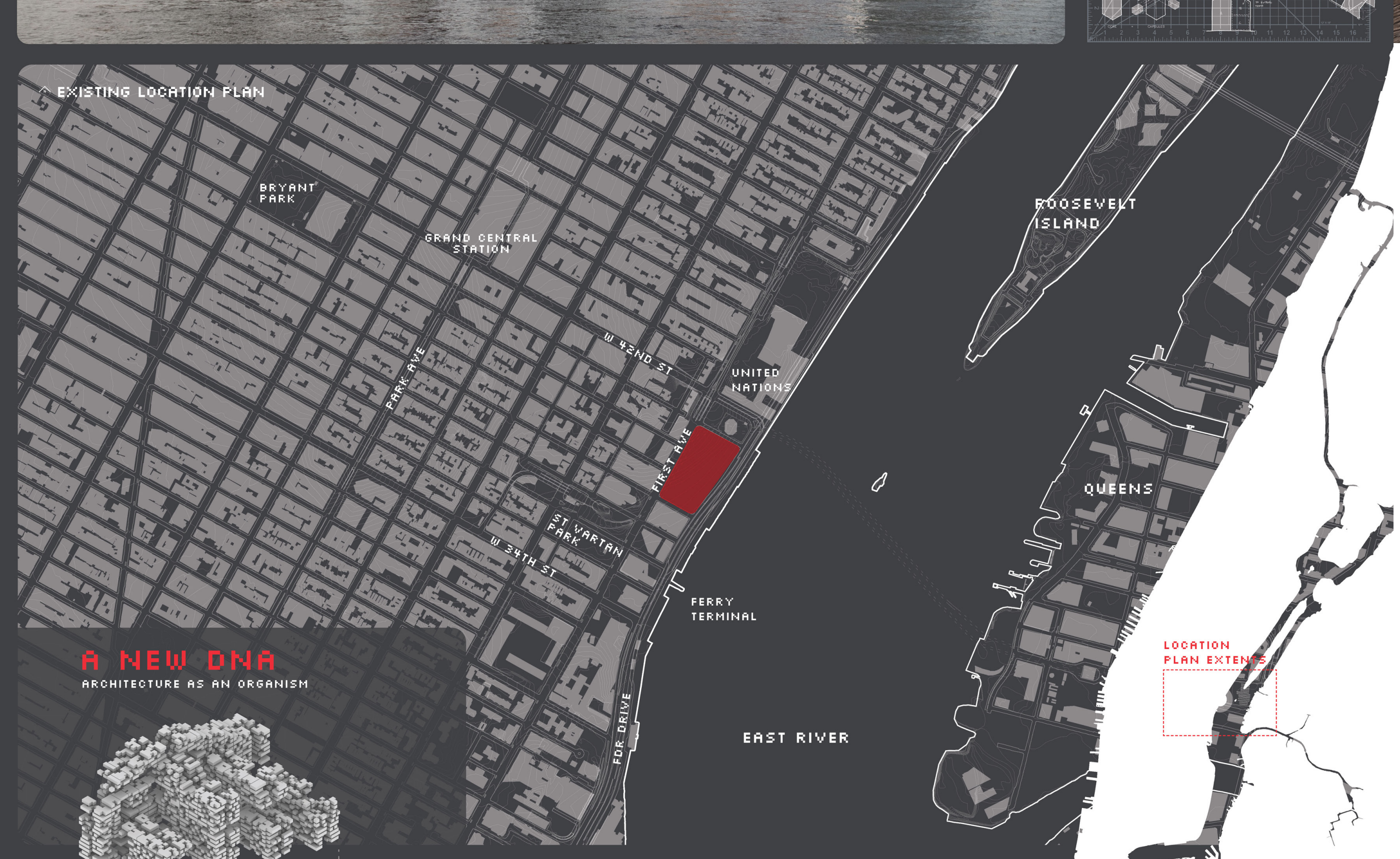
CONVENTIONAL MODEL
UTILITY PEAKS AT THE MOMENT OF CONSTRUCTION AND THEN STEADILY DECREASES OVER TIME UNTIL IT BECOMES OBSOLETE



SYMBIOSIS MODEL
CONTINUAL BOOSTING OF UTILITY OVER TIME THROUGH REGENERATIVE BUILDING TECHNIQUES AND ADAPTATION.

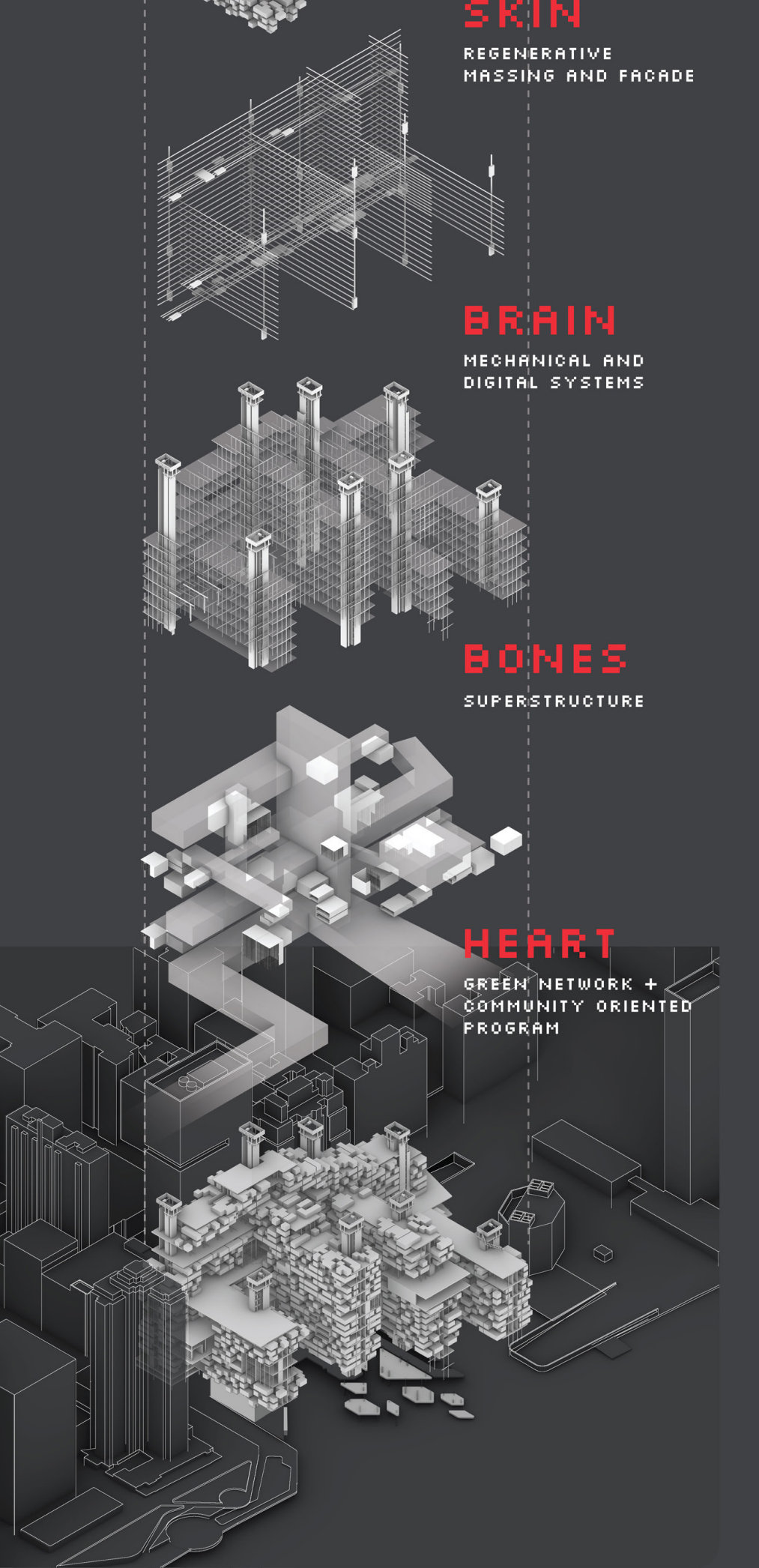

VERTICAL FOREST
MILAN
OUTDOOR SPACE
AVERAGES ABOUT 20
25% OF TOTAL BUILT AREA
STRATEGIES OF ADAPTABILITY
TYPOLOGICAL PRECEDENTS




EXISTING LOCATION PLAN
BRYANT PARK
GRAND CENTRAL STATION
W 42ND ST
UNITED NATIONS
PARK AVE
FIRST AVE
ST VARTAN PARK
W 34TH ST
FERRY TERMINAL
FDR DRIVE
EAST RIVER
ROOSEVELT ISLAND
QUEENS
LOCATION PLAN EXTENTS

A NEW DNA

ARCHITECTURE AS AN ORGANISM



SKIN
REGENERATIVE MASSING AND FACADE

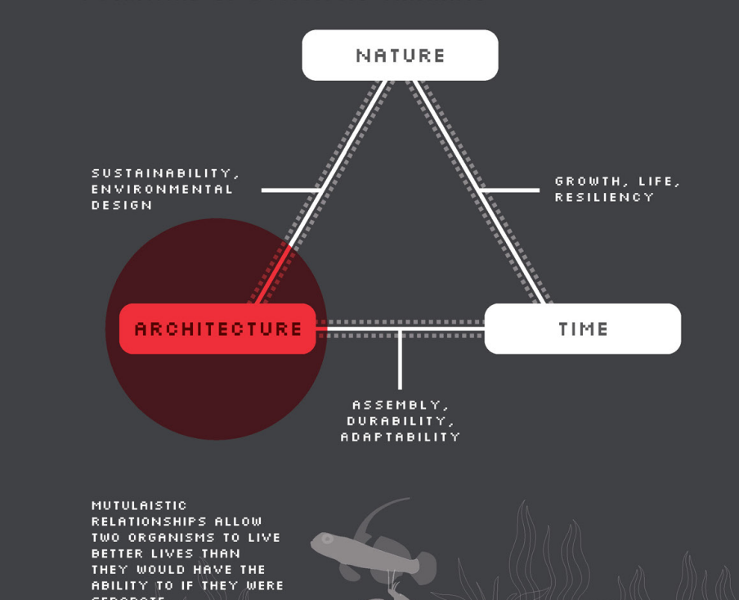
BRAIN
MECHANICAL AND DIGITAL SYSTEMS

BONES
SUPERSTRUCTURE

HEART
GREEN NETWORK + COMMUNITY ORIENTED PROGRAM

KEY RELATIONSHIPS

THE RELATIONSHIP TRIANGLE + POTENTIAL OF SYMBIOTIC THINKING


NATURE
ARCHITECTURE
TIME
SUSTAINABILITY, ENVIRONMENTAL DESIGN
GROWTH, LIFE, RESILIENCY
ASSEMBLY, DURABILITY, ADAPTABILITY

MUTUALISTIC RELATIONSHIPS ALLOW TWO ORGANISMS TO LIVE BETTER LIVES THAN THEY WOULD HAVE THE ABILITY TO IF THEY WERE SEPARATE

GOBY + PISTOL SHRIMP

- FOOD, SHELTER, SAFETY
- COMMUNITY, RITES OF PASSAGE + MORE

DJENNE MOSQUE + PEOPLE

GOVERNANCE + OPERATIONS

VR + AR VISIONING

VIRTUAL AND AUGMENTED REALITY TOOLS HELP RESIDENTS AND FULL COMMUNITIES COME TOGETHER AND FORM A COLLECTIVE VISION FOR HOW THEIR INDIVIDUAL SPACES AS WELL AS THEIR NEIGHBORHOODS MAY BEHAVE AS TIME PASSES.

PERFORMANCE INCENTIVES

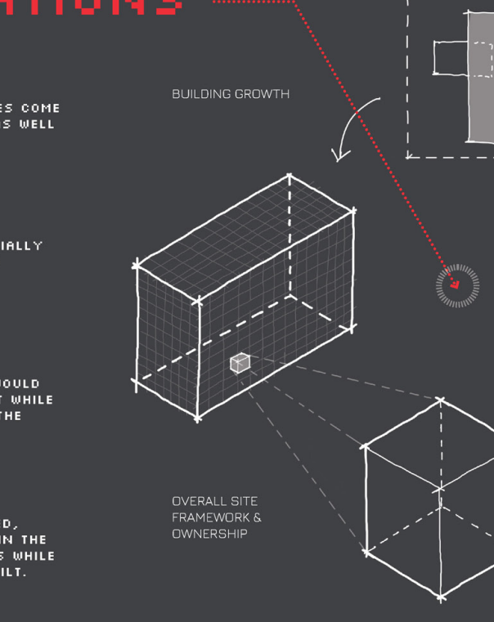
INCENTIVES WOULD BE ESTABLISHED TO ENCOURAGE ENVIRONMENTALLY AND SOCIALLY POSITIVE BEHAVIORS, FOR EXAMPLE A FINANCIAL INCENTIVE FOR MAINTAINING A CERTAIN PERCENTAGE OF GREEN SPACE ON A PRIVATE LOT.

EQUITABLE ACCESS

A HYBRID COMMUNITY LAND TRUST AND MUTUAL HOUSING ASSOCIATION MODEL WOULD ALLOW THE COMMUNITY MEMBERS TO HAVE INPUT INTO THE FUTURE DEVELOPMENT WHILE MAINTAINING CLEAR AVENUES OF EQUITABLE ACCESS AND OPPORTUNITY WITHIN THE CONSTRUCT.

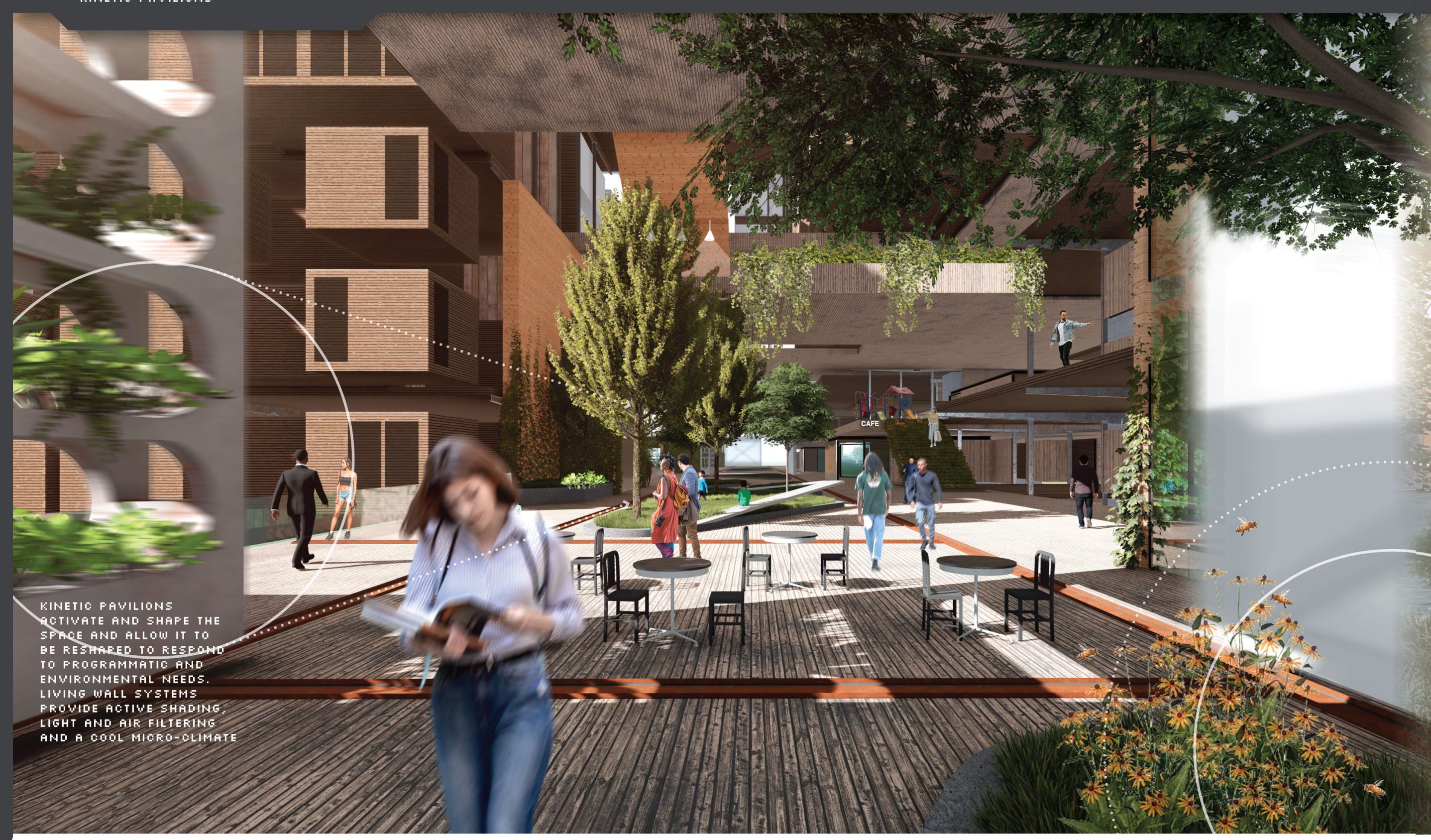
LARGER CHANGE

THIS CONSTRUCT ALSO CHALLENGES THE EXISTING WAY BUILDINGS ARE REGULATED, SEEKING TO HAVE FAR RESTRICTIONS NOT APPLY TO ANY GREEN, OPEN SPACES IN THE VERTICAL ENVIRONMENT. THEREFORE ALLOWING THESE HEALTHY KINDS OF SPACES WHILE STILL ALLOWING NEAR THE SAME OR EQUAL AMOUNT OF RENTABLE AREA TO BE BUILT.


BUILDING GROWTH
ADAPTATION
INFILL
OVERALL SITE FRAMEWORK & OWNERSHIP

1. GREEN NETWORK PROMENADE / SPRING

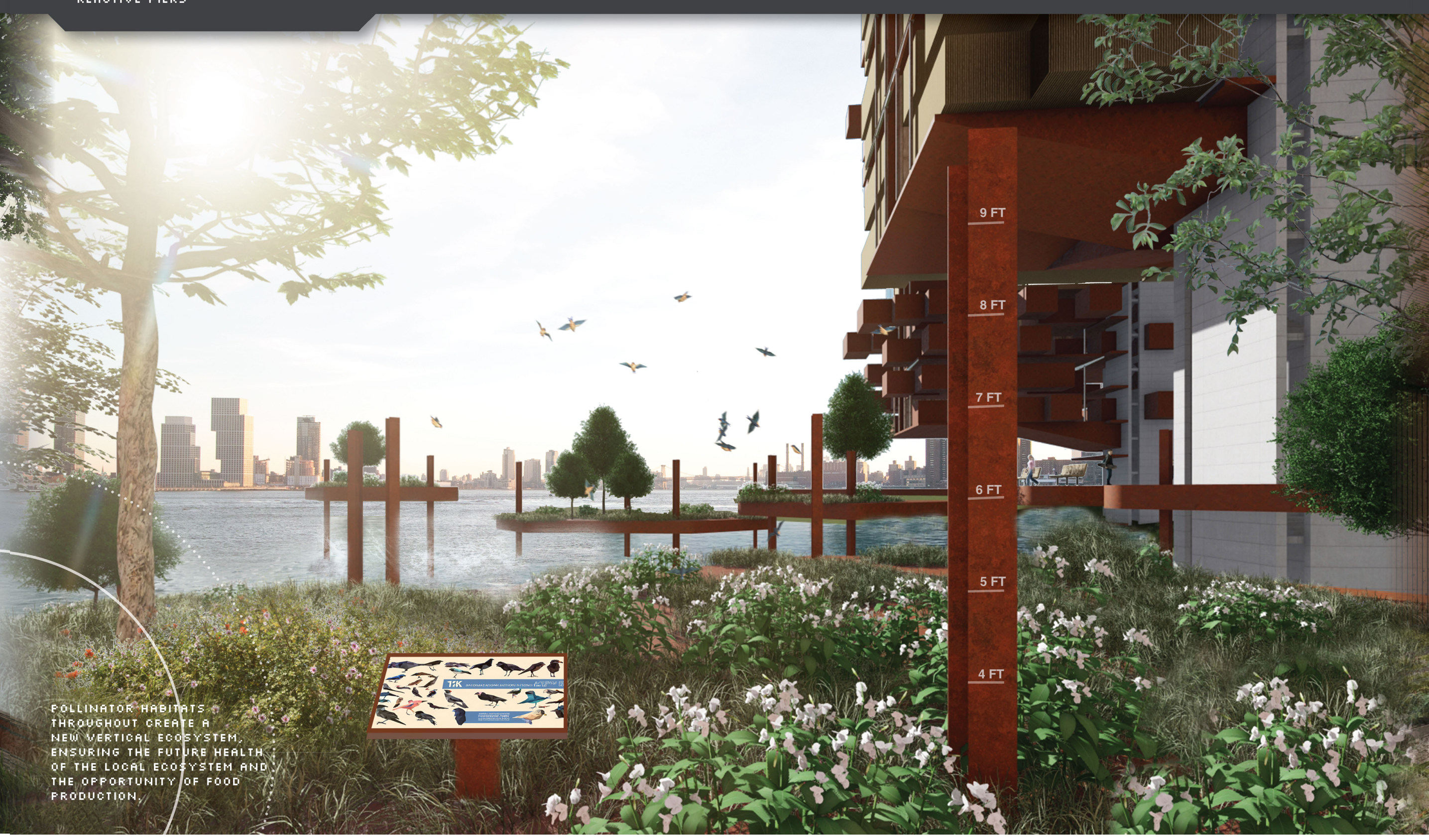
NATURAL HABITAT CREATION
KINETIC PAVILIONS



KINETIC PAVILIONS ACTIVATE AND SHAPE THE SPACE AND ALLOW IT TO BE RESHAPED TO RESPOND TO PROGRAMMATIC AND ENVIRONMENTAL NEEDS. LIVING WALL SYSTEMS PROVIDE ACTIVE SHADING, LIGHT AND AIR FILTERING AND A COOL MICRO-CLIMATE

2. HABITAT PIERS / SUMMER

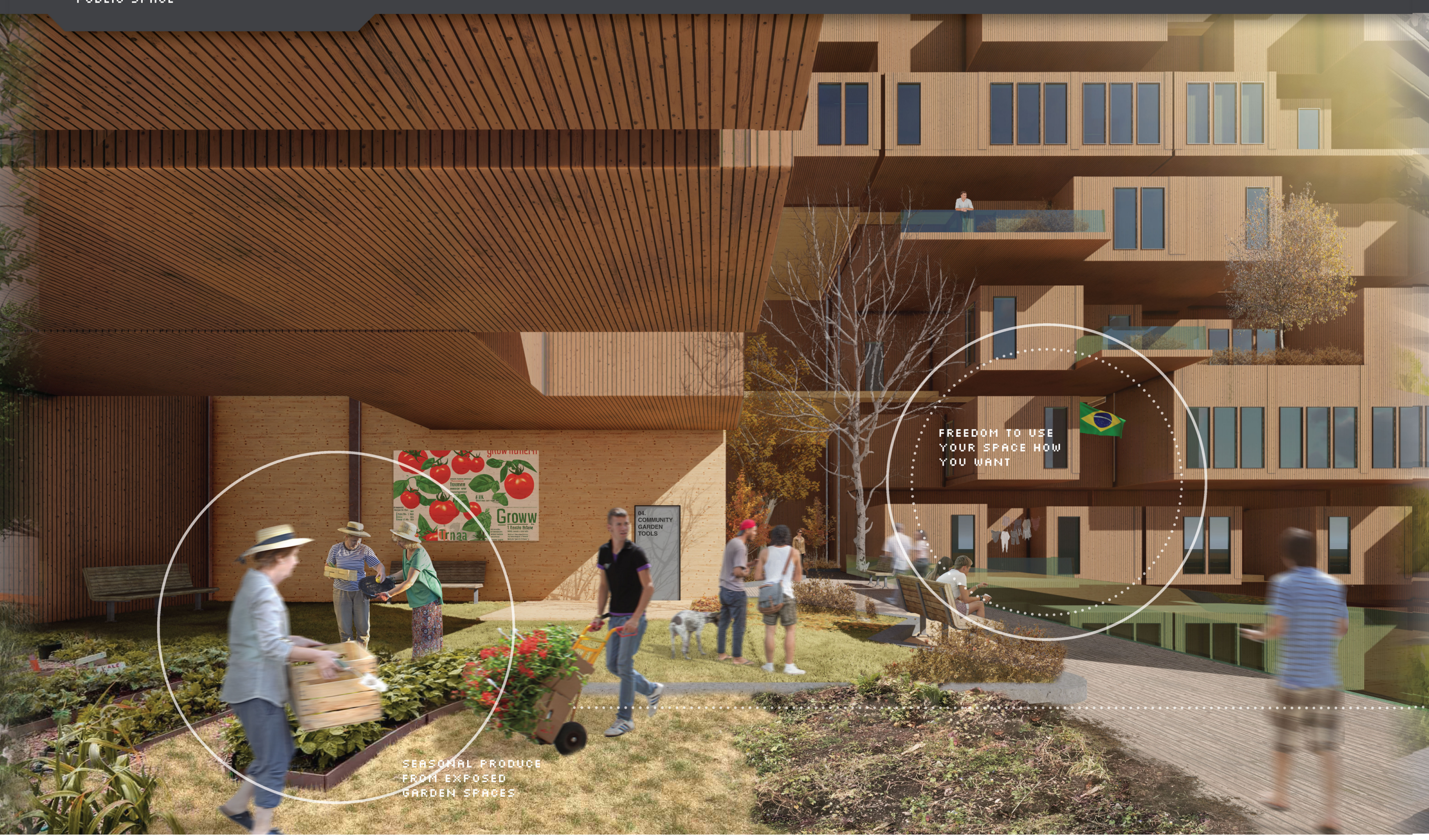
ACTIVE HABITAT CREATION
REACTIVE PIERS


9 FT
8 FT
7 FT
6 FT
5 FT
4 FT

POLLINATOR HABITATS THROUGHOUT CREATE A NEW VERTICAL ECOSYSTEM, ENSURING THE FUTURE HEALTH OF THE LOCAL ECOSYSTEM AND THE OPPORTUNITY OF FOOD PRODUCTION.

3. COMMUNITY CENTER / FALL

FOOD GROWTH AND EDUCATION
PUBLIC SPACE

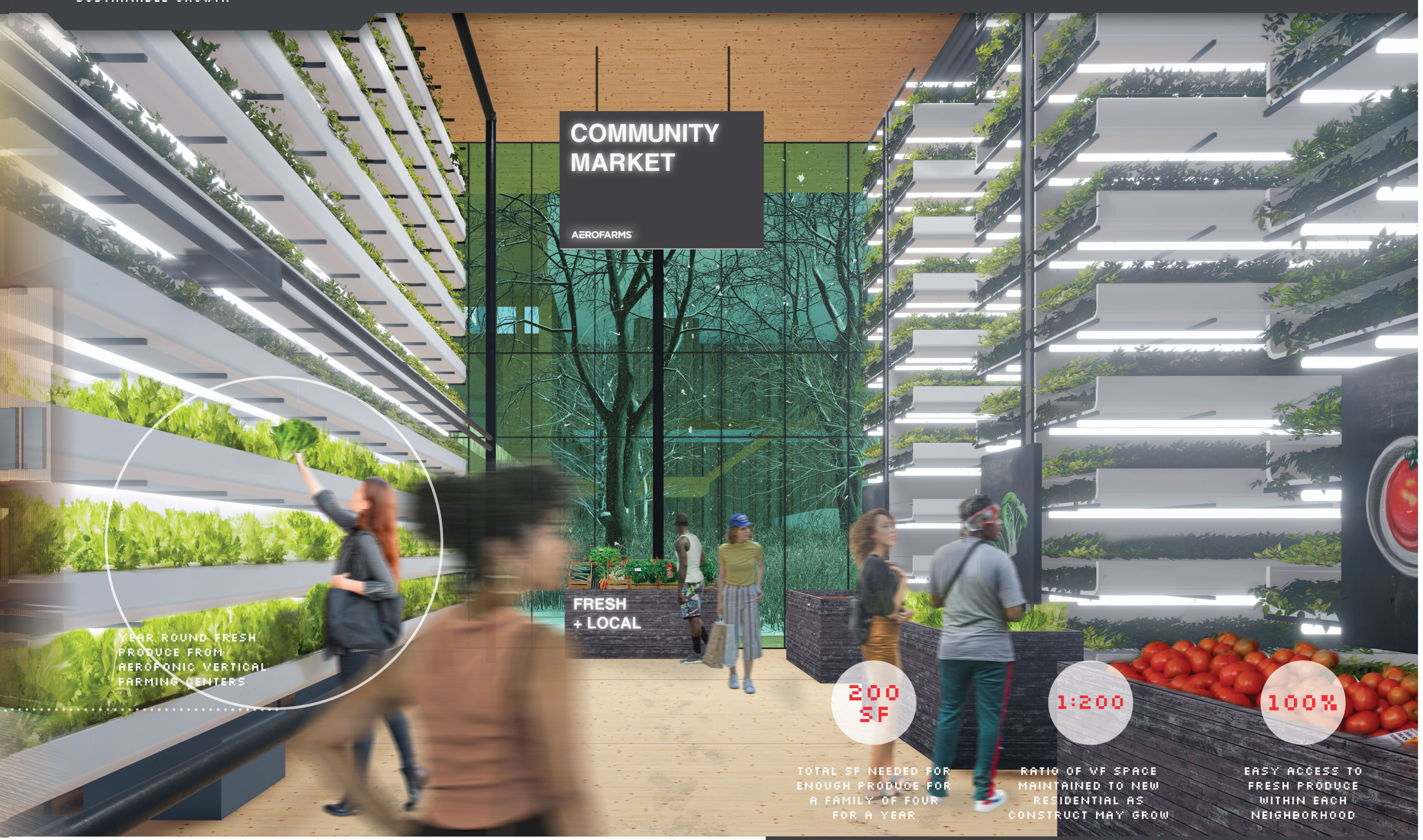

Groww
COMMUNITY GARDEN TOOLS

SEASONAL PRODUCE FROM EXPOSED GARDEN SPACES

FREEDOM TO USE YOUR SPACE HOW YOU WANT

4. VERTICAL FARM + MARKET / WINTER

EQUITABLE FOOD ACCESS
SUSTAINABLE GROWTH


COMMUNITY MARKET
AEROFARMS
FRESH + LOCAL

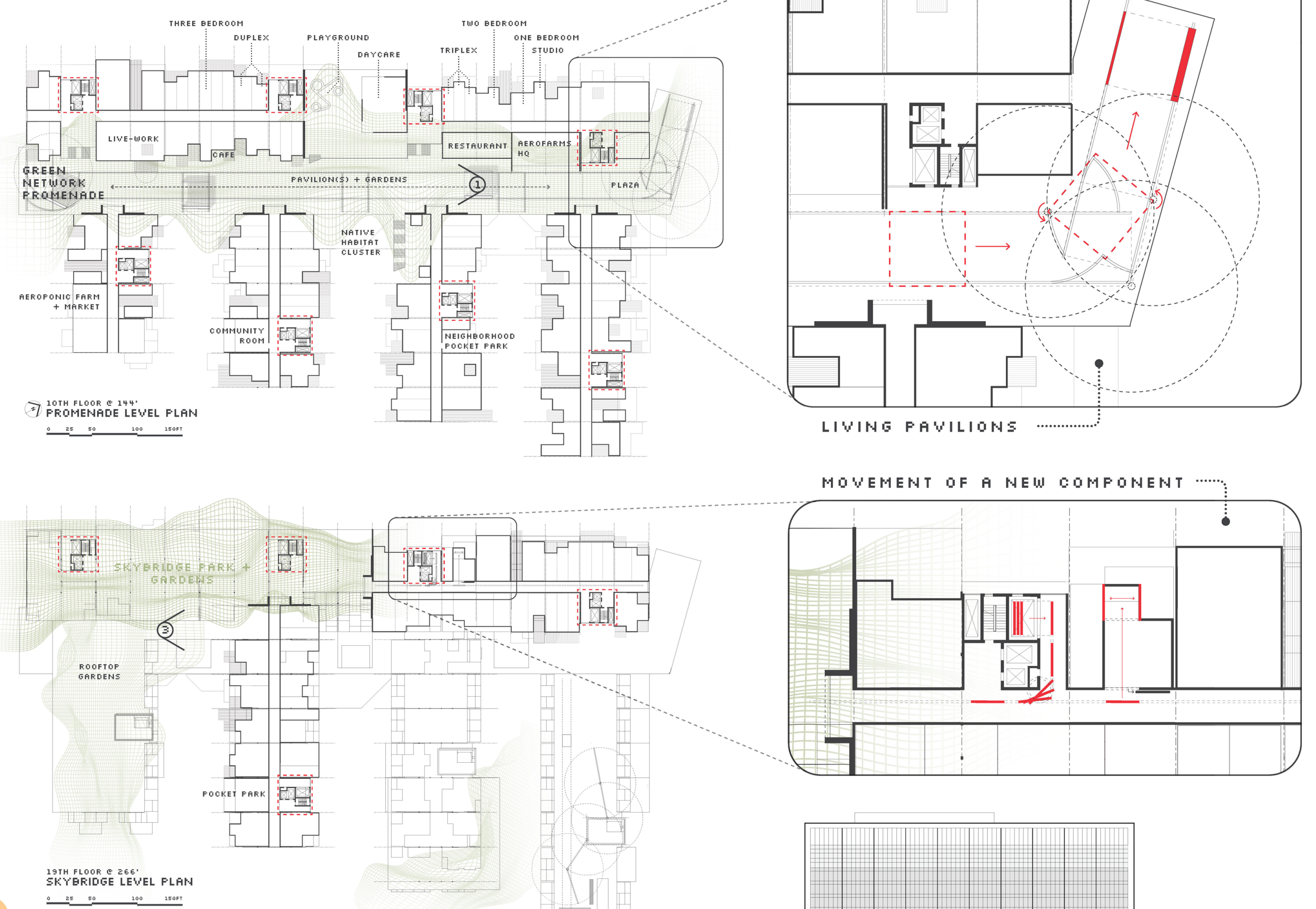
YEAR ROUND FRESH PRODUCE FROM AEROPONIC VERTICAL FARMING CENTERS

200 SF TOTAL SF NEEDED FOR ENOUGH PRODUCE FOR A FAMILY OF FOUR FOR A YEAR

1:200 RATIO OF VF SPACE MAINTAINED TO NEW RESIDENTIAL AS CONSTRUCT MAY GROW

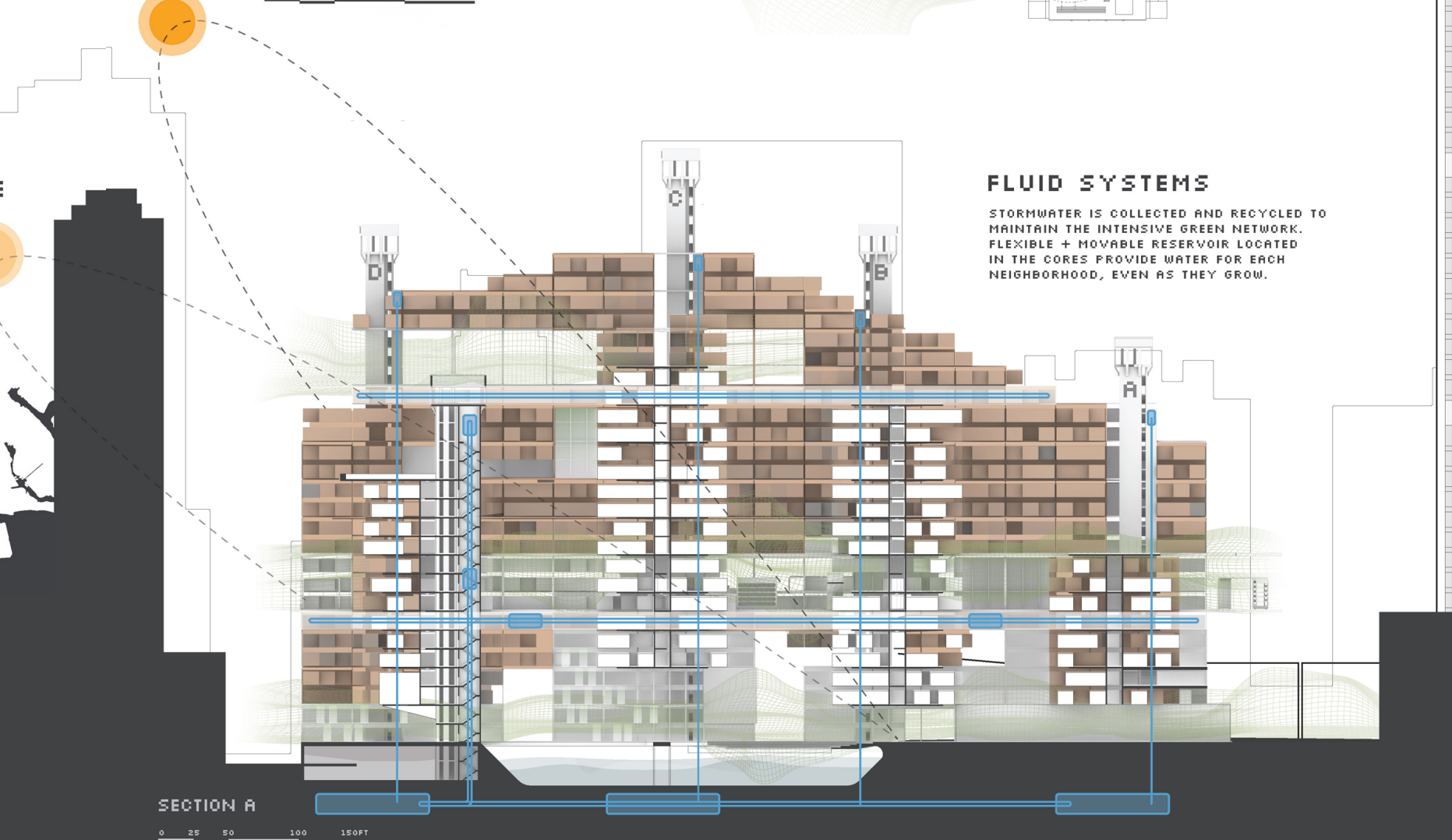
100% EASY ACCESS TO FRESH PRODUCE WITHIN EACH NEIGHBORHOOD

ORGANIC BY BEHAVIOR


THREE BEDROOM
DUPLEX
PLAYGROUND
DAYCARE
TWO BEDROOM
TRIPLEX
ONE BEDROOM
STUDIO
LIVE-WORK
CAFE
RESTAURANT
AEROFARMS HQ
GREEN NETWORK PROMENADE
PAVILION(S) + GARDENS
PLAZA
NATIVE HABITAT CLUSTER
AEROPONIC FARM + MARKET
COMMUNITY ROOM
NEIGHBORHOOD POCKET PARK
10TH FLOOR @ 144' PROMENADE LEVEL PLAN
LIVING PAVILIONS
MOVEMENT OF A NEW COMPONENT
SKYBRIDGE PARK + GARDENS
ROOFTOP GARDENS
POCKET PARK
19TH FLOOR @ 266' SKYBRIDGE LEVEL PLAN

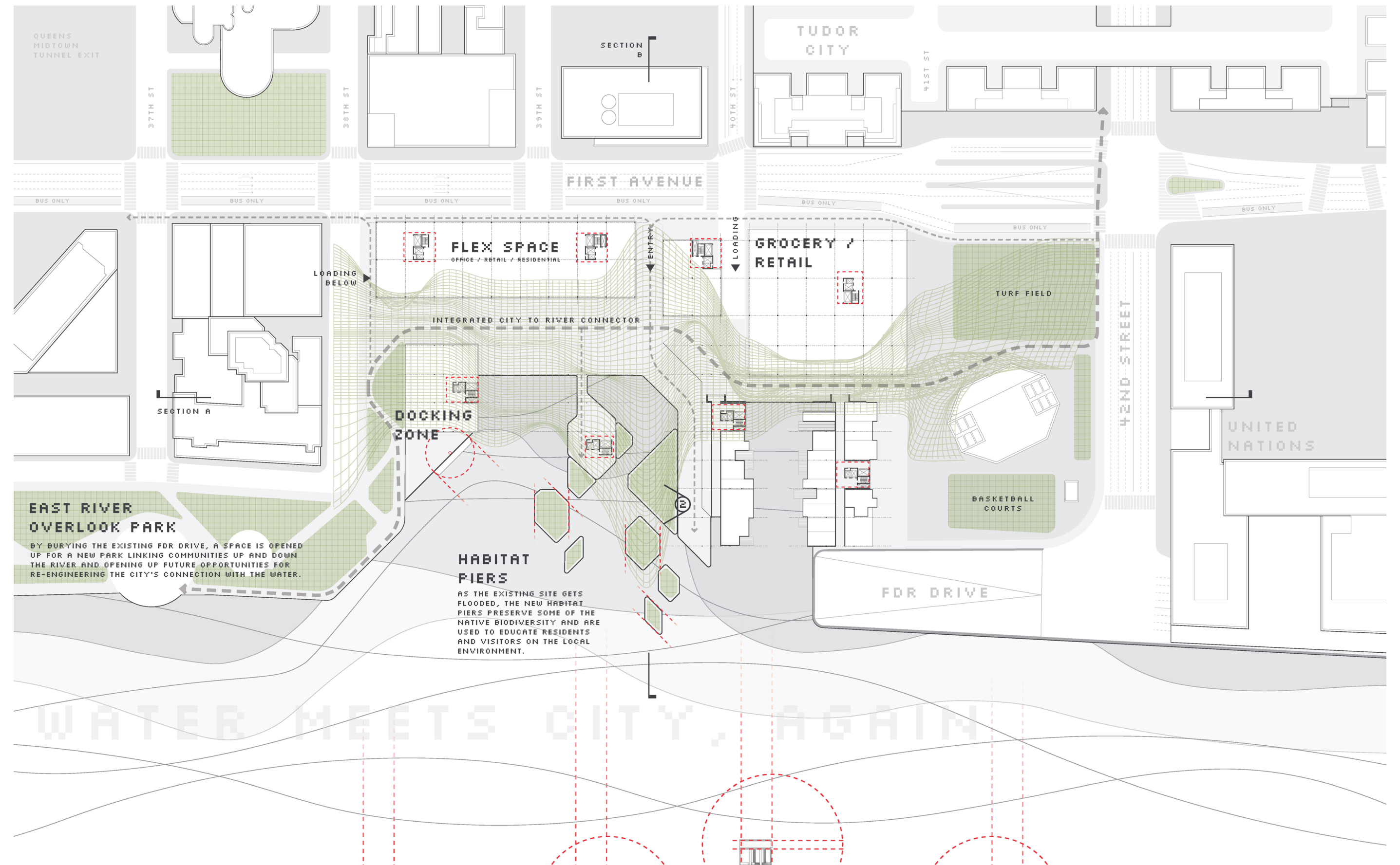
REGENERATIVE SOLAR
ALGAE FACADE PANELS DYNAMICALLY SHADE DEPENDING ON THE LEVEL OF EXPOSURE AND PRODUCE ENERGY THROUGH HEAT CAPTURE. THE SYSTEM IS CYCLED AROUND EVERY MONTH AND A HALF, UTILIZING THE 'WASTE' AS FERTILIZER AND RESTARTING THE CYCLE WHICH ONLY TAKES REFILLING THE TANK WITH WATER AND SOME MINERALS

FLUID SYSTEMS
STORMWATER IS COLLECTED AND RECYCLED TO MAINTAIN THE INTENSIVE GREEN NETWORK. FLEXIBLE + MOVABLE RESERVOIR LOCATED IN THE CORES PROVIDE WATER FOR EACH NEIGHBORHOOD, EVEN AS THEY GROW.


A
B
C
D
SECTION A

STABILITY WITHIN
ESSENTIAL EQUIPMENT FOR MANAGING THE WATER, MECHANICAL AND DIGITAL SYSTEMS ARE AGGREGATED IN A SERIES OF LEVELS ADJACENT TO PRIMARY GREEN NETWORK SPACES AS BOTH SYSTEMS REQUIRE A LEVEL OF STABILITY TO OPERATE AT THEIR FULLEST POTENTIAL, WHILE THE CONSTRUCT IS FREE TO SHIFT AROUND THEM.

SITE + SYSTEM

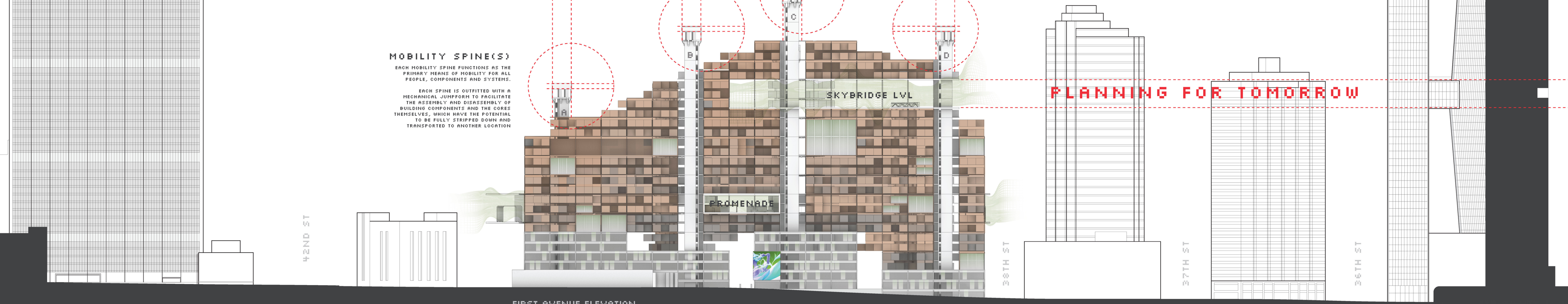

QUEENS MIDTOWN TUNNEL EXIT
37TH ST
38TH ST
39TH ST
40TH ST
41ST ST
TUDOR CITY
SECTION B
FIRST AVENUE
BUS ONLY
FLEX SPACE
OFFICE / RETAIL / RESIDENTIAL
LOADING BELOW
ENTRY
LOADING
GROCERY / RETAIL
TURF FIELD
INTEGRATED CITY TO RIVER CONNECTOR
42ND STREET
SECTION A
DOCKING ZONE
UNITED NATIONS
BASKETBALL COURTS
FDR DRIVE
EAST RIVER
WATER MEETS CITY, AGAIN

EAST RIVER OVERLOOK PARK
BY BURYING THE EXISTING FDR DRIVE, A SPACE IS OPENED UP FOR A NEW PARK LINKING COMMUNITIES UP AND DOWN THE RIVER AND OPENING UP FUTURE OPPORTUNITIES FOR RE-ENGINEERING THE CITY'S CONNECTION WITH THE WATER.

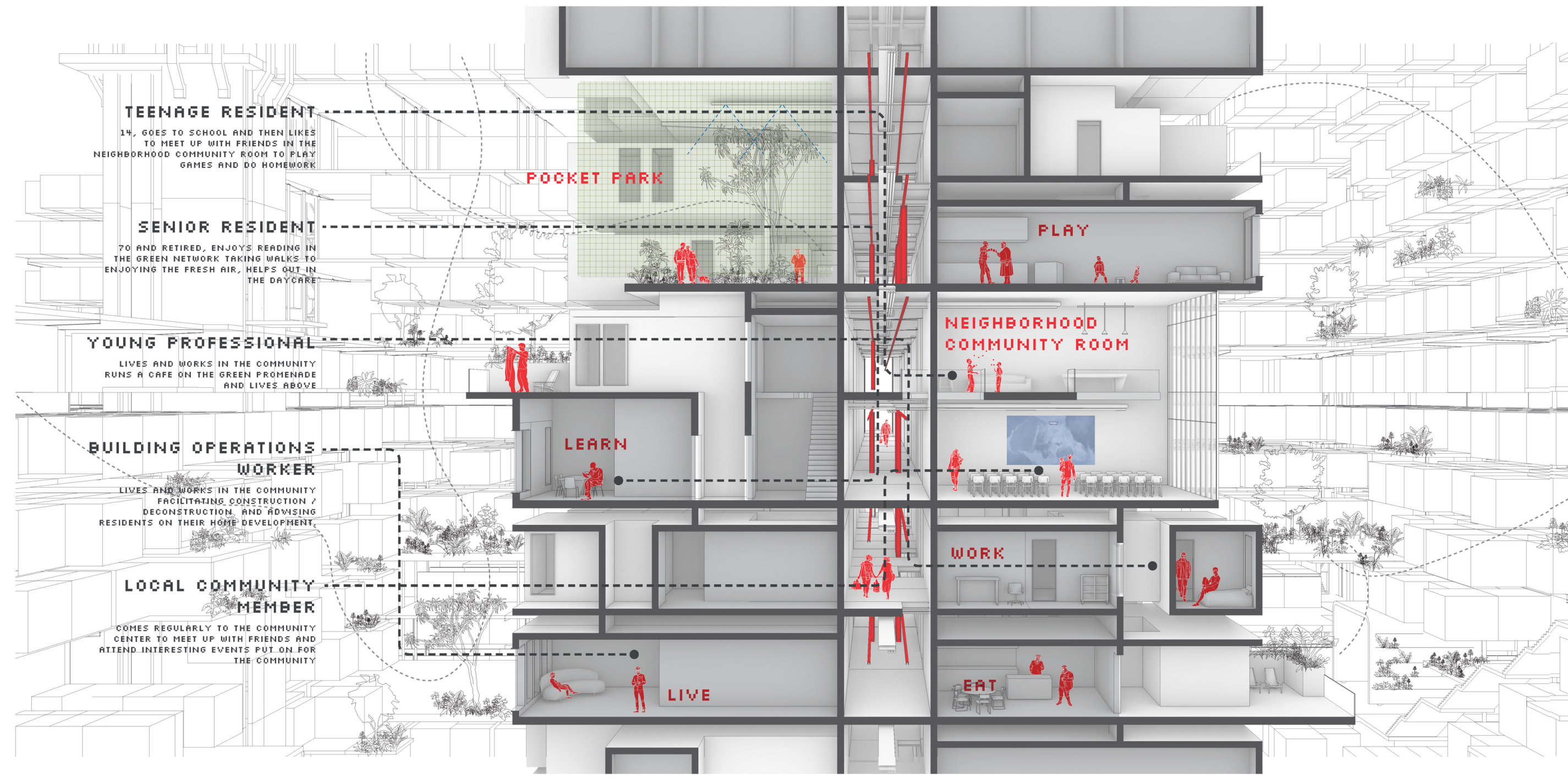
HABITAT PIERS
AS THE EXISTING SITE GETS FLOODED, THE NEW HABITAT PIERS PRESERVE SOME OF THE NATIVE BIODIVERSITY AND ARE USED TO EDUCATE RESIDENTS AND VISITORS ON THE LOCAL ENVIRONMENT.

MOBILITY SPINE(S)
EACH MOBILITY SPINE FUNCTIONS AS THE PRIMARY MEANS OF MOBILITY FOR ALL PEOPLE, COMPONENTS AND SYSTEMS.

EACH SPINE IS OUTFITTED WITH A MECHANICAL JUMPFORM TO FACILITATE THE ASSEMBLY AND DISASSEMBLY OF BUILDING COMPONENTS AND THE CORES THEMSELVES, WHICH HAVE THE POTENTIAL TO BE FULLY STRIPPED DOWN AND TRANSPORTED TO ANOTHER LOCATION


42ND ST
A
B
C
D
SKYBRIDGE LVL
PROMENADE
PLANNING FOR TOMORROW
38TH ST
37TH ST
36TH ST
FIRST AVENUE ELEVATION

THE SOCIAL NETWORK


POCKET PARK
PLAY
NEIGHBORHOOD COMMUNITY ROOM
LEARN
WORK
LIVE
EAT

TEENAGE RESIDENT
14, GOES TO SCHOOL AND THEN LIKES TO MEET UP WITH FRIENDS IN THE NEIGHBORHOOD COMMUNITY ROOM TO PLAY GAMES AND DO HOMEWORK

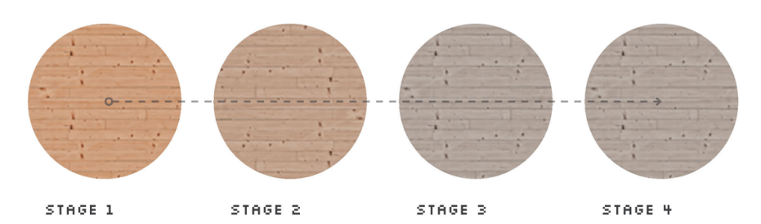
SENIOR RESIDENT
70 AND RETIRED, ENJOYS READING IN THE GREEN NETWORK TAKING WALKS TO ENJOYING THE FRESH AIR, HELPS OUT IN THE DAYCARE

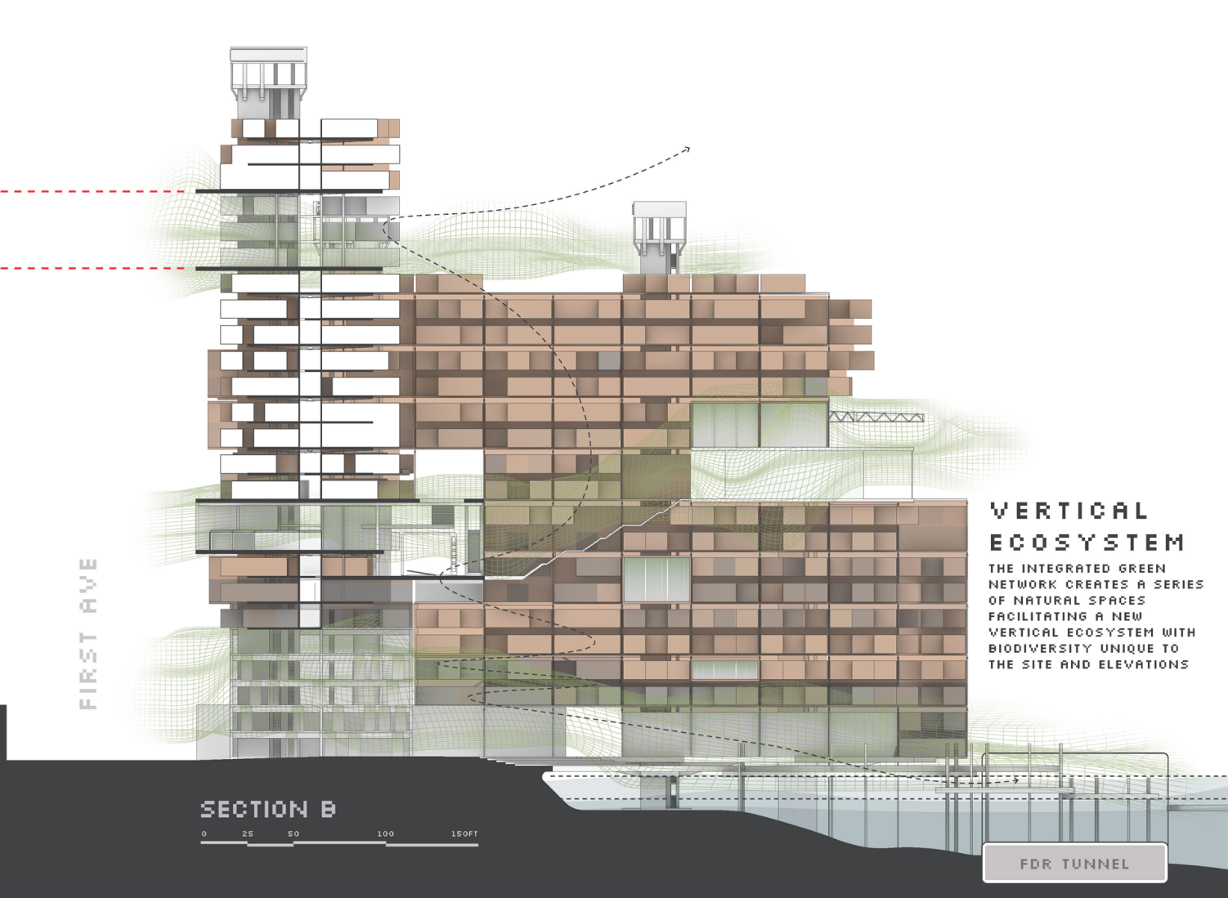
YOUNG PROFESSIONAL
LIVES AND WORKS IN THE COMMUNITY RUNS A CAFE ON THE GREEN PROMENADE AND LIVES ABOVE

BUILDING OPERATIONS WORKER
LIVES AND WORKS IN THE COMMUNITY FACILITATING CONSTRUCTION / DECONSTRUCTION, AND ADVISING RESIDENTS ON THEIR HOME DEVELOPMENT.

LOCAL COMMUNITY MEMBER
COMES REGULARLY TO THE COMMUNITY CENTER TO MEET UP WITH FRIENDS AND ATTEND INTERESTING EVENTS PUT ON FOR THE COMMUNITY

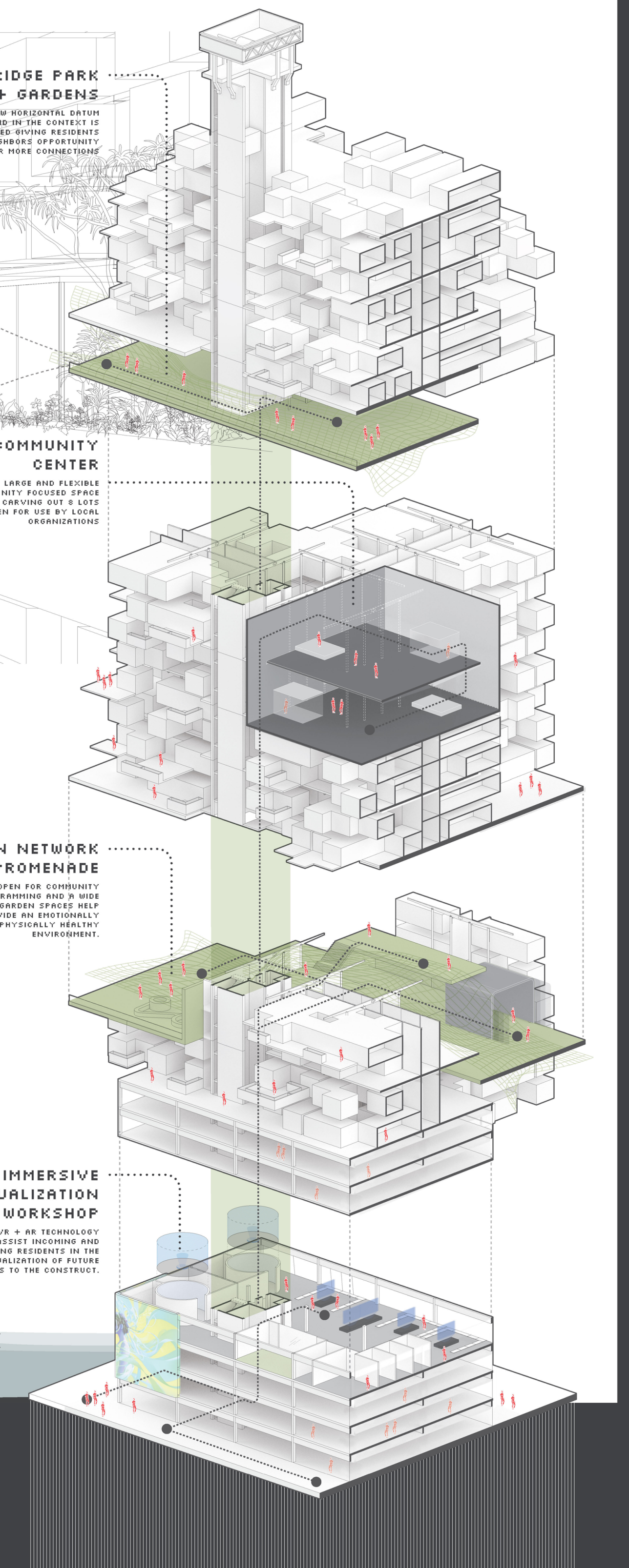
AN INFORMED FACADE
THE PANELS CAN BE MADE FLEXIBLE TO ADAPT TO OTHER MATERIALS BUT IN THIS INSTANCE, WOOD CLADDING USED TO MAKE THE CHANGE OVER TIME CLEARLY VISIBLE AND CREATING A DYNAMIC MOSAIC ACROSS THE FACADE.


STAGE 1
STAGE 2
STAGE 3
STAGE 4


FIRST AVE
2060
2030
FDR TUNNEL
EAST RIVER
SECTION B

VERTICAL ECOSYSTEM
THE INTEGRATED GREEN NETWORK CREATES A SERIES OF NATURAL SPACES FACILITATING A NEW VERTICAL ECOSYSTEM WITH BIODIVERSITY UNIQUE TO THE SITE AND ELEVATIONS

DYNAMIC ACTIVITY (SPINE C)



SKYBRIDGE PARK + GARDENS
A NEW HORIZONTAL DATUM FOUND IN THE CONTEXT IS REINFORCED GIVING RESIDENTS AND NEIGHBORS OPPORTUNITY FOR MORE CONNECTIONS

COMMUNITY CENTER
A LARGE AND FLEXIBLE COMMUNITY FOCUSED SPACE MADE BY CARVING OUT 8 LOTS IS OPEN FOR USE BY LOCAL ORGANIZATIONS

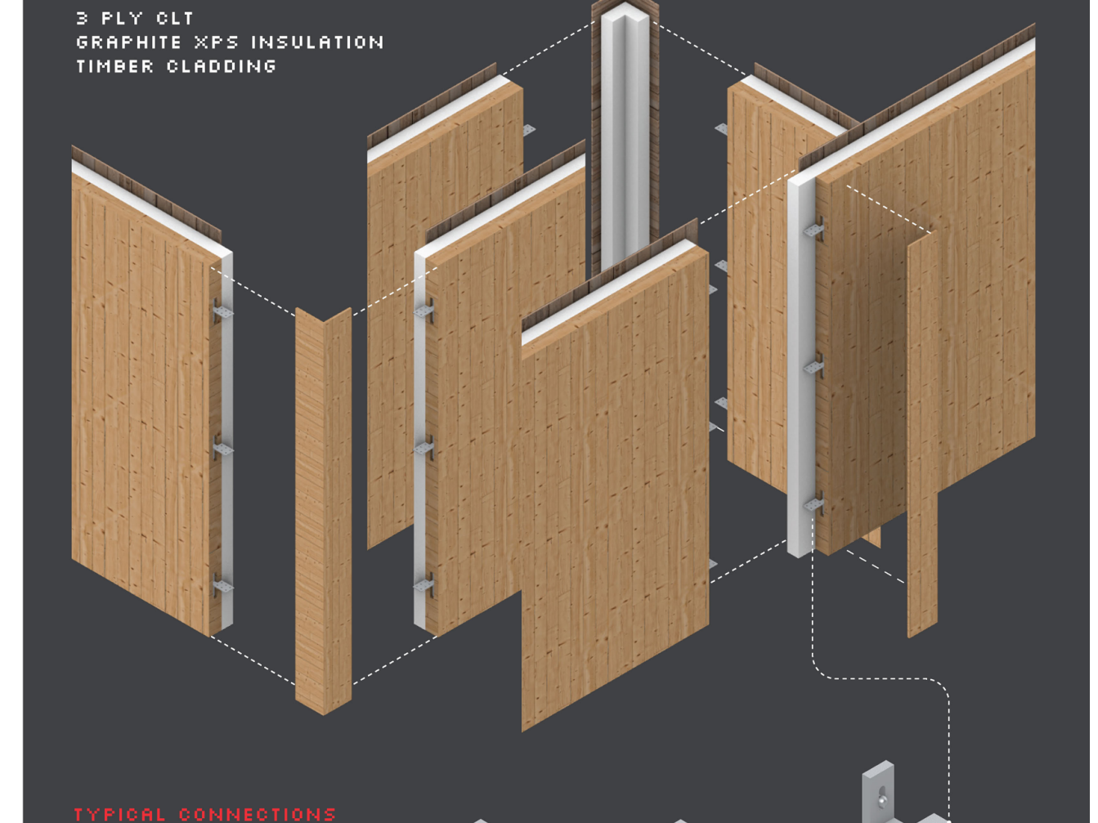
GREEN NETWORK PROMENADE
SPACES OPEN FOR COMMUNITY PROGRAMMING AND A WIDE RANGE OF GARDEN SPACES HELP TO PROVIDE AN EMOTIONALLY AND PHYSICALLY HEALTHY ENVIRONMENT.

IMMERSIVE VISUALIZATION WORKSHOP
VR + AR TECHNOLOGY ASSIST INCOMING AND EXISTING RESIDENTS IN THE VISUALIZATION OF FUTURE CHANGES TO THE CONSTRUCT.

MODULAR + EFFICIENT SYSTEMS

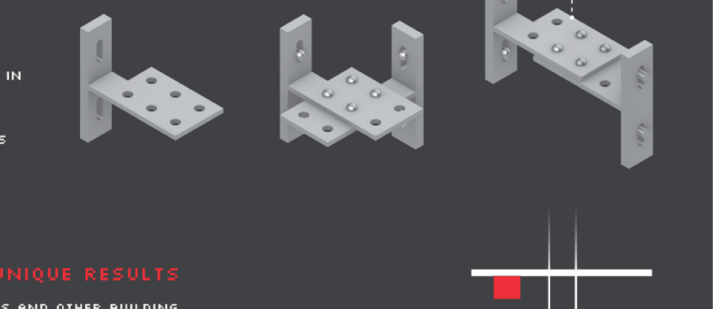
PREFABRICATED PANELS

3 PLY CLT
GRAPHITE XPS INSULATION
TIMBER CLADDING

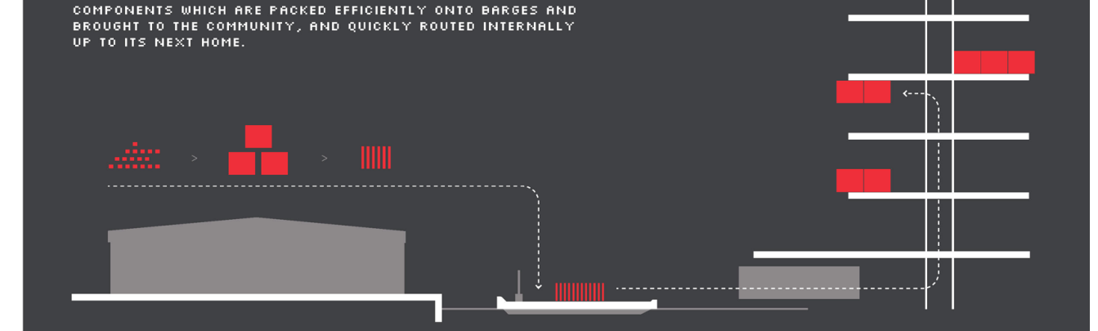


TYPICAL CONNECTIONS
STANDARDIZATION AND SIMPLICITY IS KEY TO ACHIEVING EFFECTIVE MODULAR SYSTEMS AND PRODUCTION EFFICIENCY IN ARCHITECTURE.

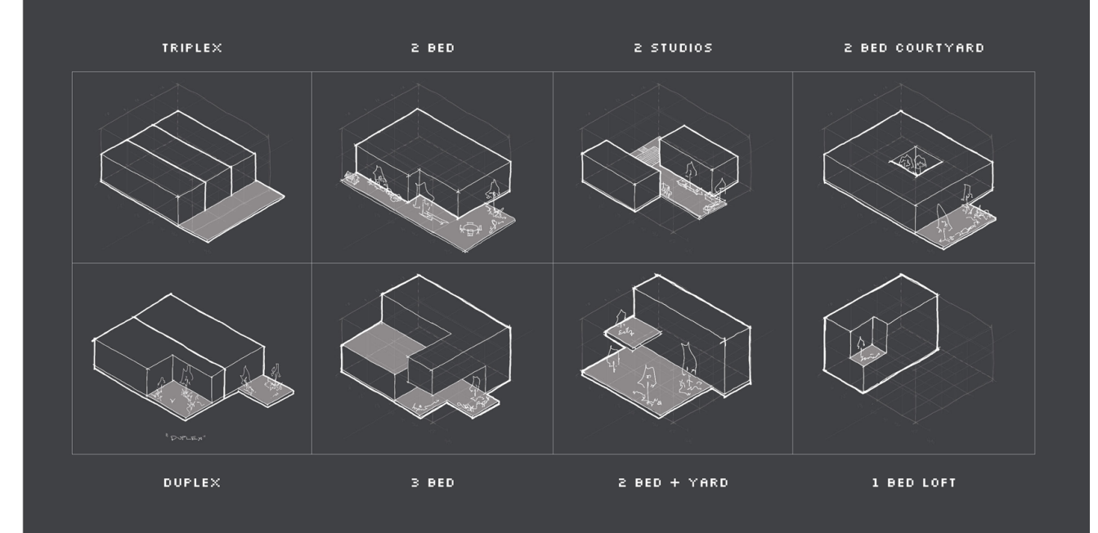
ALL WALL PANEL CONNECTIONS ARE ACHIEVED THROUGH TWO COMBINATIONS OF A SINGLE STEEL PLATE COMPONENT.

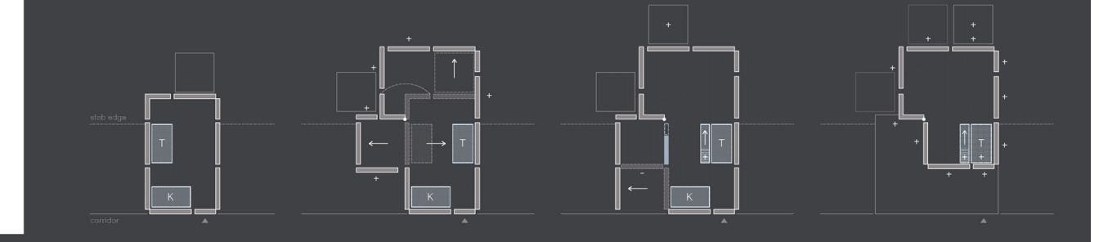


EFFICIENT PROCESS WITH UNIQUE RESULTS
NEARBY WAREHOUSE ASSEMBLES PANELS AND OTHER BUILDING COMPONENTS WHICH ARE PACKED EFFICIENTLY ONTO BARGES AND BROUGHT TO THE COMMUNITY, AND QUICKLY ROUTED INTERNALLY UP TO ITS NEXT HOME.



MAKE HOME, HOME
AS SOCIETY, THE ENVIRONMENT, + RESIDENTS NEEDS + WANTS ARE CONSTANTLY CHANGING THIS SYSTEM IS ABLE TO CHANGE TO, WITH THE PHYSICAL ARTICULATION OF THE UNIT RESPONDING DIRECTLY TO USER AND ENVIRONMENTAL INPUTS.


TRIPLEX
2 BED
2 STUDIOS
2 BED COURTYARD
DUPLEX
3 BED
2 BED + YARD
1 BED LOFT


slab edge
corridor
T
K

1. STUDIO / STARTING OUT
540 SF INTERIOR
144 SF EXTERIOR

A NEW UNIT FOR A YOUNG MARRIED COUPLE USING FIVE LARGE PANELS, ONE SMALL PANEL AND ONE CORNER CHUNK.

KITCHEN AND TOILET MODULES PLACED IN THE SPACE GIVE THE HOME ALL THE ESSENTIAL PIECES FOR FUNCTIONING AS A HOME.

2. 1 BED / NEW JOB
1,008 SF INTERIOR
144 SF EXTERIOR

A NEW JOB ALLOWS THE COUPLE TO AFFORD EXPANSION, ADDING A BEDROOM AND LARGER LIVING SPACE WITH ONLY FIVE NEW PANELS, WHILE MAINTAINING AND RELOCATING THEIR PERSONAL OUTDOOR SPACE.

THE TOILET MODULE SHIFTS TO MAKE SPACE FOR THE NEW ROOM'S INTERIOR PARTITION.

3. TWO BED / NEW LIFE
1,152 SF INTERIOR
288 SF EXTERIOR

A NEW CHILD MEANS ANOTHER NEW ROOM. BY EXPANDING TOWARD THE CORRIDOR, THE COUPLE ARE ABLE TO SELL BACK ONE OF THEIR PANELS TO HELP PAY FOR DIAPERS.

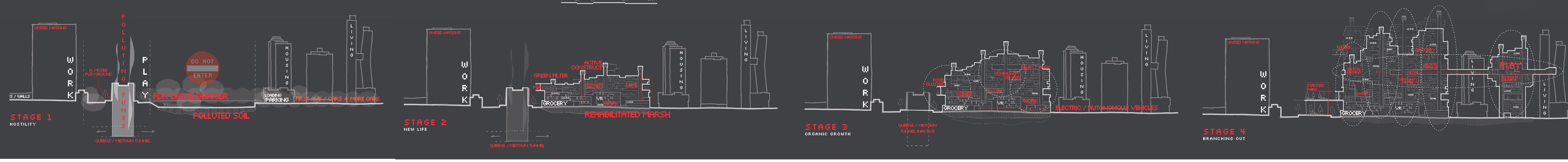
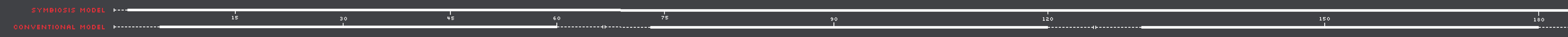
A NEW BALCONY IS ADDED ADJACENT TO THE MAIN LIVING ROOM TO GIVE THEIR SON A PLACE TO PLAY OUTSIDE.

4. THREE BED / LIFESTYLE
1,800 SF INTERIOR
432 SF EXTERIOR

A PROMOTION ALLOWS THE COUPLE OPPORTUNITY FOR FURTHER EXPANSION, AND THEY PURCHASE THE LOT ABOVE THEIR EXISTING UNIT AND BUILD A NEW MASTER SUITE WITH THEIR OWN PRIVATE BALCONY.

WORKING WITH TIME

POTENTIAL LIFESPAN COMPARISON + SERIES OF GROWTH


UNITED NATIONS
WORK
R. MOSES PLAYGROUND
POLLUTING FUMES
PLAY
DO NOT ENTER
FDR DRIVE BARRIER
POLLUTED SOIL
QUEENS / MIDTOWN TUNNEL
HOUSING
LOADING
PARKING
FIRST AVE / CARS + MORE CARS
LIVING
STAGE 1
HOSTILITY
GREEN FILTER
ACTIVE CONSTRUCT
GROCERY
REHABILITATED MARSH
STAGE 2
NEW LIFE
FOOD CLUSTER
ELECTRIC / AUTONOMOUS VEHICLES
QUEENS / MIDTOWN TUNNEL INACTIVE
STAGE 3
ORGANIC GROWTH
STACKED PARK
STAGE 4
BRANCHING OUT
VR