



**SCIENCE CITY MASTER PLAN**  
THE SAN JUAN KNOWLEDGE CORRIDOR

PHASE III SUMMARY REPORT  
JUNE 2007



**SUBMITTED JUNE 2007  
TO THE PUERTO RICO INFRASTRUCTURE FINANCING AUTHORITY (AFI)  
AND THE PUERTO RICO SCIENCE, TECHNOLOGY AND RESEARCH TRUST**

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**“SCIENCE REALLY WORKS BEST WHEN THERE’S A KIND OF FORCED INTERACTION. THERE ARE LOTS OF RESEARCH INSTITUTIONS WHERE THERE ARE ALL KINDS OF SPACE – AND THE SCIENCE ISN’T ANY GOOD. THIS (PLACE) CREATES A CRITICAL MASS OF PEOPLE THAT’S NEEDED FOR PRODUCTIVE SCIENCE.”**

**ANDREW DILLIN – BIOLOGIST, SALK INSTITUTE**

**from METROPOLIS MAGAZINE, “CAN ARCHITECTURE INSPIRE GREAT SCIENCE” – February 2007**

#### **WHAT IS THE KNOWLEDGE CORRIDOR?**

- Intentions of the Phase III Draft Summary Report
- Overview of the Strategic Economic and Urban Vision
- Urban Matrix: Corridor-wide Urban Design Strategy

#### **SCIENCE CITY DEVELOPMENT TEMPLATE**

- Oso Blanco Site
- Urban Design Framework
- Site Amenities and Program Mix
- Development Template

#### **SCIENCE CITY ECOLOGICAL + PHYSICAL IDENTITY**

- Sustainable / Ecological Strategies
- Streetscape Design Recommendation
- Typology Design Recommendations

#### **IMPLEMENTATION STRATEGY**

- Critical Success Factors
- Implementation Entity, Principles and Assumptions
- Science City: Overall Phasing Strategy
- Phase I Pre-Development Activities (years 1-3)
- Phase I Development Activities (years 3-10)
- Phase II Development Activities (years 11-20)

#### **RETURN ON INVESTMENT ANALYSIS**

- Project Economic Impact
- Project Investment Return Analysis



**THIS PHASE III MASTER PLAN REPORT OUTLINES THE PHYSICAL DESIGN VISION FOR THE SAN JUAN KNOWLEDGE CORRIDOR'S FLAGSHIP INITIATIVE – A SCIENCE CITY AT OSO BLANCO. THE DOCUMENT IS SUPPLEMENTED BY TWO OTHER PHASE III REPORTS THAT FOCUS ON ECONOMIC DEVELOPMENT AND COMMUNICATIONS RESPECTIVELY.**

**THE SCIENCE CITY AT OSO BLANCO INCLUDES THE MASTER PLAN FOR THE REDEVELOPMENT OF THE OSO BLANCO PRISON / LAS AMAPOLAS HOUSING SITES, AS WELL AS AN URBAN DESIGN FRAMEWORK DEMONSTRATING THE DEVELOPMENT PROJECT'S ADJACENCY AND RELATIONSHIP TO OTHER INSTITUTIONS AND CURRENT PROJECTS WITHIN THE KNOWLEDGE CORRIDOR SUCH AS CENTRO MÉDICO; THE PROPOSED COMPREHENSIVE CANCER CENTER; AND THE NEW MOLECULAR SCIENCES BUILDING AT CUPEY.**

**THIS REPORT IS THE THIRD OF THREE – PRECEDED BY THE PHASE I PRELIMINARY VISION REPORT; AND THE PHASE II ECONOMIC AND URBAN DESIGN SCENARIOS REPORT. THE DOCUMENTS FROM EACH PHASE SHOULD BE CONSIDERED COMPENDIA OF THE OVERALL VISION FOR THE SAN JUAN KNOWLEDGE CORRIDOR AND THE SCIENCE CITY AT OSO BLANCO.**

**IN ORDER TO CONTEXTUALIZE THE POTENTIAL IMPACT OF THE KNOWLEDGE CORRIDOR – AND TO REINFORCE THE CRITICAL NATURE OF ITS UNDERTAKING – THE FOLLOWING DATA IS OFFERED REGARDING TALENT AND EXPERTISE AS IT RELATES TO THE ISLAND.**

- **33% OF ALL M.D. GRADUATES FROM THE UPR MEDICAL SCIENCES CAMPUS GO TO THE MAINLAND TO COMPLETE THEIR RESIDENCIES**
- **40% OF ALL UPR GRADUATES IN ENGINEERING ARE HIRED BY MULTI-NATIONAL CORPORATIONS FROM THE MAINLAND**
- **50% OF PUERTO RICAN'S GRADUATING WITH A PhD IN PUERTO RICO OR IN THE USA ARE EMPLOYED BY ACADEMIA OR INDUSTRY OUTSIDE OF THE ISLAND**

**RESEARCH UNDERTAKEN AS PART OF THIS REPORT HAS DEMONSTRATED CONSENSUS THAT THIS TALENT WILL RETURN UNDER THE RIGHT CONDITIONS. THE KNOWLEDGE CORRIDOR OFFERS THE FIRST STEP TOWARDS RETAINING THIS EXCEPTIONAL RESOURCE AND IN TURN, TRANSFORMING THE PUERTO RICO ECONOMY AS A WHOLE.**



**THE CONTINUED EXODUS OF SOME OF THE BEST TALENT IN HIGH TECHNOLOGY FIELDS DEPRIVES INDUSTRY AND ACADEMIA IN PUERTO RICO OF THE CRITICAL HUMAN RESOURCES NECESSARY TO ADVANCE AN ESTABLISHED LIFE SCIENCES ECONOMY**

**THE KNOWLEDGE CORRIDOR IS THE FIRST STEP IN BUILDING UPON PUERTO RICO'S MOST VALUABLE NATURAL RESOURCE - ITS PEOPLE**





# WHAT IS THE KNOWLEDGE CORRIDOR?

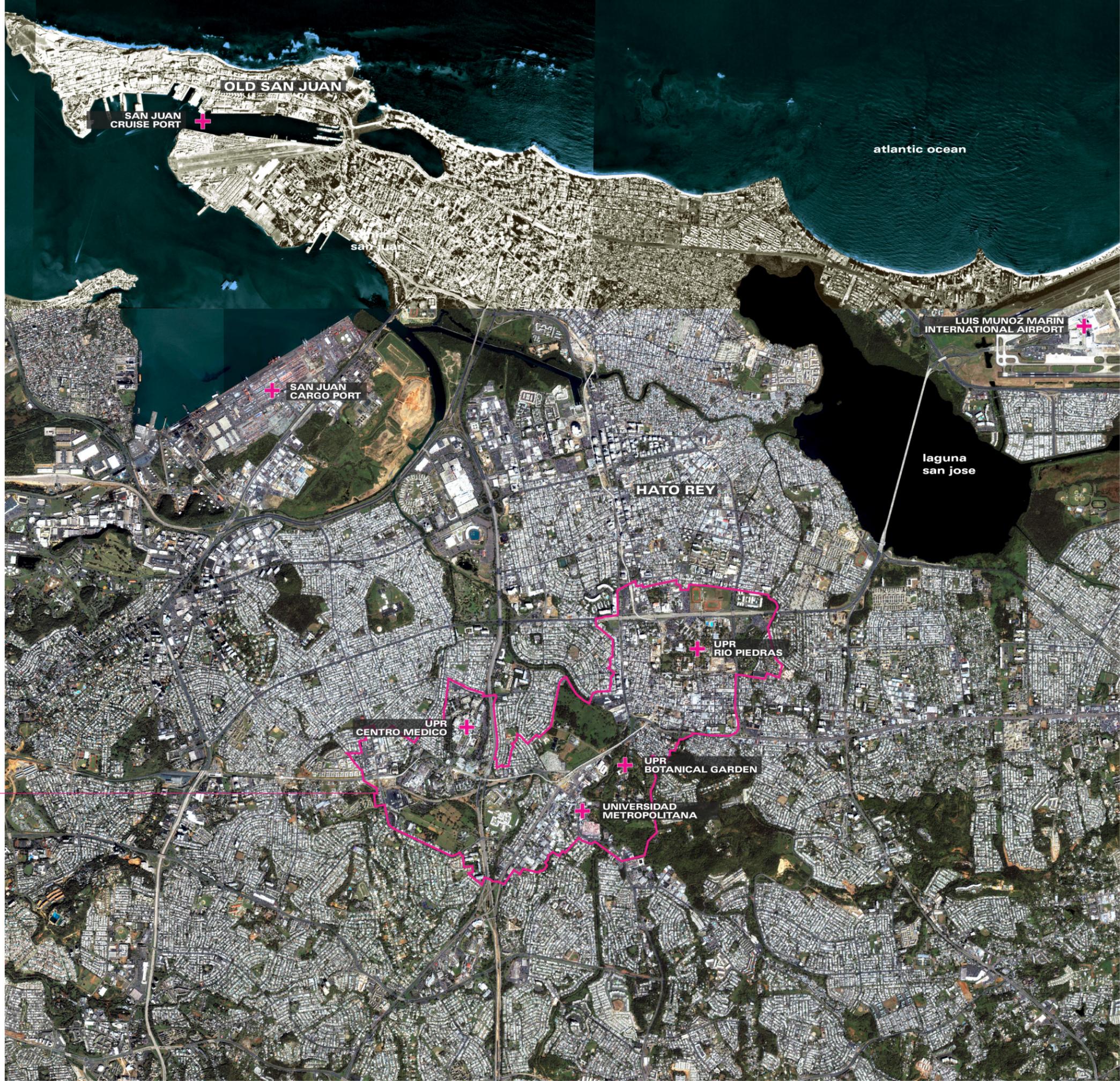


## THE KNOWLEDGE CORRIDOR

Through the Bio-Island initiative, the Government of Puerto Rico has made a commitment to the advancement of a “Knowledge Economy” in Puerto Rico – a new economy of education, research, ideas, innovation and technological creativity.

The Phase III Master Plan Report outlines the flagship development of this vision – a new Science City at Oso Blanco. This new development will sit at the geographic and ideological heart of the Knowledge Corridor – a nearly 2000 acre district within San Juan comprised of the University of Puerto Rico’s Rio Piedras campus; San Juan’s Central Medical Campus; the University of Puerto Rico’s Botanical Gardens; Universidad Metropolitana; and various publicly-owned potential development sites for life science industries, education and new lifestyle neighborhoods.

Providing a clear strategic agenda for future development at Oso Blanco will establish a comprehensive Life Sciences cluster in San Juan able to facilitate the development of a new economic vision for Puerto Rico –  
A 21ST CENTURY GLOBAL KNOWLEDGE ECONOMY.



**THE KNOWLEDGE CORRIDOR COMPRISES  
VARIOUS EDUCATIONAL, RESEARCH AND  
CULTURAL SITES CENTERED ALONG THE  
TREN URBANO**

## THE KNOWLEDGE CORRIDOR

The aim of the Knowledge Corridor is to fuel economic growth and innovation by capitalizing upon Puerto Rico's growing Life Science industries. Investment and development in this area will strengthen and expand the Island's place in the global economy, attracting and retaining new scientific talent as well as generating capital and innovative ideas for use throughout the world.

This report outlines how to leverage this expanding economy into the development of a new "Science City" – a state-of-the-art enclave that integrates educational and research campuses with commercial laboratories, vibrant mixed-use urban neighborhoods, efficient transportation networks and dynamic public open spaces.

The Knowledge Corridor incorporates a potential investment of \$3 billion in infrastructure and transportation initiatives; nearly 700,000 m<sup>2</sup> of dormant, government owned land; the adjacency of recognized centers of innovation and academic excellence; and the unique tropical vibrancy of Puerto Rico and its culture.

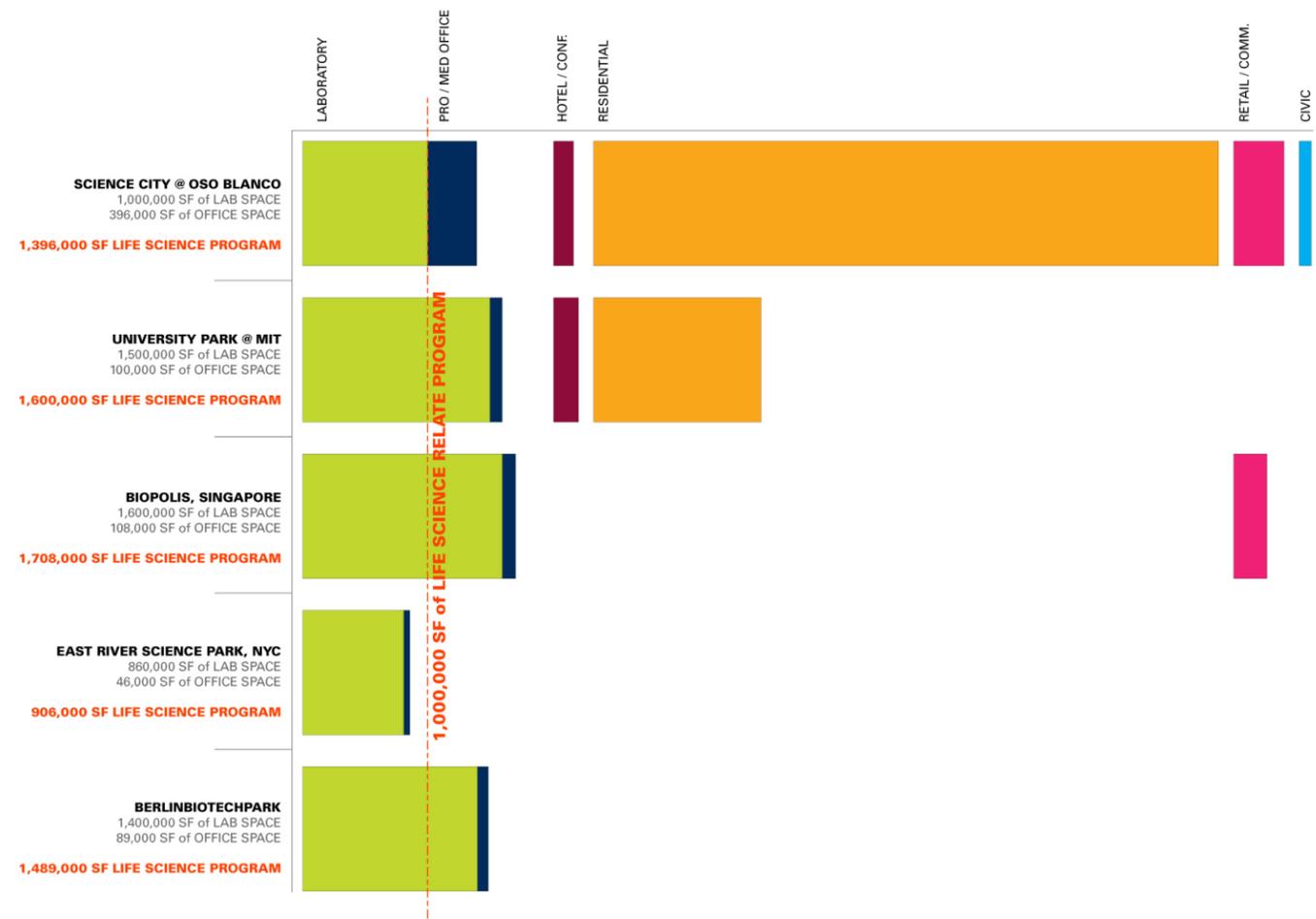


**SAN JUAN'S KNOWLEDGE CORRIDOR IS THE  
FLAGSHIP INITIATIVE OF A NEW ECONOMIC  
AGENDA FOR PUERTO RICO**

### THE KNOWLEDGE CORRIDOR

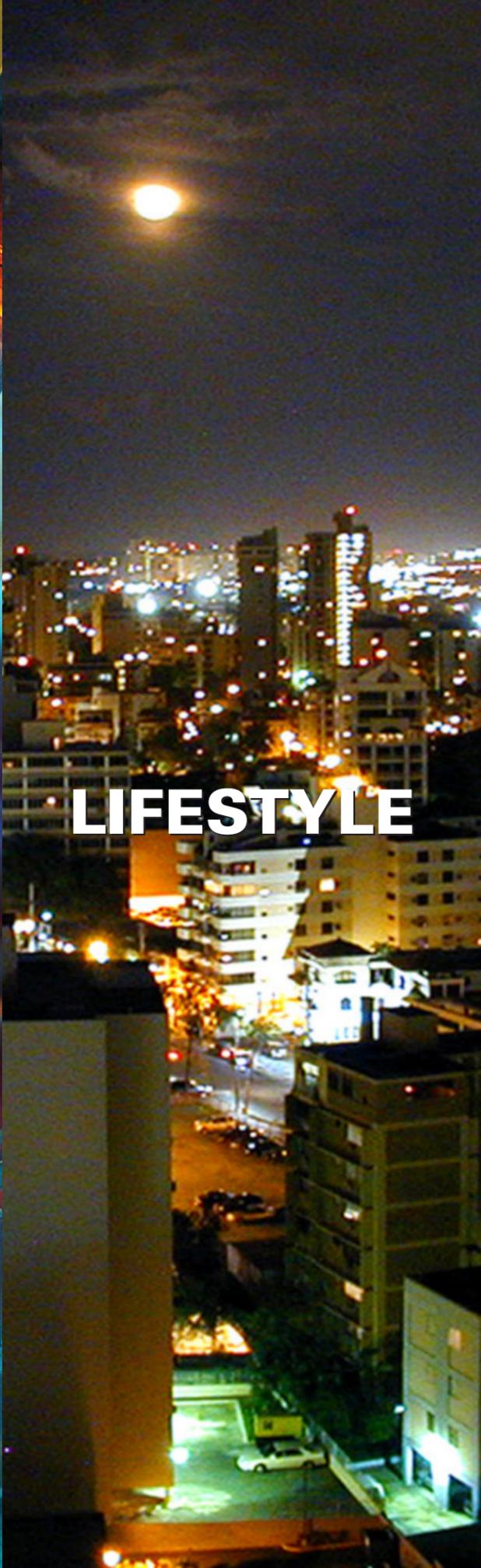
What distinguishes the Knowledge Corridor and the Science City at Oso Blanco from other global Life Science developments is both physical and logistical. Every development of this type will offer state-of-the-art lab and office facilities. However, when combined with cultural and lifestyle amenities such as iconic and charismatic public open spaces; diverse neighborhoods like Rio Piedras; a science-related charter school; and an international research institute, the Science City at Oso Blanco will stand out amongst its peers. In fact the real driver for international corporate location managers – in addition to the available workforce and a positive business environment – is the potential quality of life available to their employees.

Ultimately, corporations are looking for recognized centers of innovation and academic excellence; government incentives that work on multiple levels of a corporation’s operation; the presence of a defined industry cluster that provides the critical mass of infrastructure, facilities, people and amenities; and locations that offer attractive live/work options to draw global talent.





**RESEARCH**



**LIFESTYLE**



**CULTURE**



**NATURE**



**EDUCATION**

**BY CONSIDERING THE CORRIDOR AS  
PART OF A LARGER URBAN ECOSYSTEM,  
ANY REDEVELOPMENT WILL HAVE A  
TRANSFORMATIVE EFFECT ON THE  
BROADER METROPOLIS OF SAN JUAN**



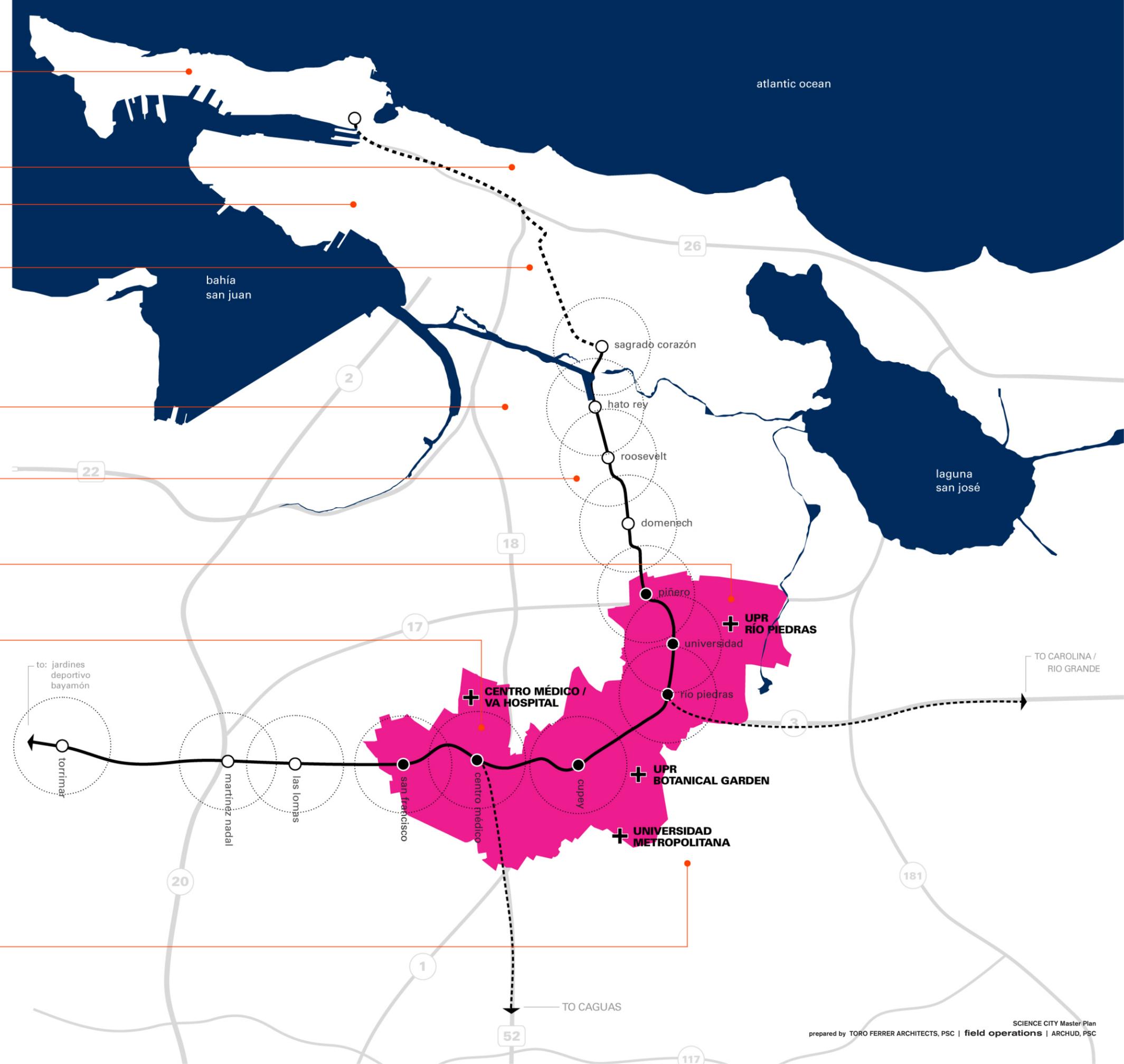
## REGIONAL OVERVIEW

The stations along the Tren Urbano line offer a series of new nodes for the development of various high-density industry clusters.

The Knowledge Corridor benefits from an intense grouping of scientific, medical and research programs within its boundaries.<sup>1</sup> This programmatic character is supported by the comprehensive system of transportation and communication infrastructures that link the Corridor to the whole of the San Juan metropolitan region. This network provides easy access to other program clusters and amenities throughout San Juan including, parks, athletic venues, shopping districts, convention and exhibition areas, as well as the unique neighborhoods that abut or are nearby the Corridor such as Hato Rey, Condado and Rio Piedras.

<sup>1</sup> This delimitation is a preliminary study area based upon the Special Development District proposed for the Tren Urbano Transit Corridor.

- HERITAGE
- TOURISM
- CONVENTION
- BUSINESS
- ENTERTAINMENT
- FINANCIAL
- EDUCATION
- MEDICAL
- ECOLOGICAL



 **tren urbano**  
 **knowledge corridor**

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 scale 1:45000

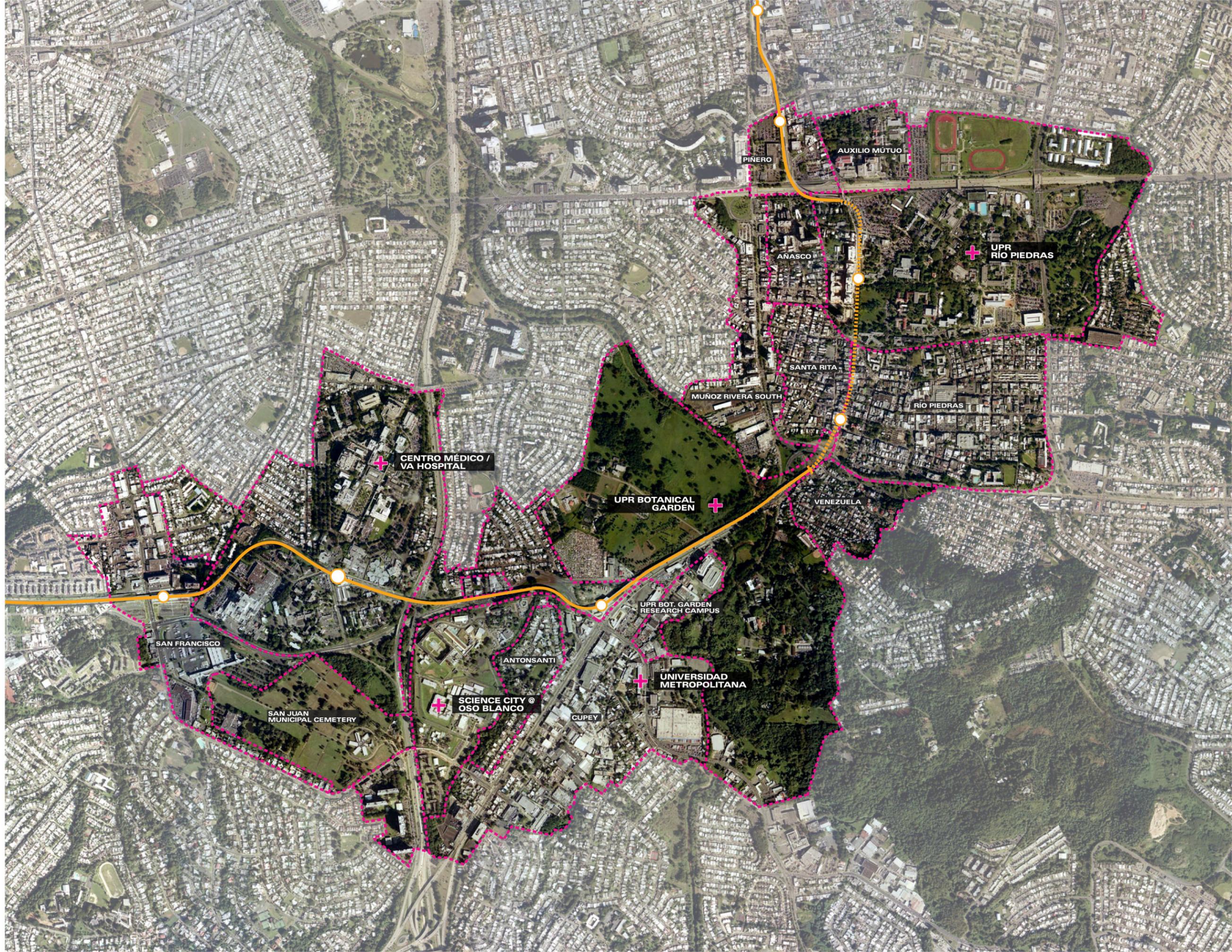
## **CORRIDOR OVERVIEW / INSTITUTIONAL TENANTS**

Embedded within the sprawling urban fabric of San Juan and the natural preserve of the Ecological Corridor, the Knowledge Corridor structurally aligns itself along the Tren Urbano between Piñero station in the north and San Francisco station to the south west. Within this zone are four major institutional tenants that programmatically distinguish the Corridor from other territories within the San Juan metropolitan region and act as catalysts for the definition of the Knowledge Corridor as a realizable initiative. These tenants include the University of Puerto Rico's flagship campus at Rio Piedras as well as the University's Botanical Gardens, the Universidad Metropolitana and the Centro Médico de Puerto Rico.

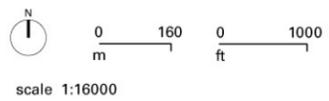
In addition to these institutions, the Corridor's unique and distinct communities will all play a major role in the planning effort of the territory. At present, the Corridor is populated by no fewer than 25 development or redevelopment projects including; campus open space improvements at UPR Rio Piedras; renovations and expansion of the Botanical Garden; restoration of the Historic Aqueduct; a new Molecular Sciences Building at Cupey; the Comprehensive Cancer Center adjacent to Centro Médico; a new Veteran's Administration Tower; a new Department of Education Headquarters; and the Cupey Station Area improvements, in addition to several other public/private development initiatives.

### **THESE UNDERTAKINGS EQUATE TO A CURRENT INVESTMENT IN THE KNOWLEDGE CORRIDOR OF NO LESS THAN 450 MILLION DOLLARS**

Add to this other Tren Urbano station area improvements and potential expansion of the system to Caguas and Carolina, and you have investment in this region of San Juan totaling more than three billion dollars. A carefully coordinated plan is necessary to ensure that all these developments add up to a memorable, coherent vision – THE SAN JUAN KNOWLEDGE CORRIDOR.



- + institutional tenants
- tren urbano
- - - district boundaries



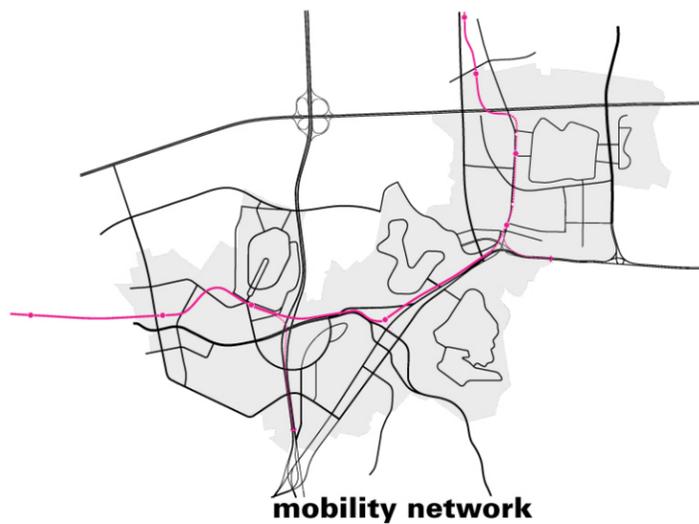
## URBAN MATRIX FOR GROWTH MOBILITY NETWORK + GREEN TISSUE + REDEVELOPMENT ZONES

The overall urban design strategy for the Knowledge Corridor looks to stimulate under-utilized properties by instrumentalizing existing institutional tenants and transportation infrastructures to transform land use and create a structural matrix within which redevelopment projects can be implemented at a variety of scales – from private sector infill, to new construction, to government incentive driven rehabilitation.

This strategy is composed of operations upon three structural layers that will guide development within the territory over the long-term rather than proposing specific developments and transformations outside of the context of changing technological and market forces. In order to shape change within the Corridor, it is anticipated that a series of local renovations to each of the strategy's structural layers is necessary, in turn shaping the Corridor's immediate physical identity.

### CONNECTIVITY, IDENTITY AND PROGRAMMATIC ADJACENCY DRIVE THIS STRATEGY

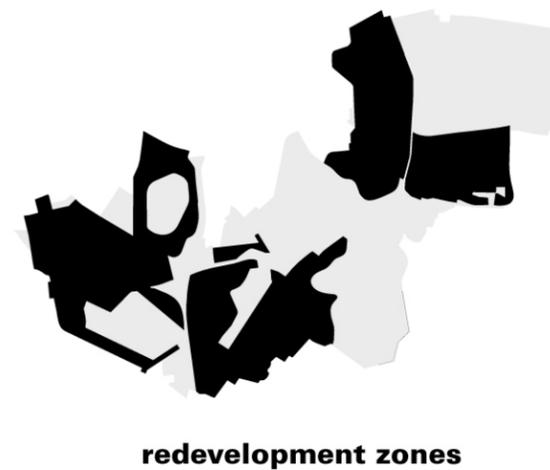
A full description of this approach can be found in the Phase II Report – Economic and Urban Design Scenarios for the San Juan Knowledge Corridor.



**mobility network**



**green tissue**



**redevelopment zones**



**HEALTH**

**NATURE**

**LIFESTYLE**

**EDUCATION**

**RESEARCH**

**CULTURE**

-  mobility network
-  green tissue
-  redevelopment zones
-  tren urbano
-  urban plaza / pedestrian
-  knowledge corridor



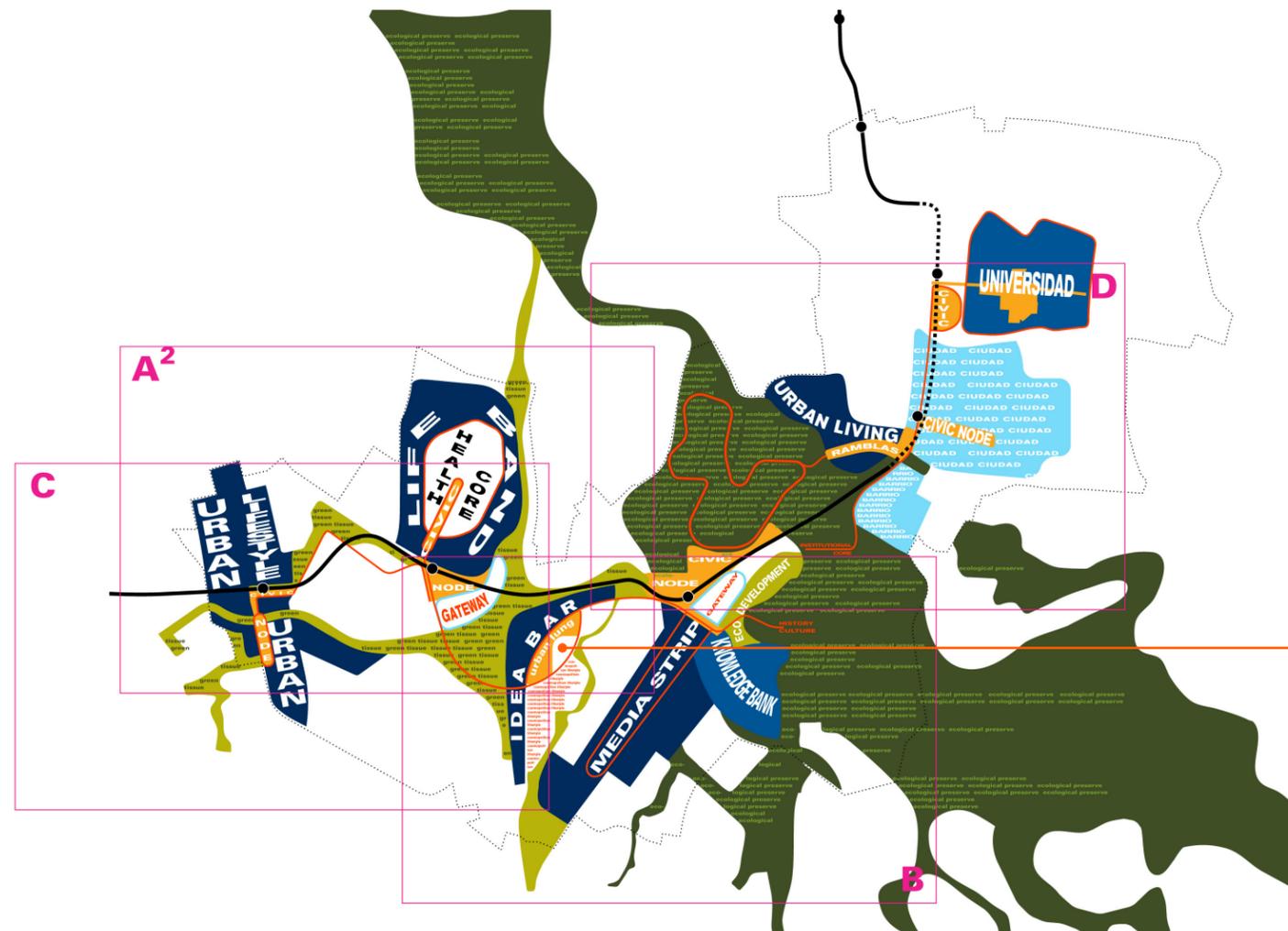
  
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## STRATEGIC DEVELOPMENT ZONES

The true agenda of the Knowledge Corridor is to attract intellectual talent and investment capital to Puerto Rico in order to capitalize on a growing life-science market. This capital is no longer solely interested in isolated science parks set in bucolic suburban settings, but is now moving towards urban locations offering unique and appealing lifestyle opportunities that promote interaction as well as intellectual and social exchange. In order to attract this capital, the Knowledge Corridor must provide a distinct mix of programs that build upon one another to create exceptional urban spaces and places within which this interactivity can become manifest and flourish.

It should be noted that in addition to the Science City site at Oso Blanco / Las Amapolas, there are a number of potential development sites within the Knowledge Corridor that the Puerto Rico Science Technology and Research Trust can capitalize over the long-term development of the Knowledge Corridor. Nodes of high-intensity development within the Corridor will enable the transformation of much larger territory over time, allowing the Knowledge Corridor to more broadly influence the metropolis of San Juan.

Though the four development areas outlined in the preceding Phase II report – in addition to the Science City – are isolated for the purposes of the study, it must be understood that they are integrally linked. The most effective way to ensure the successful transformation of these zones and the broader Corridor is to actively promote a range of use patterns and programs for each. Diverse programs relating to science, research and innovation should be located adjacent to or nearby cultural and civic amenities rather than isolated into enclaves. A strong mix of residential, retail and commercial programs should support and supplement the base programmatic disposition of the Knowledge Economy to offer an appealing set of choices to a range of potential populations and users.



**SCIENCE CITY @ OSO BLANCO**

## **THE CORRIDOR TOMORROW**

This impression of the San Juan Knowledge Corridor represents a potential build-out of 25+ years including development of a new Science City at Oso Blanco as well as redevelopment of other strategic areas including the University of Puerto Rico at Rio Piedras; the Centro Médico de Puerto Rico Campus/Veteran's Administration Hospital; the University of Puerto Rico Botanical Garden; the Cupey Station Area/PR-1 Corridor; the San Francisco Station Area/AMA Bus Depot; and the PR-1/Muñoz Rivera/PR-3 Intersection. The blue lines shown define the trajectory of the Tren Urbano which links the institutional tenants of the Knowledge Corridor with areas like Hato Rey and Central San Juan, Caguas and Carolina.

**FOREGROUNDED IN THIS VIEW IS THE SCIENCE CITY DEVELOPMENT AT OSO BLANCO – THE CENTER OF INNOVATION, RESEARCH AND TECHNOLOGY WITHIN THE KNOWLEDGE CORRIDOR.**



CENTRO MEDICO DE PUERTO RICO

SCIENCE CITY AT OSO BLANCO

UNIVERSITY OF PUERTO RICO RIO PIEDRAS

UPR BOTANICAL GARDEN NORTH

UPR BOTANICAL GARDEN SOUTH

UNIVERSIDAD METROPOLITANA



# SCIENCE CITY DEVELOPMENT TEMPLATE



## SCIENCE CITY DEVELOPMENT SITE

While there are a number of available development parcels throughout the Knowledge Corridor, the Oso Blanco / Las Amapolas site stands out as the obvious location for the deployment of a new Life Science oriented development – the Knowledge Corridor’s Science City. In addition to its geographic location at the Corridor’s center, there are a number of reasons for the site’s desirability including its sheer size at approximately 81 acres; its connectivity to highways and a new mass transit system; and the fact that the parcel is currently publicly held.

However, perhaps the most compelling feature of the Oso Blanco site is its adjacency to an established Life Sciences campus at Centro Médico, the new Comprehensive Cancer Center at PR-18 / PR-21 and the new Molecular Sciences Building at Cupey. Though this section of the report focuses on an urban design scenario for the Science City site, the study takes into consideration the parcel’s relationship with adjacent institutions and development properties, as well as anticipated future development within the Knowledge Corridor.



**CENTRO MÉDICO**

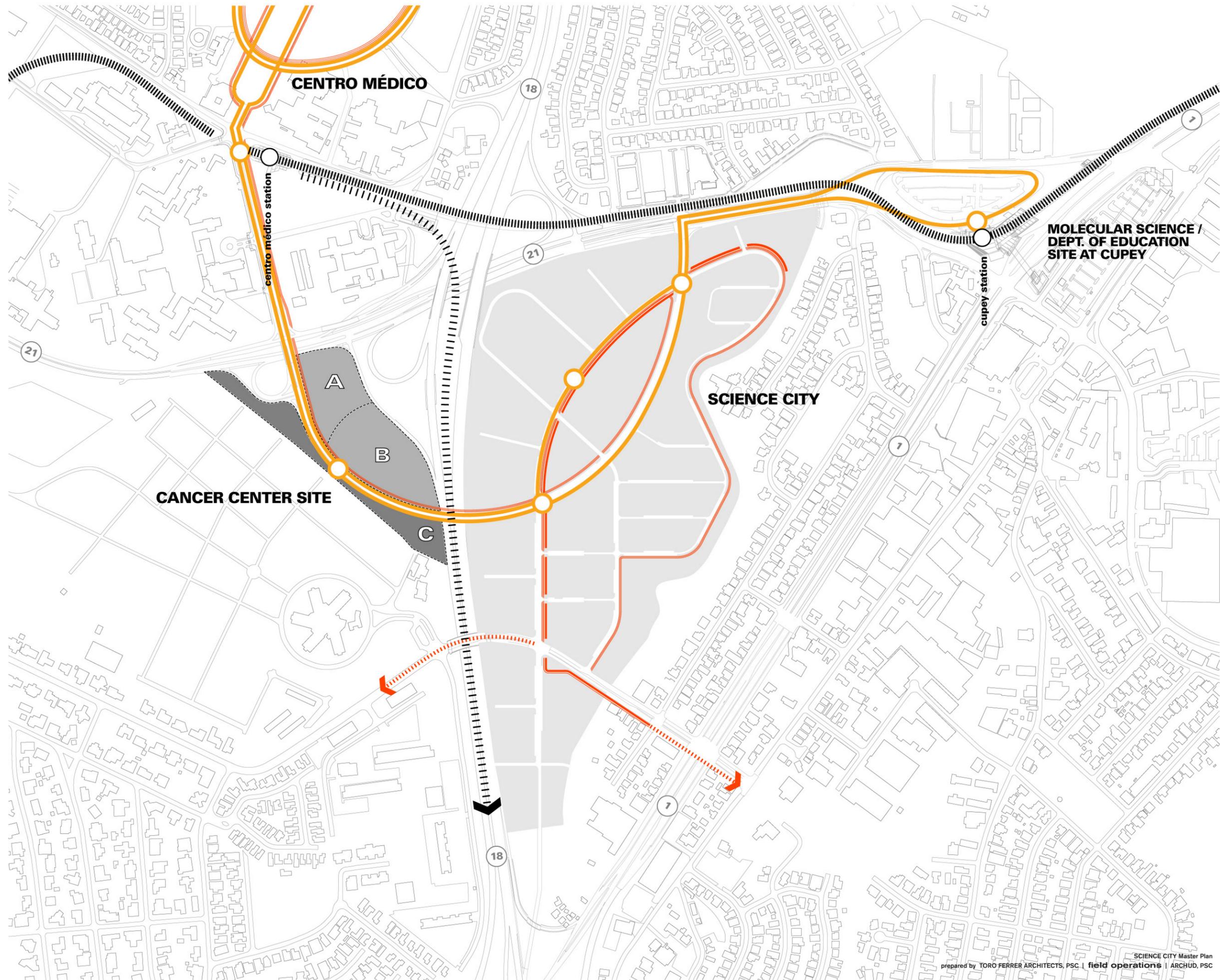
**CANCER CENTER SITE**

**SCIENCE CITY AT OSO BLANCO**

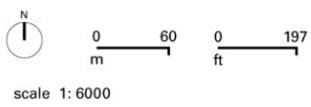
## LINKAGES

Connection between Centro Médico, the new Comprehensive Cancer Center at PR-18 / PR-21 and the new Molecular Sciences Building at Cupey will rely upon a variety of mobility options creating a strong network of movement within the Science City District. This lattice includes two transit stops – one at Cupey and the other at Centro Médico – each less than a 12 minute walk from the center of the Oso Blanco development. Linking these two stations is a shuttle loop that will circle the Centro Médico campus, cross the Comprehensive Cancer Center site and move through Oso Blanco before circling back around at Cupey station making the Science City a true Transit Oriented Development (TOD). In addition, bicycle and pedestrian circuits will parallel the Science City Boulevard, connecting each of the three campuses internal circulation structures. This pedestrian/bicycle network is envisioned to link with other regional networks within the Knowledge Corridor connecting the Science City to places like the University of Puerto Rico, the Botanical Garden and the Rio Piedras community.

The primary element of this mobility network is the proposed Science City Boulevard. This new circuit will not only physically connect the three campuses, but will also function in restructuring the Comprehensive Cancer Center site, creating three distinct parcels for development. The deployment of this new boulevard will, in effect, transform the proposed cancer center site from a leftover suburban outparcel into a well defined piece of urban fabric integral to the Science City.



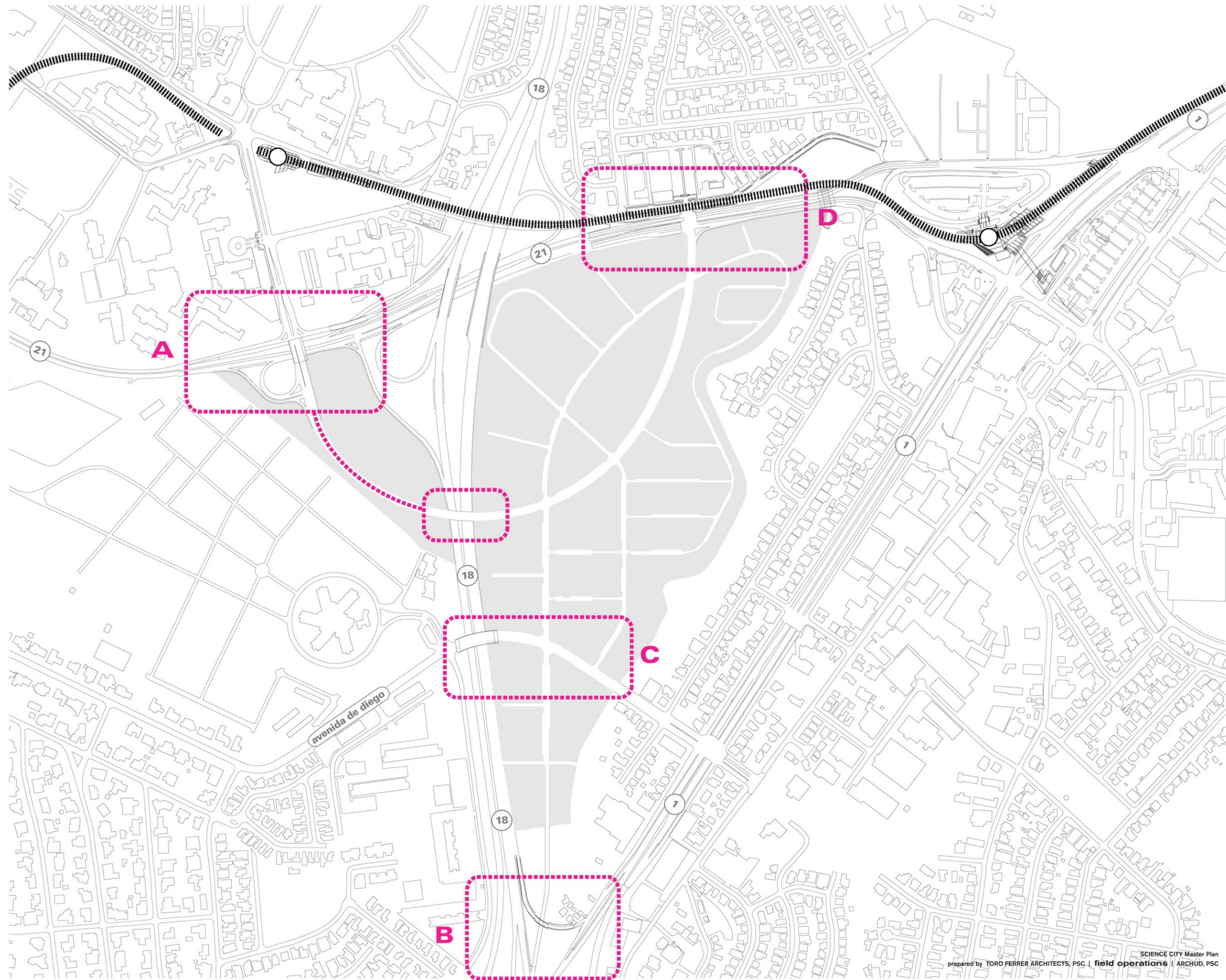
- center center parcels (NET values)**  
 A - 125,765 sf (11.685 m<sup>2</sup>)  
 B - 197,680 sf (18.365 m<sup>2</sup>)
- co-generation parcel (NET values)**  
 C - 101,557 sf (9,435 m<sup>2</sup>)
- pedestrian / bike circuit**
- trolley circuit**
- tren urbano**
- tren urbano extension (caguas)**



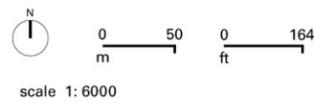
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## INFRASTRUCTURAL IMPROVEMENTS

In order to complete the Science City Mobility Network outlined above, four primary infrastructural renovations will need to be implemented. A) The first is the above mentioned Science City Boulevard. This connection will include a new roadway across the Comprehensive Cancer Center site, a bridge linking the Cancer Center site with Oso Blanco, and a new interchange and bridge at PR-21. B) The second infrastructural renovation is a new exit along PR-18 entering the Science City development to the south of Las Amapolas. This new access will necessitate a reconfiguration of the existing connection between PR-1 and P-18 in addition to the proposed ramp. C) The third renovation will be to Avenida de Diego between the Buena Vista Creek and the bridge over PR-18. This modification will include a road widening for the addition of turn lanes, as well as a planted central median. Traffic control measures are also anticipated; however, any change will need to meet the dimensions of the existing bridge over PR-18. D) The fourth off-site infrastructure renovation occurs at the intersection of the Science City Boulevard and PR-21. A proposed improvements project for this roadway currently exists, extending from Cupey Station. However, this project will need to be modified to accommodate traffic volume and connection to the proposed Science City development.



 off-site infrastructure improv.



scale 1: 6000

## **ILLUSTRATIVE PLAN: DISTRICT**

Programmatic linkages to Centro Médico, the new Comprehensive Cancer Center at PR-18 / PR-21 and the new Molecular Sciences Building at Cupey provide the foundation for a true Life Sciences cluster at Oso Blanco. Infrastructural renovations and strongly articulated, identifiable public open spaces provide the physical structure within which long-term, high-density urban development will take place. Pair this with adjacent public amenities like the Botanical Garden, and the Knowledge Corridor's "Green Heart" will soon have an equally vibrant urban core around which future development can and will occur – A NEW SCIENCE CITY at OSO BLANCO.



## **SITE AMENITIES / SCIENCE CITY PROGRAM MIX**

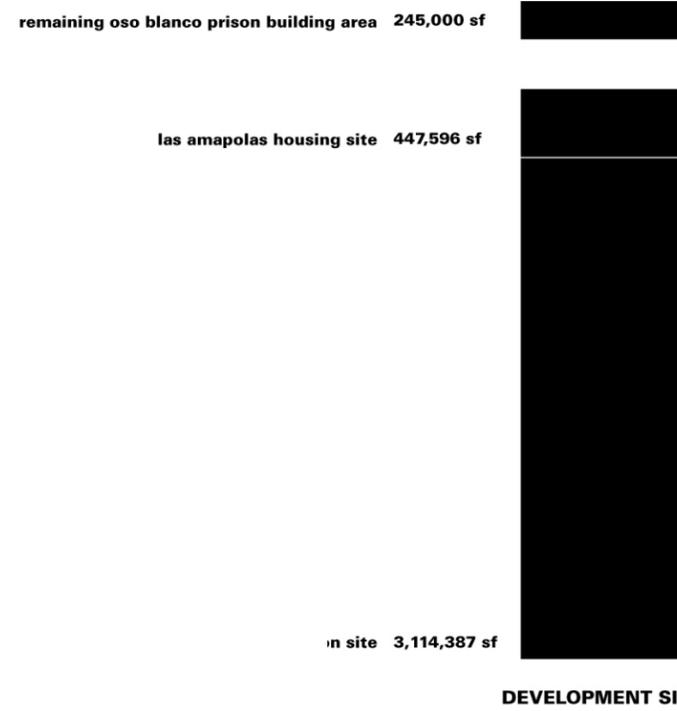
In order to achieve success, redevelopment of the Oso Blanco prison site into a new Science City will require a series of amenities to attract and hold the interest of end users and developers, as well as to sustain the image and reality of a new life science community. The seven elements listed below constitute a minimum set required for success in addition to any laboratory facilities:

- Exceptional Public Open Space
- Well-Defined Pedestrian Connectivity
- Diverse Retail Options
- Lodging / Conferencing
- Incubator / Research Institute
- Recreation Venues
- Residential Alternatives

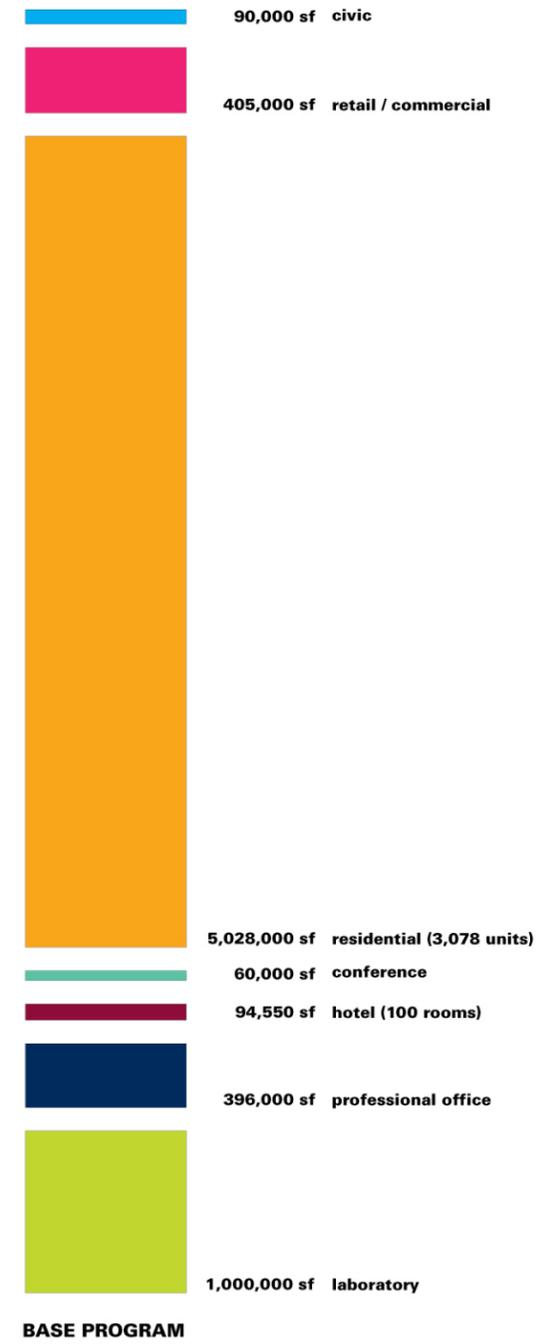
The sheer size of the Oso Blanco / Las Amapolas parcel necessitates an ambitious mix of related programs to be paired with the life science laboratory and office spaces that are the foundation of a new Science City. Noting the amenities typically desired in a development of this type, this visualization proposes a significant residential component, paired with hotel/conference, retail, and civic programs including a K-8 science-magnet school and incubator to promote small business initiatives.

The actual amount of program to be developed for the Science City will be a function of market forces and available incentives. The program shown here reflects current market conditions in relation to the desired return on investment for the Science City Development as of the conclusion of this report.

Note: See Appendix 01 of the Phase II report for INITIAL ASSESSMENT OF POTENTIAL MARKET SUPPORT FOR PROPOSED USES for further discussion and analysis of this topic.



**TOTAL DEVELOPMENT SITE AREA: 3,561,983 SF**



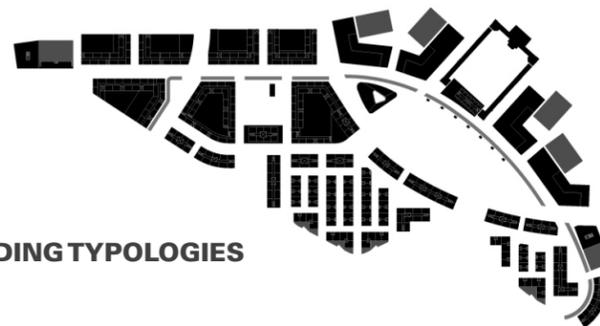
**TOTAL PROPOSED PROGRAM AREA: 7,073,550 SF**



**CLEAR INFRASTRUCTURAL ORGANIZATION**

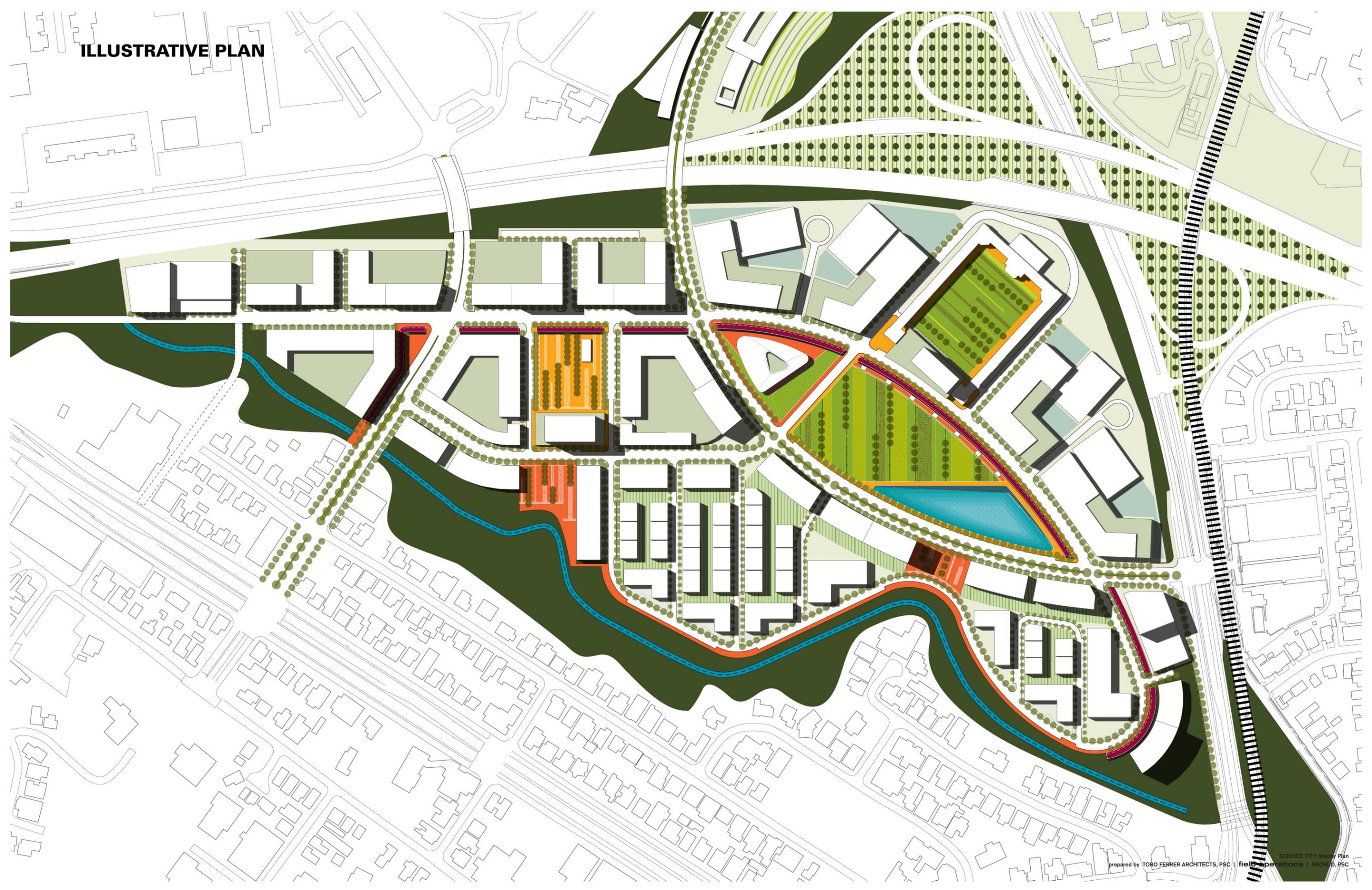


**UNIQUE PROGRAMMATIC ADJACENCIES**



**DISTINCT BUILDING TYPOLOGIES**

ILLUSTRATIVE PLAN



## EXISTING TOPOGRAPHY

The topography of the Oso Blanco prison site can generally be characterized as gently sloping, moving from high in the south to lower in the north. The site is somewhat plateaued from the context that surrounds it – bounded by the depressed lines of PR-18 to the west and PR 21 to the north. The site’s eastern boundary – the Buena Vista Creek – sits as much as 5 meters below the overall surface of the development site in some places. A high point near the intersection of de Diego Avenue and PR 18 will likely need to be cut down given its acute relationship with the rest of the site. An equal measure of fill will likely be necessary where the Buena Vista Creek pushes in on the boundary of the site due east of the historic prison building. Overall, a great deal of cut and fill is not anticipated. That said, it is proposed that all development at Oso Blanco take advantage of the given topography in order to produce a richer, varied urban fabric.

# TOPOGRAPHY: EXISTING



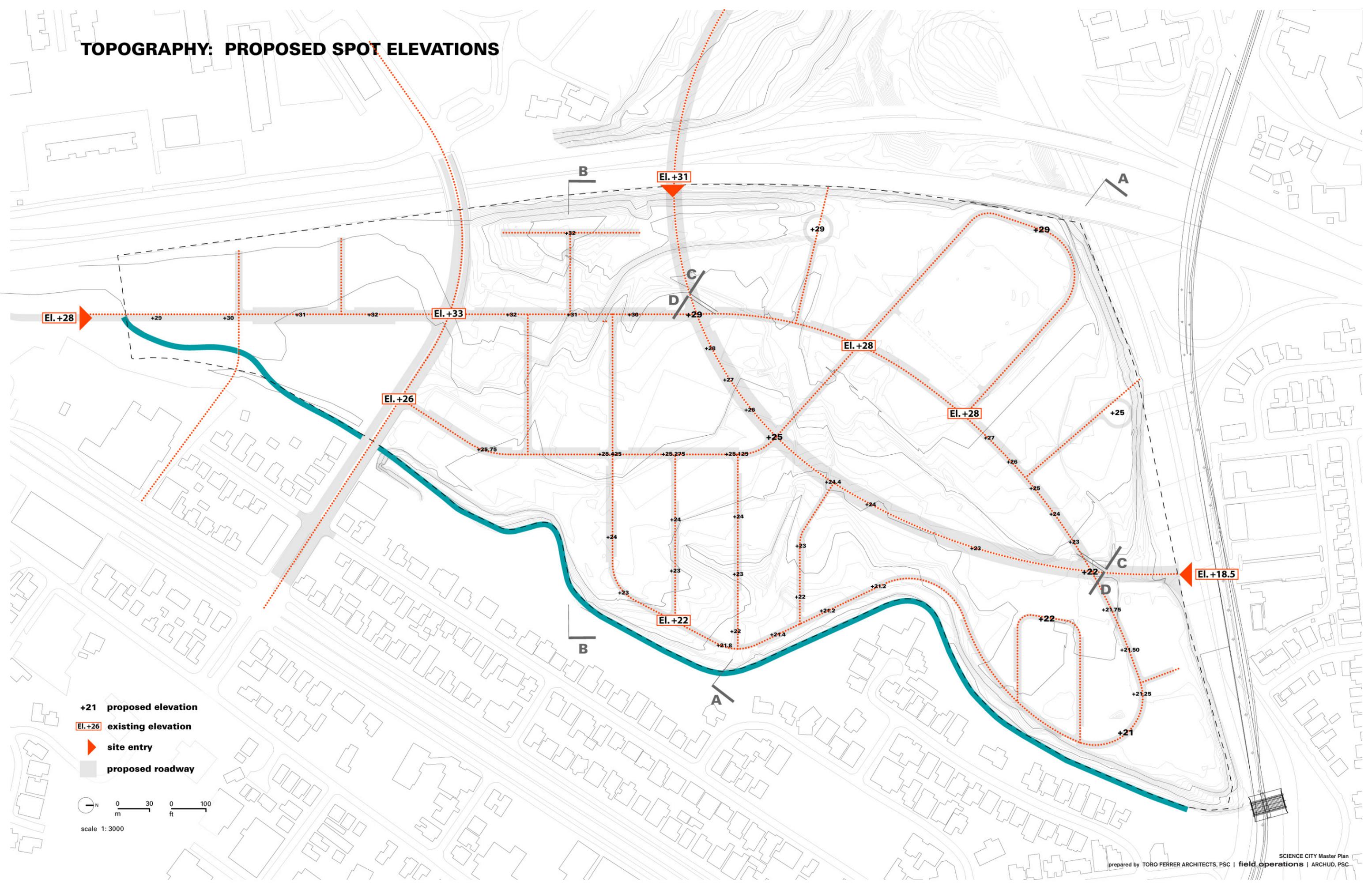
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## PROPOSED TOPOGRAPHY

Given the amount of demolition and regrading necessary to prepare the Oso Blanco and Las Amapolas sites for development, topographic manipulation is not anticipated to be a major issue in the development of the Science City. However, there are four areas where elevation givens need to be maintained in order to implement the proposed master plan. These include the elevation around the historic Oso Blanco prison building; the elevations at the intersection of the two major north-south roadways within the Science City with Avenida de Diego; the ramp elevation between PR 18 and Las Amapolas; and the existing elevation at the entry to the Science City along PR 21. Additionally, the relationship between the proposed River Road and the Buena Vista Creek will be a function of the existing grades along this edge of the site. The proposed Master Plan uses these existing spot elevations to interpolate the potential organization of the site's vehicular infrastructure and entry elevations of each development block. It is assumed that in the next phase of the project that a full regrading study will be developed in order to document any locations of cut and fill proposed for the site as well as specific areas of concern that can be studied in more detail.

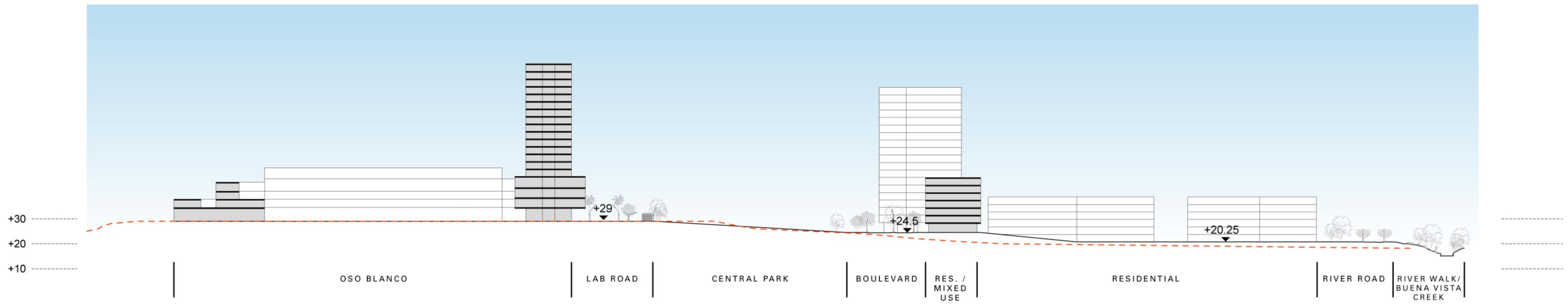
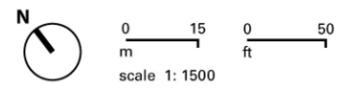
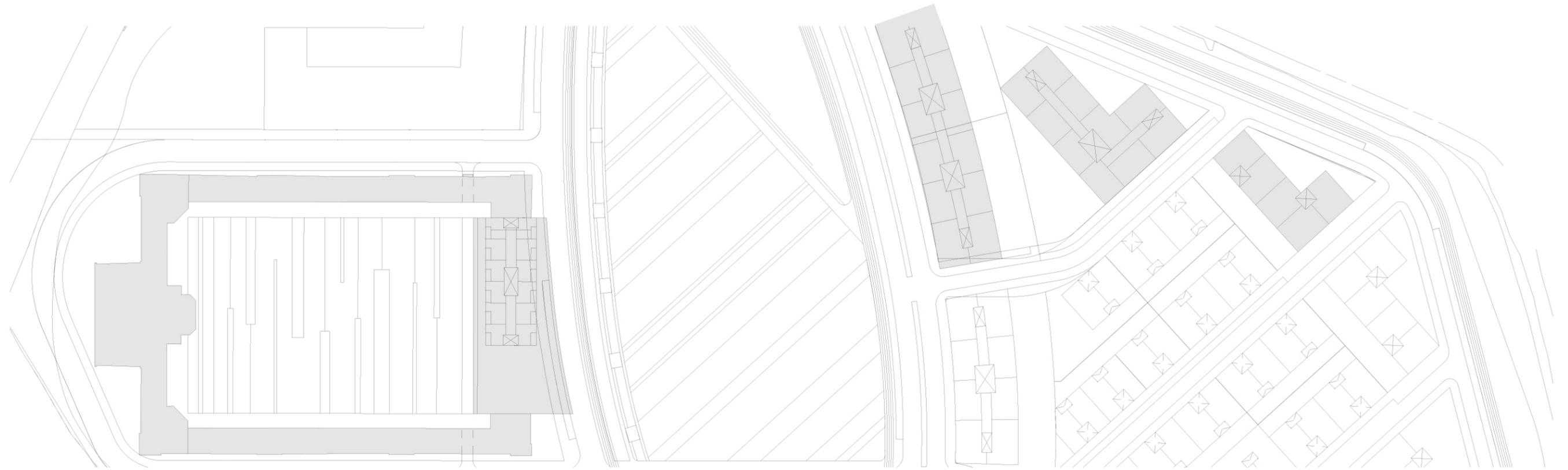
The following series of sections demonstrate anticipated relationships within the master plan with particular emphasis on the major public open spaces of the project including the central park, the Oso Blanco courtyard, the retail plaza and the new river walk.

# TOPOGRAPHY: PROPOSED SPOT ELEVATIONS



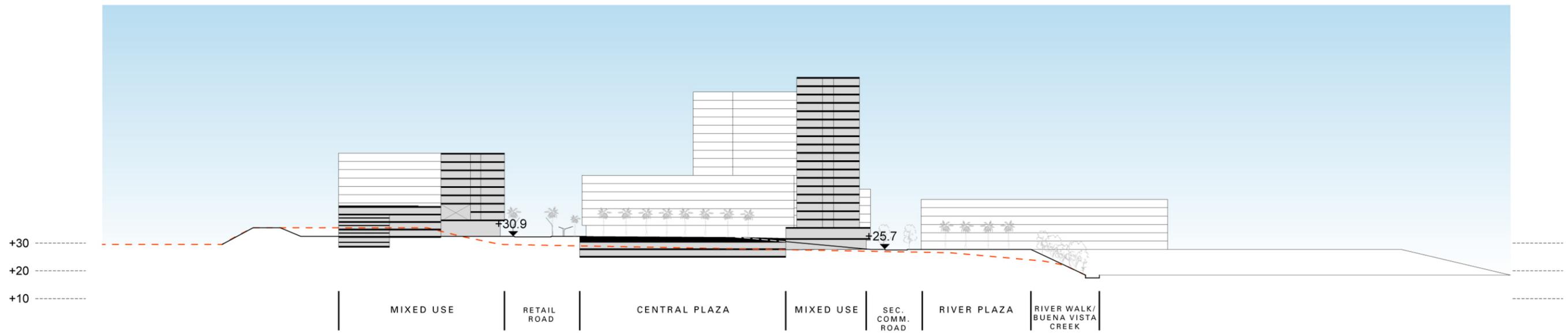
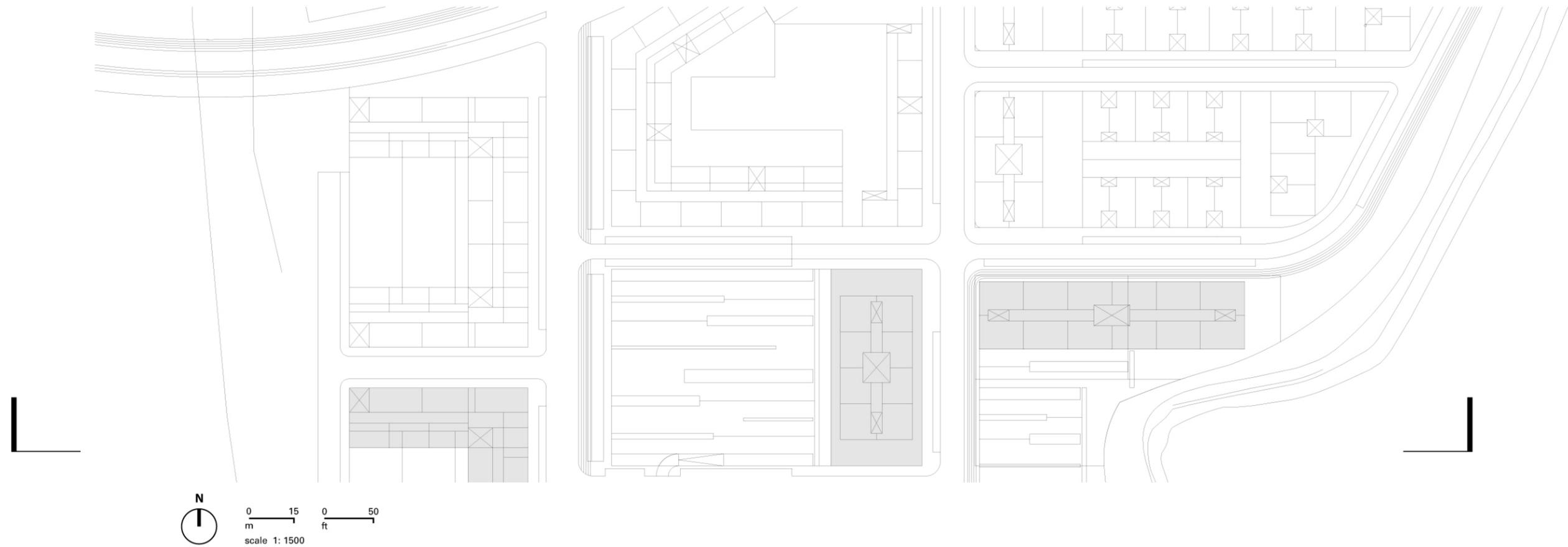
- +21** proposed elevation
- El. +26** existing elevation
- ▶** site entry
- proposed roadway

0 30 100  
m ft  
scale 1:3000



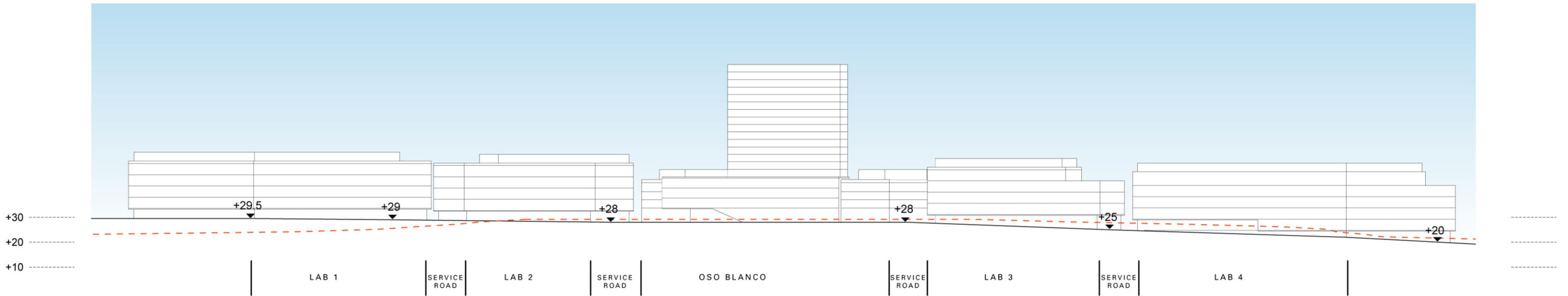
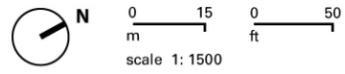
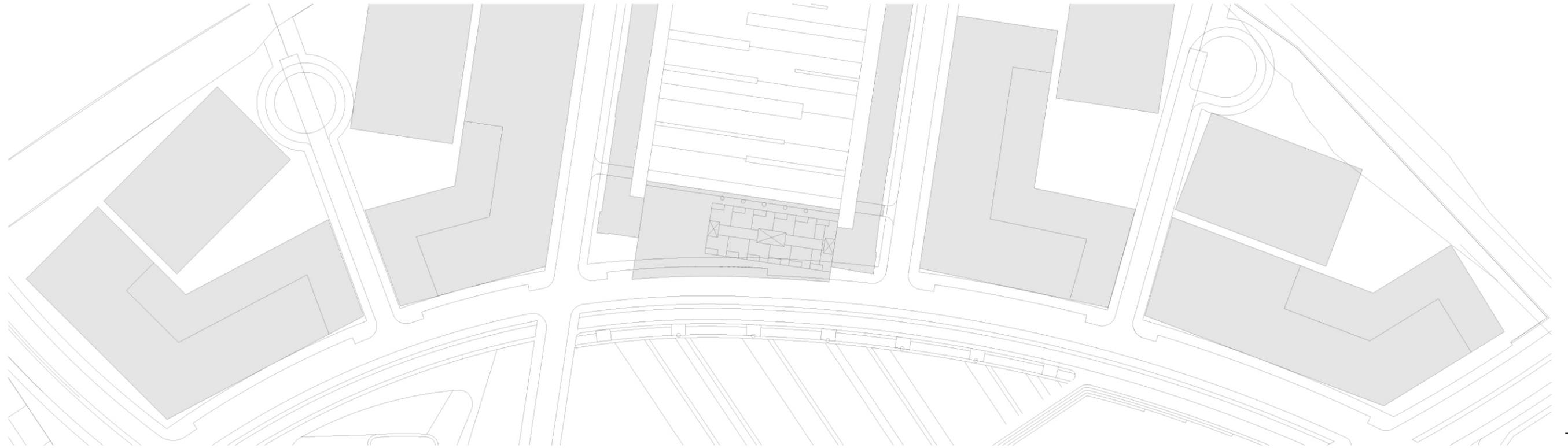
**SECTION A: LOOKING NORTH ACROSS CENTRAL PARK**

EXISTING ELEVATION - - - - -



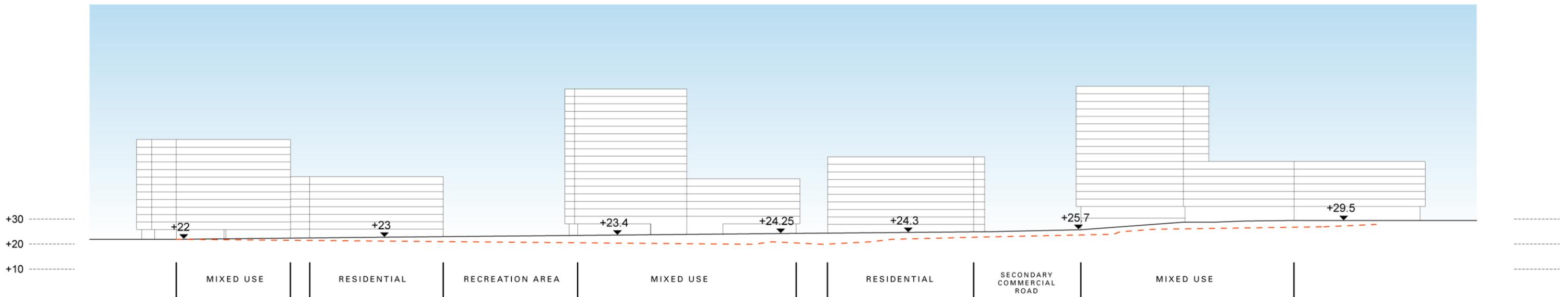
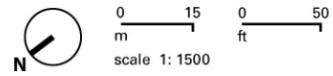
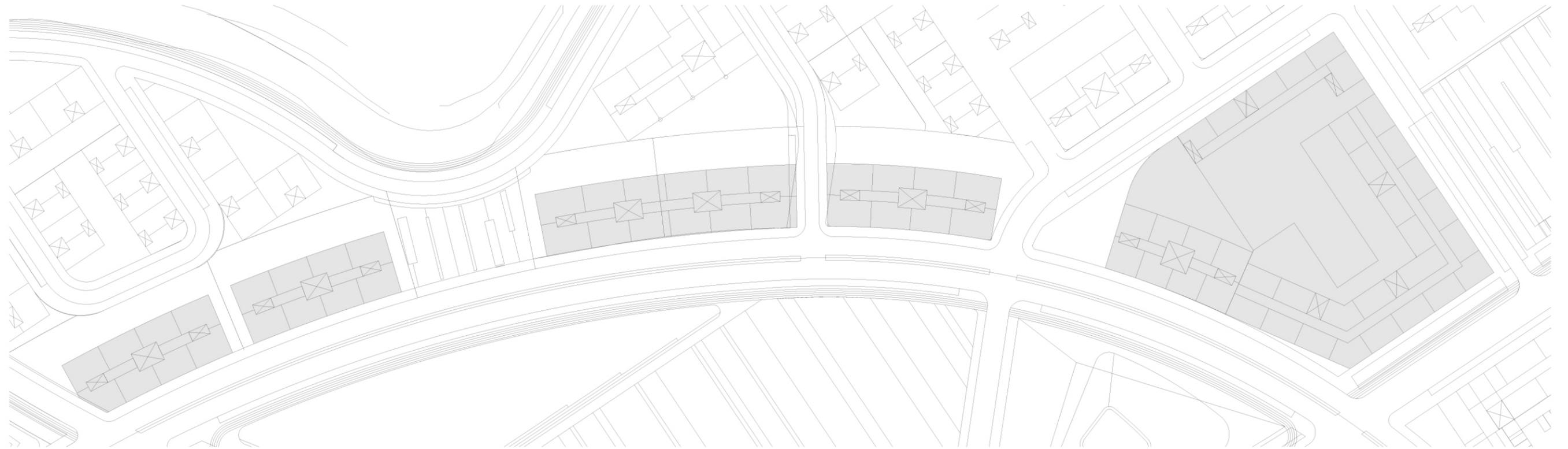
**SECTION B: LOOKING NORTH ACROSS CIVIC PLAZA**

EXISTING ELEVATION - - - -



**SECTION C: SCIENCE PARK LOOKING NORTH-WEST TOWARDS LABS / OSO BLANCO**

EXISTING ELEVATION - - - -



**SECTION D: SCIENCE PARK LOOKING SOUTH-EAST TOWARDS RESIDENTIAL / BUENA VISTA CREEK**

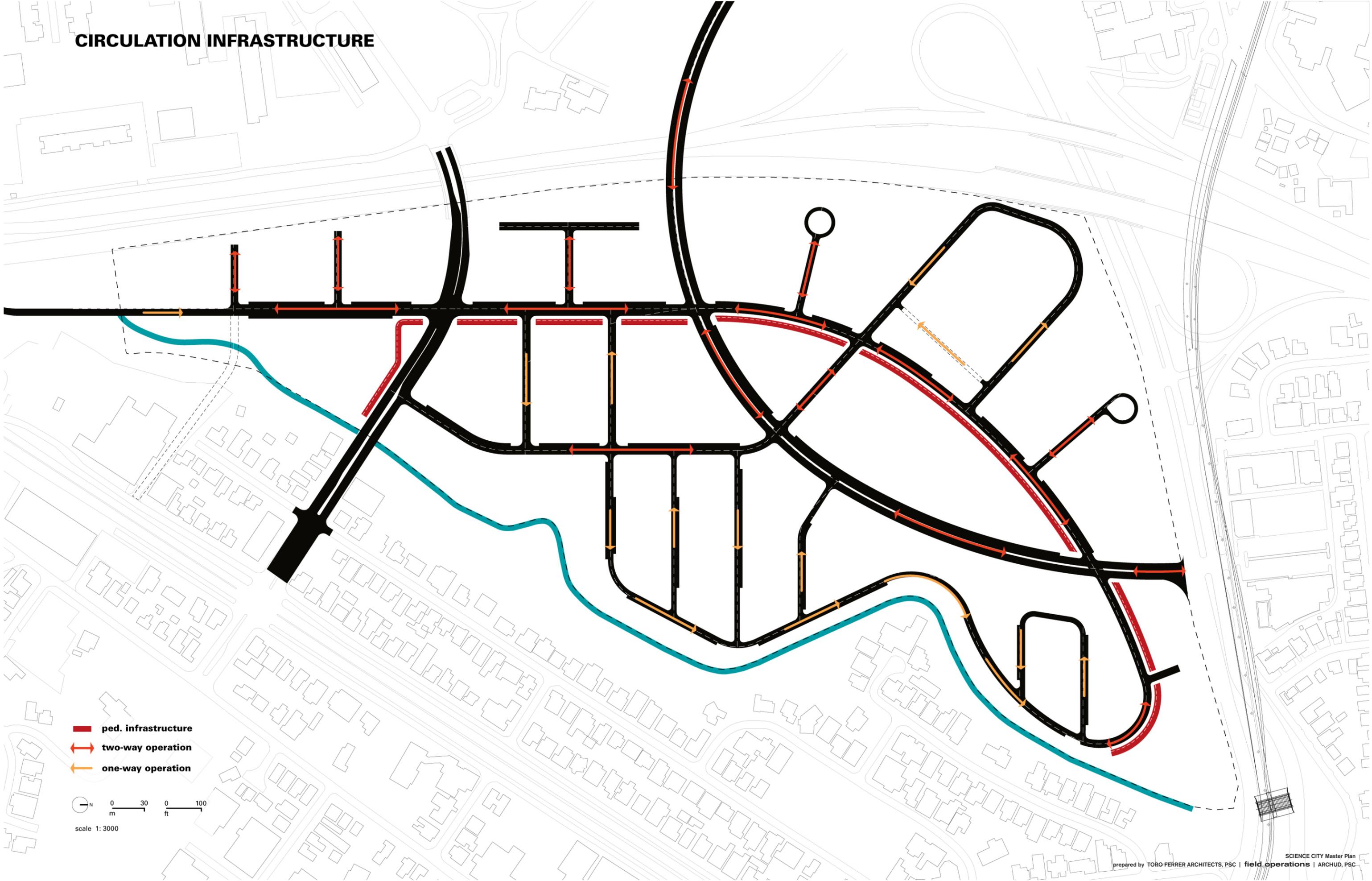
EXISTING ELEVATION - - - - -

## CIRCULATION INFRASTRUCTURE

The circulation infrastructure for the proposed Science City Master Plan relies on four primary lines of movement. The first is the Science City Boulevard connecting Centro Médico with the Comprehensive Cancer Center and Oso Blanco. The second line of movement is the North-South line linking PR 18 the Oso Blanco parcel through Las Amapolas. The major mixed-used elements of the proposal are aligned along this vector as it crosses Avenida de Diego to the south, with the laboratories sited along the line to the north once it crosses the Science City Boulevard. This vector is also the line of the major pedestrian infrastructure on the site – the Shade Walk. The third line of movement within the Science City parallels the North-South line to the East. Here the roadway bends at its intersection with the Science City Boulevard before looping around the historic Oso Blanco prison building. The fourth primary line of movement is the River Way that lines the Buena Vista Creek. This route bounds the site to the east, providing a complete circulatory loop for vehicular movement within the Science City.

These four major circulatory lines are supplemented by a number of secondary routes that lace them together. The scale and spatiality of each is distinct, reinforcing the character of each district within the Science City (see proposed street sections p 84-91).

# CIRCULATION INFRASTRUCTURE



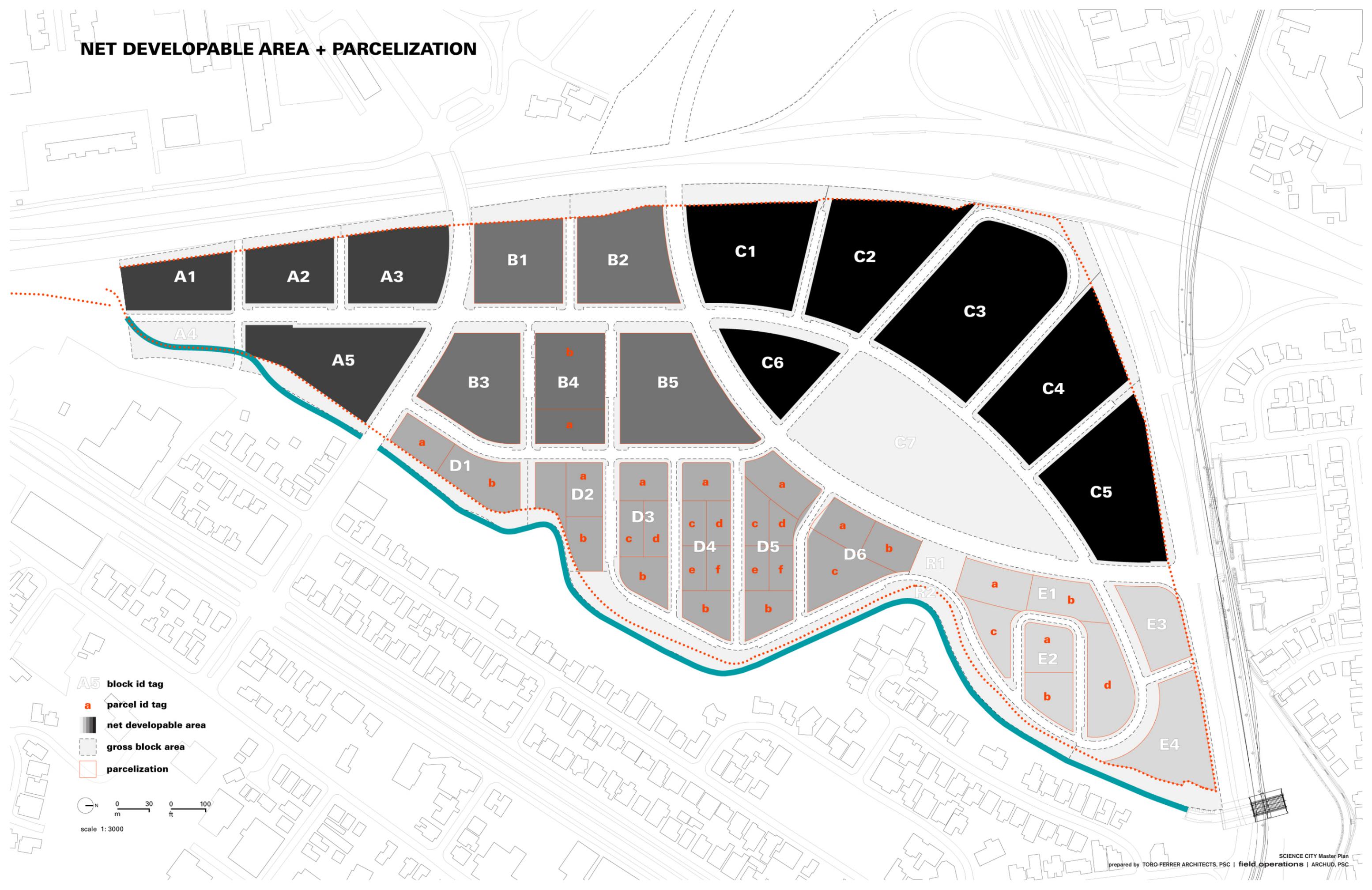
- ped. infrastructure**
- two-way operation**
- one-way operation**

0 30 0 100  
m ft  
scale 1:3000

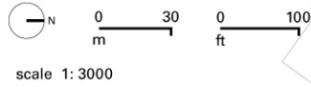
## **BLOCK STRUCTURE / DEVELOPABLE AREA / PARCELIZATION**

The proposed Master Plan for Oso Blanco divides the site into 27 separate blocks ranging in size from 40,000 SF (3,715 SM) to more than 250,000 SF (23,225 SM). The majority of the blocks are between 100,000 - 150,000 SF (9,290 - 13,935 SM). Blocks in Zones A, B and C are not able to be subdivided since they are anticipated to house primarily mixed use (A +B) or laboratory (C) programs which require larger parcels to accommodate their commensurate building types. The blocks in Zones D and E are able to be subdivided into smaller parcels given that their primary programmatic disposition is residential in nature. This subdivision is not fixed, and is described in more detail later in this report under the section addressing residential building typologies (see p 98-109). Parcels C-7 and R-1+2 are not developable as they are slated to become the primary public open space elements of the Science City development. Parcel C-6 is only available for the development of a civic building such as a school or library.

# NET DEVELOPABLE AREA + PARCELIZATION



- A5 block id tag
- a parcel id tag
- net developable area
- gross block area
- parcelization



## PROPOSED MASSING

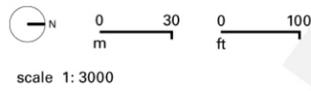
The proposed massing of the Science City development orients itself around three major public open spaces in addition to the Historic Prison courtyard. The central park is lined to the north west by large laboratory buildings, and to the south east by high density residential structures overlooking the green lung of the Science City Development. To the south is the smaller scale retail plaza around which the large mixed use buildings and their associated parking structures are located. The larger buildings of this type are sited at the core of the development area while the smaller scale mixed use types are oriented along PR 18. The eastern edge of the development is bounded by the River Way and River Walk. Between this public amenity and the large scale mixed use core is the primary residential component of the development. This area has a dense, lower scale building mass and footprint, except where the blocks meet the central oval park and larger towers emerge. The overall development is punctuated by these taller towers along the major open spaces, breaking free from the tight, well-formed fabric at the base of the development.

# PROPOSED MASSING

-  development limit
-  topographic limit
-  building levels
-  parking levels
-  building footprint
-  parking footprint
-  parking below grade

TOTAL LABORATORY:	1,000,000 SF
TOTAL RESIDENTIAL:	5,028,000 SF
TOTAL RETAIL:	405,000 SF
TOTAL OFFICE:	396,000 SF
TOTAL HOTEL:	94,550 SF
TOTAL CONFERENCE:	60,000 SF
TOTAL CIVIC:	90,000 SF
<b>TOTAL BUILT:</b>	<b>7,073,550 SF</b>

Note: All Areas in Gross SF







### **PROGRAM DISTRIBUTION: LABORATORY / RETAIL / PROFESSIONAL OFFICE**

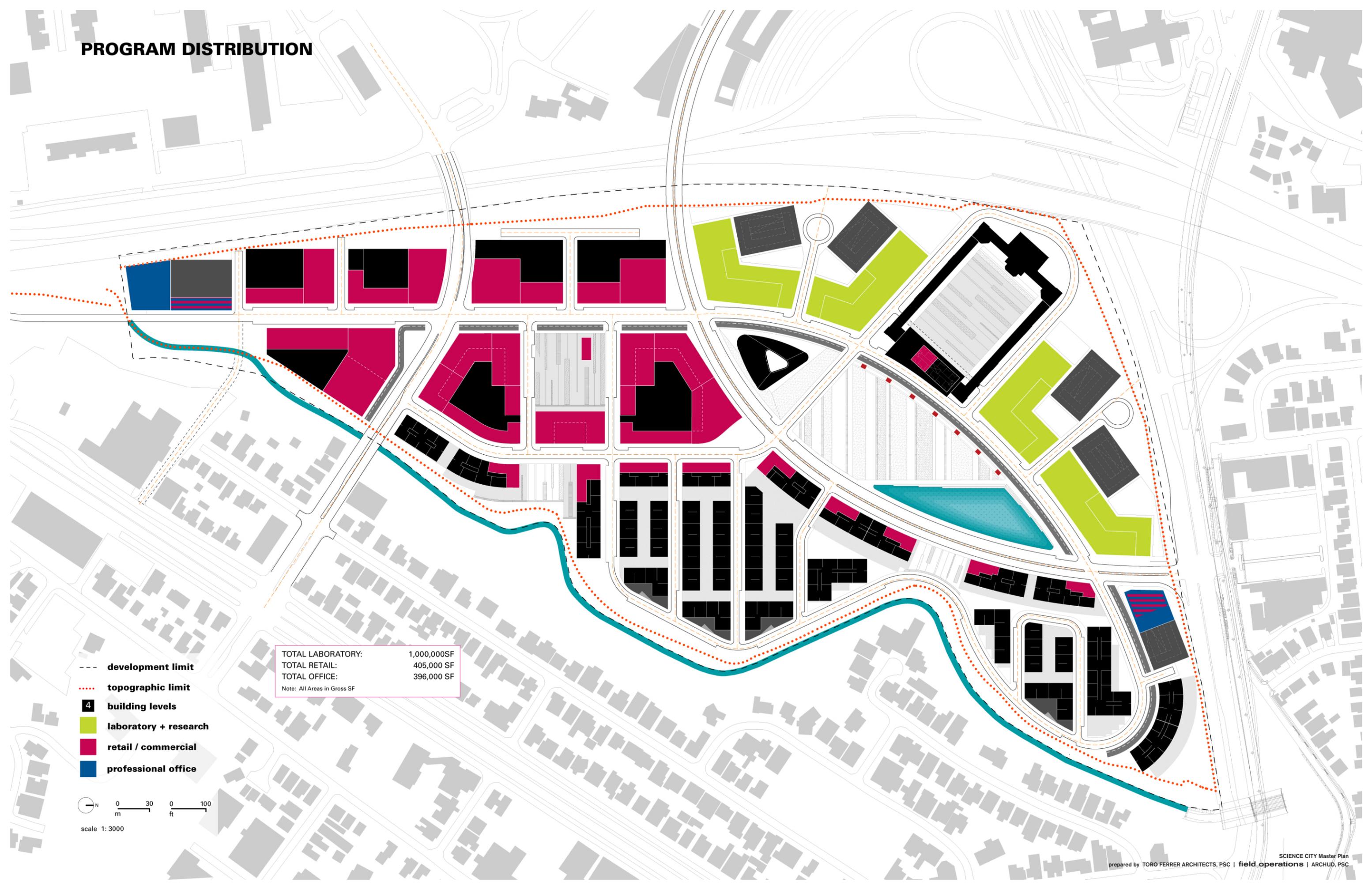
There are three major zones of program within the proposed Science City development. Flanking either side of the Historic Prison Building are laboratories totalling one-million square feet. Centered around the intersection of the major north-south axis and Avenida de Diego is the major commercial / retail component of the development. This area is primarily mixed use, allowing the commercial / retail programs to activate the surrounding streets and public open spaces. Other smaller scale retail is spread throughout the development, in particular along the perimeter of the Science City's central park. Professional / medical office space anchors the development to the north and south with highly visible towers marking the entrances to the development. Given the similarities in parcel size requirements, the professional office and laboratory areas can be exchanged as necessary given appropriate market forces.

# PROGRAM DISTRIBUTION

- development limit
- ..... topographic limit
- 4 building levels
- laboratory + research
- retail / commercial
- professional office

TOTAL LABORATORY: 1,000,000SF  
 TOTAL RETAIL: 405,000 SF  
 TOTAL OFFICE: 396,000 SF  
 Note: All Areas in Gross SF

0 30 0 100  
 m ft  
 scale 1: 3000



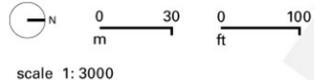
## **PROGRAM DISTRIBUTION: RESIDENTIAL / CIVIC / HOTEL + CONFERENCE**

In addition to the laboratory program, the primary programmatic element of the Science City development is residential. This program is distributed across nearly 60% of the site – in a mixed use configuration along the major north-south route, and in a variety of residential configurations on the eastern half of the site. All told, the proposed configuration includes more than 3,000 housing units. In addition to the open space amenities the Science City proposal offers, there is also a major civic building at the center of the development that would house a school, science museum and library. This iconic element anchors the central open space, and acts as a visible pivot to those moving along the Science City Boulevard from Centro Médico. The historic prison is envisioned to include a number of programs including hotel and conference facilities, 100 units of housing, as well as the administrative offices for the Science, Technology and Research Trust.

# PROGRAM DISTRIBUTION

-  development limit
-  topographic limit
-  residential program
-  civic program
-  hotel / conference

TOTAL RESIDENTIAL:	3,078 units (5,028,00 SF)
TOTAL HOTEL:	112 rooms (94,550 SF)
TOTAL CONFERENCE:	60,000 SF
TOTAL CIVIC:	90,000 SF
Note: All Areas in Gross SF	



scale 1: 3000

## PARKING DISTRIBUTION

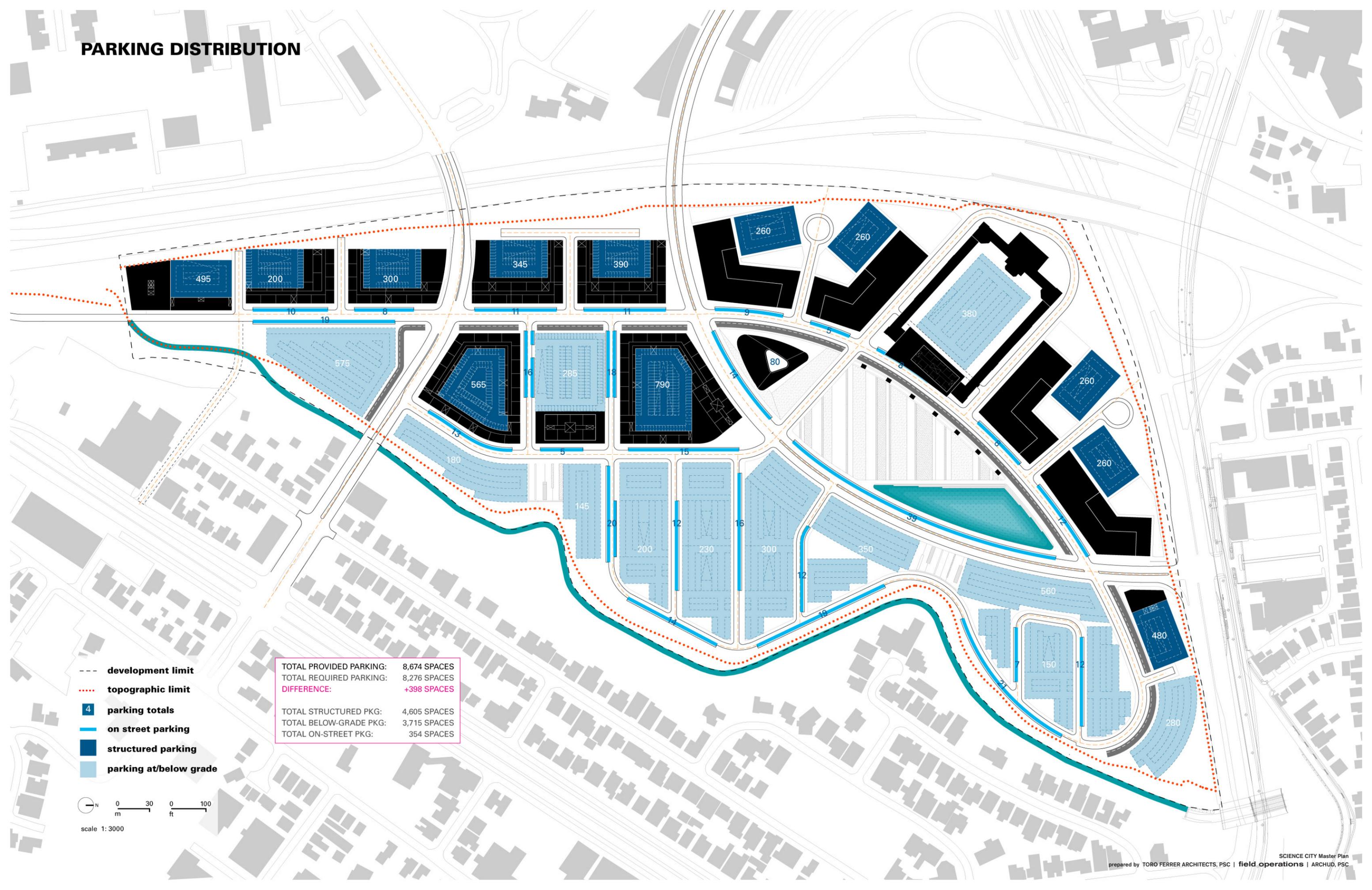
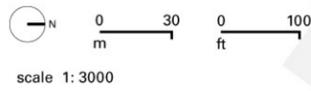
Given the amount of program proposed for the Science City development, the major logistical hurdle is providing adequate parking facilities. Though the project is considered a Transit Oriented Development (TOD), a significant amount of parking must be accommodated within a densely developed master plan vision, acknowledging that the Tren Urbano has been in operation for less than two years. The required parking quantity reached in the return on investment analysis for this report is 8,156 spaces (excluding on street parking). Though this quantity is quite high, it already reflects a reduction in parking parameters as they relate to current zoning codes given the TOD designation. More aggressive reductions will be dependent on the development and implementation of a viable regional transit system.

In all cases, structured parking should be oriented away from any active public space, including streets and must be screened or wrapped where ever possible. Larger structures like those required in the mixed use blocks at the center of the development are expected to locate the parking within the core of the building block, thereby screening it from public view. The given grade of the development site also affords opportunities to slide parking below grade without the expensive cost of excavation. Of particular note for this type of configuration is the residential areas of Zones D and E to the eastern side of the development along the Buena Vista Creek. In general wherever possible, below grade parking is a strong preference. On street metered parking is utilized to supplement structured parking, providing an active edge for commercial and retail street frontage as well as visitor parking for the residential component of the Science City.

# PARKING DISTRIBUTION

- development limit
- topographic limit
- parking totals
- on street parking
- structured parking
- parking at/below grade

TOTAL PROVIDED PARKING:	8,674 SPACES
TOTAL REQUIRED PARKING:	8,276 SPACES
<b>DIFFERENCE:</b>	<b>+398 SPACES</b>
TOTAL STRUCTURED PKG:	4,605 SPACES
TOTAL BELOW-GRADE PKG:	3,715 SPACES
TOTAL ON-STREET PKG:	354 SPACES



	6,354	6,412	8,491	3,684	11,947		9,226	10,364	9,475	8,389	12,461
GROSS BLOCK AREA (sq m)	6,354	6,412	8,491	3,684	11,947		9,226	10,364	9,475	8,389	12,461
GROSS BLOCK AREA (sq ft)	68,395	69,014	91,391	39,654	128,593		99,309	111,555	101,986	90,296	134,128
NET DEVELOPABLE AREA (sq m)	4,901	4,688	6,402	0	8,653		6,472	7,536	7,488	6,830	10,159
NET DEVELOPABLE AREA (sq ft)	52,753	50,459	68,914	0	93,141		69,661	81,117	80,603	73,520	109,355
INTENSITY (gross bldg area / net block)	388.60%	376.54%	326.49%		461.66%		373.24%	412.98%	490.05%	374.05%	539.53%
BLOCK ABLE TO BE SUB-DIVIDED (Y/N)	N	N	N	N	Y		N	N	N	N	N
<b>BLOCK</b>	<b>A-1</b>	<b>A-2</b>	<b>A-3</b>	<b>A-4</b>	<b>A-5</b>		<b>B-1</b>	<b>B-2</b>	<b>B-3</b>	<b>B-4</b>	<b>B-5</b>
RESIDENTIAL AREA (GROSS)	0	190,000	195,000	0	375,000		230,000	305,000	315,000	250,000	490,000
# OF UNITS	0	129	129	0	254		159	188	188	160	296
<b>LABORATORY</b>											
RETAIL (GROSS)	5,000	0	30,000	0	55,000		30,000	30,000	80,000	25,000	100,000
RETAIL (NET)	3,500	0	21,000	0	38,500		21,000	21,000	56,000	17,500	70,000
HOTEL	0	0	0	0	0		0	0	0	0	0
CONFERENCE	0	0	0	0	0		0	0	0	0	0
OFFICE (GROSS)	200,000	0	0	0	0		0	0	0	0	0
OFFICE (NET)	160,000	0	0	0	0		0	0	0	0	0
CIVIC	0	0	0	0	0		0	0	0	0	0
<b>OPEN SPACE</b>				39,654						52,000	
PARKING SPACES REQUIRED (NET)	494	194	300	0	574		344	387	562	283	794
STRCTD. PARKING SPACES PROVIDED	495	200	300	0	575		345	390	565	285	790
<b>TOTAL GROSS AREA: BLOCK</b>	<b>205,000</b>	<b>190,000</b>	<b>225,000</b>	<b>0</b>	<b>430,000</b>		<b>260,000</b>	<b>335,000</b>	<b>395,000</b>	<b>275,000</b>	<b>590,000</b>
RES. DENSITY (sq m / UNIT)		36.34	49.63		34.07		40.70	40.09	39.83	42.69	34.32
RES. DENSITY (DWELLING UNIT / acre)		108.16	79.19		115.37		96.56	98.05	98.68	92.07	114.51



**PROGRAM QUANTITIES: DEVELOPMENT ZONES A + B**

**TOTAL: ZONE A**

GROSS AREA (sq ft)	397,047
NET AREA (sq ft)	265,267
RESIDENTIAL AREA	760,000
# OF UNITS	512
<b>LABORATORY</b>	<b>0</b>
RETAIL (GROSS)	90,000
RETAIL (NET)	63,000
HOTEL	0
CONFERENCE	0
OFFICE (GROSS)	200,000
OFFICE (NET)	160,000
CIVIC	0
<b>OPEN SPACE</b>	<b>39,654</b>
PARKING SPACES REQUIRED (NET)	1,562
STRUCTURED PARKING SPACES PROVIDED	1,570

**GROSS AREA 1,050,000**

**TOTAL: ZONE B**

GROSS AREA (sq ft)	537,274
NET AREA (sq ft)	414,256
RESIDENTIAL AREA	1,590,000
# OF UNITS	991
<b>LABORATORY</b>	<b>0</b>
RETAIL (GROSS)	265,000
RETAIL (NET)	185,500
HOTEL	0
CONFERENCE	0
OFFICE (GROSS)	0
OFFICE (NET)	0
CIVIC	0
<b>OPEN SPACE</b>	<b>52,000</b>
PARKING SPACES REQUIRED (NET)	2,370
STRUCTURED PARKING SPACES PROVIDED	2,375

**GROSS AREA 1,855,000**

GROSS BLOCK AREA (sq m)	13,674	13,799	20,338	13,728	13,406	7,079	23,294	1,582	10,577
GROSS BLOCK AREA (sq ft)	147,181	148,529	218,914	147,768	144,299	76,198	250,732	17,033	113,846
NET DEVELOPABLE AREA (sq m)	9,880	11,046	16,759	11,054	10,596	4,979	0		
NET DEVELOPABLE AREA (sq ft)	106,350	118,898	180,389	118,979	114,053	53,591	0		
INTENSITY (gross bldg area / net block)	235.07%	210.26%	191.56%	210.12%	219.20%	167.94%			
BLOCK ABLE TO BE SUB-DIVIDED (Y/N)	N	N	N	N	N	N	N	N	N

BLOCK	C-1	C-2	C-3	C-4	C-5	C-6	C-7	R-1	R-2
RESIDENTIAL AREA (GROSS)	0	0	150,000	0	0	0	0		
# OF UNITS	0	0	100	0	0	0	0		
LABORATORY	250,000	250,000	0	250,000	250,000	0	0		
RETAIL (GROSS)	0	0	5,000	0	0	0	0		
RETAIL (NET)	0	0	3,500	0	0	0	0		
HOTEL	0	0	94,550	0	0	0	0		
CONFERENCE	0	0	60,000	0	0	0	0		
OFFICE (GROSS)	0	0	36,000	0	0	0	0		
OFFICE (NET)	0	0	28,800	0	0	0	0		
CIVIC	0	0	0	0	0	90,000	0		
OPEN SPACE						22,606	250,732	17,033	113,846
PARKING SPACES REQUIRED (NET)	250	250	405	250	250	75	0		
STRCTD. PARKING SPACES PROVIDED	260	260	380	260	260	80	0		
<b>TOTAL GROSS AREA</b>	<b>250,000</b>	<b>250,000</b>	<b>345,550</b>	<b>250,000</b>	<b>250,000</b>	<b>90,000</b>	<b>0</b>		

RES. DENSITY (sq m / UNIT)			167.59						
RES. DENSITY (DWELLING UNIT / acre)			23.45						



PROGRAM QUANTITIES: DEVELOPMENT ZONES C + R

TOTAL: ZONE C

GROSS AREA (sq ft)	1,133,622
NET AREA (sq ft)	692,260
RESIDENTIAL AREA # OF UNITS	150,000
LABORATORY	1,000,000
RETAIL (GROSS)	5,000
RETAIL (NET)	3,500
HOTEL	94,550
CONFERENCE	60,000
OFFICE (GROSS)	36,000
OFFICE (NET)	28,800
CIVIC	90,000
OPEN SPACE	273,339
PARKING SPACES REQUIRED (NET)	1,480
STRUCTURED PARKING SPACES PROVIDED	1,500
<b>GROSS AREA</b>	<b>1,435,550</b>

GROSS BLOCK AREA (sq m)	7,575	6,344	6,978	8,634	9,772	7,777		12,716	4,753	4,953	9,744
GROSS BLOCK AREA (sq ft)	81,532	68,285	75,113	92,931	105,183	83,711		136,874	51,165	53,313	104,885
NET DEVELOPABLE AREA (sq m)	4,719	4,751	5,727	7,164	8,205	6,629		10,396	3,915	3,477	5,607
NET DEVELOPABLE AREA (sq ft)	50,795	51,138	61,646	77,114	88,313	71,354		111,899	42,142	37,426	60,356
INTENSITY (gross bldg area / net block)	334.68%	307.01%	340.65%	337.16%	379.33%	518.54%		570.15%	379.67%	440.87%	444.03%
BLOCK ABLE TO BE SUB-DIVIDED (Y/N)	Y	Y	Y	Y	Y	Y		Y	Y	N	N

BLOCK	D-1	D-2	D-3	D-4	D-5	D-6		E-1	E-2	E-3	E-4
RESIDENTIAL AREA (GROSS)	165,000	152,000	205,000	255,000	330,000	365,000		628,000	160,000	0	268,000
# OF UNITS	108	84	121	141	185	206		354	96	0	180
LABORATORY											
RETAIL (GROSS)	5,000	5,000	5,000	5,000	5,000	5,000		10,000	0	5,000	0
RETAIL (NET)	3,500	3,500	3,500	3,500	3,500	3,500		7,000	0	3,500	0
HOTEL								0	0	0	
CONFERENCE								0	0	0	
OFFICE (GROSS)	0	0	0	0	0	0		0	0	160,000	0
OFFICE (NET)	0	0	0	0	0	0		0	0	128,000	0
CIVIC	0	0	0	0	0	0		0	0	0	
OPEN SPACE	30,737	17,147									39,670
PARKING SPACES REQUIRED (NET)	180	144	200	230	296	340		566	144	494	270
STRCTD. PARKING SPACES PROVIDED	180	145	200	230	300	350		560	150	480	280
<b>TOTAL GROSS AREA</b>	<b>170,000</b>	<b>157,000</b>	<b>210,000</b>	<b>260,000</b>	<b>335,000</b>	<b>370,000</b>		<b>638,000</b>	<b>160,000</b>	<b>165,000</b>	<b>268,000</b>

RES. DENSITY (sq m / UNIT)	43.69	56.56	47.33	50.81	44.35	32.18		29.37	40.78		
RES. DENSITY (DWELLING UNIT / acre)	89.95	69.49	83.04	77.36	88.63	122.14		133.84	96.38		

**TOTAL: ZONE D**

GROSS AREA (sq ft)	506,755
NET AREA (sq ft)	400,359
RESIDENTIAL AREA	1,472,000
# OF UNITS	845
LABORATORY	0
RETAIL (GROSS)	30,000
RETAIL (NET)	21,000
HOTEL	0
CONFERENCE	0
OFFICE (GROSS)	0
OFFICE (NET)	0
CIVIC	0
OPEN SPACE	47,884
PARKING SPACES REQUIRED (NET)	1,390
STRUCTURED PARKING SPACES PROVIDED	1,405

**TOTAL: ZONE E**

GROSS AREA (sq ft)	346,236
NET AREA (sq ft)	251,824
RESIDENTIAL AREA	1,056,000
# OF UNITS	630
LABORATORY	0
RETAIL (GROSS)	15,000
RETAIL (NET)	10,500
HOTEL	0
CONFERENCE	0
OFFICE (GROSS)	160,000
OFFICE (NET)	128,000
CIVIC	0
OPEN SPACE	39,670
PARKING SPACES REQUIRED (NET)	1,474
STRUCTURED PARKING SPACES PROVIDED	1,470

**GROSS AREA 1,502,000**

**GROSS AREA 1,231,000**



**PROGRAM QUANTITIES: DEVELOPMENT ZONES D + E**

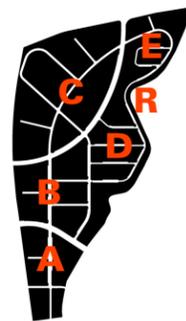
289,336	TOTAL AREA: OSO BLANCO (sq m)
3,114,387	TOTAL AREA: OSO BLANCO (sq ft)
41,583	TOTAL AREA: LAS AMAPOLAS (sq m)
447,596	TOTAL AREA: LAS AMAPOLAS (sq ft)
330,919	TOTAL AREA: SCIENCE CITY (sq m)
3,561,983	TOTAL AREA: SCIENCE CITY (sq ft)

283,523	TOTAL GROSS BLOCK AREA (sq m)
3,051,813	TOTAL GROSS BLOCK AREA (sq ft)
188,033	NET DEVELOPABLE AREA (sq m)
2,023,966	TOTAL NET DEVELOPABLE AREA (sq ft)

349.49% INTENSITY (gross bldg area total / net block total)

**BLOCK**

5,028,000	TOTAL RESIDENTIAL AREA (GROSS)
3,078	TOTAL UNITS
1,000,000	TOTAL LABORATORY
405,000	TOTAL RETAIL (GROSS)
283,500	TOTAL RETAIL (NET)
94,550	TOTAL HOTEL
60,000	TOTAL CONFERENCE
396,000	TOTAL OFFICE (GROSS)
316,800	TOTAL OFFICE (NET)
90,000	TOTAL CIVIC
583,426	TOTAL OPEN SPACE
8,276	TOTAL PARKING SPACES REQUIRED (NET)
8,320	STRUCTURED PARKING SPACES PROVIDED
7,073,550	TOTAL GROSS AREA: PROJECT



**PROGRAM QUANTITIES: PROJECT DEVELOPMENT TOTALS**



# SCIENCE CITY ECOLOGICAL + PHYSICAL IDENTITY



**ECOLOGICAL INNOVATION PAIRED WITH  
EXCEPTIONAL PUBLIC OPEN SPACES  
WILL PROVIDE THE SCIENCE CITY WITH A  
DISTINCT + MEMORABLE PHYSICAL IDENTITY**



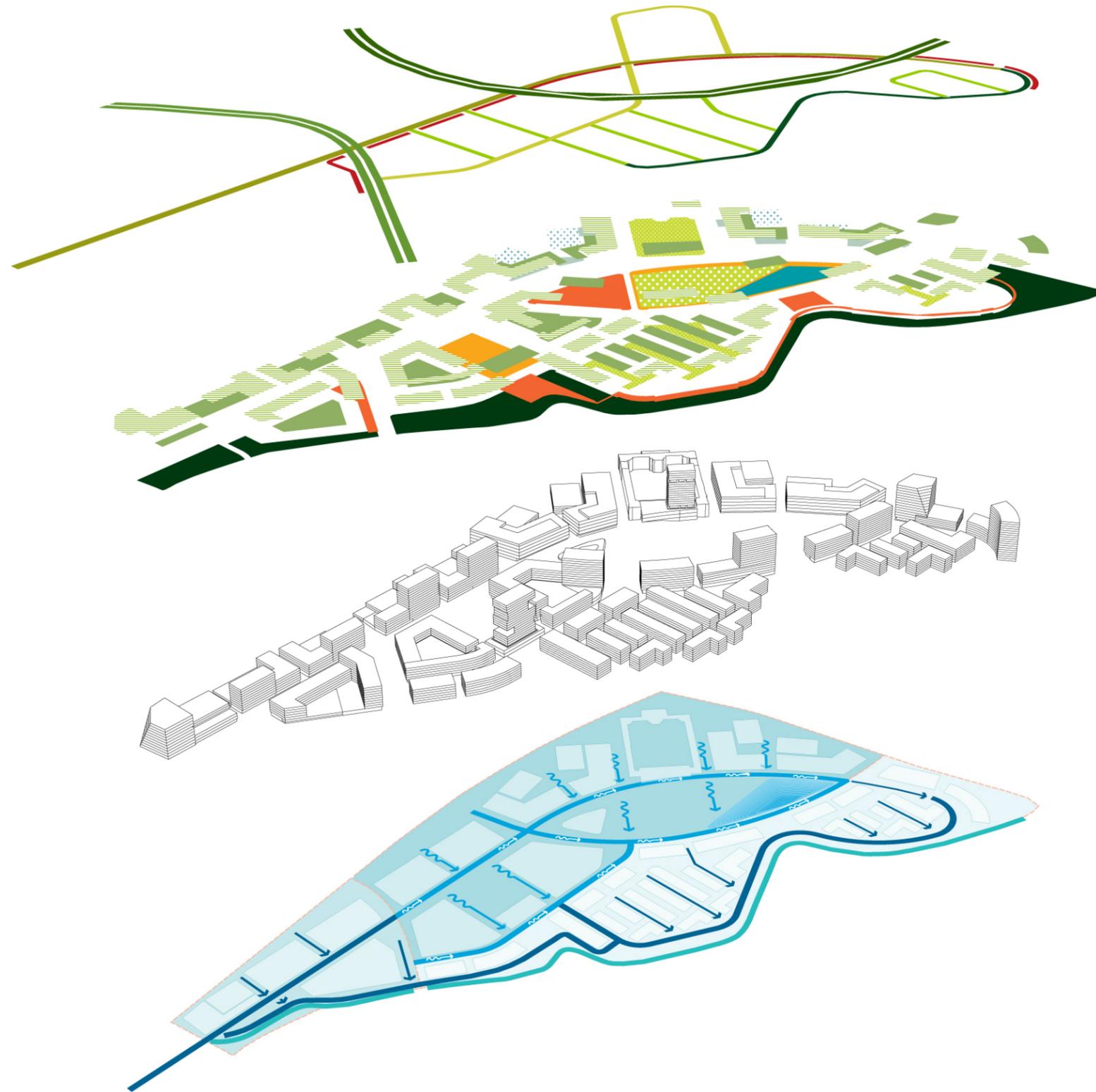
## **ECOLOGICAL + PHYSICAL IDENTITY**

The Science City Development at Oso Blanco positions itself in relation to a growing Knowledge Economy on Island. Science and Research are the foundation of this project and should be evident in every aspect of the development. The presence of laboratories alone will not make this a true Science City. Rather, we propose a fully integrated matrix of sustainable building, responsible hydrologic strategies, performative ecological surfaces and strong, clear physical design for public open spaces to exemplify the aspirations of such a project.

The information in the following section of this document outlines the various components of this matrix. In addition to content relating to the components listed above, this section also includes typological design recommendations for three building types (typical residential block; laboratories; and mixed-use blocks), as well as for the proposed hierarchy of streets within the development. It should be noted we are not defining specific requirements or guidelines here since each of the systems outlined below requires a significant technical expertise outside of the scope of this report. However, it is understood that these systems are appropriate on an order of magnitude for a development like Oso Blanco, and therefore should be considered and studied further as the project moves forward.

The strong physical presence of innovative and compelling ecological and sustainable systems will provide the Science City at Oso Blanco with an immediate and recognizable brand, as well as a physical character that will structure the long-term development of the project from its onset through completion.

# ECOLOGICAL + PHYSICAL IDENTITY



• LANDSCAPE / CIRCULATION IDENTITY

• PERFORMATIVE ECOLOGICAL SURFACES

• SUSTAINABLE BUILDING SYSTEMS

• HYDROLOGICAL STRATEGY

## HYDROLOGIC INFRASTRUCTURE

The foundation of a strong ecological and sustainable development is the responsible and efficient use of water. Development at the scale of the Science City will invariably impact the surrounding water table by covering permeable ground surfaces with impermeable building surfaces. In a typical development, this would have the effect of channeling the abundant tropical rains into an already overburdened storm sewer system. As an alternative, we propose to collect and channel this rain water and run off into a storm water system that filters the collected water before either 1) directing it into a bladder that allows it to percolate back into the water table or 2) directing it into a collection basin where it is reused by adjacent building systems for irrigation, grey water and/or cooling. A strong hydrologic strategy will also prevent any adverse impact on the Buena Vista creek along the Oso Blanco site's eastern perimeter.

A primary example of the second operation noted above would be the retention basin in the Science City's central park. Here, water from much of the western half of the site would be collected, filtered and reused for cooling in the adjacent laboratory parcels and for irrigation of the central open space. This would in effect turn the entire central park into a performative infrastructure that not only provides a public amenity for the broader development, but also serves to directly support the science and research mandate of the Puerto Rico Science Technology and Research Trust.



storm water gutter



storm water infiltration bays

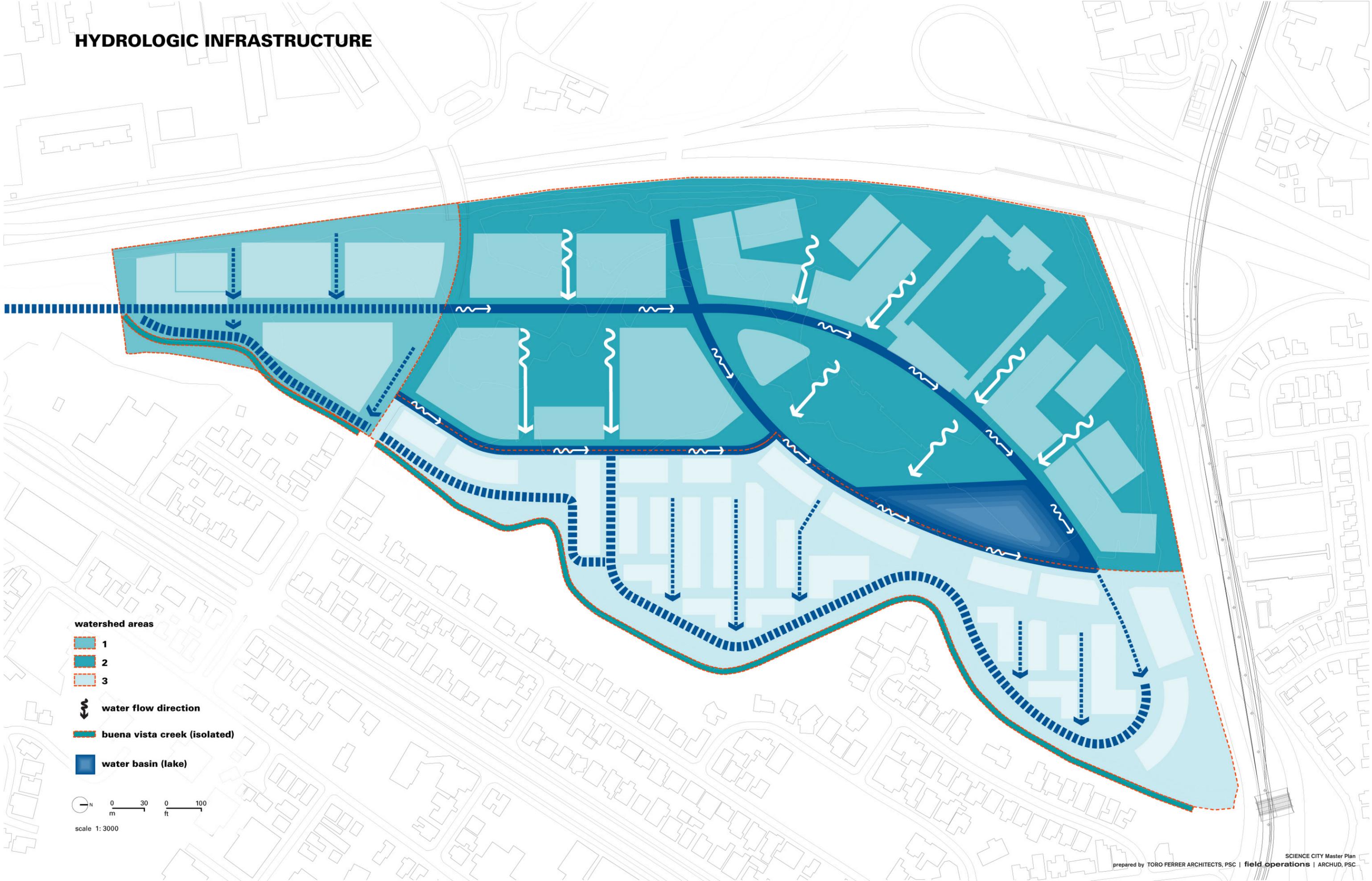


water basin / lake



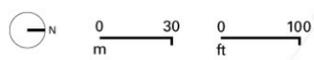
rooftop collection

# HYDROLOGIC INFRASTRUCTURE



## watershed areas

- 1
  - 2
  - 3
- water flow direction
- buena vista creek (isolated)
- water basin (lake)



scale 1:3000

### ECOLOGICAL SURFACES

As was previously noted, development at the scale of the Science City will invariably cover permeable ground surfaces with impermeable building surfaces. However, it is possible (and perhaps imperative) to utilize these horizontal, built surfaces for positive effect. Where possible, any opportunity to retain a permeable surface is obviously the preference. However, there are many alternatives to an impermeable horizontal plane. Green roofs or roof gardens on the tops of buildings will both offer water collection for potential reuse in buildings, as well as provide cooling (both internal to the building and at the broader urban level) through a reduction in heat gain. Photovoltaics can be deployed on otherwise dormant building tops for energy production. Gardens surrounding buildings will provide shade both inside and outside of the structures, and in some cases may also provide water collection. In addition to the water basin in the central park, we also propose to use this green heart as a geothermal field capable of driving heat pumps for cooling (particularly in the laboratories). While the scale and magnitude of many of these systems has not yet been established, it should be clear that a new development of this scale offers abundant opportunity for the responsible deployment of sustainable ecological strategies and building systems.



**civic plaza**



**recreation plaza**



**retention bladders / geothermal bed**



**water basin / lake**



**green roof**



**roof gardens**



**cooling gardens**



**riverway / eco corridor**



**palm canopy / wind field**

# ECOLOGICAL SURFACES

-  civic plaza
-  recreation plaza
-  retention bladders / geothermal bed
-  roof garden (ocupiable)
-  green roof (cooling)
-  photovoltaic cells
-  residential garden
-  basin
-  cooling garden
-  riverway / eco corridor
-  palm canopy / wind field

N 0 30 0 100  
m ft

scale 1: 3000





### CIRCULATION IDENTITY

In addition to providing shade and protection to the pedestrian with in the Science City, the vegetal character and spatial dimension of each of the proposed streetscapes will provide a clear wayfinding system for the development. Iconic palms and lush boulevards will organize movement though the enclave, while smaller scale domestic streets will mark the unique districts within the Science City. An animated street section along the Buena Vista Creek will provide an active public promenade that links the major open spaces of the development. Each of these circuits will be physically distinct, utilizing a variety of native vegetal species, generous urban furnishings, and distinct lighting.

The main armature of the Science City's circulatory network will be the proposed shade walk. This element will physically link the northern terminus of the river walk (parcel E4) with the laboratory district, the central park, the retail plaza and the southern plaza along Avenida de Diego. The shade walk will be a unique architectural element that provides the Science City with a physical identity as well as performative services such as shade, water collection and local energy production through a bundled, systemic design.



science city boulevard



boulevard - av. josé de diego



primary retail street



laboratory street

**GATEWAY**

**INSTITUTIONAL**



secondary retail street



residential street

**DOMESTIC**

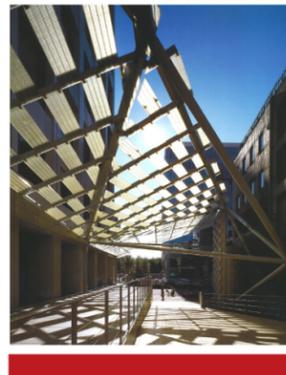


river walk



pedestrian / bike circuit

**ACTIVE**



shade walk

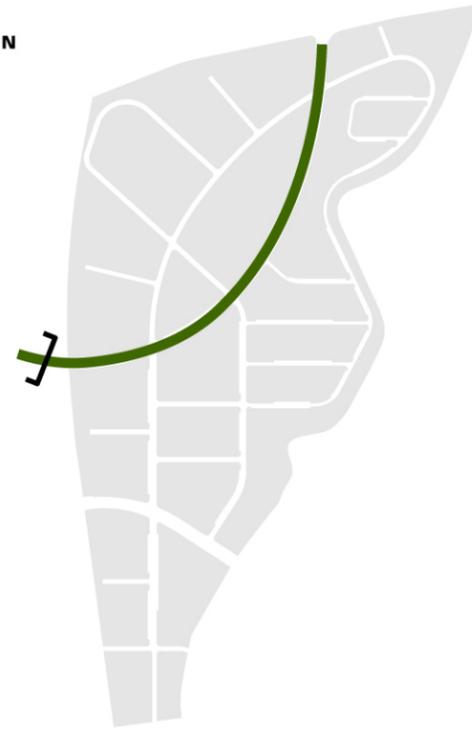
# CIRCULATION IDENTITY

- science city boulevard
- ave. de diego
- institutional corridor
- secondary corridor
- local streets
- riverway
- shadewalk
- bikeway
- trolley loop



scale 1: 3000

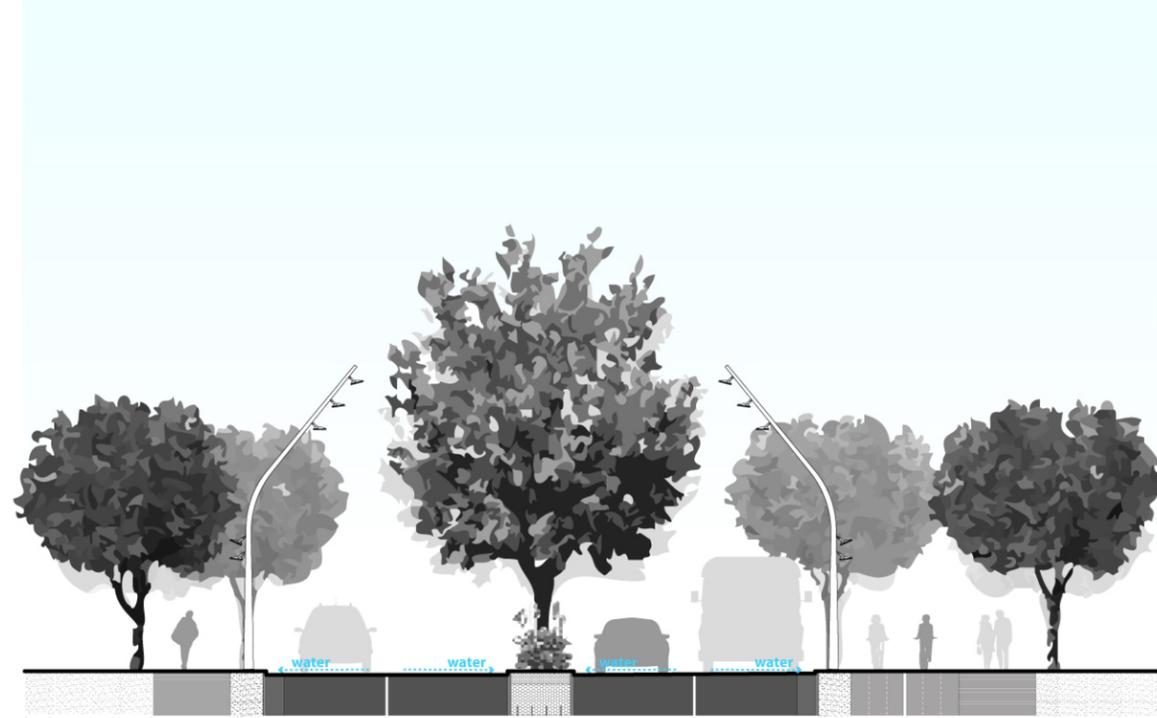
KEY PLAN



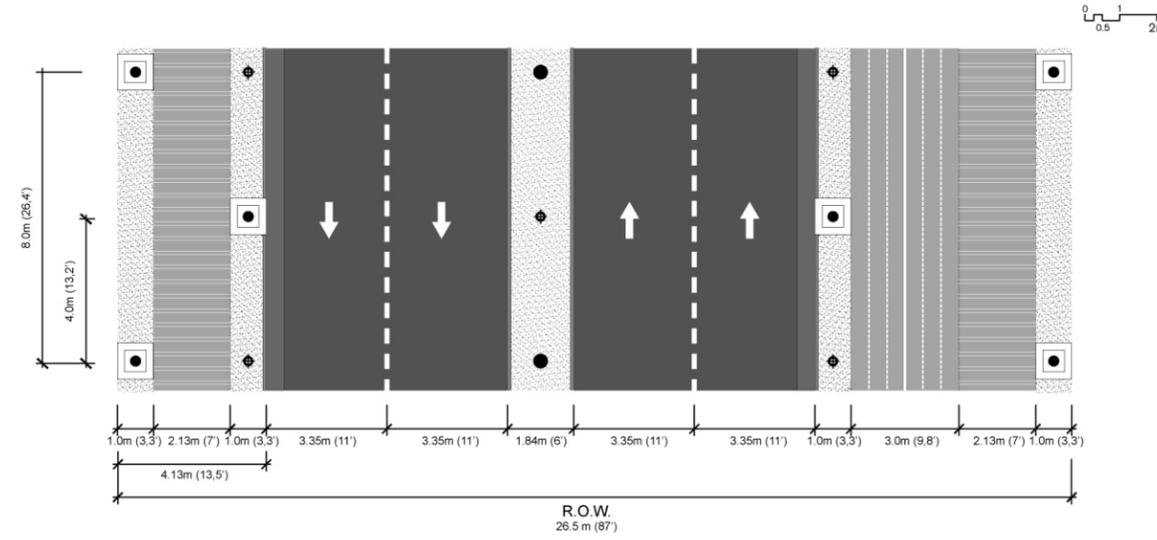
# GATEWAY

## BOULEVARD - COMPREHENSIVE CANCER CENTER SITE

SECTION



PLAN



- LIGHTING+PLANTING
- SIDEWALK
- LIGHTING+PLANTING
- ROAD (TROLLEY LANE)
- ROAD
- LIGHTING+PLANTING (STORM WATER INFRASTRUCTURE)
- ROAD
- ROAD (TROLLEY LANE)
- LIGHTING+PLANTING
- BIKE PATH
- SIDEWALK
- LIGHTING+PLANTING

KEY PLAN



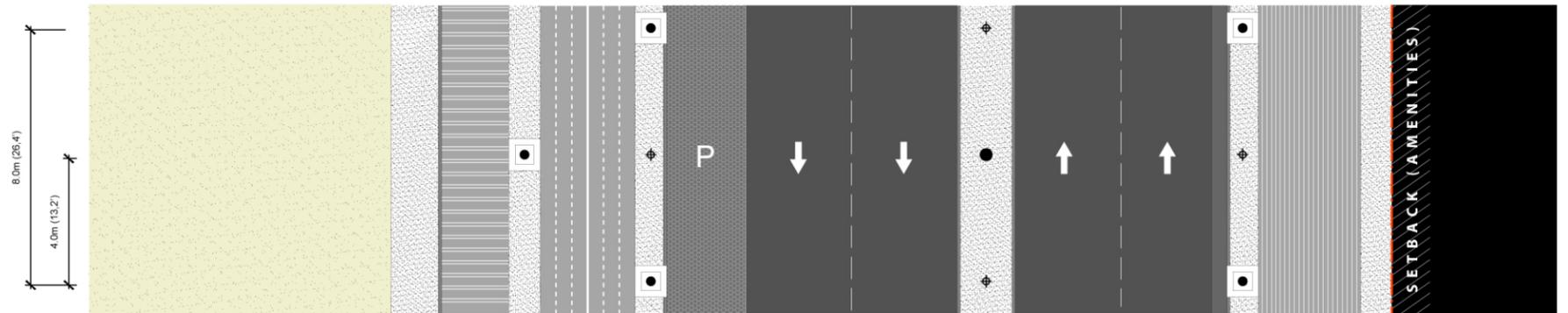
# GATEWAY

## BOULEVARD - SCIENCE CITY

SECTION



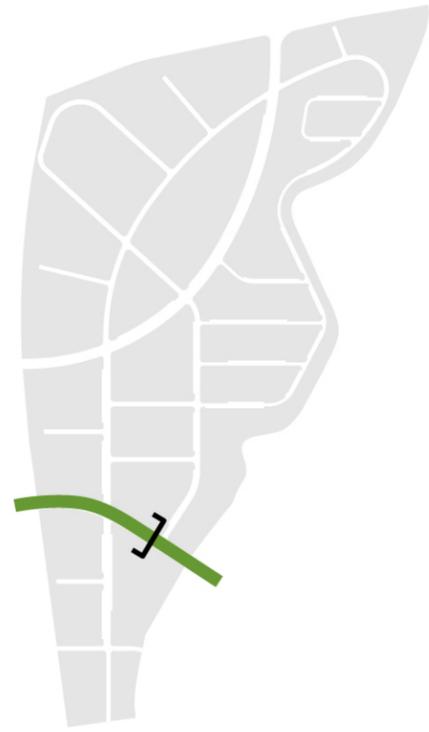
PLAN



1.7m (5.6')	2.13m (7')	1.0m (3.3')	3.0m (9.8')	1.0m (3.3')	2.5m (8.2')	3.35m (11')	3.35m (11')	1.84m (6')	3.35m (11')	3.35m (11')	1.0m (3.3')	varies (2.66-3.23m/9'-11')	1.0m (3.3')	1.0m (4')
-------------	------------	-------------	-------------	-------------	-------------	-------------	-------------	------------	-------------	-------------	-------------	----------------------------	-------------	-----------

R.O.W. 29.3 m (96.1')														
INOVATION PARK	PLANTING	SIDEWALK	PLANTING	BIKE PATH	LIGHTING+PLANTING	PARKING + STORM WATER INFRASTRUCTURE	ROAD (TROLLEY LANE)	ROAD	LIGHTING+PLANTING (STORM WATER INFRASTRUCTURE)	ROAD	ROAD (TROLLEY LANE)	LIGHTING+PLANTING	SIDEWALK	LIGHTING+PLANTING

KEY PLAN

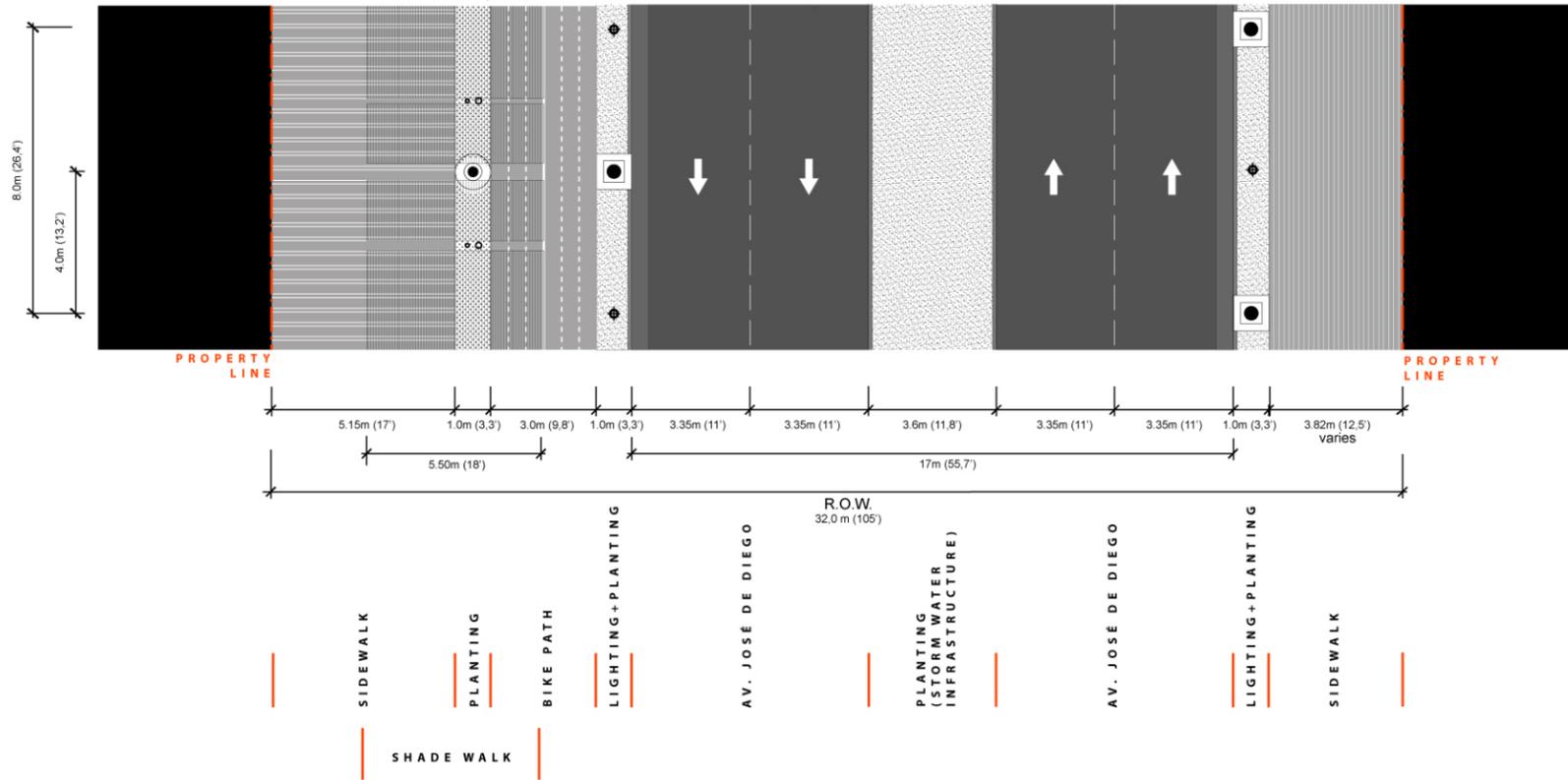


# GATEWAY

SECTION

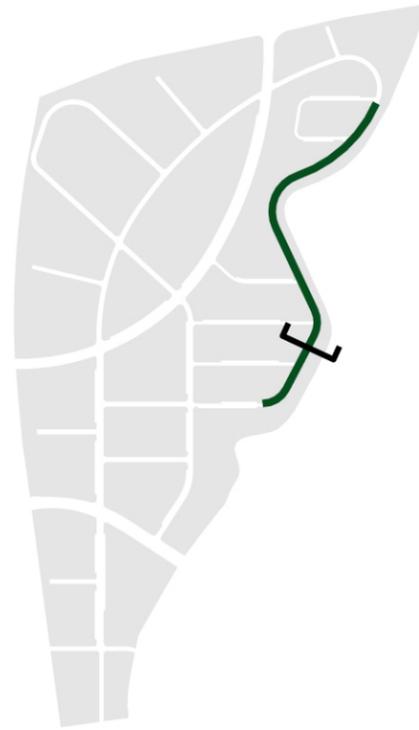


PLAN



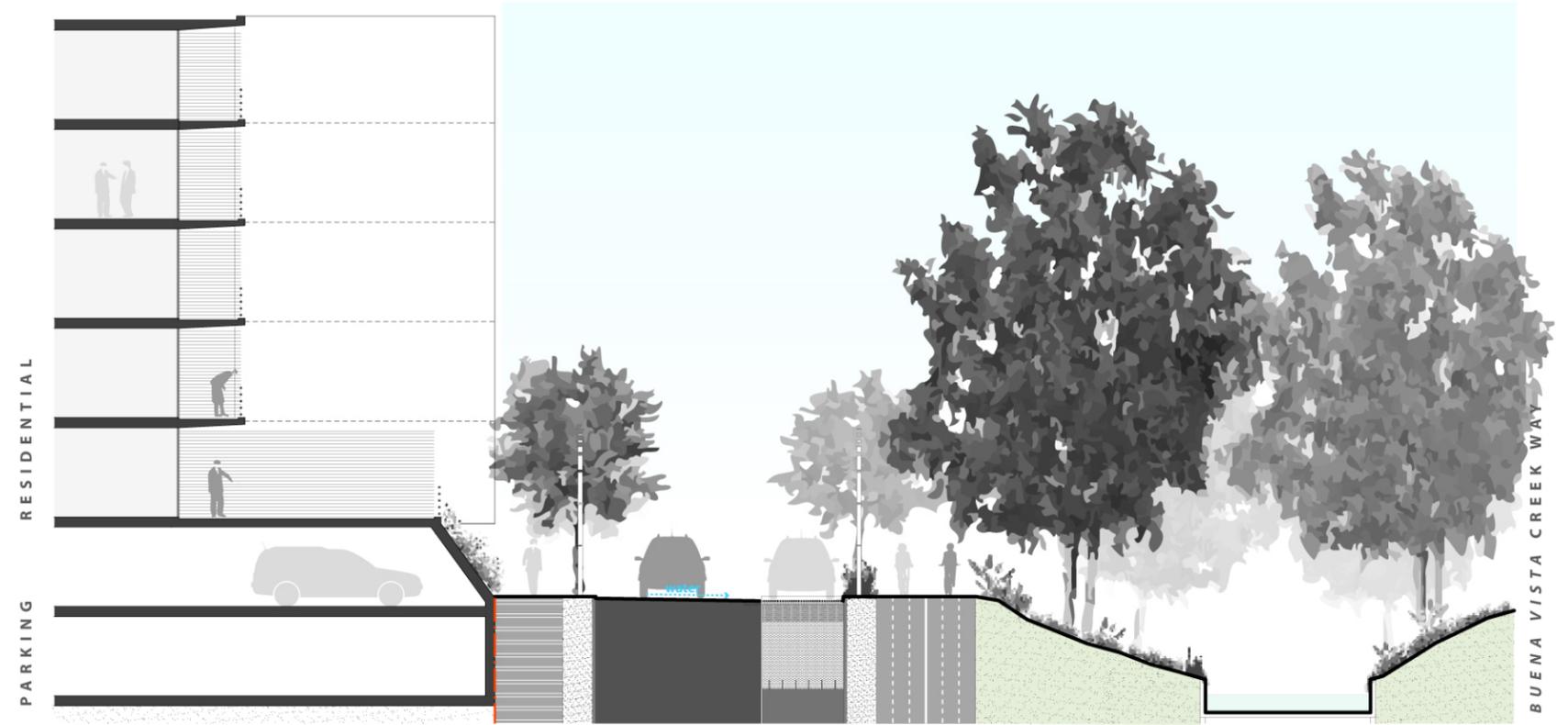
## AV. JOSÉ DE DIEGO

KEY PLAN

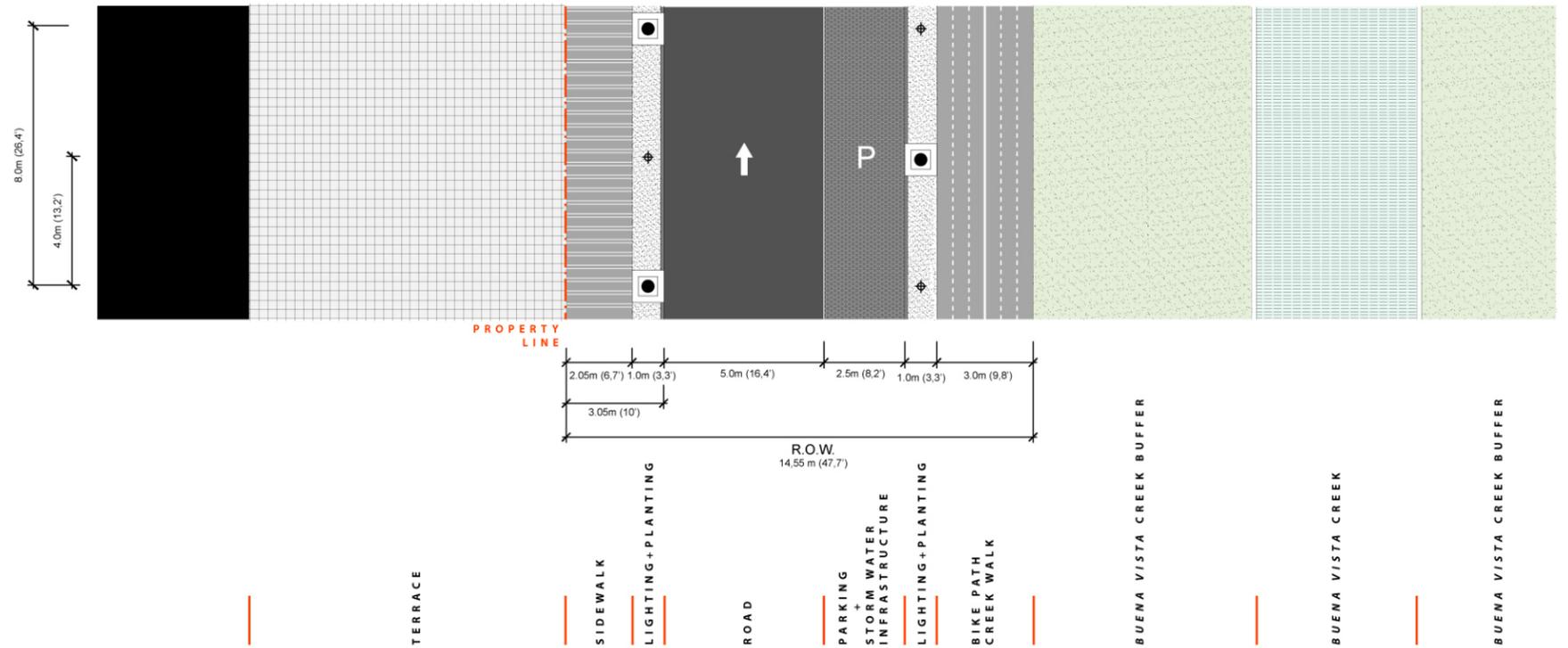


ACTIVE

SECTION

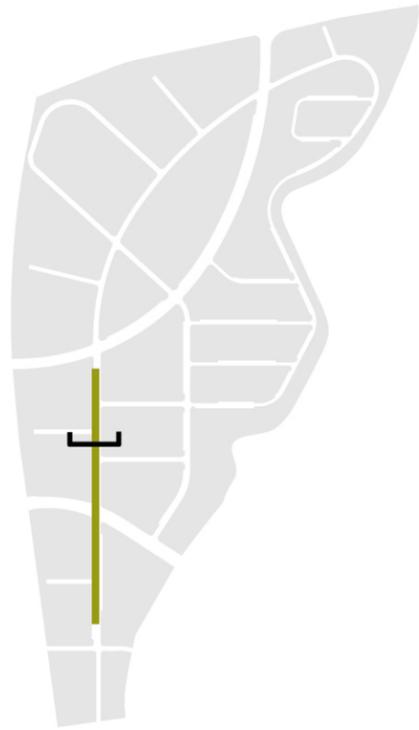


PLAN

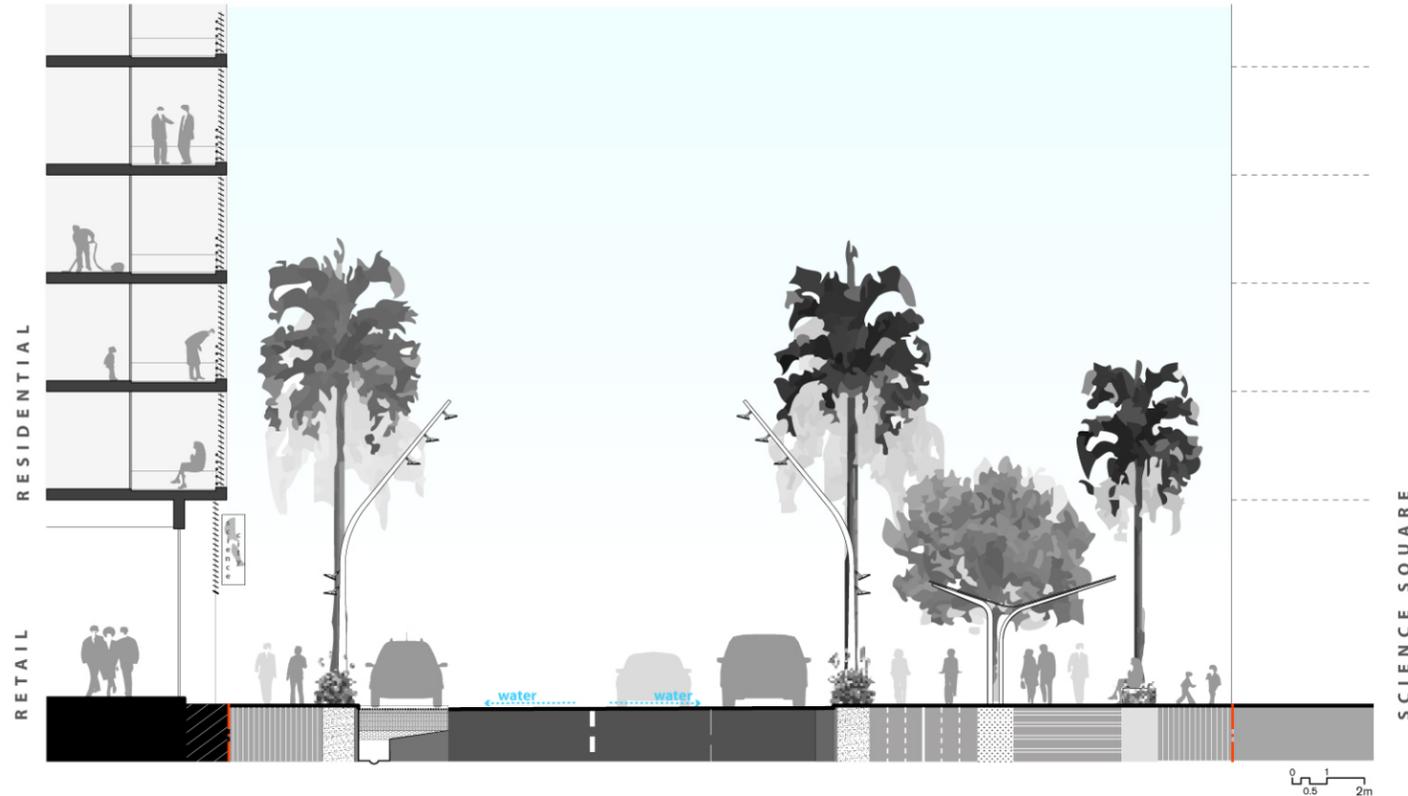


ONE WAY - RIVER WALK STREET

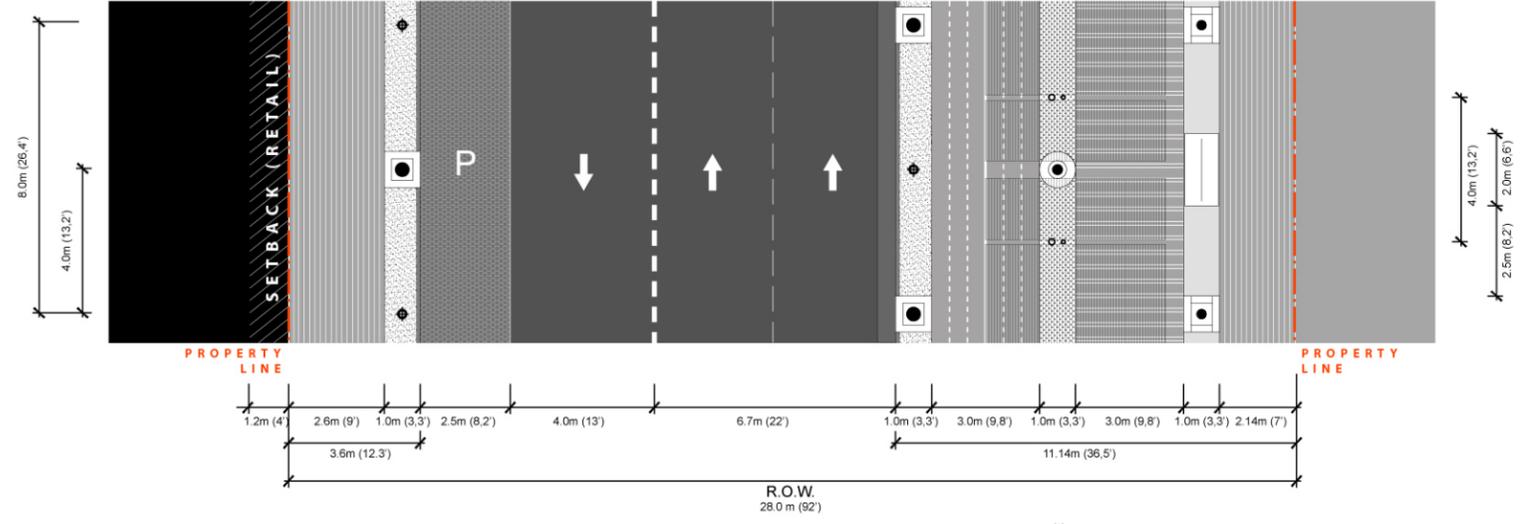
KEY PLAN



SECTION



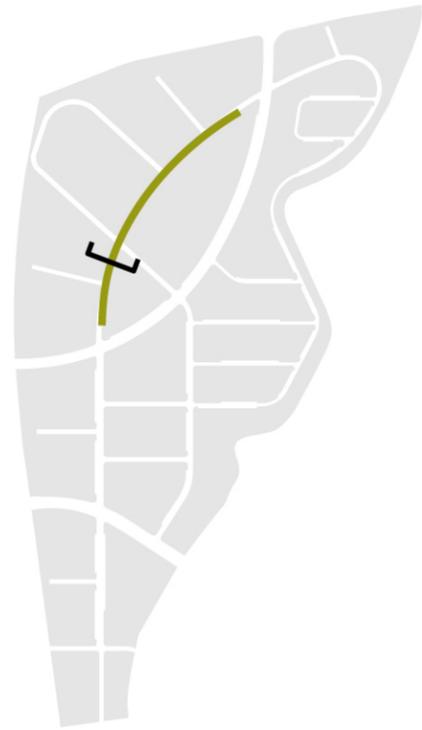
PLAN



# INSTITUTIONAL

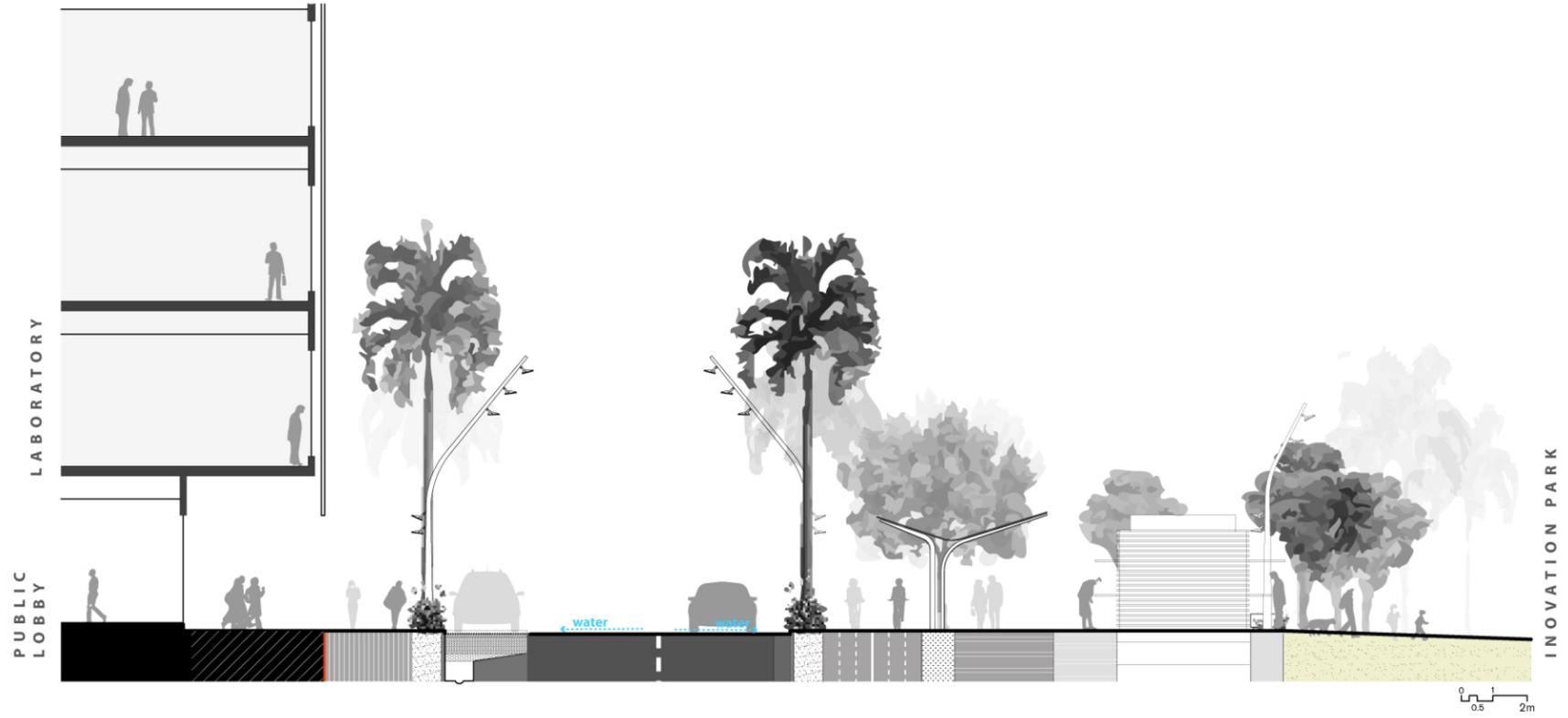
PRIMARY RETAIL/COMMERCIAL STREET

KEY PLAN

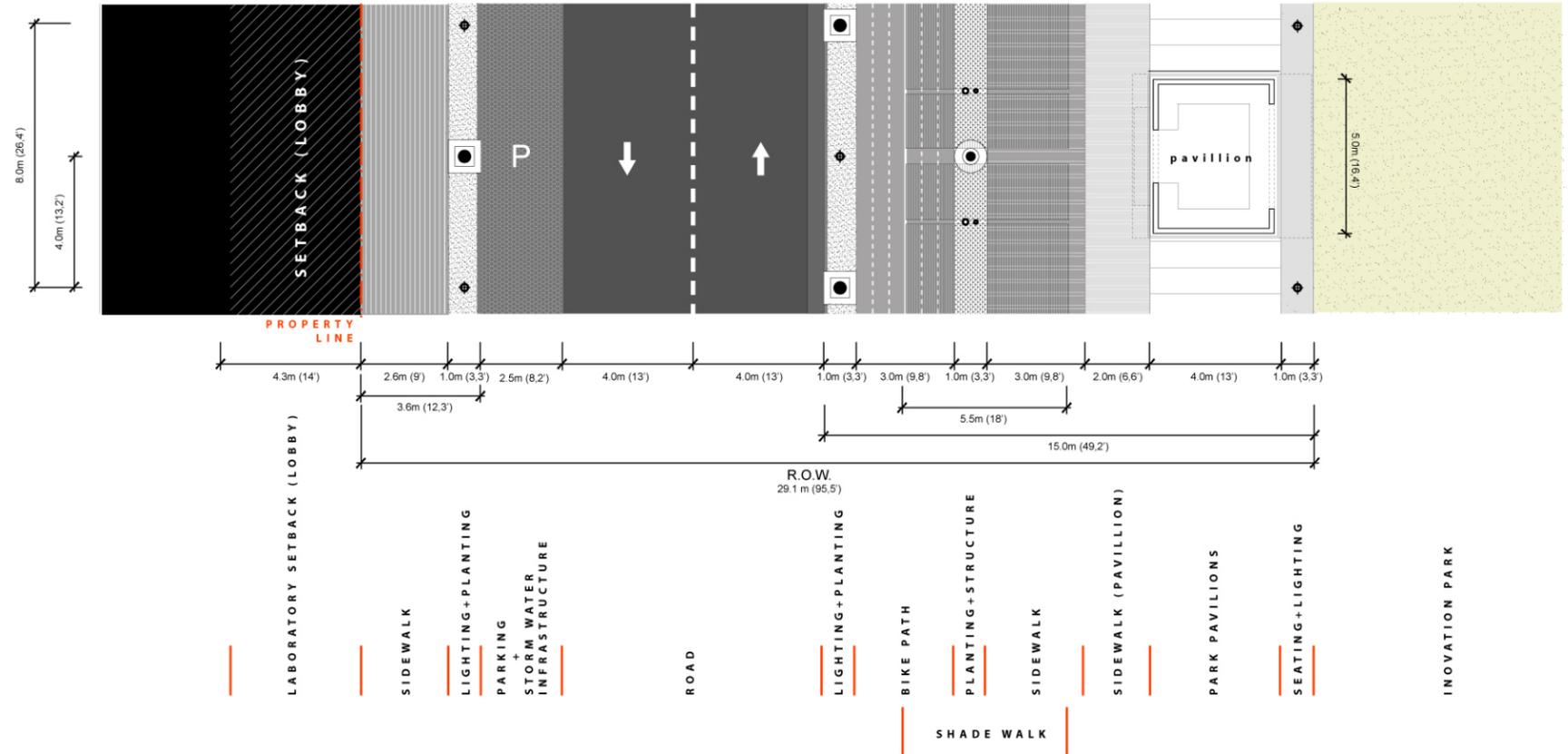


# INSTITUTIONAL

SECTION



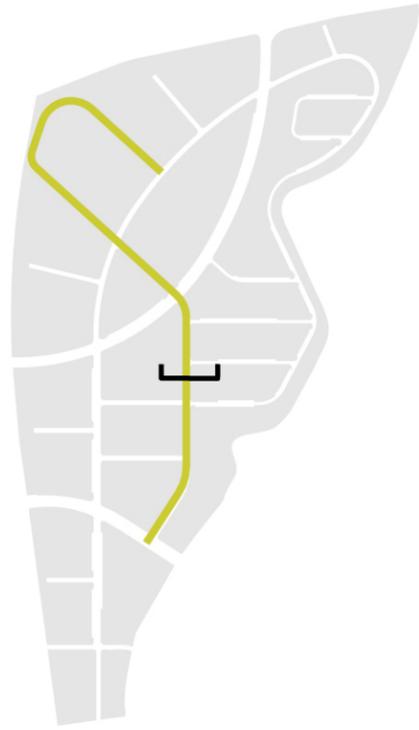
PLAN



LABORATORY STREET

INNOVATION PARK

KEY PLAN

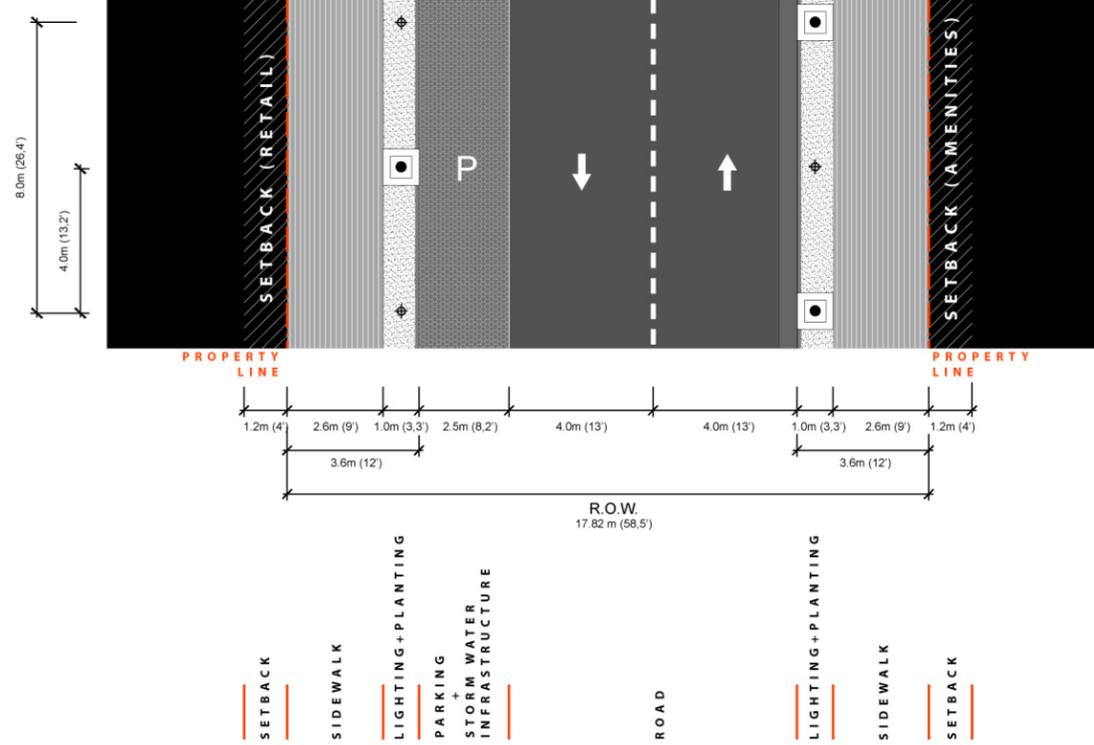


# DOMESTIC

SECTION

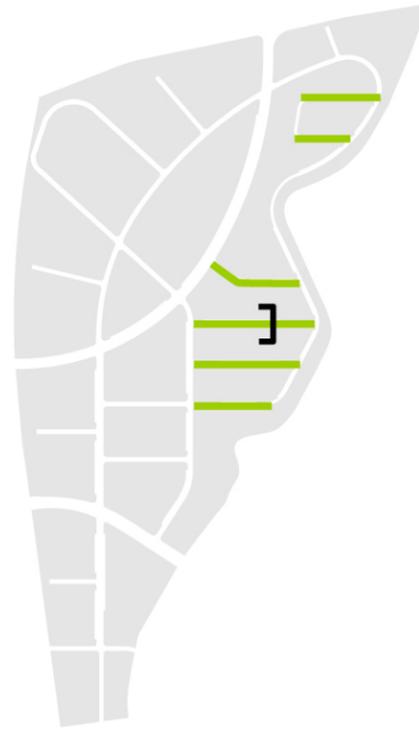


PLAN

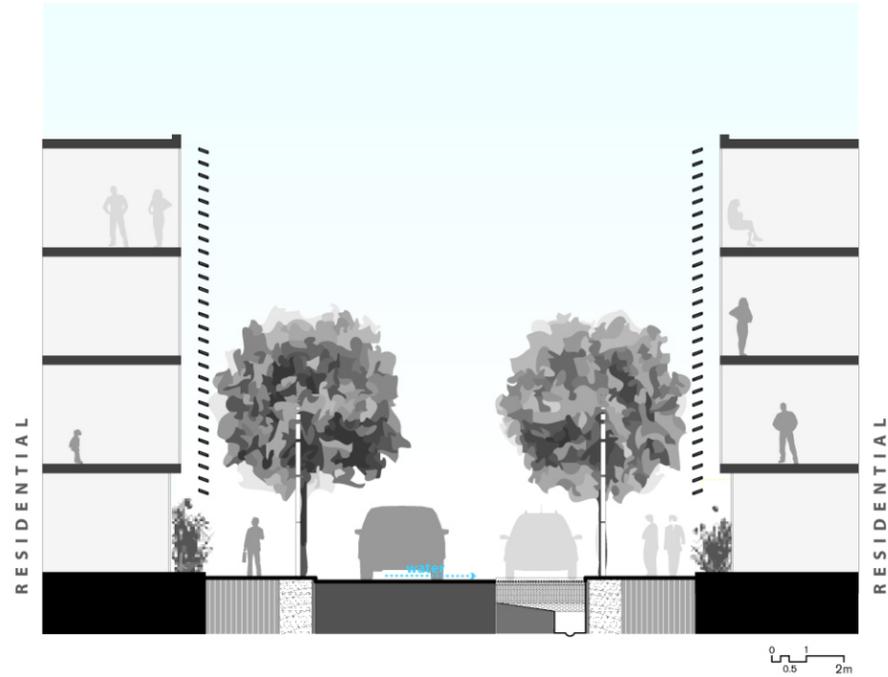


## SECONDARY RETAIL/COMMERCIAL STREET

KEY PLAN

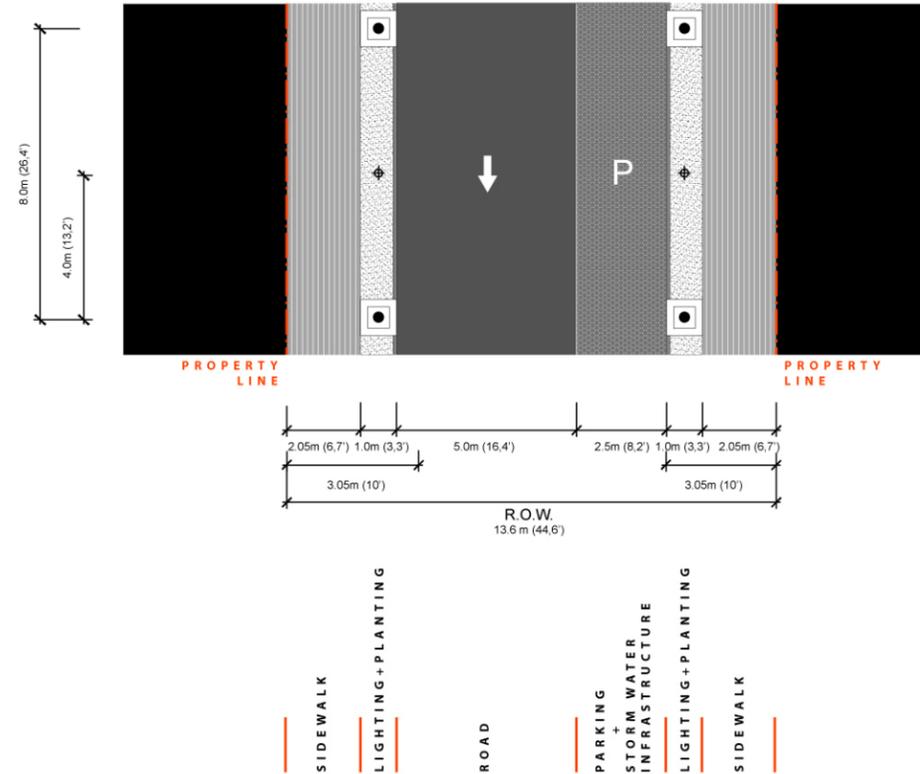


SECTION



# DOMESTIC

PLAN



## ONE WAY - RESIDENTIAL STREET

**FULLY INTEGRATED SUSTAINABLE SYSTEMS  
FOR BUILDINGS AND OPEN SPACE WILL  
CREATE A UNIQUE URBAN ENVIRONMENT  
WITH SCIENCE AT THE FOUNDATION OF ITS  
MANDATE FOR DEVELOPMENT**

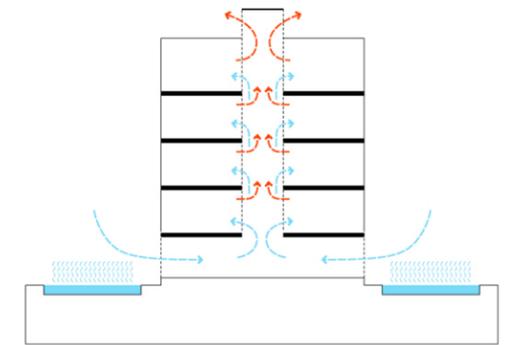
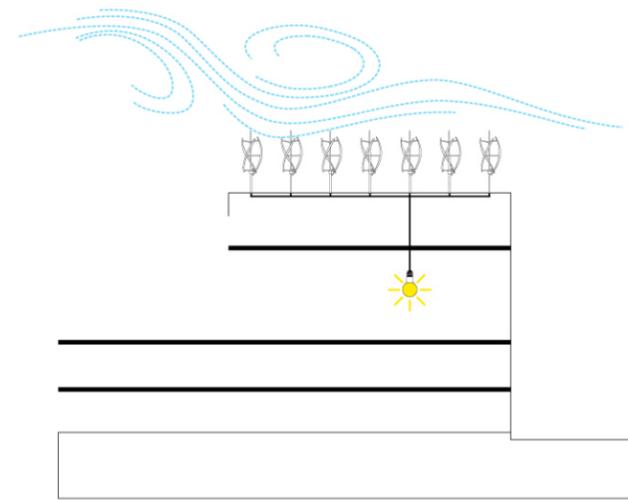
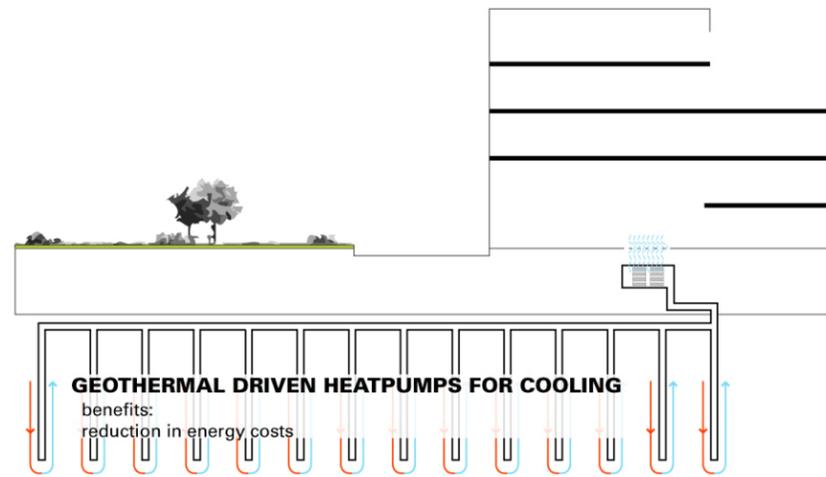


## SUSTAINABLE BUILDING SYSTEMS

Though difficult to control at the master plan level, it is expected that all building construction within the Science City will aspire to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification and will minimize ecological impact during construction, as well as in subsequent operation. In lieu of defining specifics per building or area within the development (eventually to be done in individual RFPs), we have outlined a menu of potential systems that are easily deployable within any new construction and are appropriate for the distinctive Puerto Rico climate. Though each system varies in terms of initial cost and eventual return, each functions in reducing a building's ecological footprint as well as providing a more comfortable work/live environment for the individual building's occupants.

Perhaps what is most compelling about this menu is that each of the systems outlined below is not exclusive to itself, but can (and should) be bundled with other systems to optimize a building's ecological performance. This allows flexibility in both design and performance that can be calibrated to an individual building's siting, orientation and use.

The following diagrams indicate the basic sustainable system; anticipated benefits of deployment; and potential locations for use within the Science City, in addition to precedent examples of their real world implementation.



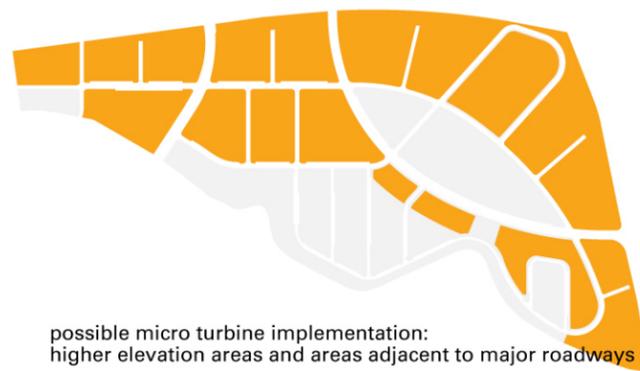
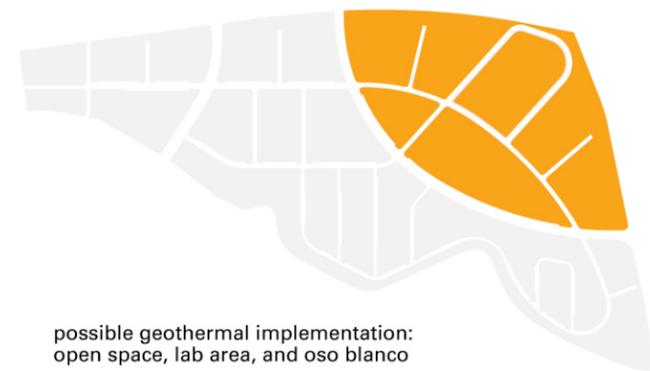
geo-thermal coils provide an effective ecological solution for cooling

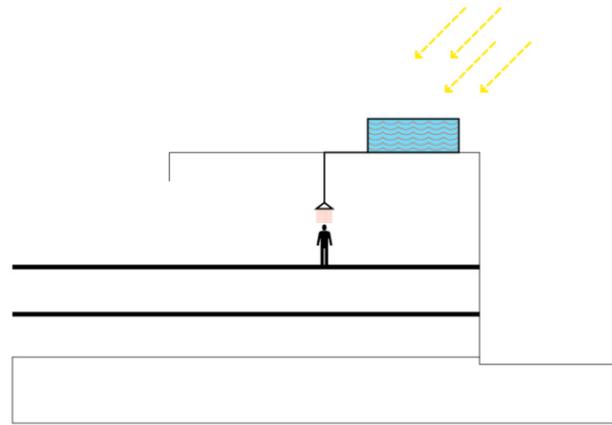
thermal chimneys provide low cost and low maintenance cooling

micro wind turbines reduce energy costs

thermal chimneys are passive systems requiring no added energy to cool buildings

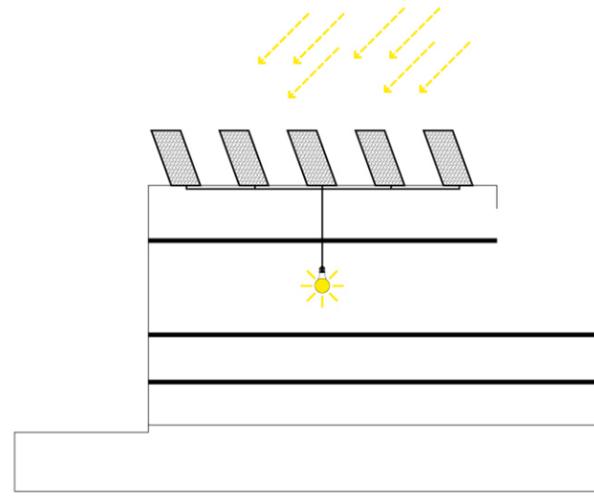
thermal chimney efficacy is increased when placed next to water





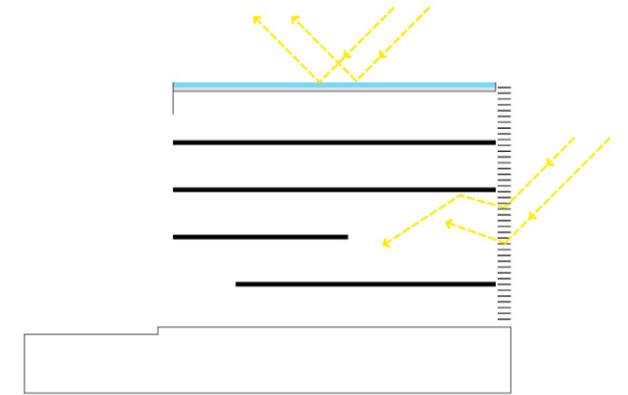
**SOLAR PANELS**

benefits:  
reduction in water heating costs



**PHOTO-VOLTAIC PANELS**

benefits:  
reduction in electricity costs

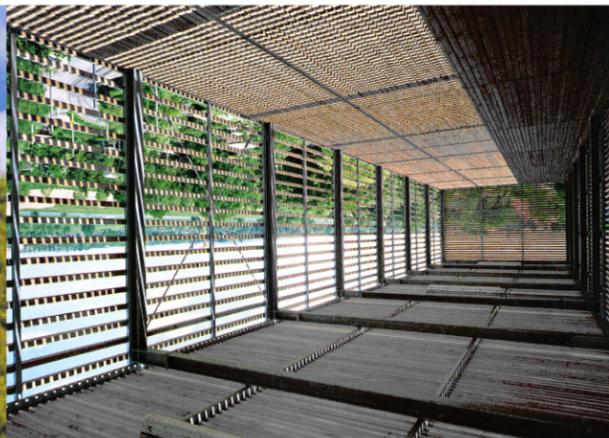


**DAYLIGHT & NATURAL SHADING**

benefits:  
reduction in electricity consumption for lighting and cooling  
improve health of inhabitants  
increase productivity



vertical vegetated surface provides shade and heat absorption



open shade structure provides shade and allows for increased air flow



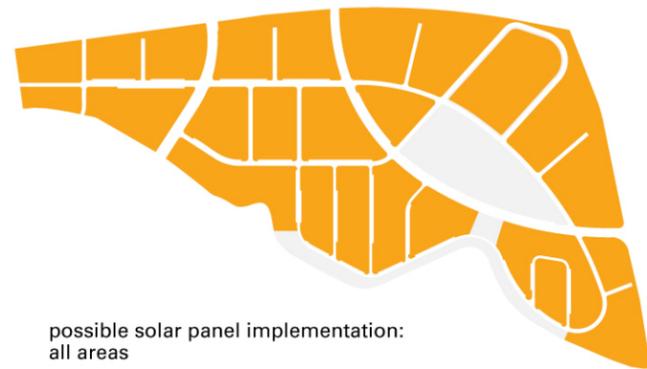
photovoltaic panels can have an operational lifetime of over 40 years



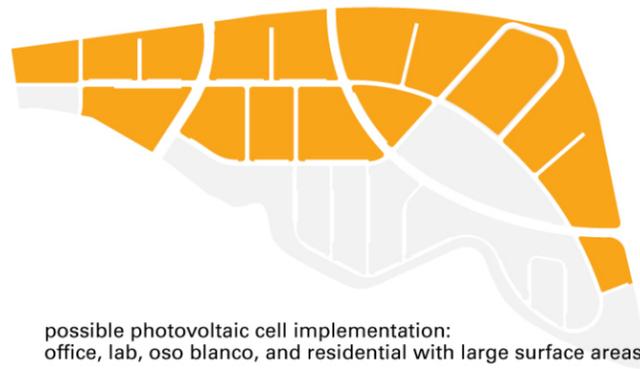
porous walls provide unique lighting and allow for air flow



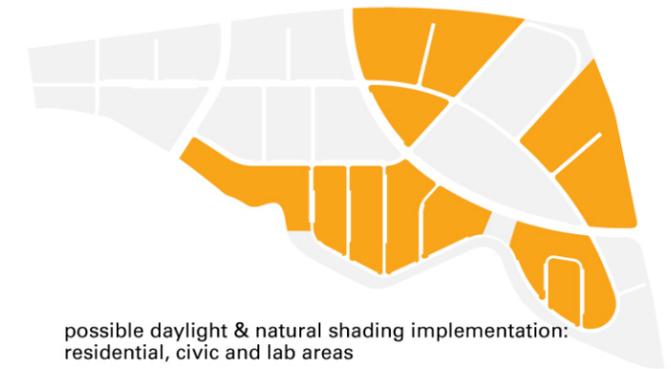
photovoltaic cells placed on rooftops are invisible



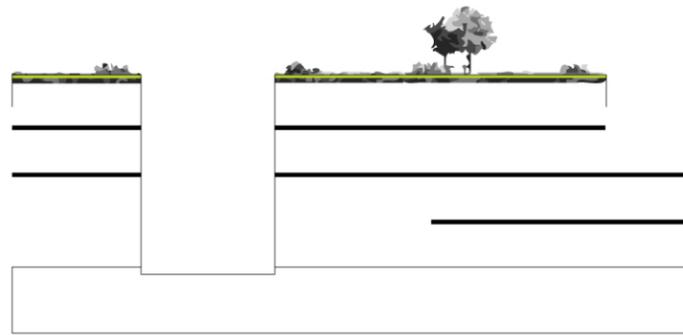
possible solar panel implementation:  
all areas



possible photovoltaic cell implementation:  
office, lab, oso blanco, and residential with large surface areas

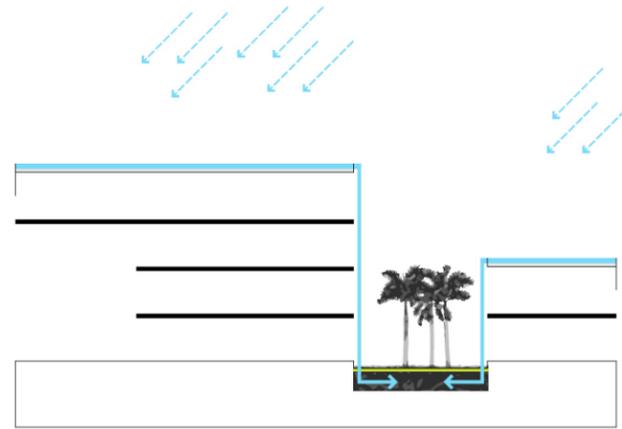


possible daylight & natural shading implementation:  
residential, civic and lab areas



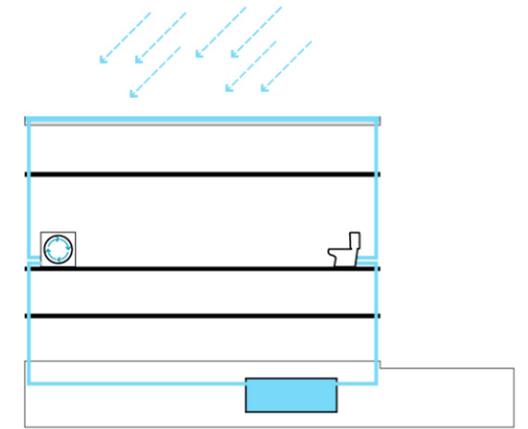
**ROOF GARDENS**

benefits:  
 reduction in heat island effect  
 improve air quality by trapping air borne pollutants  
 reduction in runoff volume to city piped drainage system



**GREY WATER FOR IRRIGATION**

benefits:  
 reduction in runoff volume to city piped drainage system  
 reduction in cost of irrigation



**GREY WATER FOR INDOOR RE-USE**

benefits:  
 reduction in water costs



green roofs reduce rainwater runoff and provide insulation



water collection systems recycle grey water reducing water costs



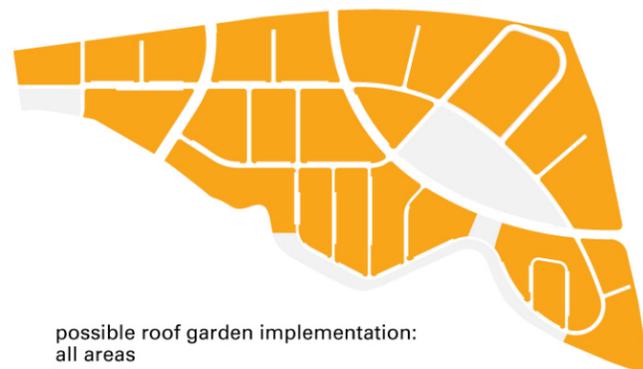
green roofs can reduce heat island effects in cities



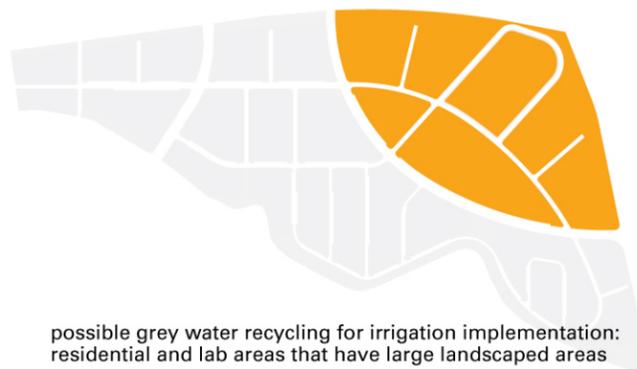
grey water recycling can create ecologically diverse wetland habitats in development areas



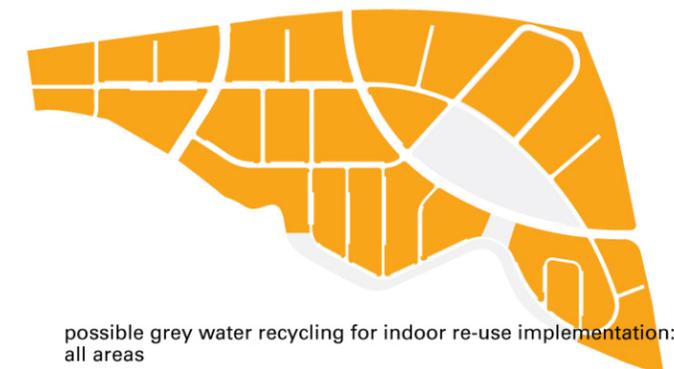
water retention and filtration system



possible roof garden implementation:  
 all areas



possible grey water recycling for irrigation implementation:  
 residential and lab areas that have large landscaped areas



possible grey water recycling for indoor re-use implementation:  
 all areas

## TYOLOGIES

The Science City development is composed of three primary building types: *laboratory, primary residential and mixed use* (at both small and large scales). It is anticipated that in the next phase of the project's development a full set of design guidelines per block will be developed, including recommendations for a design review/excellence program . In anticipation of that, the following typology studies have been undertaken. These are not meant as a specific proposal to any one type, but as set of recommendations that outline a type's expected programmatic adjacencies; its orientation in relation to streets and open space; as well as critical points of articulation including size, scale, setback and surface articulation. The guidelines also offer a anticipated range for expected program size and possible configurations to resolve basic parking requirements.<sup>1</sup>

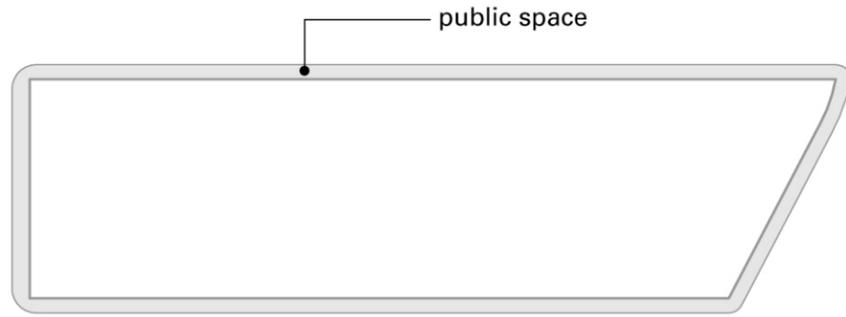
<sup>1</sup> Though they are not indicated in the following diagrams, the sustainable building systems outlined above are all able to be accommodated within the typologies described below and should be integrated as such.



## RESIDENTIAL PRECEDENTS

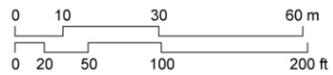




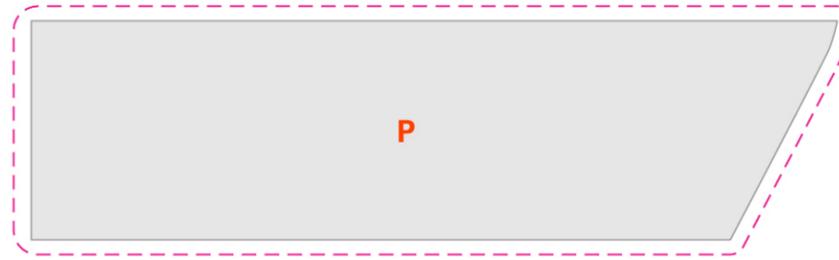


### TYPICAL RESIDENTIAL BLOCK

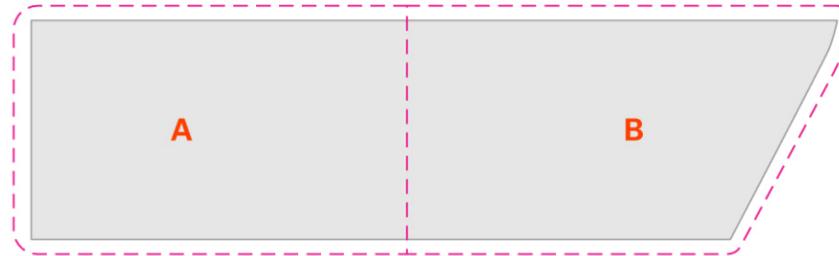
As a way of promoting a diverse and vibrant urban character, the following typical residential block / parcel structure is proposed. The intent is not a set of rigid guidelines, but a responsive approach that takes into account both existing and future parcel development.



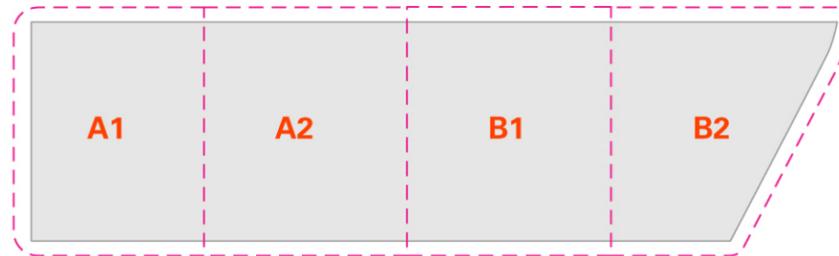
### POTENTIAL PARCEL DISTRIBUTION



1 DEVELOPER



2 DEVELOPERS



4 DEVELOPERS



6 DEVELOPERS

### GROSS AREA

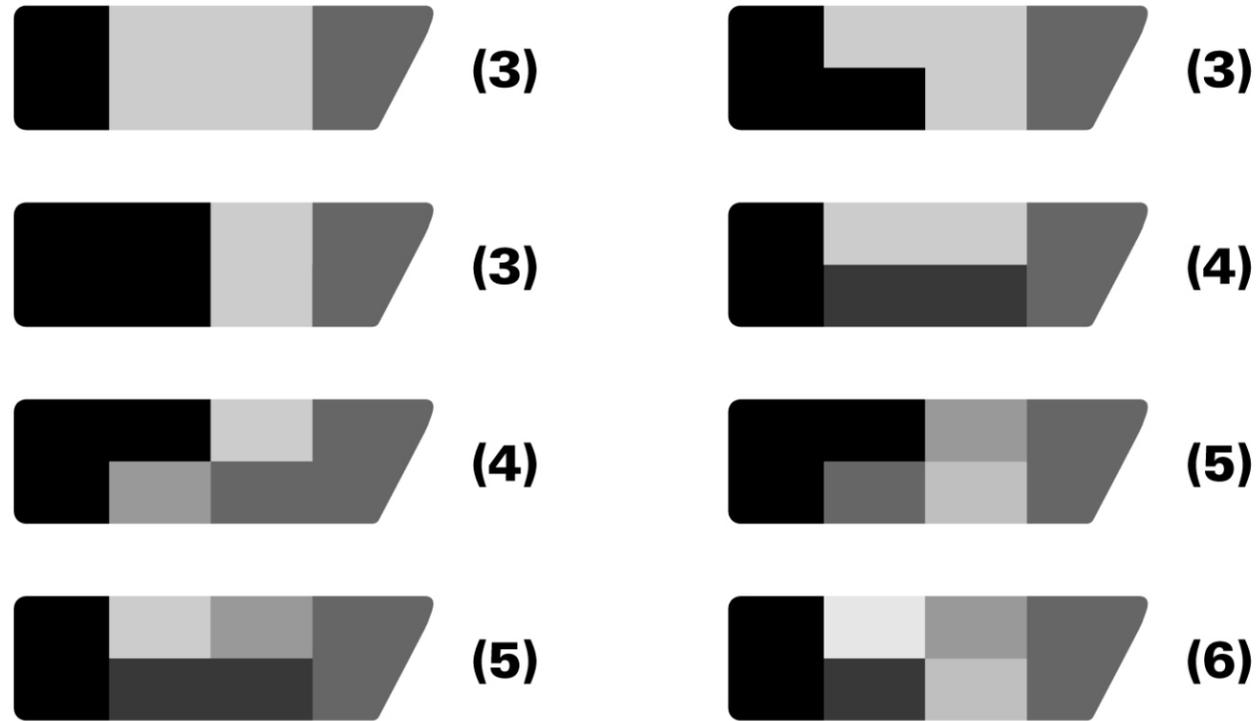
### NET AREA

<b>P</b>	8,469 m <sup>2</sup>	91,159 f <sup>2</sup>	<b>P</b>	7,165 m <sup>2</sup>	77,123 f <sup>2</sup>
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<b>A</b>	4,219 m <sup>2</sup>	45,412 f <sup>2</sup>	<b>A</b>	3,563 m <sup>2</sup>	38,351 f <sup>2</sup>
<b>B</b>	4,250 m <sup>2</sup>	45,746 f <sup>2</sup>	<b>B</b>	3,601 m <sup>2</sup>	38,760 f <sup>2</sup>

<b>A1</b>	2,035 m <sup>2</sup>	21,904 f <sup>2</sup>	<b>A1</b>	1,638 m <sup>2</sup>	17,631 f <sup>2</sup>
<b>A2</b>	2,183 m <sup>2</sup>	23,497 f <sup>2</sup>	<b>A2</b>	1,925 m <sup>2</sup>	20,720 f <sup>2</sup>
<b>B1</b>	2,183 m <sup>2</sup>	23,497 f <sup>2</sup>	<b>B1</b>	1,925 m <sup>2</sup>	20,720 f <sup>2</sup>
<b>B2</b>	2,066 m <sup>2</sup>	22,238 f <sup>2</sup>	<b>B2</b>	1,676 m <sup>2</sup>	18,040 f <sup>2</sup>

<b>A1</b>	2,035 m <sup>2</sup>	21,904 f <sup>2</sup>	<b>A1</b>	1,638 m <sup>2</sup>	17,631 f <sup>2</sup>
<b>A2a</b>	1,091 m <sup>2</sup>	11,743 f <sup>2</sup>	<b>A2a</b>	962 m <sup>2</sup>	10,354 f <sup>2</sup>
<b>A2b</b>	1,091 m <sup>2</sup>	11,743 f <sup>2</sup>	<b>A2b</b>	962 m <sup>2</sup>	10,354 f <sup>2</sup>
<b>B1a</b>	1,091 m <sup>2</sup>	11,743 f <sup>2</sup>	<b>B1a</b>	962 m <sup>2</sup>	10,354 f <sup>2</sup>
<b>B1b</b>	1,091 m <sup>2</sup>	11,743 f <sup>2</sup>	<b>B1b</b>	962 m <sup>2</sup>	10,354 f <sup>2</sup>
<b>B2</b>	2,066 m <sup>2</sup>	22,238 f <sup>2</sup>	<b>B2</b>	1,676 m <sup>2</sup>	18,040 f <sup>2</sup>



sample distribution: not comprehensive

**RECOM 1:** It is recommended that each block should have at least 3 unique developments or development types in order to promote a diverse urban character along residential streets



single development streetwall: monotonous + not desirable

varied streetwall: visually active + preferable

**(NO)**

**(YES)**

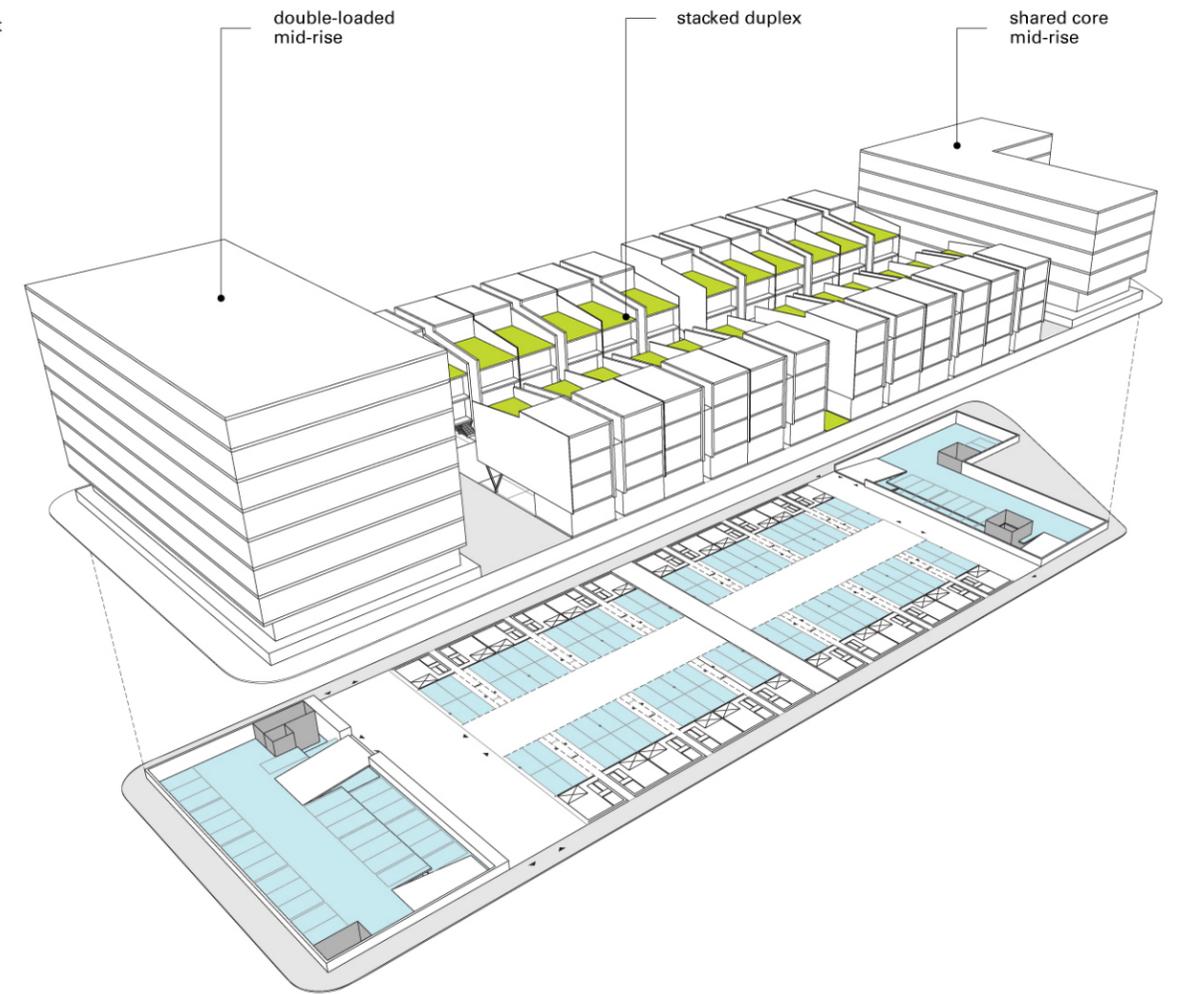
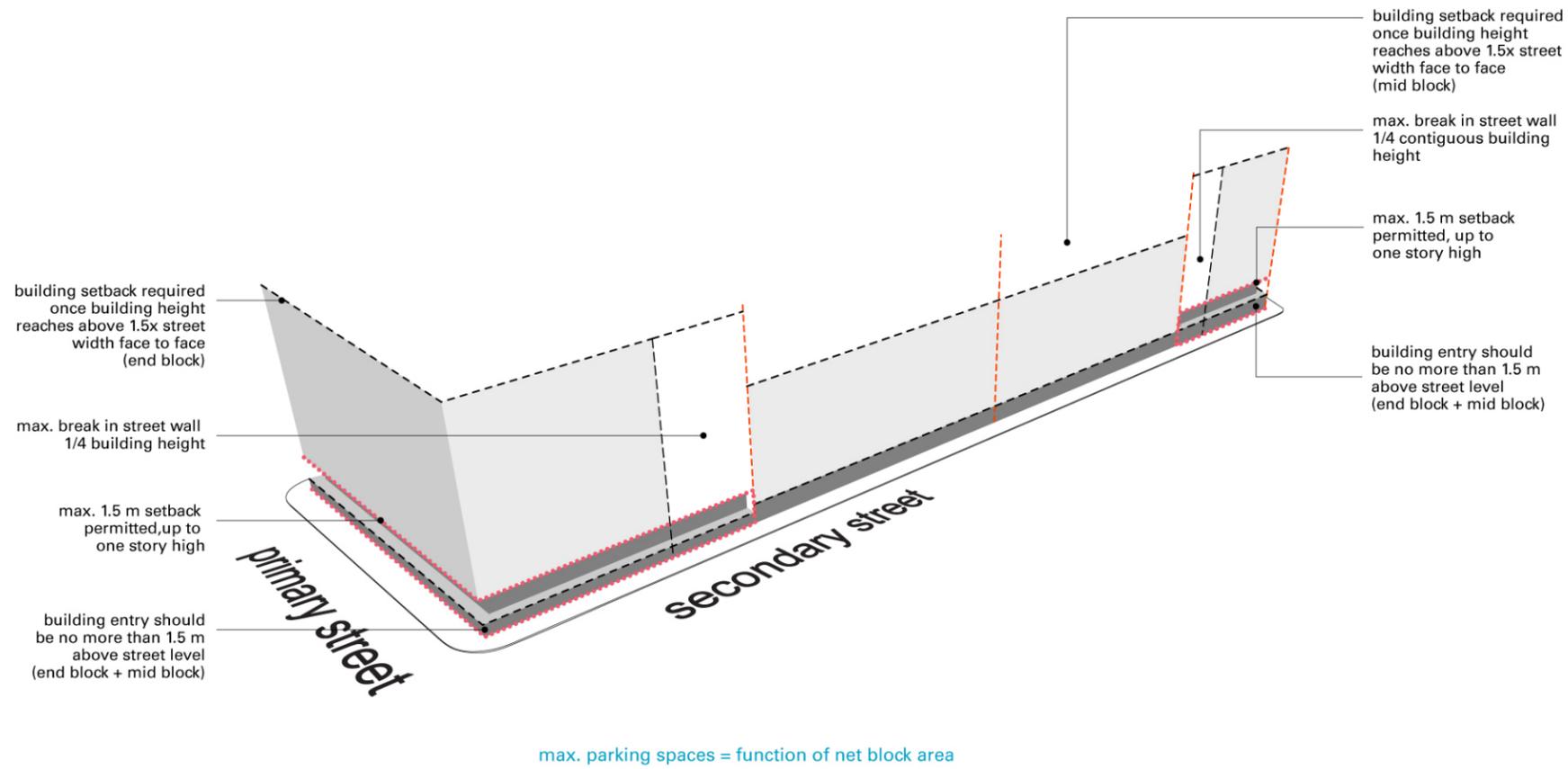
**RECOM 2:** The development of a particular parcel should take into account not only the contiguous development of its own block, but also that of adjacent blocks to preclude monolithic or homogeneous urban streetscapes.



**RECOM 3:** Regardless of block development structure, the street wall of end-block parcels should be continuous and of a scale that balances the lower scale mid-block development



**RECOM 4:** In order to influence the scale of development in the typical residential block, a parking cap per net block area is proposed. This would in effect control initial development without precluding future market pressure for additional residential growth.



**TPOLOGY DESIGN RECOMMENDATIONS**

**SAMPLE MASSING**



**4 DEVELOPERS**

**RESIDENTIAL BLOCK - 4 DEVELOPERS  
DOUBLE-LOADED MID-RISE + STACKED DUPLEX + SHARED CORE MID-RISE**

**RESIDENTIAL:**

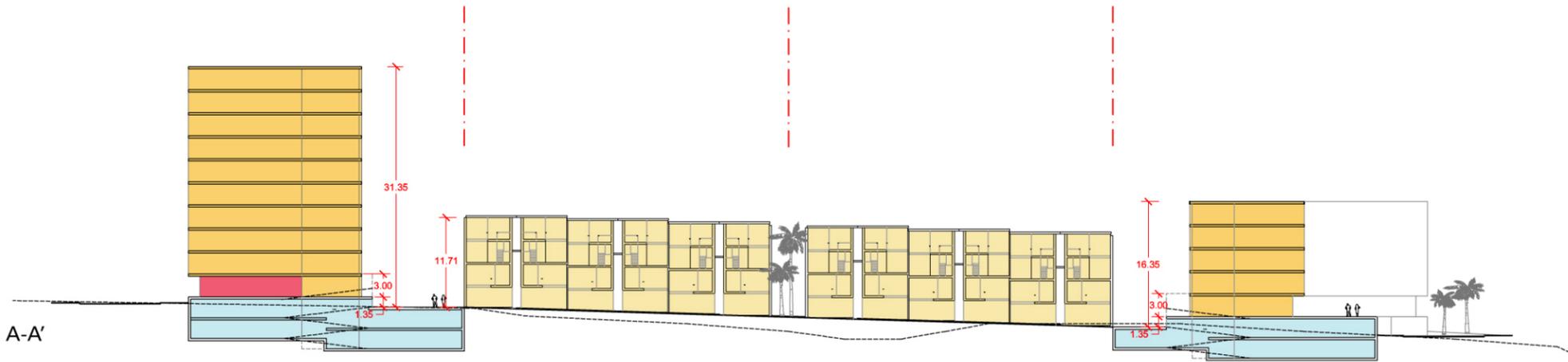
double-loaded mid-rise	48 units (2 bedroom)
stacked duplex	48 units (2 / 3 bedroom)
shared core mid-rise	25 units (2 bedroom)

**PARKING:**

double-loaded mid-rise	72 spaces - two-level underground parking
stacked duplex	96 spaces - tandem parking at street level
shared core mid-rise	38 spaces - two-level underground parking

*note: parking totals commensurate with program (1.5 spaces/unit min)*

LONG. SECTION A-A'



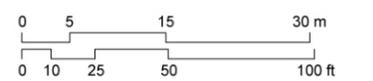
TYPICAL FLOOR PLAN

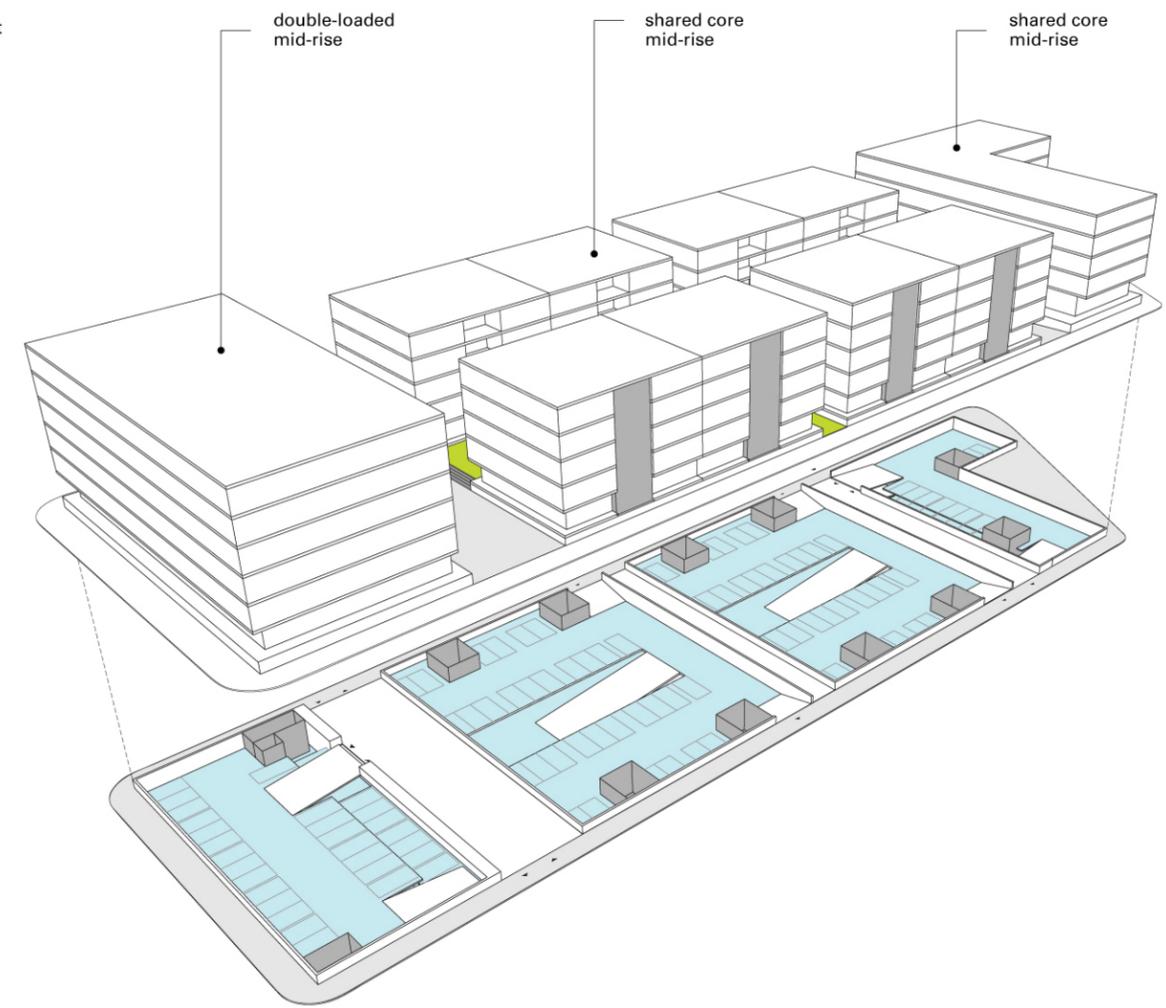
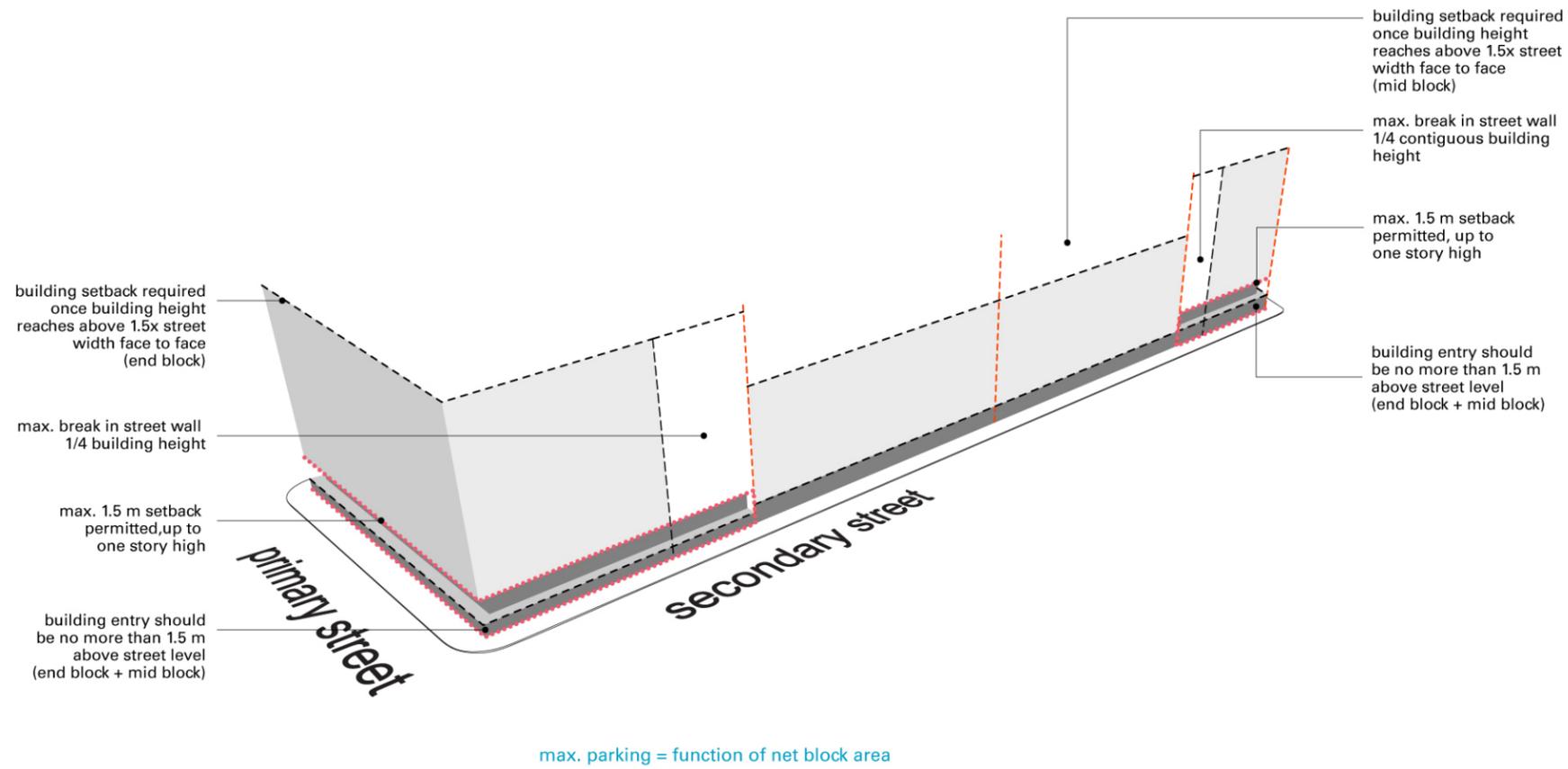


UNDERGROUND PARKING PLAN



- residential / multi-family
- residential townhouse
- green / open area
- parking
- retail / commercial





**TPOLOGY DESIGN RECOMMENDATIONS**



**2 DEVELOPERS**

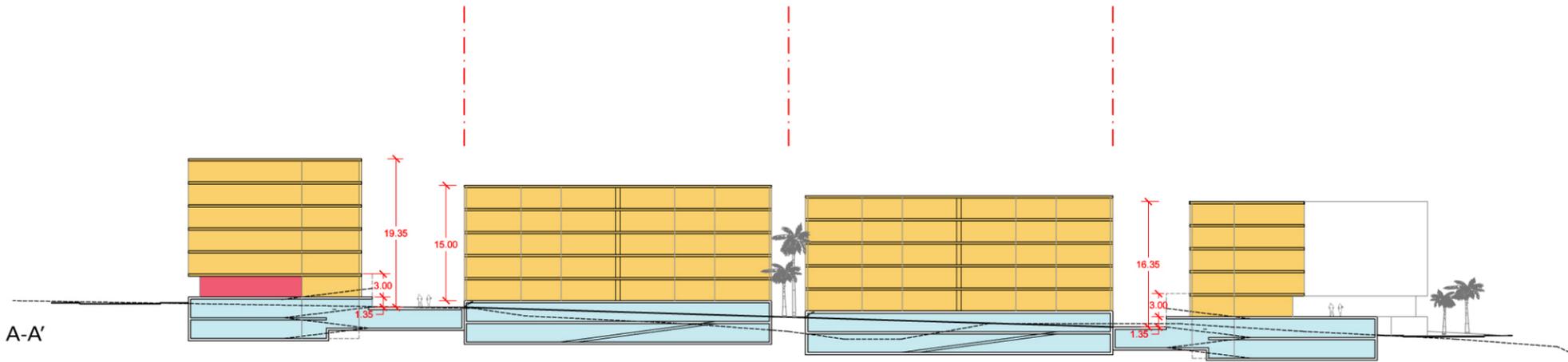
**RESIDENTIAL BLOCK - 2 DEVELOPERS**  
**DOUBLE-LOADED MID-RISE + SHARED CORE MID-RISE**

<b>RESIDENTIAL:</b>		
double-loaded mid-rise		36 units (2 bedroom)
shared core mid-rise		105 units (2 / 3 bedroom)
shared core mid-rise		25 units (2 bedroom)
<b>PARKING:</b>		
two-level underground parking		260 spaces

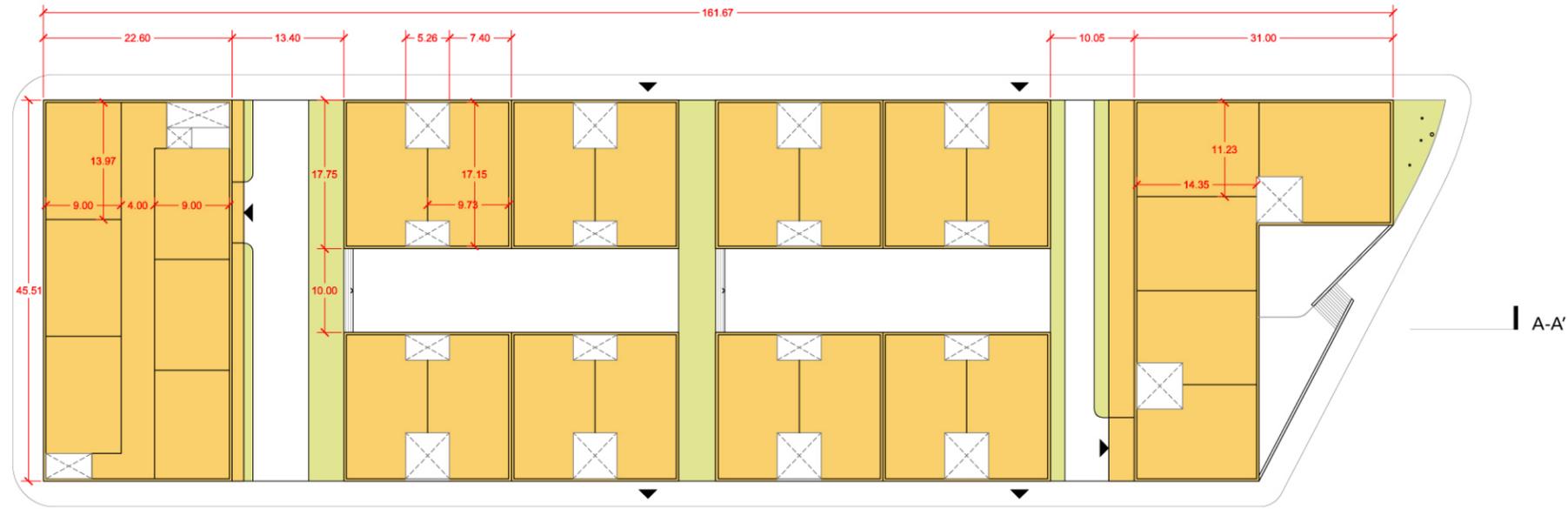
*note: parking totals commensurate with program (1.5 spaces/unit min)*

**SAMPLE MASSING**

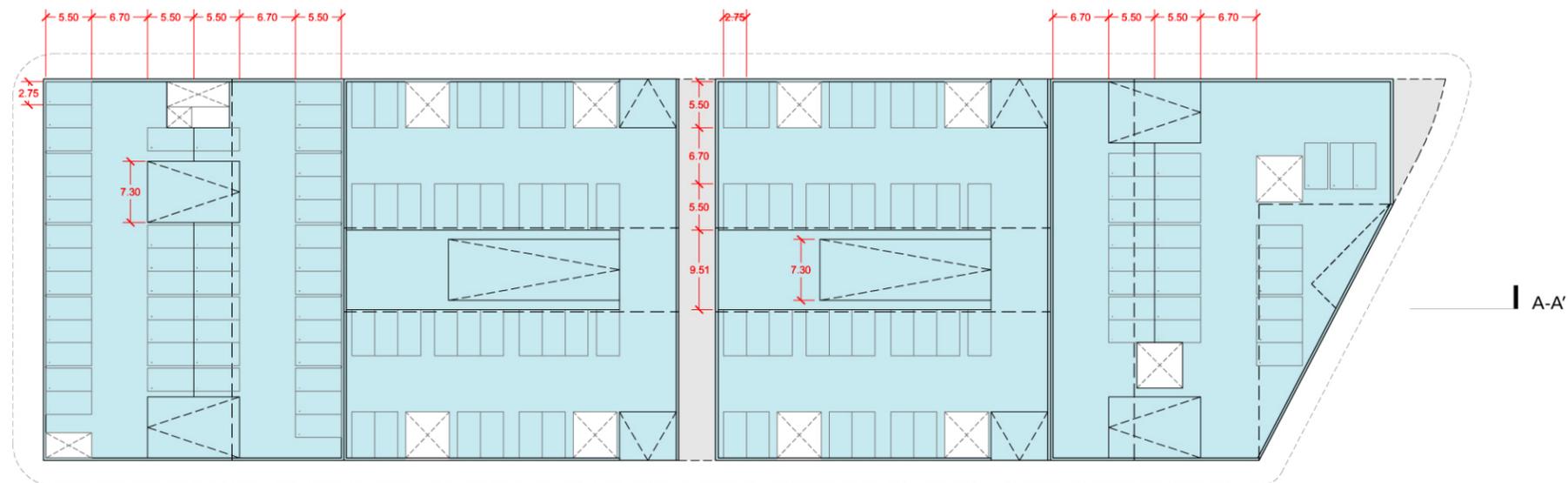
LONG. SECTION A-A'



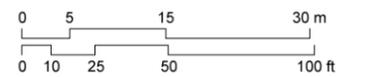
TYPICAL FLOOR PLAN

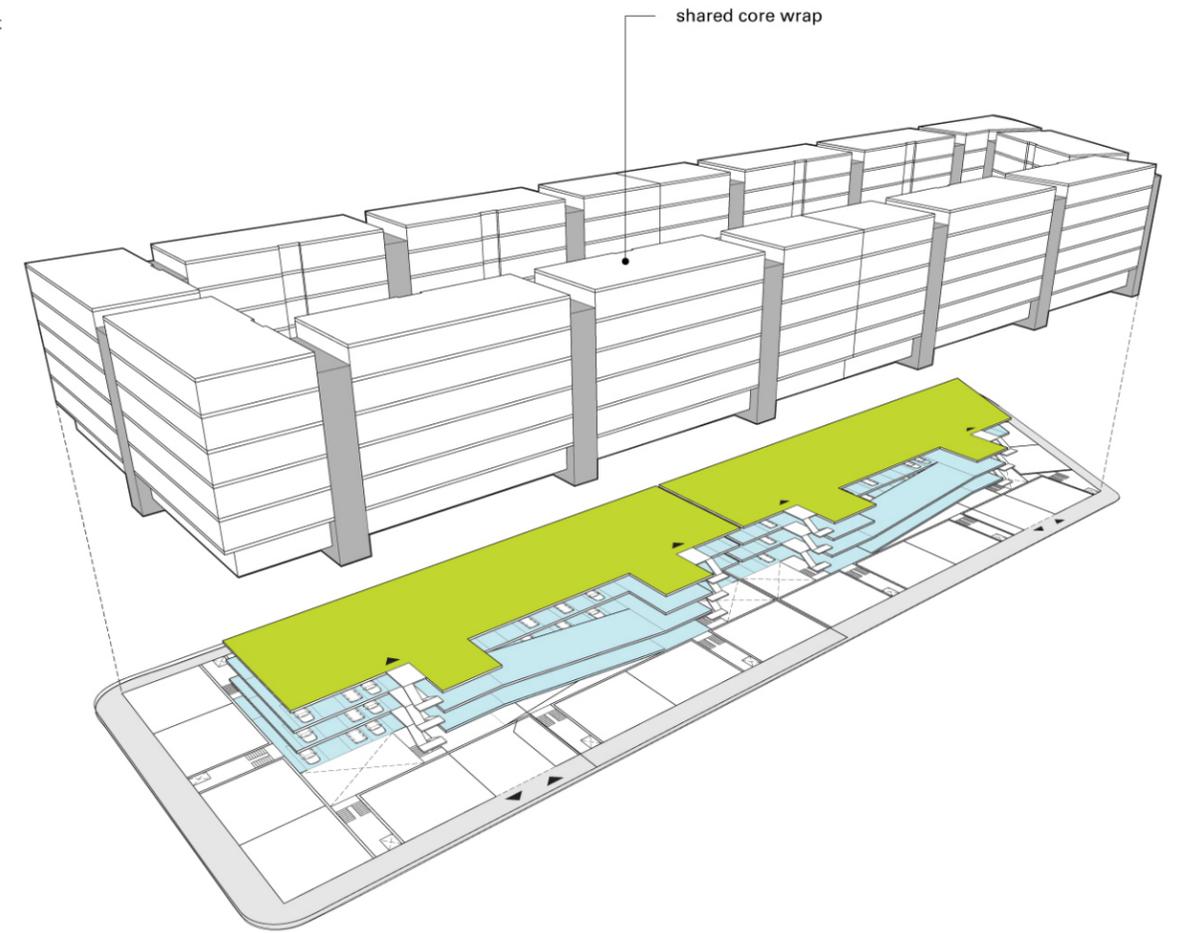
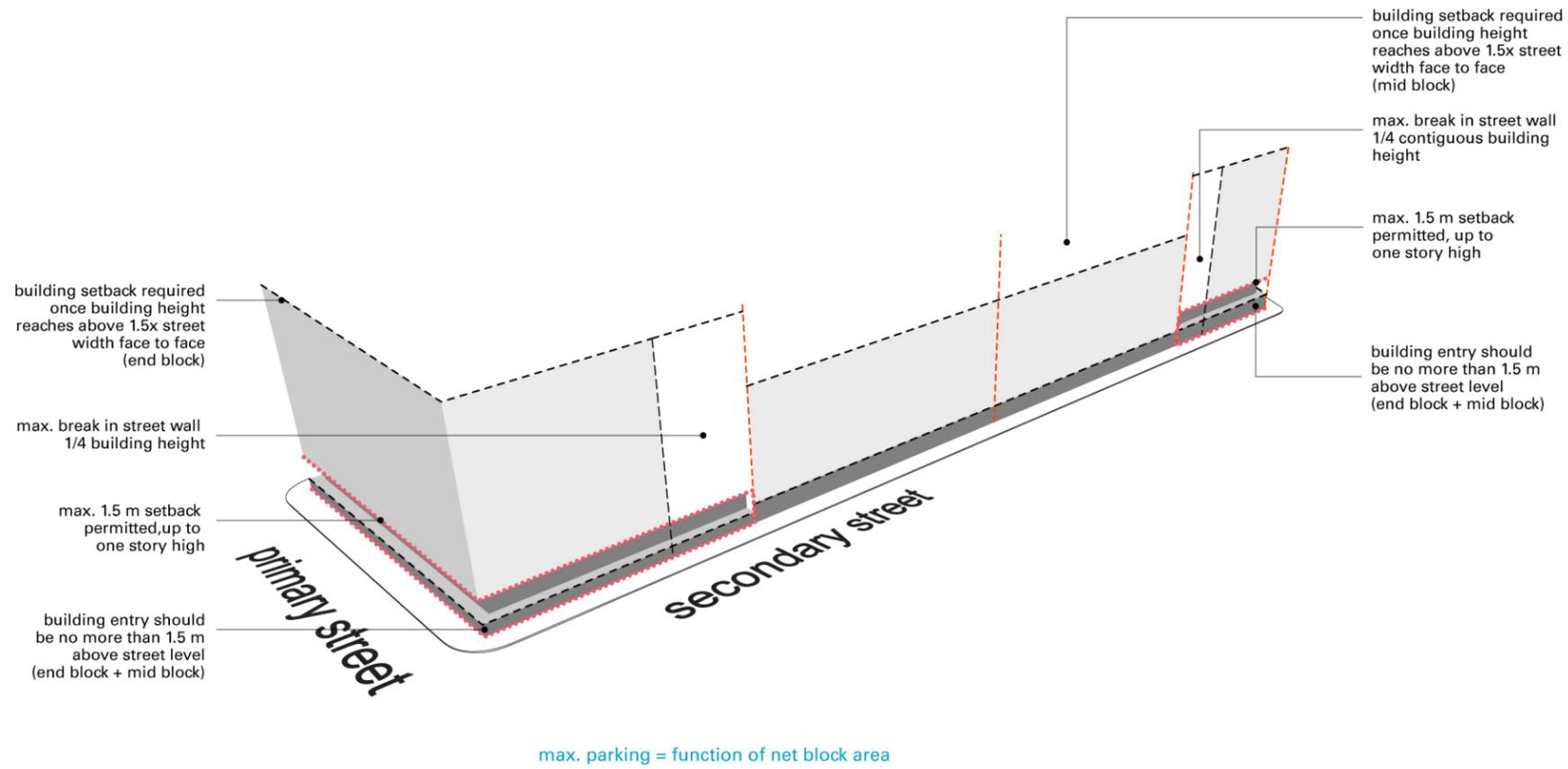


UNDERGROUND PARKING PLAN



- residential / multi-family
- residential townhouse
- green / open area
- parking
- retail





TPOLOGY DESIGN RECOMMENDATIONS

SAMPLE MASSING



**1 DEVELOPER**

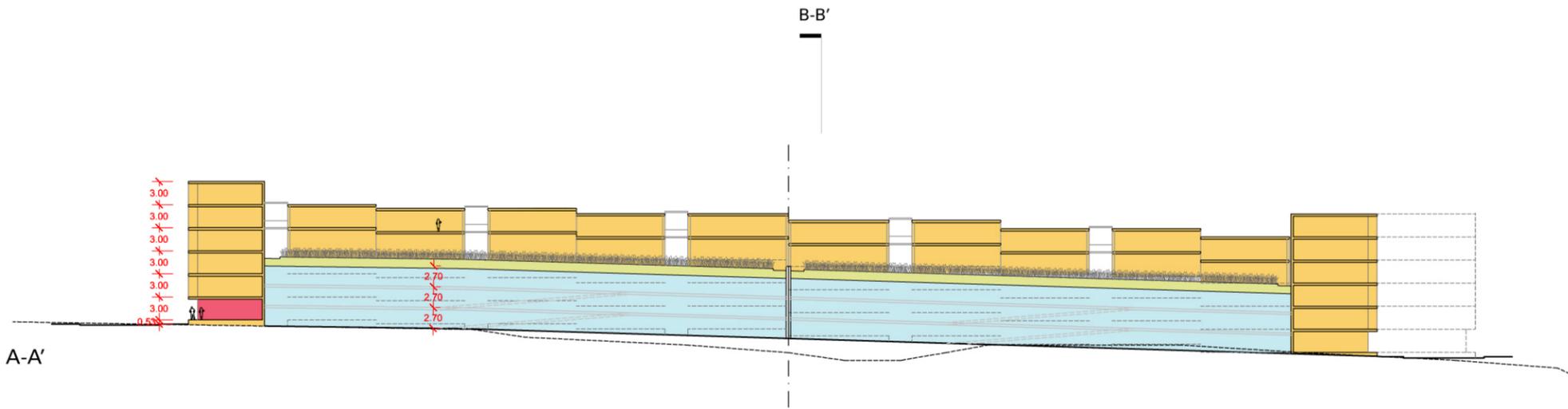
**RESIDENTIAL BLOCK - 1 DEVELOPER  
SHARED CORE WRAP**

RESIDENTIAL:  
shared core wrap            142 units (2 bedroom)

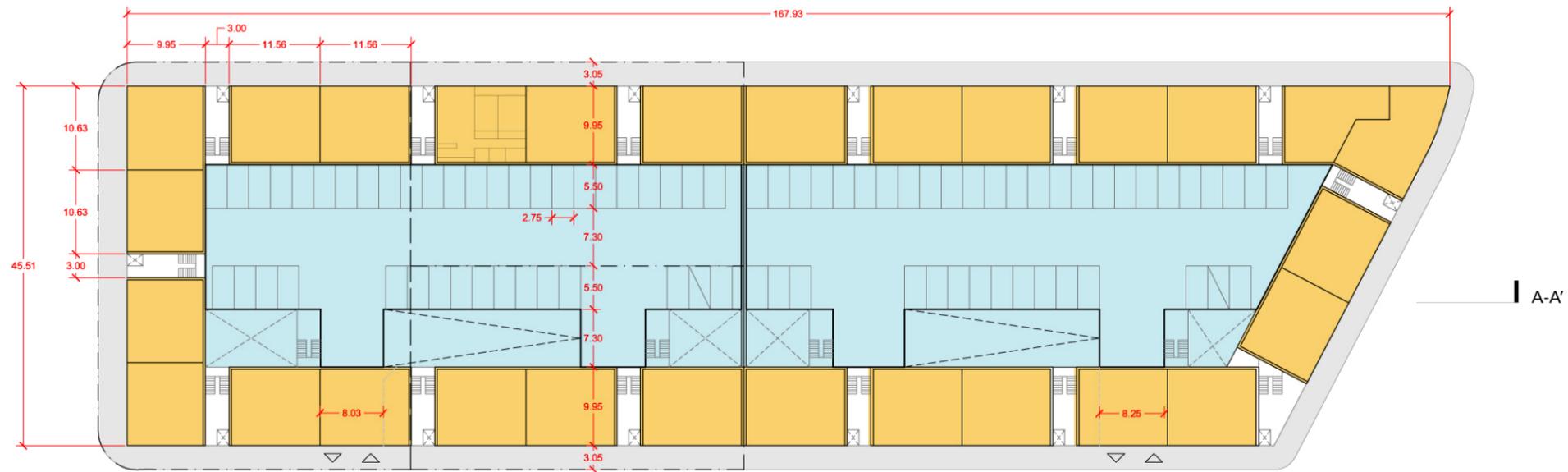
PARKING:  
three-level parking garage    246 spaces

*note: parking totals commensurate with program (1.5 spaces/unit min)*

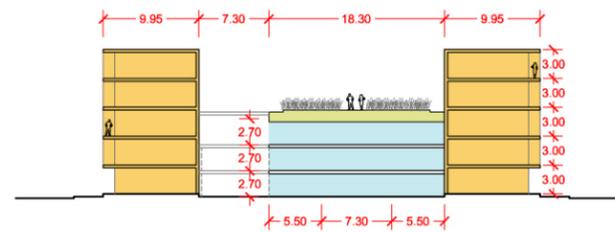
LONG. SECTION A-A'



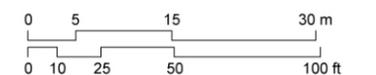
TYPICAL FLOOR PLAN



CROSS SECTION B-B'

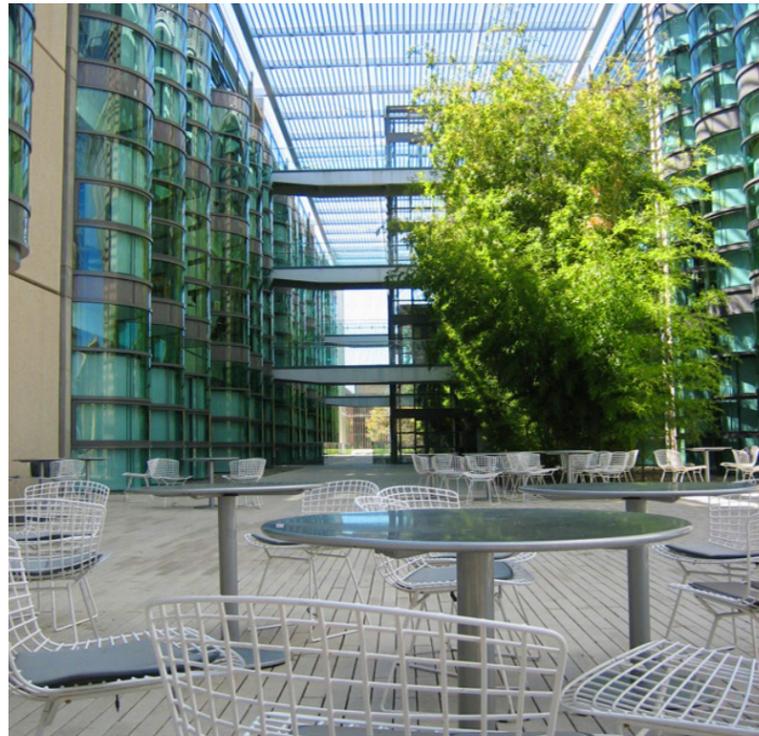


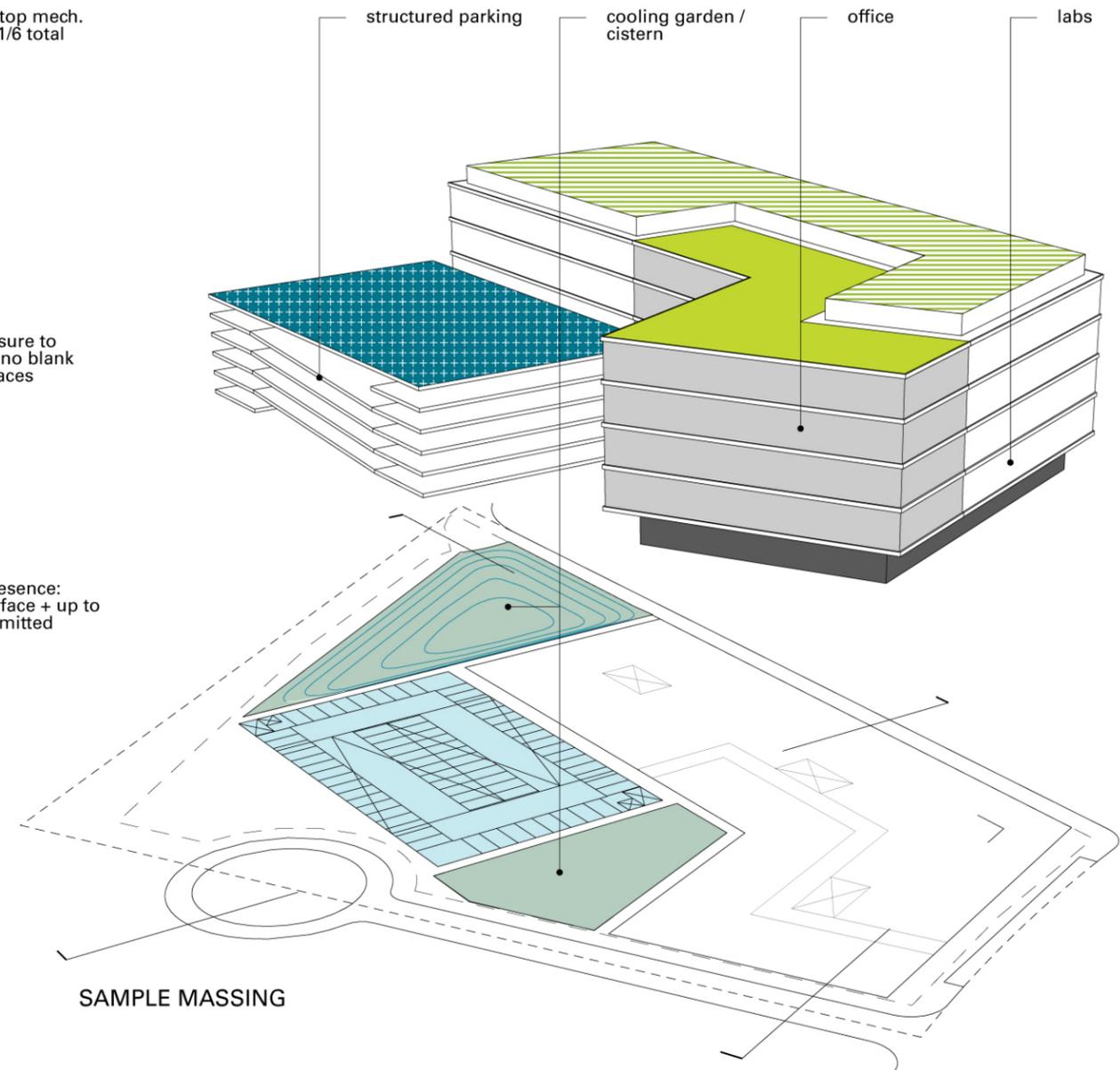
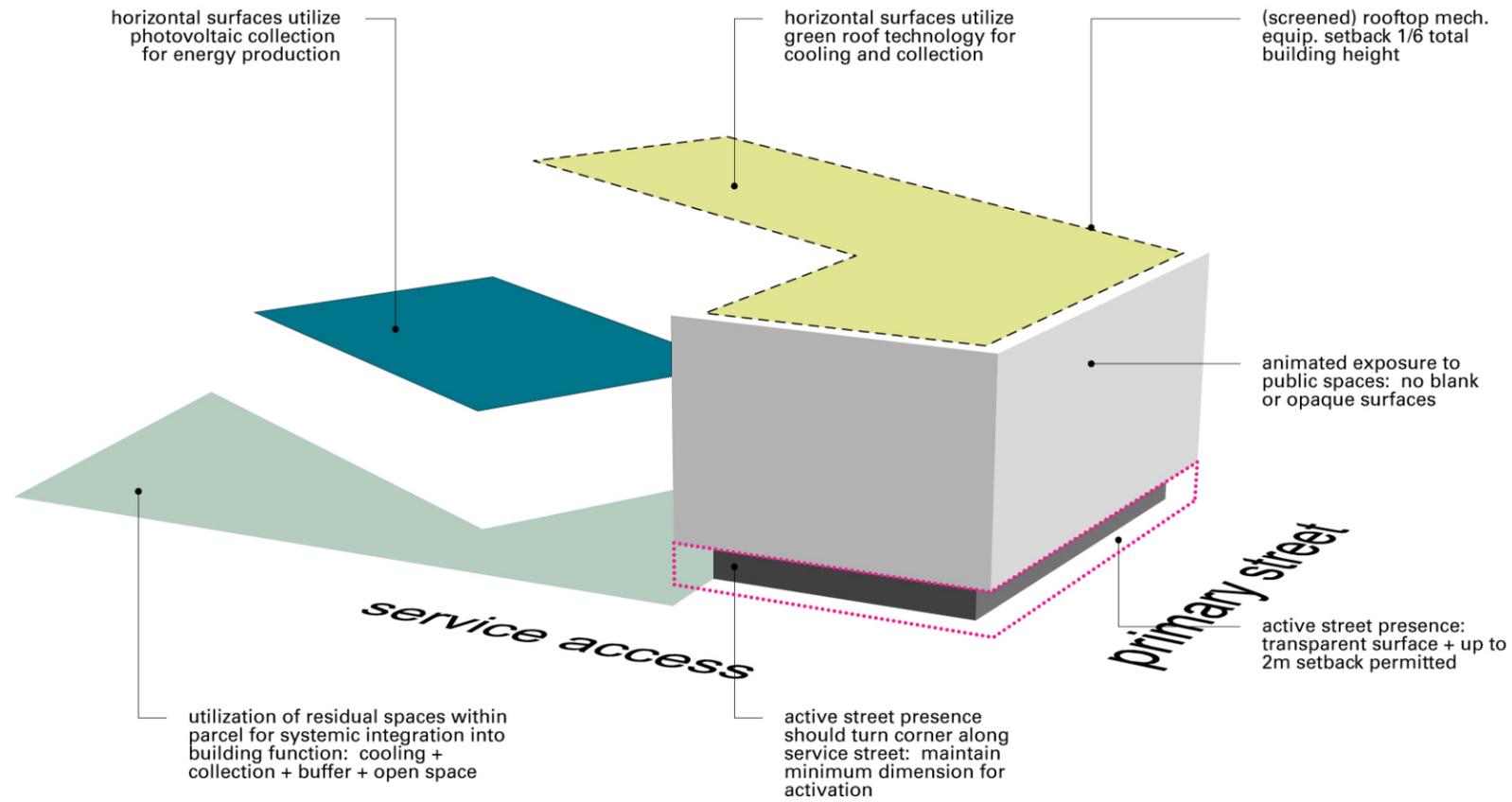
- residential / multi-family
- residential townhouse
- green / open area
- parking
- retail



# LABORATORY PRECEDENTS

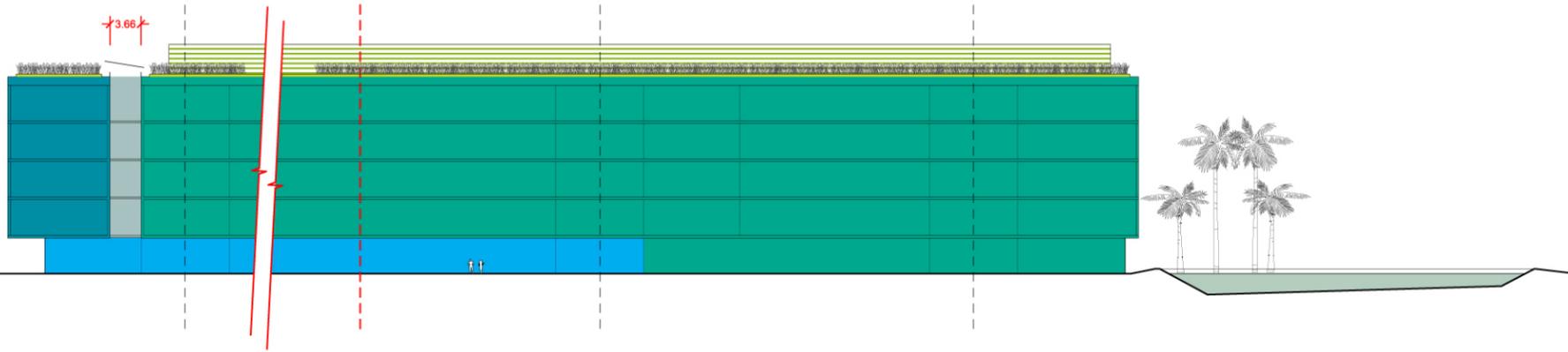




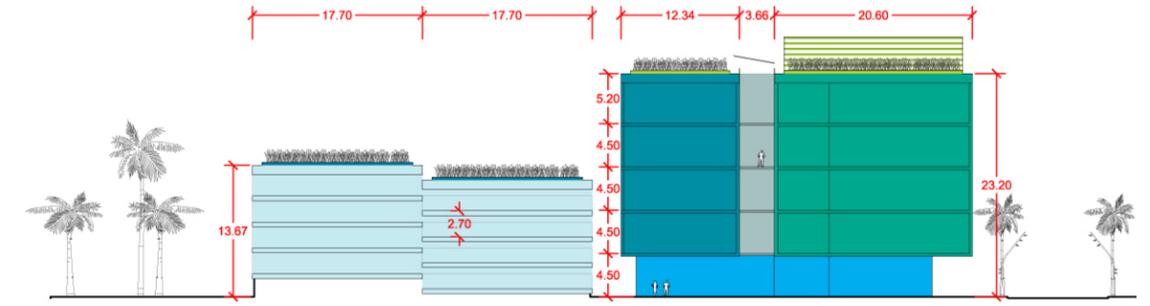


**TPOLOGY DESIGN RECOMMENDATIONS**

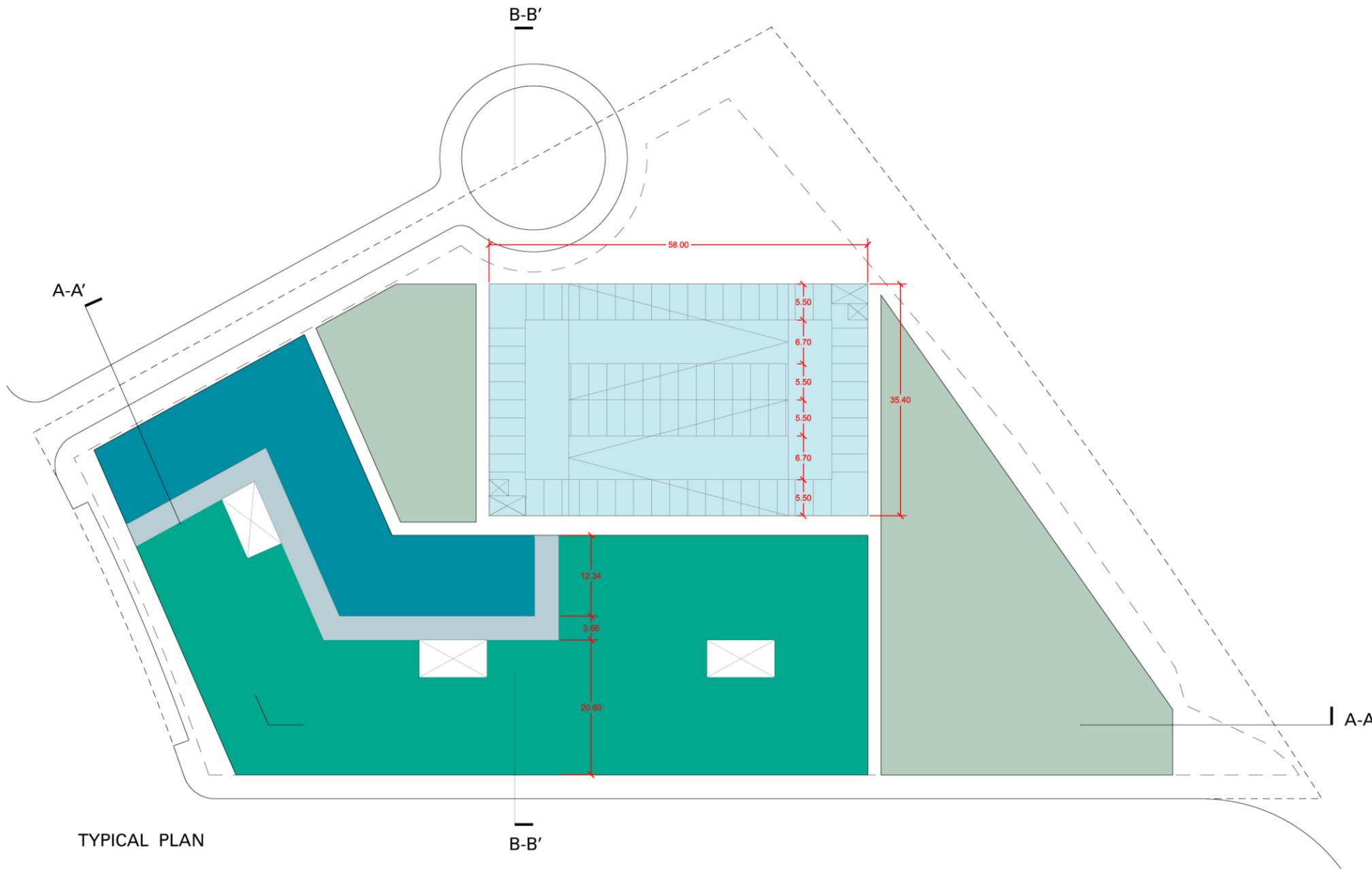
<b>LAB TYPOLOGY</b>	
<b>LABORATORY:</b>	
lab (gross):	141,200 ft <sup>2</sup>
office (gross):	60,600 ft <sup>2</sup> (requires 250 car spaces @ 3 cars / 1,000 f <sup>2</sup> )
other (gross):	48,200 ft <sup>2</sup>
total:	250,000 ft <sup>2</sup>
<b>STRUCTURED PARKING:</b>	
2-bay sloped garage, 4 floors (296 spaces total)	
<i>note: parking totals commensurate with program</i>	



LONGITUDINAL SECTION A-A'



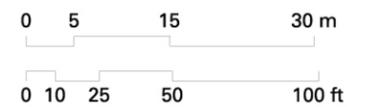
TRANSVERSE SECTION B-B'



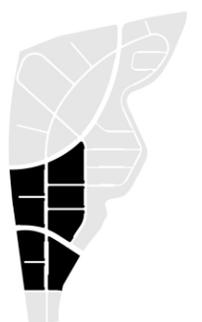
TYPICAL PLAN

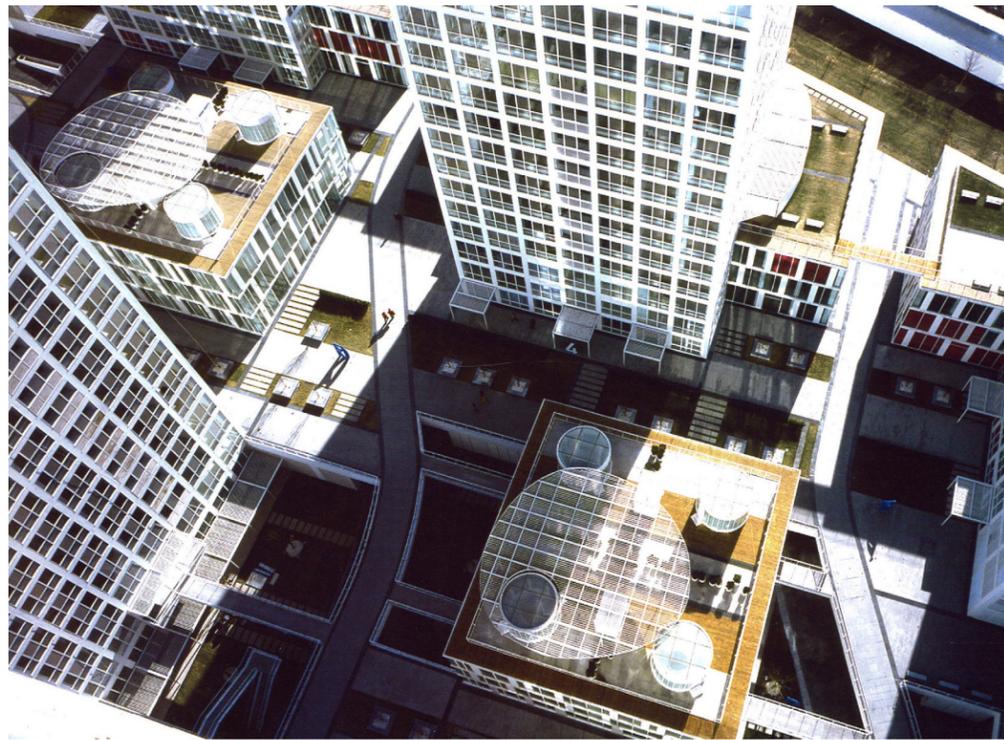
B-B'

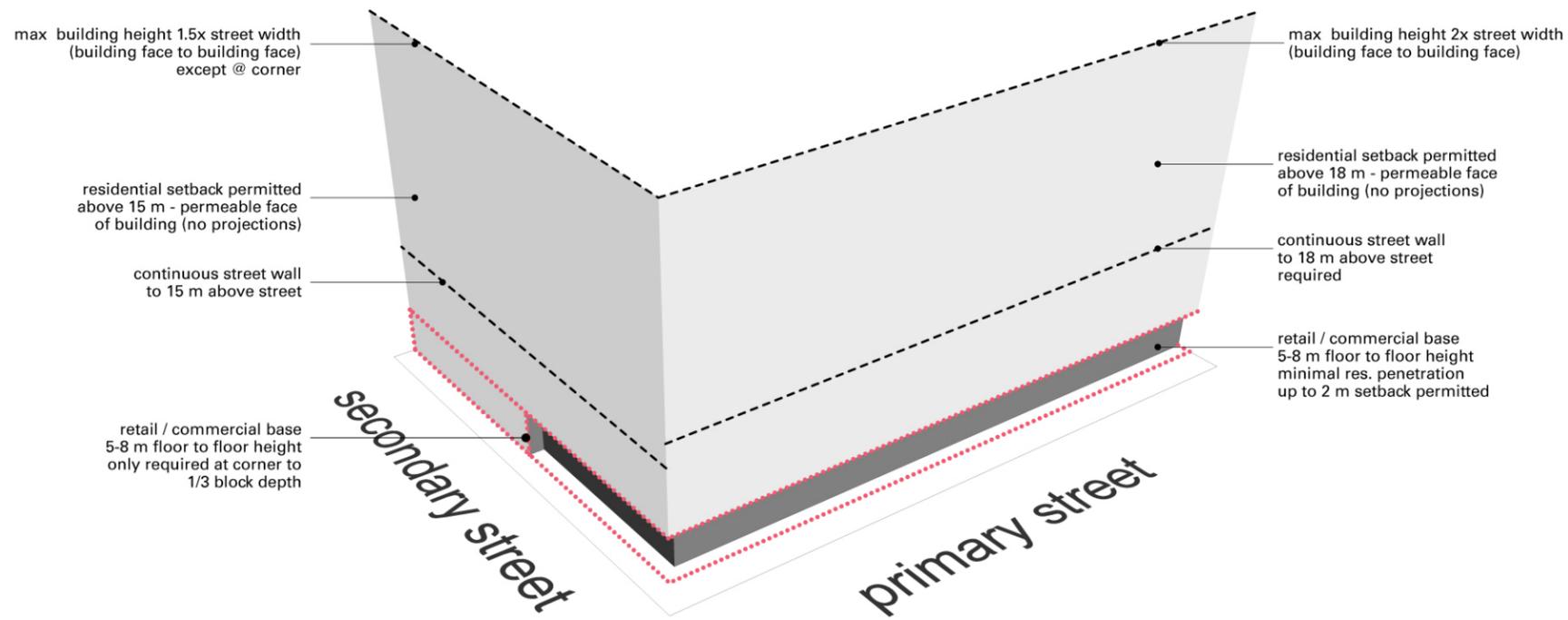
- laboratory
- offices
- public lobby
- circulation
- parking
- open space / cooling garden



# MIXED-USE PRECEDENTS

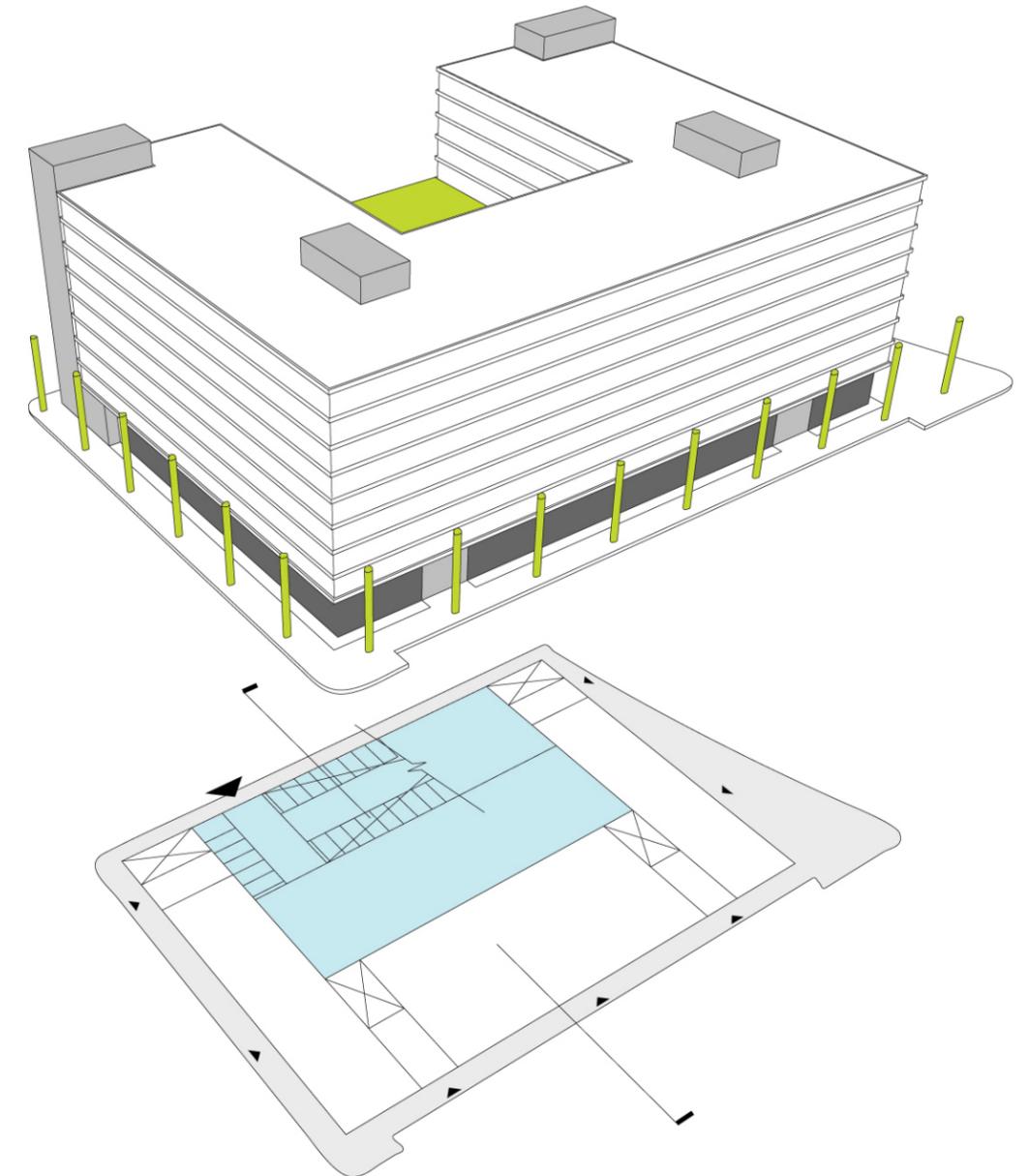




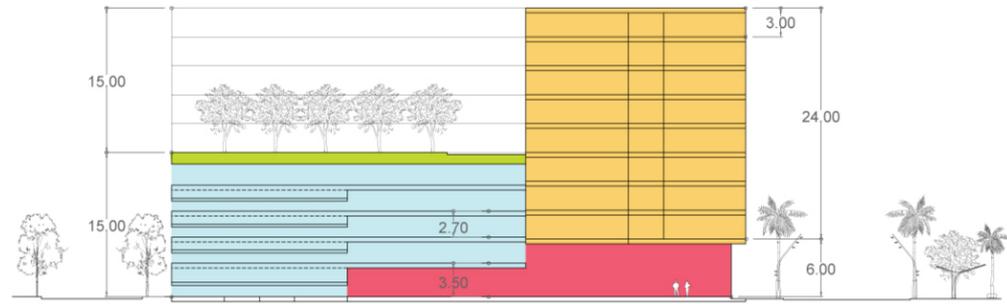


**TYPOLOGY DESIGN RECOMMENDATIONS**

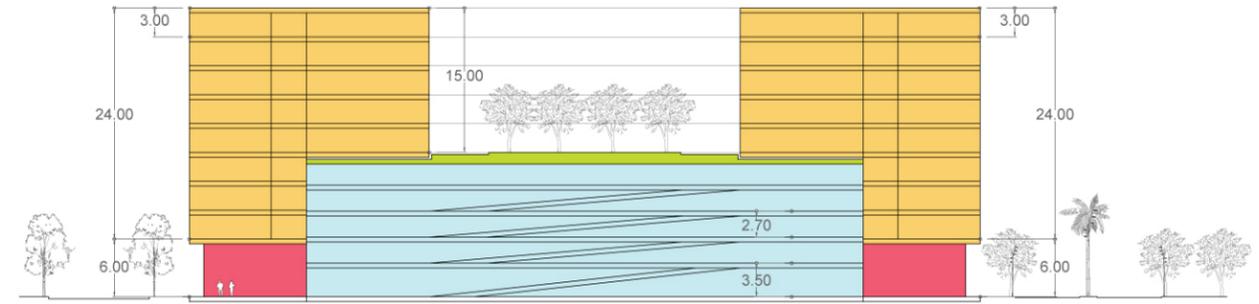
<b>MIXED USE TYPOLOGY - SECONDARY (Alt. 1)</b>	
RETAIL:	20-30,000 sf
RESIDENTIAL:	140-160 units (2 + 3 bedroom) double + single loaded corridor with roof garden
PARKING:	190 ft x 120 ft (58 m x 36.6 m) footprint - 55 spaces per level note: parking totals commensurate with program



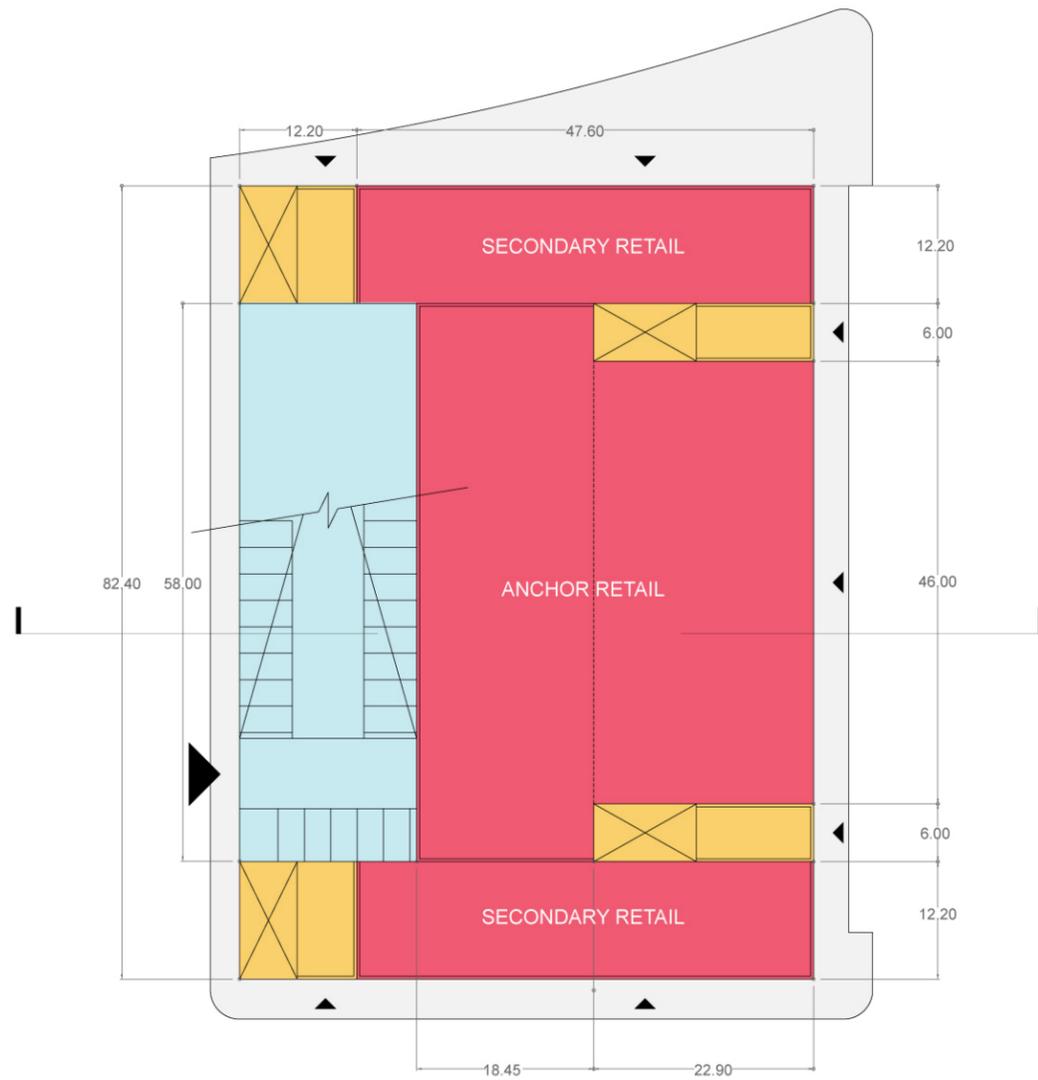
**SAMPLE MASSING**



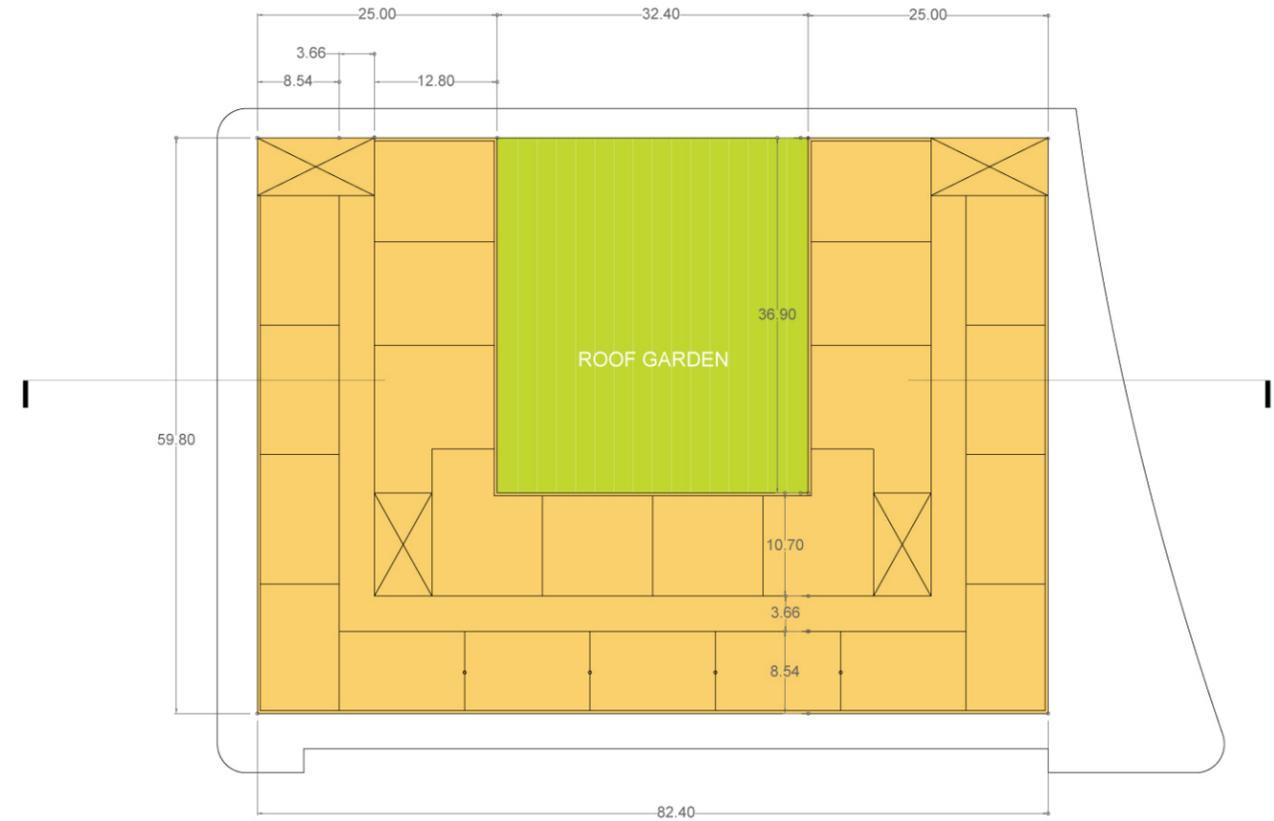
TRANSVERSE SECTION



LONGITUDINAL SECTION

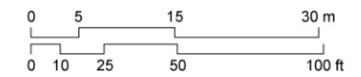


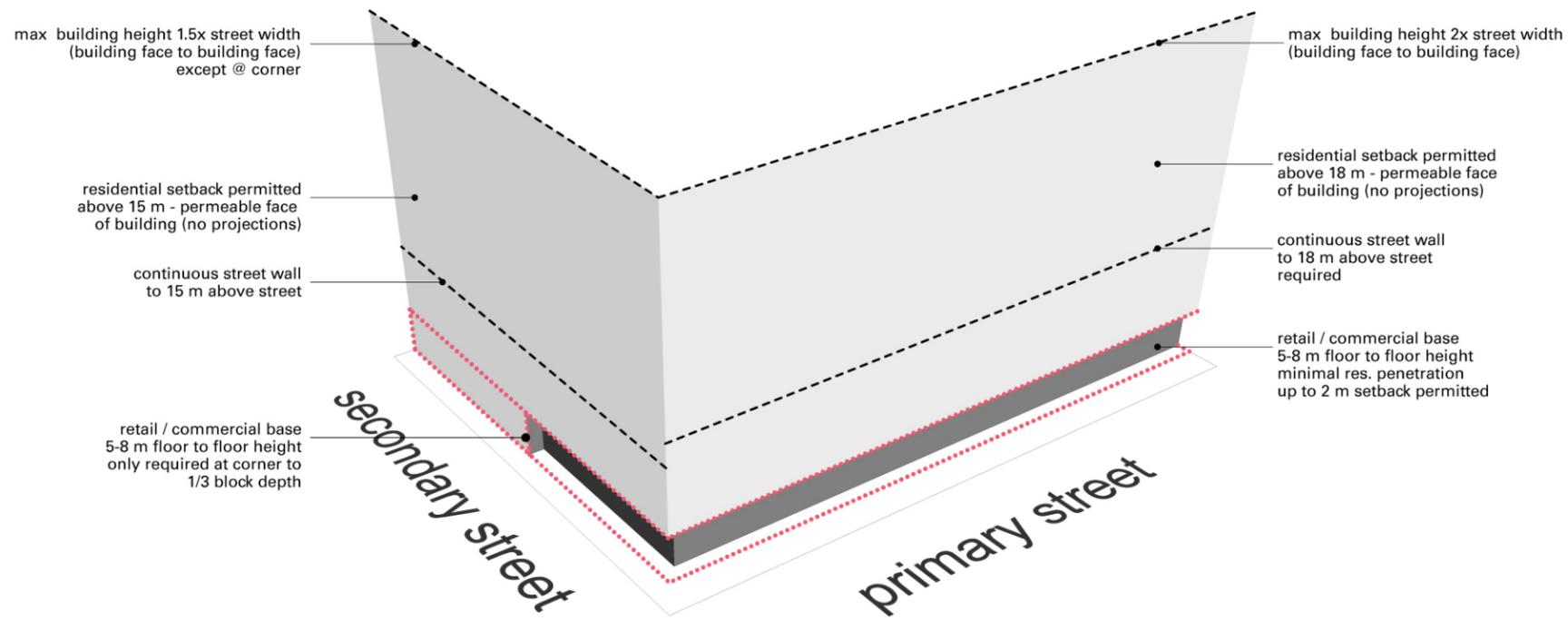
GROUND FLOOR PLAN



TYPICAL RESIDENTIAL FLOOR PLAN

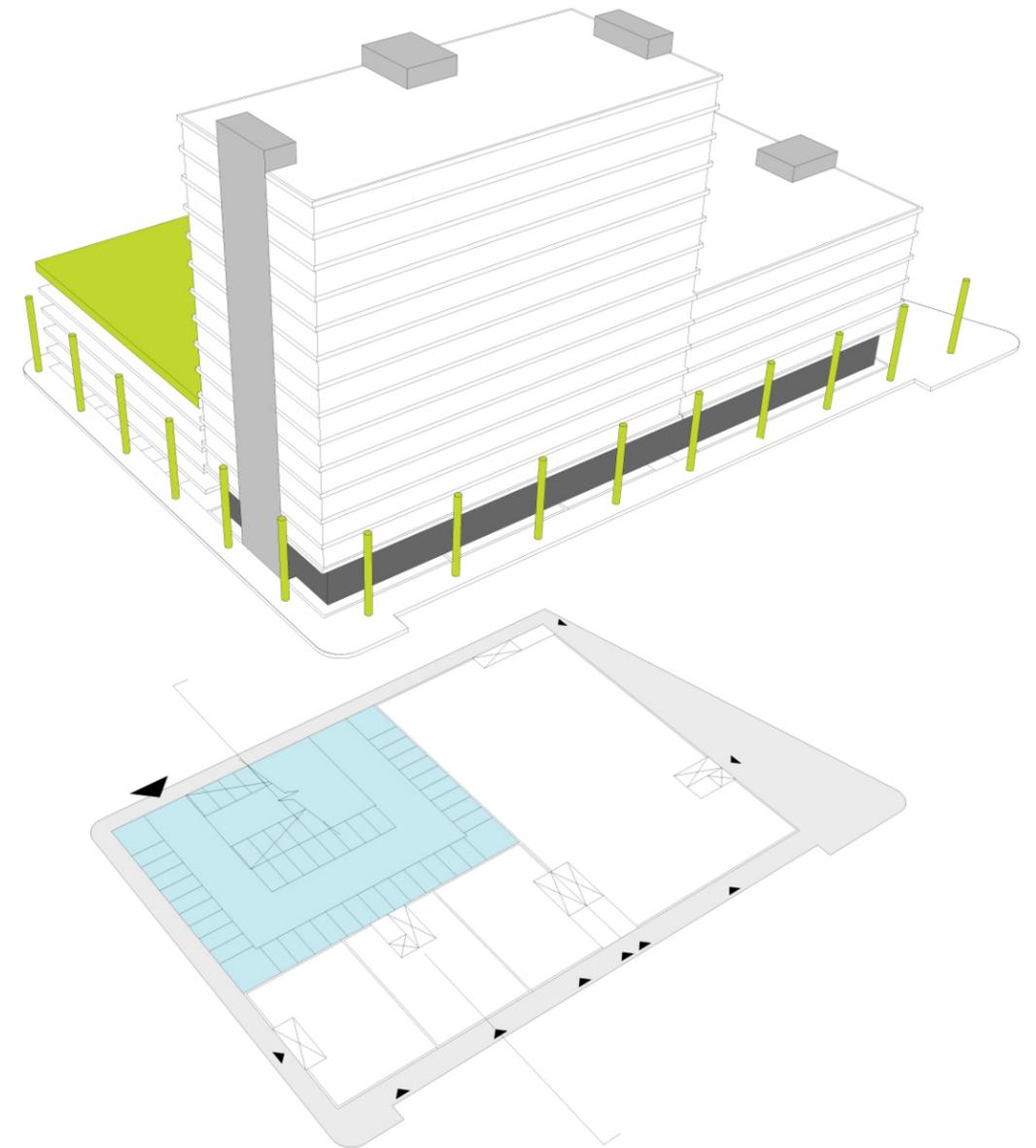
- commercial / retail
- residential
- roof garden
- parking





TYPOLOGY DESIGN RECOMMENDATIONS

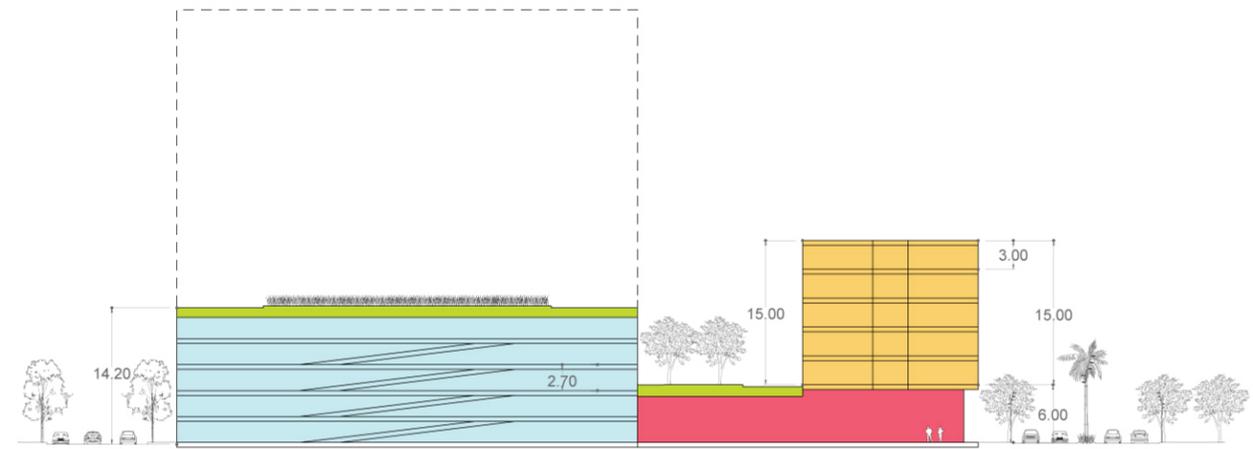
<b>MIXED USE TYPOLOGY - SECONDARY (Alt. 2)</b>	
RETAIL:	20-30,000 sf
RESIDENTIAL:	125-175 units (2 + 3 bedroom) tower / double loaded corridor with roof garden / green roof
PARKING:	158 ft x 120 ft (48 m x 36.6 m) footprint - 45 spaces per level note: parking totals commensurate with program



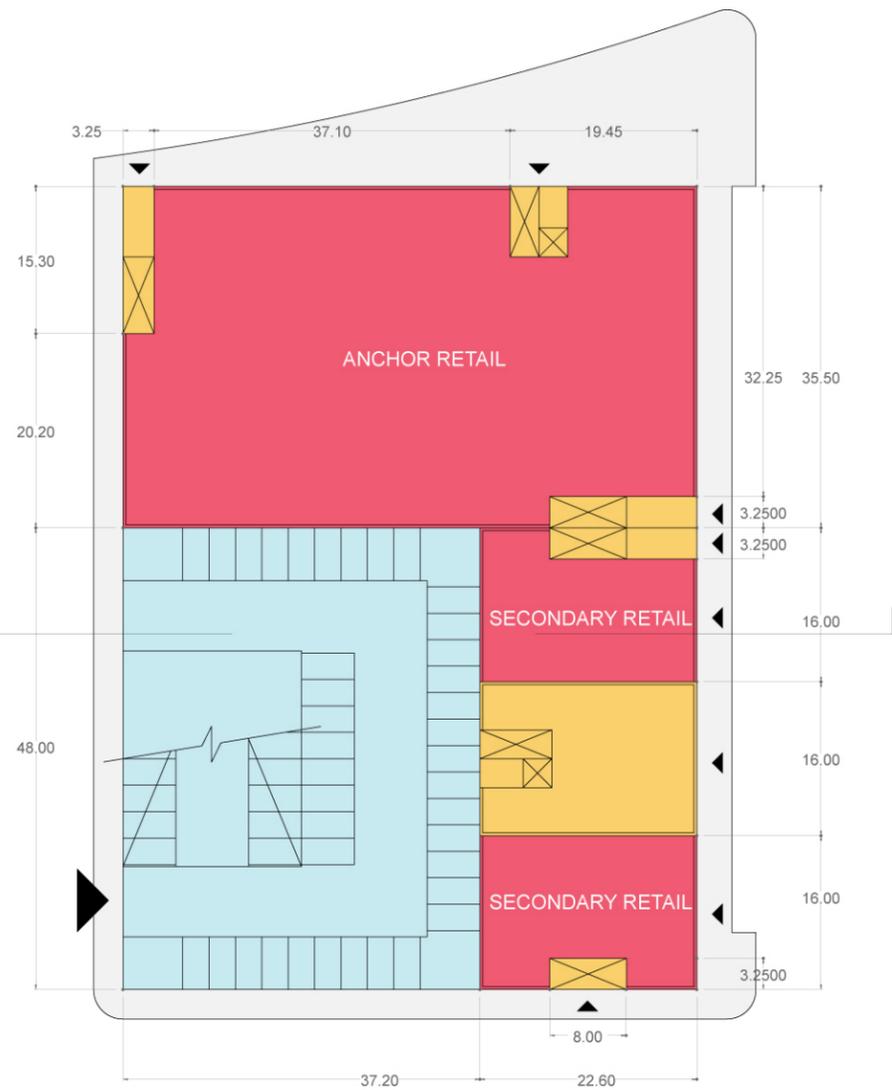
SAMPLE MASSING



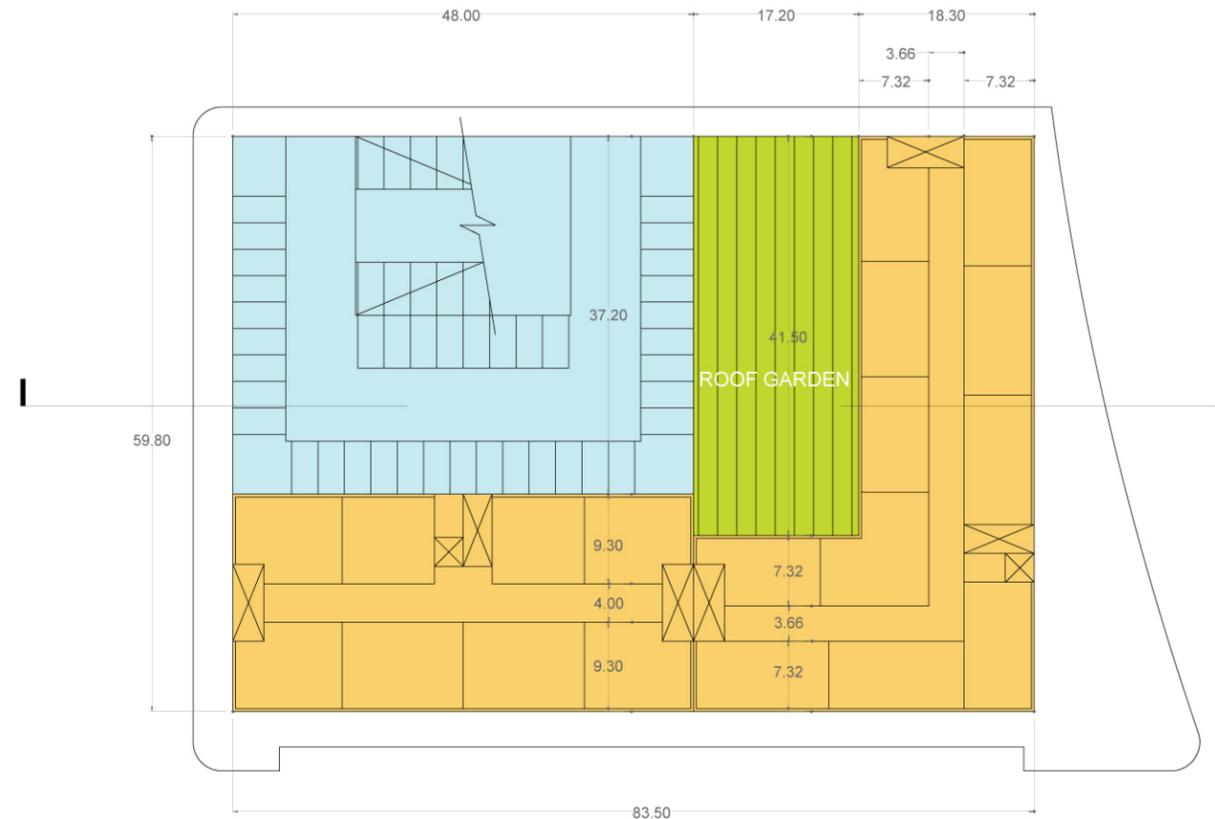
LONGITUDINAL SECTION



TRANSVERSE SECTION

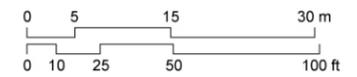


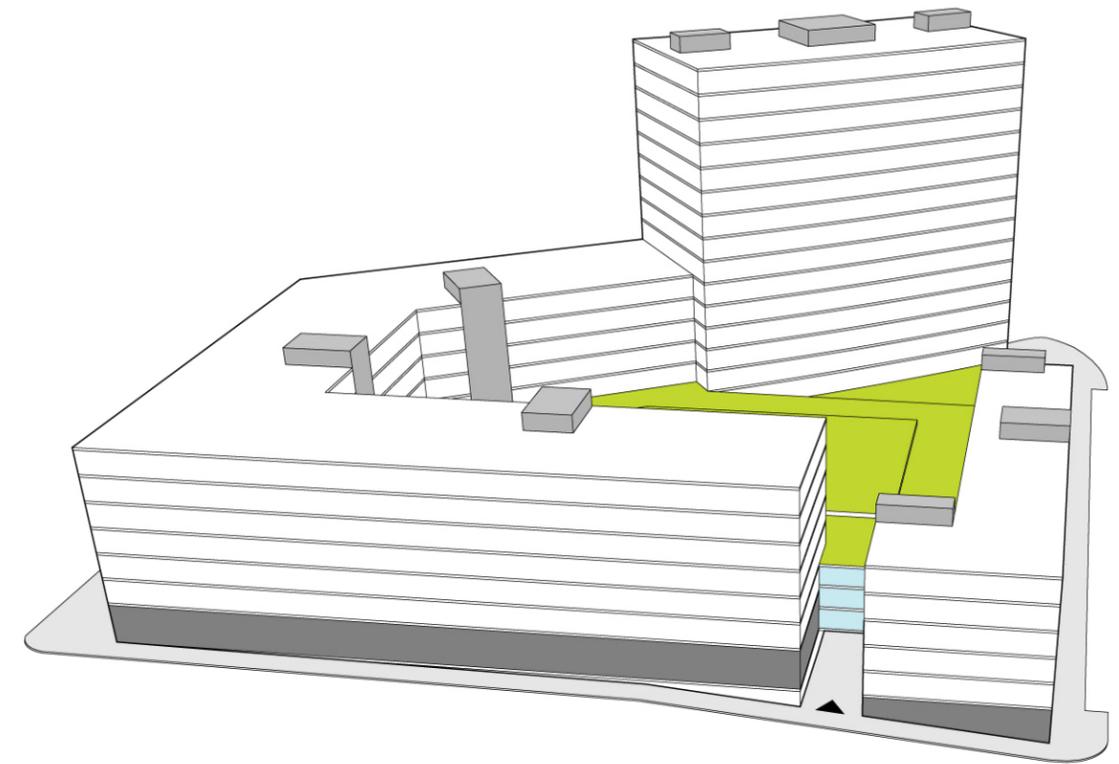
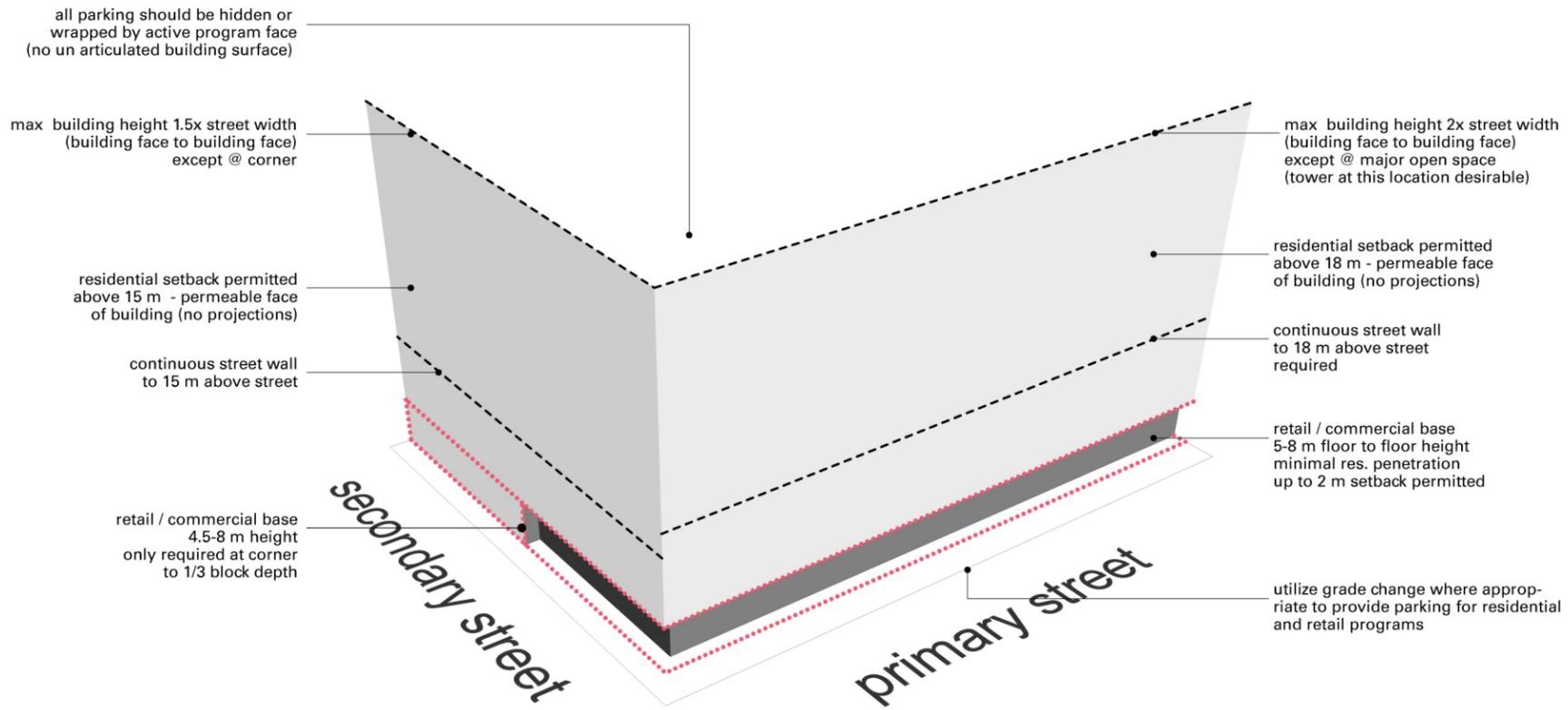
GROUND FLOOR PLAN



TYPICAL RESIDENTIAL FLOOR PLAN

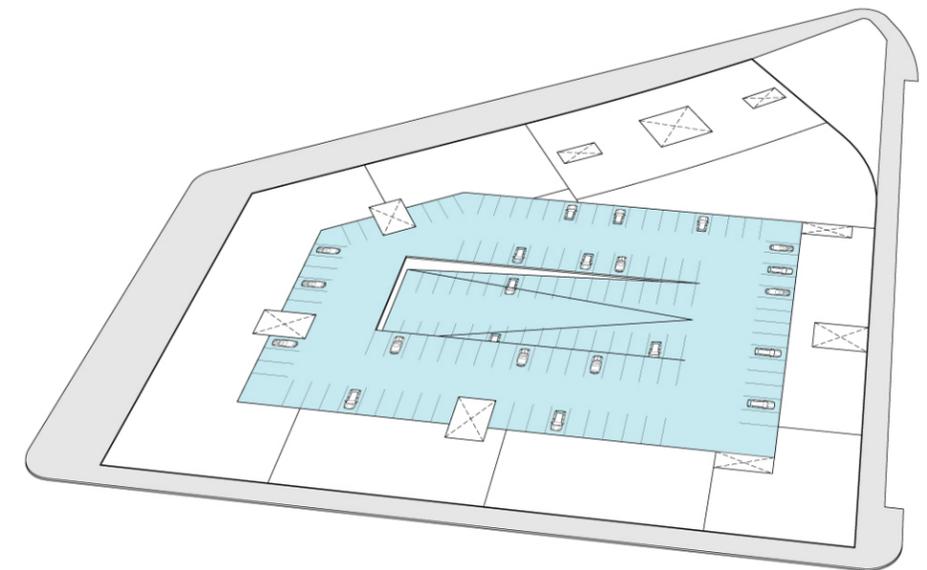
- commercial / retail
- residential
- roof garden / green roof
- parking





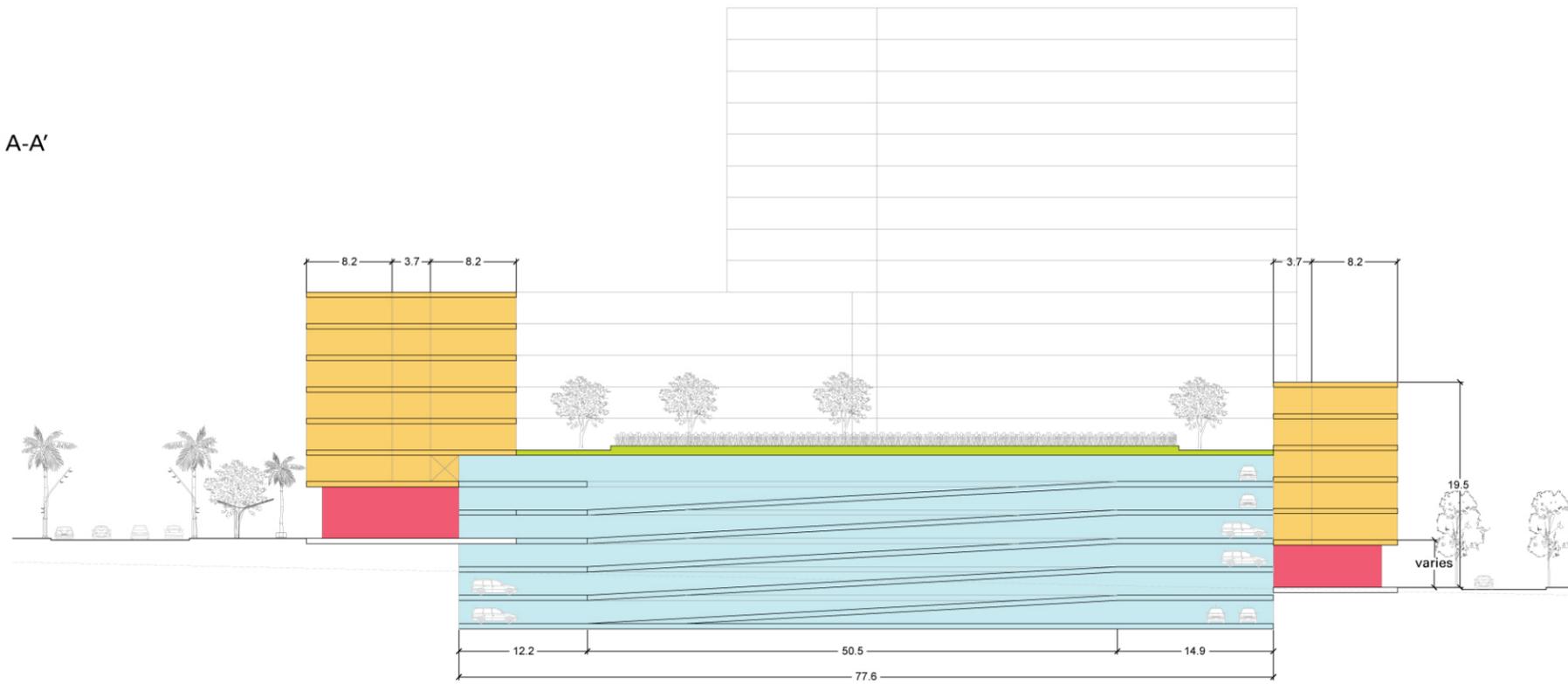
TYPOLOGY DESIGN RECOMMENDATIONS

MIXED USE TYPOLOGY - MEGABLOCK	
RETAIL:	60-100,000 sf
RESIDENTIAL:	180-300 units (2 + 3 bedroom) tower / single + double loaded corridor with roof garden / green roof
PARKING:	varies: 180 ft x 260 ft (55 m x 80 m) footprint - 125 spaces per level note: parking totals commensurate with program

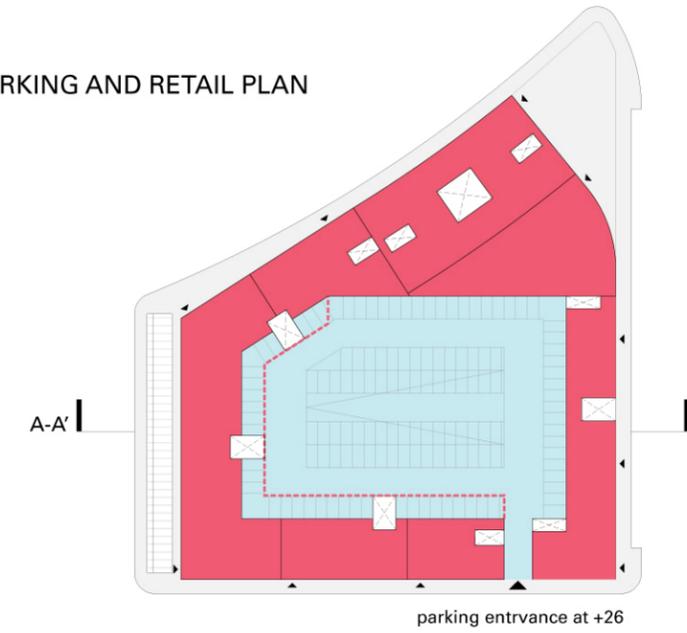


SAMPLE MASSING

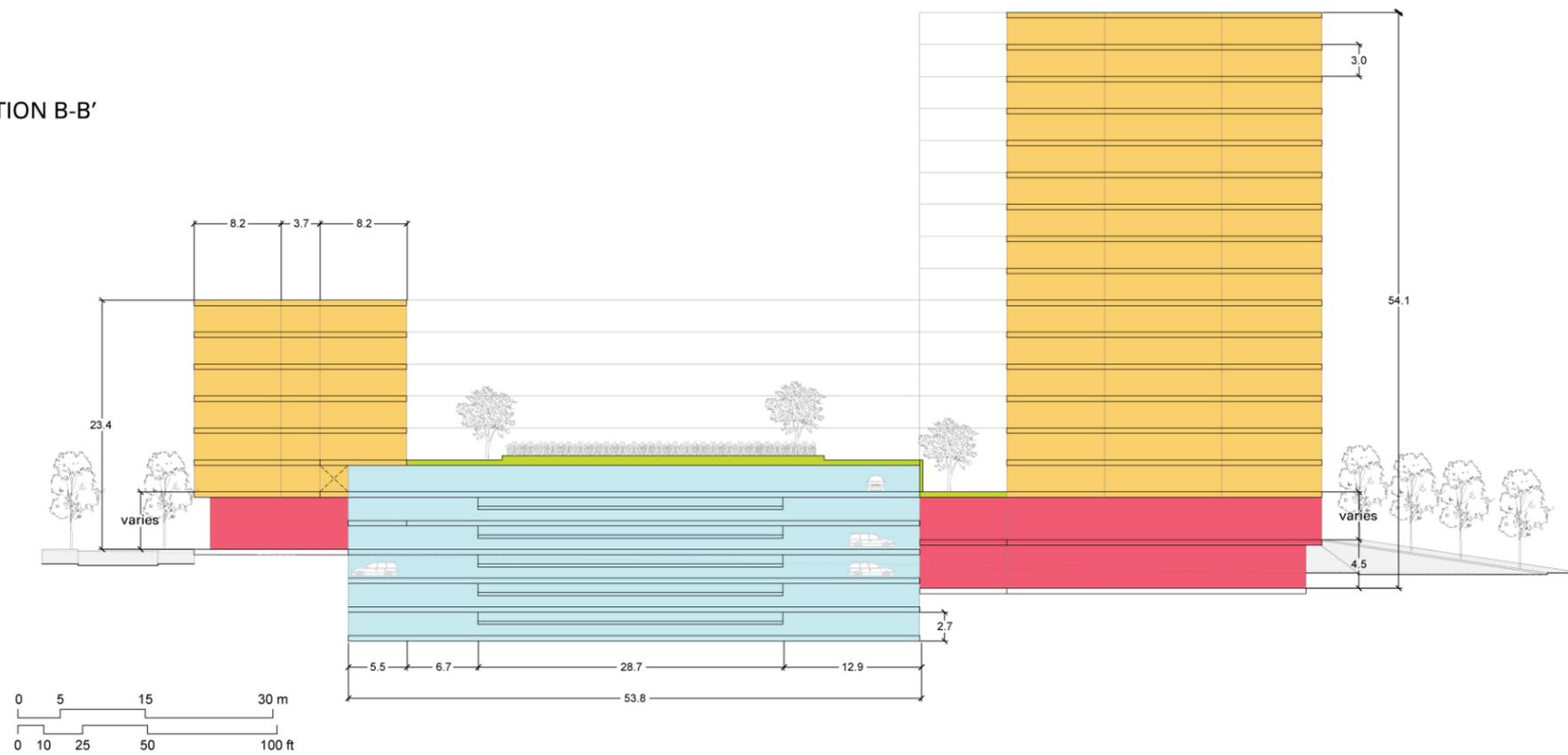
SECTION A-A'



PARKING AND RETAIL PLAN



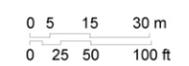
SECTION B-B'



RESIDENTIAL AND ROOF PLAN



- commercial / retail
- residential
- roof garden / green roof
- parking



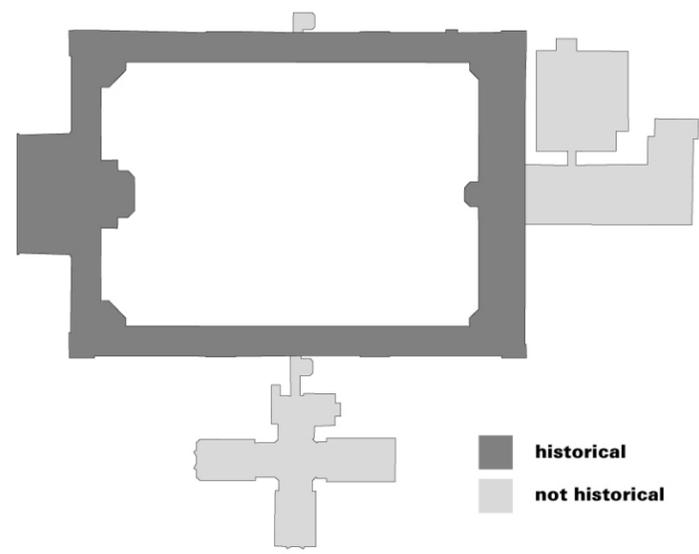
### OSO BLANCO PRISON ADAPTIVE REUSE

A number of studies have been undertaken to determine an appropriate program for, and configuration of the adaptive reuse of the Oso Blanco Prison. While a final decision regarding reuse will be a function of market pressure, we have used today's conditions to propose a primary mix of hotel/conference facilities paired with a residential program. Since the reuse of the former prison building is one of the first projects to be undertaken by the Science, Technology and Research Trust, the project is also envisioned to incorporate office facilities for the Trust as well as a limited quantity of other leasable office space.

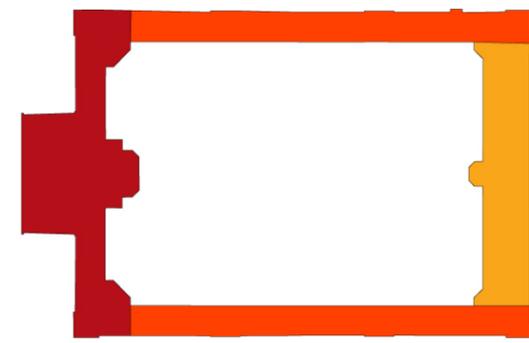
Considering the preservation issues outlined in the Phase II Report (see diagrams below), two basic alternatives are proposed for the reuse of the prison structure: 1) The first scenario leaves the sectional dimension of the three retained historical building legs and proposes a hotel / conference function within them. The head house would become the lobby of the hotel as well as secondary conference facilities, while the long legs would become guest rooms and suites. 2) Scenario two proposes an armature to be attached to the long legs of the prison on the courtyard side, deepening its sectional dimension in order to accommodate residential housing program. In this scenario, the head house would become the STRT office facilities.

In both scenarios, the short tertiary leg is removed and replaced by a bar of conference facilities, accentuated by a tower element above the replaced leg. In scenario one, this tower would include primarily residential program. In scenario two, this tower would provide the hotel element for the development, with potential expansion to include extended stay housing or full residential units.

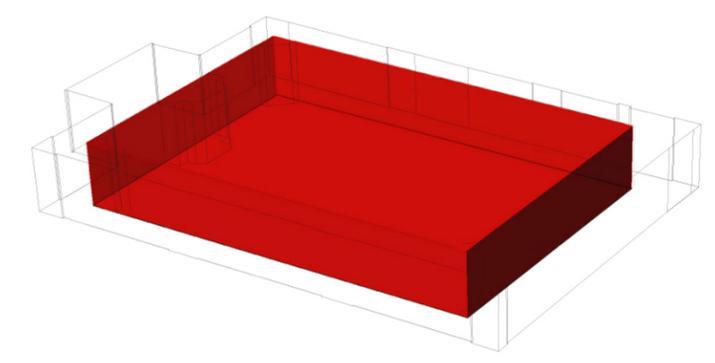
For the purposes of the return on investment report, scenario two has been used in the financial model.



■ historical  
 ■ not historical



**HISTORICAL FACADE PRIORITY**  
 ■ primary  
 ■ secondary  
 ■ tertiary



**MAINTAIN COURTYARD PROPORTION**  
 ■ existing volume of courtyard

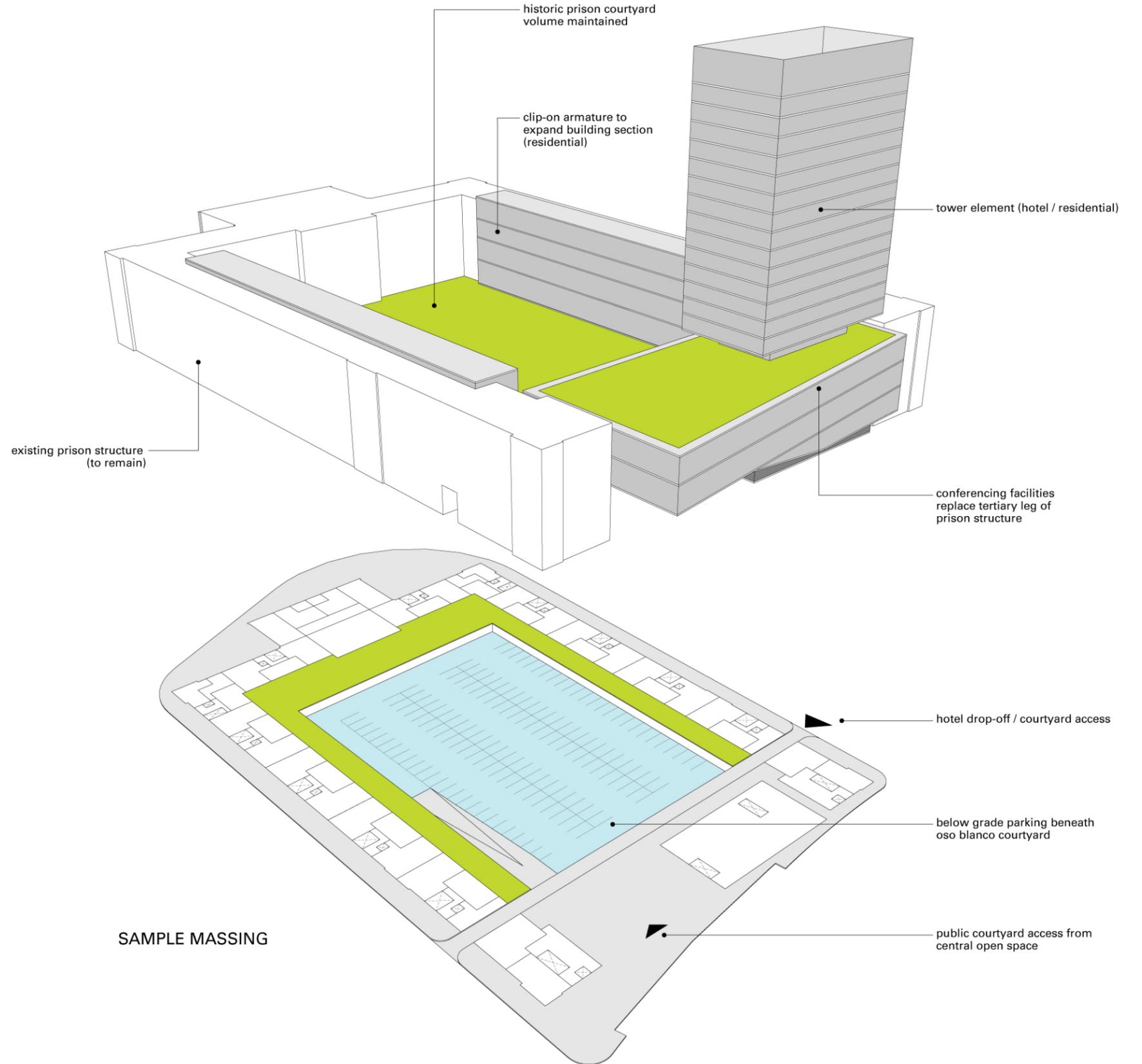




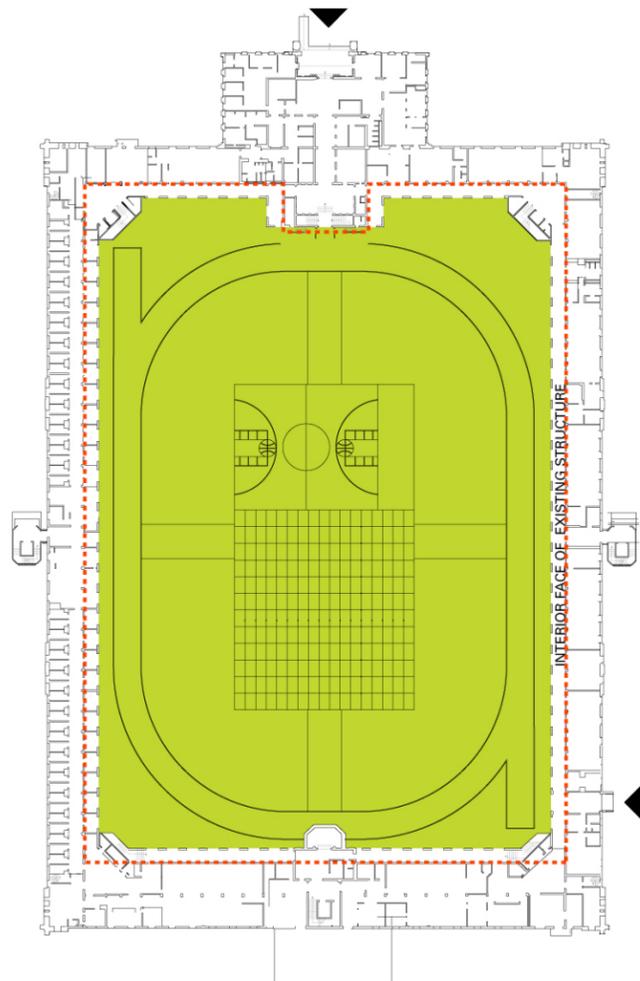
**PRECEDENT: GASOMETER - VIENNA**

This project takes an abandoned public infrastructure and transforms it into an integral piece of urban fabric. Four gasometers were converted into market rate housing by four different world-renown architects - including Jean Nouvel - by adding clip on elements to the basic building structure. In the case of architect Coop Himmelb(l)au, this included a tower element on the outside of the existing structure.

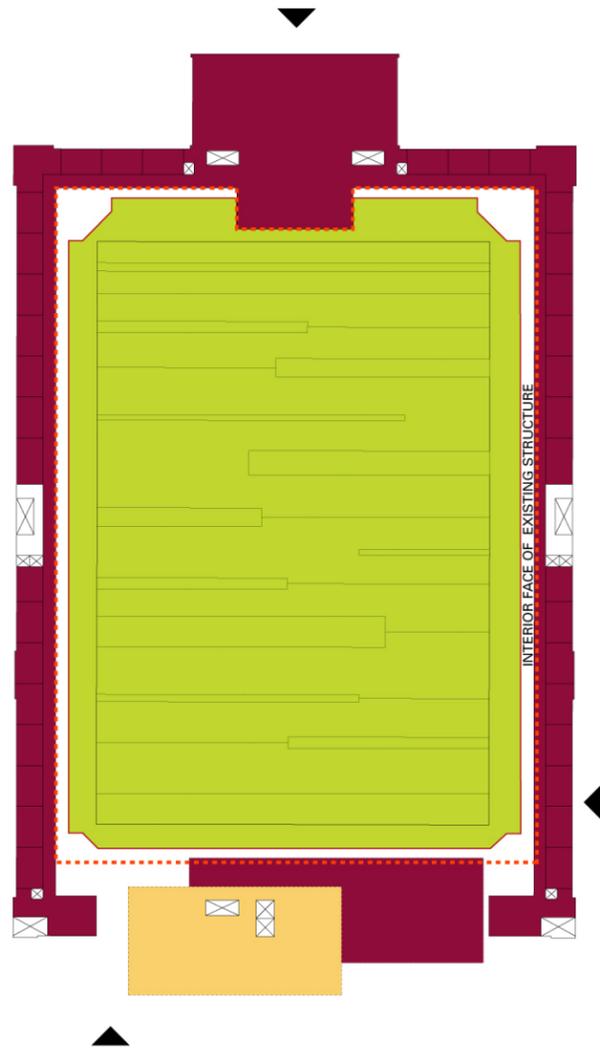
This project is a powerful example of the possibilities in retaining a piece of historic construction without being overburdened or limited by its past.



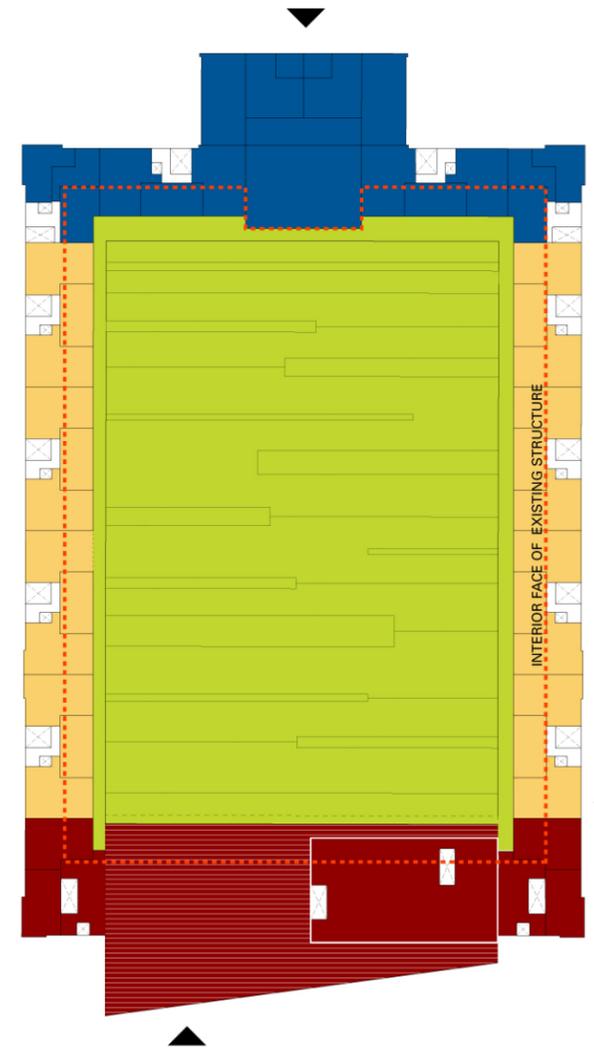
EXISTING OSO BLANCO PRISON



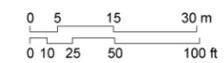
OSO BLANCO SCENARIO 1  
(no change to existing footprint)



OSO BLANCO SCENARIO 2  
(footprint is expanded)



- hotel and conference
- residential
- courtyard
- office









# IMPLEMENTATION STRATEGY

## CRITICAL SUCCESS FACTORS

A number of initiatives must converge at the Oso Blanco/Las Amapolas site in order to achieve implementation of the Science City Master Plan and, as a result, mark the beginning of a new chapter of Economic and Urban Development for Puerto Rico. As much as the Science City is a key component of Puerto Rico's shift to a Knowledge Economy, it also presents a new paradigm for urbanism in a metropolitan area that has been dominated by ad-hoc sprawl during the last 50 years. Planning decisions in Puerto Rico's past now provide the Science, Technology and Research Trust (STRT) with an opportunity to re-imagine Puerto Rico's future urban development while continuing to support manufacturing and research initiatives that will position the Island as a world leader in pharmaceuticals and the life sciences.

Such an opportunity requires Vision.

Economic Development, Science and Urbanism are the primary elements of the Science City. Though this characterization is somewhat reductive, it does not ignore the enormous logistical undertaking (both economic and political) that a project like the Science City necessitates. Operations within each of these categories must be undertaken throughout the process of implementing the Master Plan. Within each of these primary components lies a complex web of efforts, tasks, goals and objectives that must be accomplished to assure success of the Science City.

Projects of the scale of the Science City are complex, multi-phased and financially complicated endeavors. Experience worldwide – particularly in competing mainland markets – has demonstrated the following critical success factors:

**SITE INFRASTRUCTURE:** Only a turnkey-like initiative will attract tenants and developers to invest in a particular development. Science City is designed to provide prepared sites adjacent to world-class public amenities like open spaces and civic facilities within a fully integrated urban environment. Program and facilities will be connected to the Centro Médico Campus – as well as the new Comprehensive Cancer Center and Molecular Sciences Building – through improvements to the existing vehicular network and the eventual expansion of the Tren Urbano transit system. Primary utilities and redundant systems for the lab programs must also be in place to address market requirements of the Life Sciences Industry.

**QUALITY OF LIFE:** The Life Science agenda must attract talent globally and provide a platform for local professionals to remain on-island. The Science City will offer an improved quality of life within a metropolitan development. Dynamic public spaces, recreation alternatives, education and a cosmopolitan 24/7 live/work environment must be provided to assure critical lifestyle elements are as immediate as the infrastructure required for science and research.

**SCIENTIFIC & ENTREPRENEURIAL CREATIVITY:** Well beyond typical tax incentives, the STRT and its Board of Directors must assist the Puerto Rico Government in the creation of legislative projects that foster Research and Development legally as well as financially. Cost protection measures rather than tax exemption; science-oriented legislation; and fully-permitted sites will catalyze development initiatives to support all aspects and layers of the Knowledge Economy at an Island-wide, Corridor and Science City scale. A potential incentive of this type would be the exemption of LEED-compliant urban developments from impact fees and/or municipal taxes within the Knowledge Corridor.

**PERCEIVED FEASIBILITY:** Time is of the essence. The STRT must provide the Science and Development industries with a fully-permitted template that can become an immediate reality in order to compete with other international competitors. With UPR's new Molecular Science Laboratory in Cupey breaking ground, the STRT has evidence of Puerto Rico's commitment to R+D. Making the Science City a reality is the next step.

**METROPOLITAN / ENVIRONMENT FRIENDLY INITIATIVE:** A strong metropolitan district can only benefit from mobility. Fully woven into the new Tren Urbano system, the Science City will provide continuous mass-transit options to its tenants, residents and workforce while contributing to the environment by reducing the reliance on heavily polluting automobiles. High density, mixed use development will support a live/work environment that is inclusive of public space and natural resources at a Science City and Knowledge Corridor level. Compliance requirements with LEED standards will extend the STRT's commitment to the environment through private development initiatives within the Science City Grounds.

**IMPLEMENTATION:** Users will expect a dedicated and autonomous entity – such as the STRT – as a Master Developer. Long term commitments will provide the required consistency in Science-related operations to compete globally while also maintaining an institutional identity for day-to day development initiatives, operations and maintenance. With dedicated support from key utility and government agencies, the STRT could become a stakeholder for the immediate district and promote strong civic relationships with neighboring communities and institutions throughout the Knowledge Corridor.

## **IMPLEMENTATION ENTITY, PRINCIPLES AND ASSUMPTIONS**

The Science City at Oso Blanco/Las Amapolas is the most important strategic development zone within the San Juan Knowledge Corridor. The project presents a coherent programmatic concentration of uses and stakeholders necessary to achieve the goals of the Knowledge Corridor at an immediately realizable scale, while simultaneously acting as a catalyst for redevelopment throughout the broader Corridor territory.

The STRT is the right entity to implement the Science City Vision at all scales and levels given its empowerment by legislative decree. Its policy side will assist in establishing mechanisms that facilitate permit processing times, while its science and “green” agendas locate it at the forefront of the development community in Puerto Rico. The Trust’s public side guarantees that the Life Science initiative is a long term commitment of Puerto Rico – for its people, its economy, and its future.

The STRT will establish a scientific agenda that will clearly define priorities in the Life Science research and development fields. A real estate agenda, guided by the Science City Master Plan, will impact the Knowledge Corridor as a whole by facilitating collaboration between private and public entities and institutions in order to optimize the resources already present within the Knowledge Corridor.

The STRT’s mission to promote a Life Sciences agenda will be achieved by capitalizing the Oso Blanco / Las Amapolas development site through the implementation of the Science City. As a Master Developer – the STRT or its development entity – will not only be responsible for the initial research and development infrastructures, but will also fund nascent R+D initiatives on a short, and potentially long term basis. Within the Science City, these initial research and development infrastructures include a 250,000 SF laboratory/incubator; a hotel with conferencing facilities; and a science magnet school. The Trust will then sell all other development parcels to third parties under a controlled scenario that guarantees maximum financial return, compliance with design guidelines and consistency with the overall Science City Vision.

To be clear, the Science City is being instrumentalized to promote the Island’s new economic development agenda while also functioning as the financial vehicle that drives the Science, Technology and Research Trust. Ultimately, the Trusts’s role in the Science City is the support of a prosperous economic future for Puerto Rico in the Life Sciences and related research and development industries.

Beyond the role of the STRT and its master development entity, a series of planning principles and assumptions underlay the implementation strategies for the Science City:

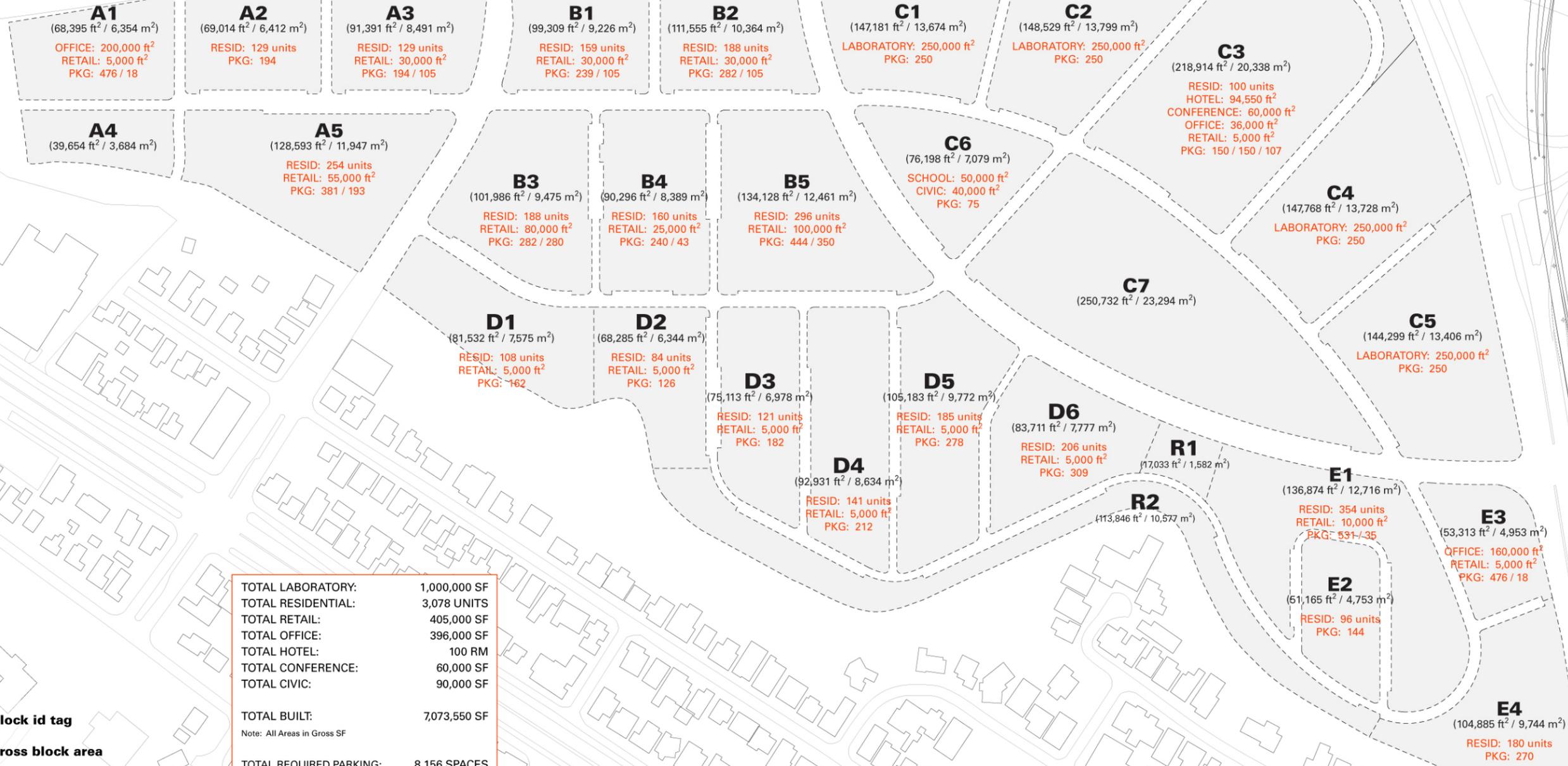
- 1)** The implementation of the Science City will imply reaching a complex set of agreements with those entities with the power to make changes, and at least the passive support of those with the potential to block them. Implementation should be guided by an open decision making process that encourages participation of all levels of government, related institutions, the community and the private sector with particular interest in the future development of the Knowledge Corridor. There are various existing land use, zoning, and institutional mechanisms that could channel the interaction of these interests.
- 2)** Envisioned as a twenty year development process, the Master Plan should be reviewed and/or revised every 5-7 years to react to market conditions as well to programmatic requirements or demands from the residential, commercial, retail or life science industries.
- 3)** The implementation strategy for Science City is rooted in a financial plan based on the proposed Development Template. Its corresponding investment and development schedule is consistent with the financial mechanisms proposed and/or available to assure a return on investment for the STRT – owner and Master Developer of the Science City.
- 4)** Investment in public transit is an action which could significantly improve financial and quality of life conditions over the life span of the Science City project. The recently inaugurated Tren Urbano heavy rail project enables the Science City to become a true Transit-Oriented Development (TOD) initiative that can, over time, allow significant reductions in parking facilities and thus enable higher residential densities and office/retail intensities with a net result of higher values of land and revenues for the STRT. Other means such as, but not limited to, parking meters and car sharing can support the proposed development initiative, either as revenue-generating sources or as cost-reduction alternatives, respectively.
- 5)** Notwithstanding its focus on the research and development community, the Science City should also become a socially diverse district of Metropolitan San Juan. It should provide housing, employment and cultural opportunities for a broad spectrum of the population. The community building strategy of the Science City must also incorporate workforce housing and/or employee assisted housing. An x-ray of the Corridor’s tenants and of the Science City’s programmatic components reflects that such a mix of housing types will be required to achieve a balanced, 24/7 live/work environment.
- 6)** The Science City should be a showcase of innovative urban strategies. The sustainable agenda of the Knowledge Corridor will present through the Science City development template, how mixed-use, high density developments can work for the environment, and in turn will provide the Science City with an immediately recognizable physical identity. The STRT must consider requiring LEED-compliance standards for all development efforts within Science City regardless of the nature of the proposed use. Furthermore, other “green” initiatives and investments at a site scale may also provide sustainable elements that can also contribute to the economic health and productivity of the Science City.
- 7)** Although Puerto Rico is well positioned globally as an industrial and manufacturing leader, it is of the utmost importance that a state of the art communications infrastructure is in place and available for each and every tenant of the Science City. High speed data communications such as microwave and fiber optics must be fully integrated in the proposed development.

## **SCIENCE CITY: OVERALL PHASING STRATEGY**

The overall Science City program calls for a gross square footage of approximately 7,073,550 sq. ft of construction (excluding parking garages) along 25 development blocks (see Development Template Program Summary). Additional lot subdivision could be expected in blocks or parcels where mixed-use developments or stand-alone residential developments are proposed depending on market conditions and/or the final Business Plan to be carried by the STRT development entity. The program mix has been calculated based on the initial assessment for the Research & Development component and the support structure needed for the latter including all other uses that would be required in a city-building strategy for a live/work, 24/7 environment.

The Development Template timetable currently reflects two (2), ten (10) year phases for a total of twenty (20) years for its full-build condition after the rezoning process is completed. An infrastructure implementation plan will see completion within the first phase while the majority of pre-development activities take place from receipt of Title until approximately year three (3). The STRT should expect development ground-breaking for its Life Sciences components as well as for private development initiatives from year three (3) onwards. Phase I, will concentrate activities in the northern section of the proposed Science City (Oso Blanco prison site) while Phase II activities will expand the coverage to the southern section (Las Amapolas site). Some of the planning and management activities of the STRT master development entity will continue throughout the full completion of the various phases of the project.

# PROGRAM DISTRIBUTION



TOTAL LABORATORY:	1,000,000 SF
TOTAL RESIDENTIAL:	3,078 UNITS
TOTAL RETAIL:	405,000 SF
TOTAL OFFICE:	396,000 SF
TOTAL HOTEL:	100 RM
TOTAL CONFERENCE:	60,000 SF
TOTAL CIVIC:	90,000 SF
<b>TOTAL BUILT:</b>	<b>7,073,550 SF</b>
Note: All Areas in Gross SF	
<b>TOTAL REQUIRED PARKING:</b>	<b>8,156 SPACES</b>
Note: Built SF Does Not Include Parking	

**A5** block id tag  
 gross block area



scale 1: 3000

## **PHASE ONE PRE-DEVELOPMENT ACTIVITIES**

Once the properties are transferred to the STRT, the Trust's development entity must commence a schedule-driven implementation plan to assure that infrastructure construction activities can be initiated in year two (2), as proposed by the Implementation Strategy. An initial but comprehensive list of required pre-development activities is summarized herein:

- 1.** Establish a Development Entity and Development Business Plan.
- 2.** Continue communication and branding efforts.
- 3.** The STRT should provide the Department of Transportation and Public Works, the Department of Housing, and the Department of Education with any support required to achieve the transfer of all properties in order to achieve financing means and methods to implement its Business Plan.
- 4.** Prepare and process an Environmental Impact Statement. Only after the FEIS has been filed, a rezoning process must commence with the Puerto Rico Planning Board (PRPB).
- 5.** Complete rezoning effort through a "Consulta de Ubicación" process with the PRPB. The approval of a Science City concept design will define the zoning parameters in conformity to the zoning districts that the Planning Board agrees to recognize as relevant to the proposed development, as well as any other design parameter in respect to accesses, environmental issues, etc.
- 6.** Complete environmental remediation studies and required mitigation actions after completion of relocation activities and before commencement of demolition phase.

- 7.** Complete a package of contract documents for the required environmental mitigation and demolition of all structures in Oso Blanco property, with the exception of the original State Penitentiary known as “Oso Blanco.”
- 8.** Complete infrastructure design, and file a “Desarrollo Preliminar” in ARPE for the Science City, including proposed lotification, site and off-site infrastructure improvements.
- 9.** Establish Public Policies to be reflected in subsequent RFQ/RFP packages that address design quality, sustainability requirements, workforce housing and any other qualities that contribute to the Vision and the Development Model proposed for the Science City.
- 10.** Prepare detailed design guidelines for each development parcel. Organize a Design Review / Excellence Board to assist the Master Development entity in overseeing the implementation of projects with the highest urban and architectural standards.
- 11.** Continue Interagency Coordination and off-site projects – public and private – related to Science City. These include, among other actions: i) Confirming access connections and development parcel configurations for the proposed Comprehensive Cancer Center and Centro Médico Station area. ii) Implementation of transit connection between Science City and Tren Urbano in coordination with PR-HTA projects such as the Caguas extension and Station Area Improvements projects. iii) Input on the Tren Urbano TOD Zoning District project. The STRT must lead changes in the Planning/Regulatory environment by presenting its Corridor-wide agenda and ideas to all applicable parties while its Science City presents the potential results of the initiative.

## PHASE ONE DEVELOPMENT ACTIVITIES (YEARS 3-10)

Phase I will implement all primary infrastructural components over a ten year period while it also initiates Life Science and private development initiatives. Consistent with the city-building strategy, and in order to properly anchor the Life Sciences components, most of the mixed-use retail core north of De Diego Avenue (sector B) will be included in this Phase. Selective stand-alone residential parcels (Sector D) are also included to respond to current market conditions and offer typical residential condominiums with limited or no service retail along their ground floors. Intended to diversify the offer and minimize risk, during Phase I both mixed-use and stand alone residential developments will accompany approximately half a million square feet of Laboratory / Incubator space; a Hotel / Conference Center; and a K-8 magnet school. The Oso Blanco structure will be left in place and modified as an adaptive reuse effort to avoid its deterioration and minimize or eliminate its operation and maintenance costs to the Government of Puerto Rico. Although more than one alternative has been analyzed, each seems to reflect that a mix of uses including hotel, residential and office could be properly incorporated as a potential reuse of the former state penitentiary. Given its sheer size and scale, the Hotel and Conference component, while independent, will be integrated with the existing Oso Blanco Structure physically but not programmatically.

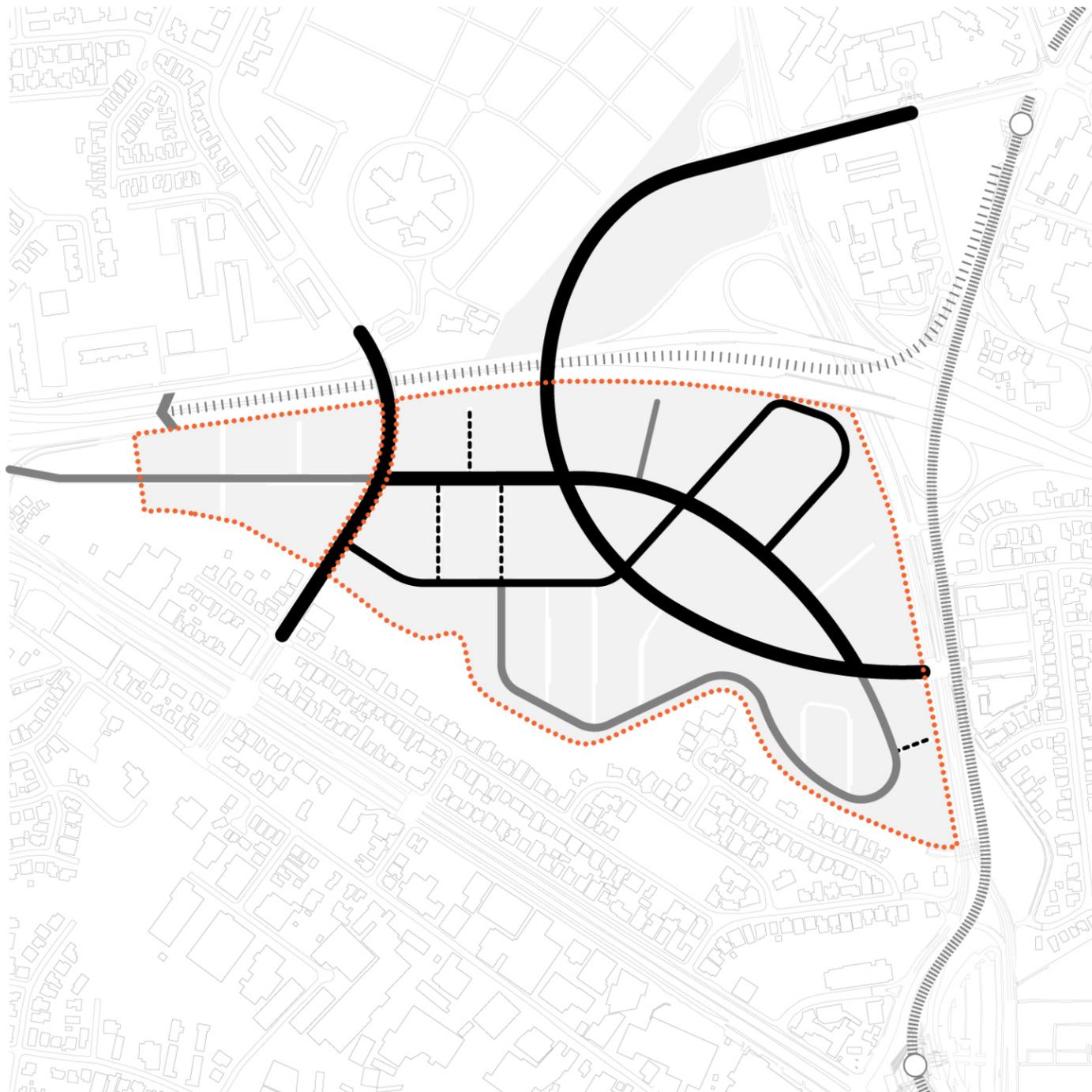
## PHASE ONE INFRASTRUCTURE TEMPLATE

Between years two (2) and seven (7), all site preparation and infrastructure components are expected to be completed. Once the site is cleared, initial efforts will concentrate in roadway infrastructure that will provide connectivity with Centro Medico and encompass the primary public space in Science City. All primary roads including the northern section of the River Walk will be built by the STRT while secondary roads will be required from developers and developments as work progresses within Science City.

The site preparation and infrastructure components include, among others, the following tasks:

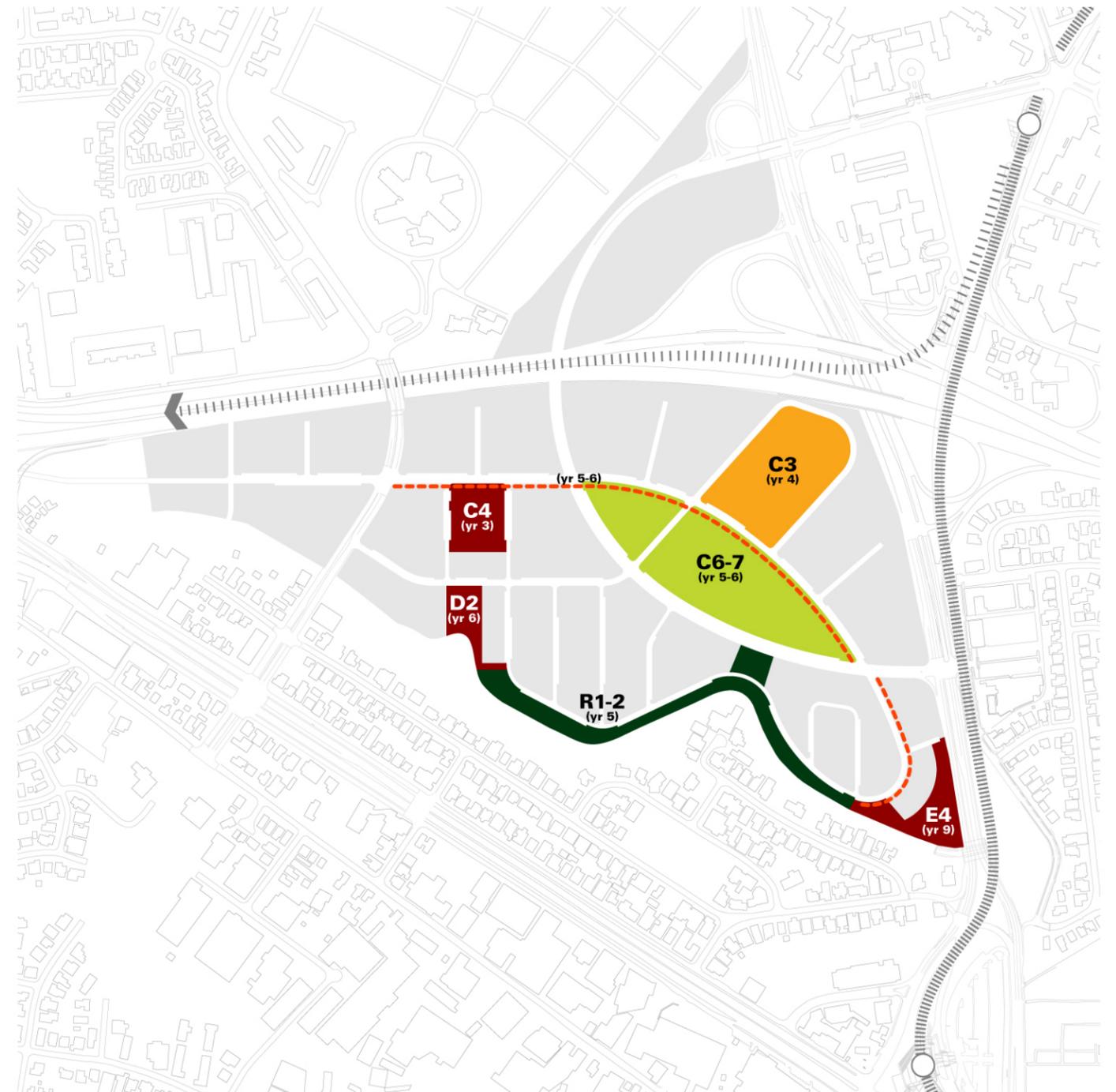
- Environmental Remediation and Demolition
- Roadway network on and off-site
- Transit connections
- Open Space & Landscape
- Utility infrastructure (power, water, sanitary, telecom)
- Sustainable and environment-friendly storm water management
- Cogeneration Plant

# PHASE ONE INFRASTRUCTURE TEMPLATE



## SITE PREPARATION / INFRASTRUCTURE

- thick black line** vehicular infrastructure (year 2-5)
- thin black line** vehicular infrastructure (year 5-7)
- dashed black line** vehicular infrastructure (private development)
- dotted orange line** demolition / site prep (year 2-3)



## OPEN SPACE

- green** central park
- orange** oso blanco courtyard
- dark green** riverway
- dashed red line** pedestrian shade walk
- red** public open space (private development)

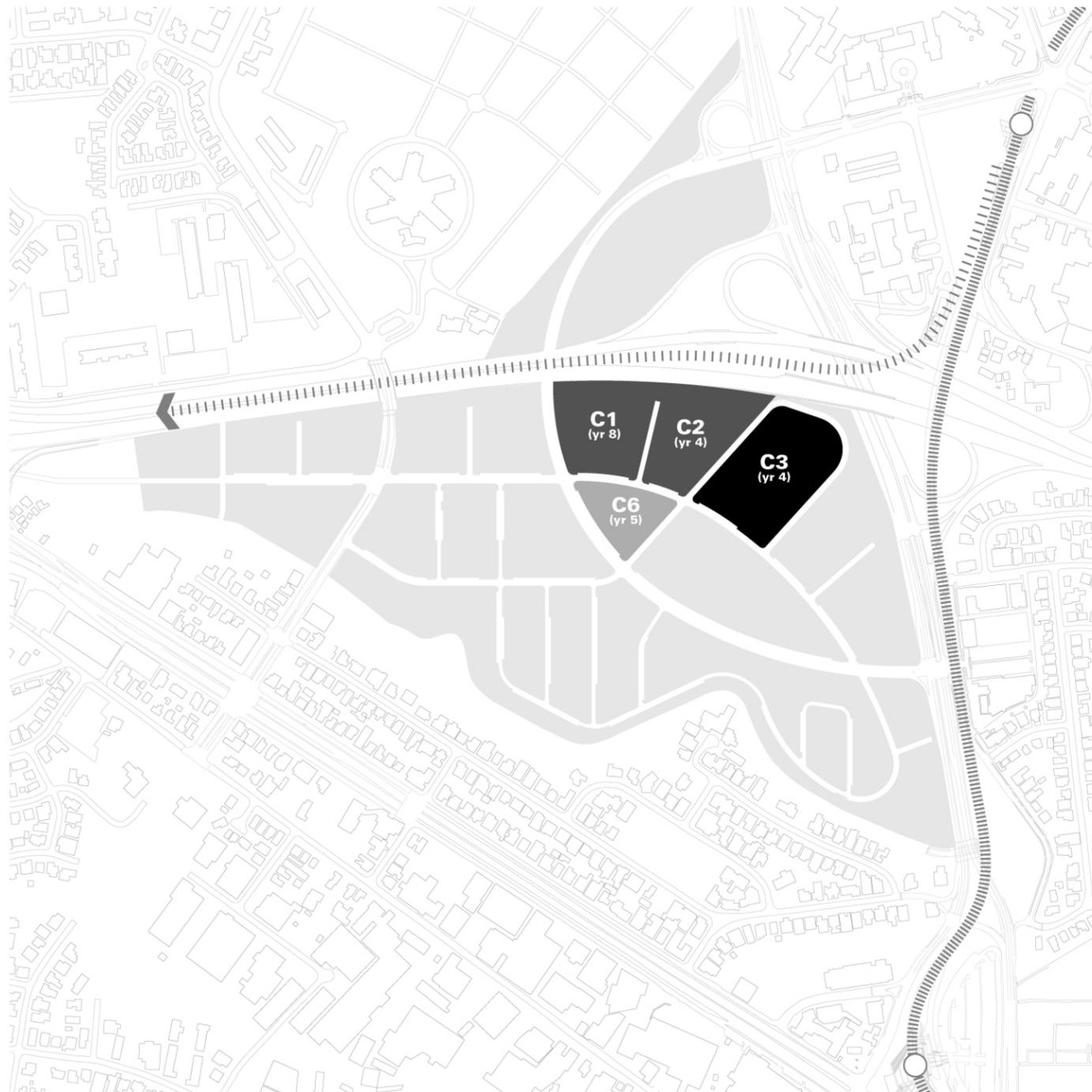
## **PHASE ONE DEVELOPMENT TEMPLATE**

The STRT will develop, as part of Phase I, the Incubator and Laboratories, a hotel and conference center as well as a K-8 magnet school incorporating a multi-use civic center for the Science City community, a Science museum and a public library. Parking for all facilities developed by the STRT will also be built under this phase. Through issuance of RFQs/RFPs, Phase I private development actions currently foresee the mixed use village/town center as the primary place-making element. Its location adjacent to Avenida de Diego and its central plaza surrounded by retail resembles our traditional town cores but at a metropolitan scale, and with the much needed mobility connections that our former town centers lack. To offer distinctive typologies common to the Puerto Rico housing market, a series of stand-alone residential development are integrated in Phase I cater to all spectrums of the San Juan real estate market.

### **Phase One Total Development Program**

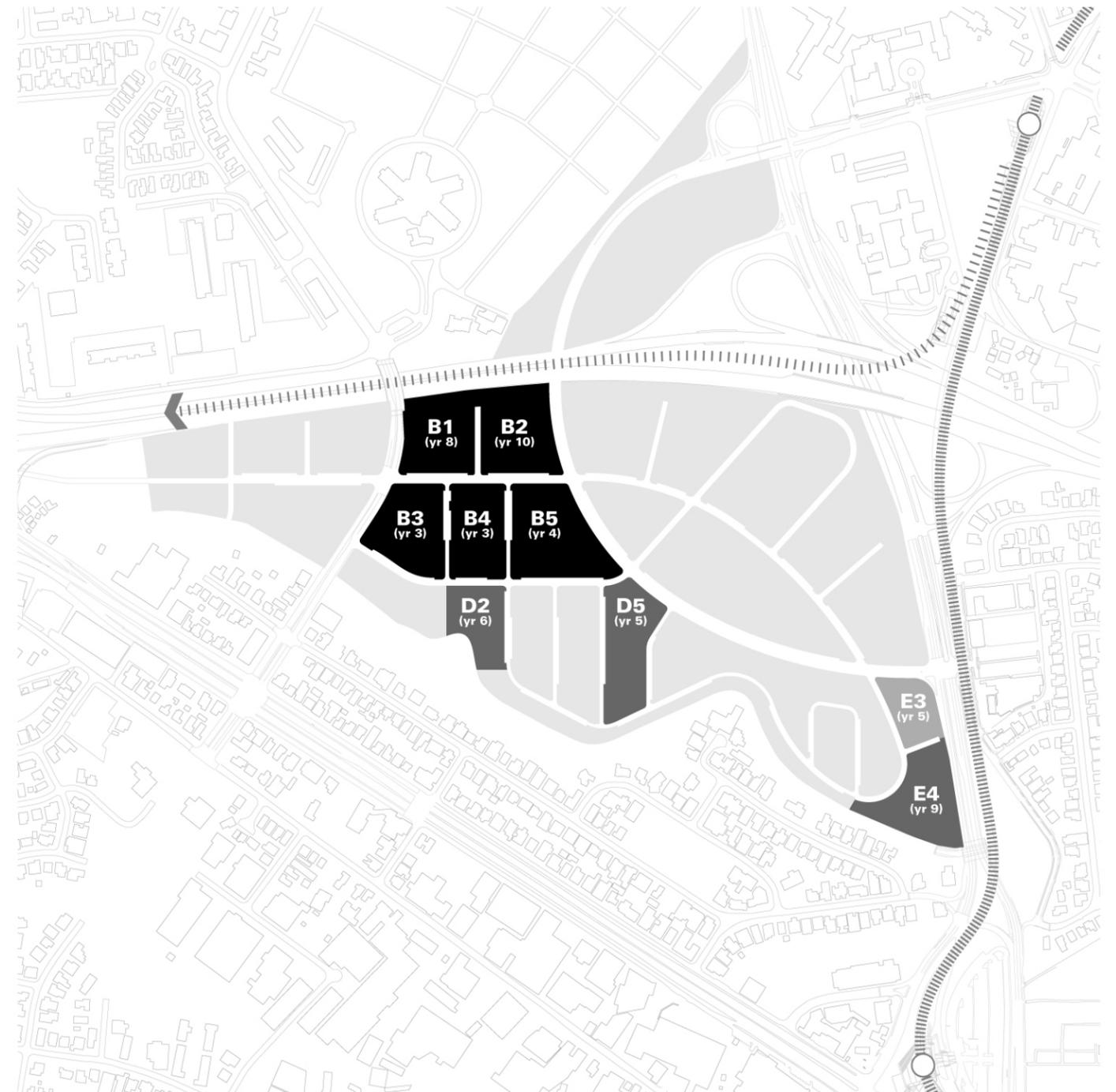
- Laboratories: 500,000 gsf
- Hotel/ Conference Ctr: 154,550 gsf
- Residential: 1540 units
- Office: 196,000 gsf
- Retail 285,500 gsf
- K-8 Math & Science School: 50,000 gsf
- Civic Center: 16,000 gsf
- Science Museum / Library: 24,000 gsf

# PHASE ONE DEVELOPMENT TEMPLATE



## DEVELOPMENT (STRT)

- hotel / conference
- turnkey laboratories
- k-8 school



## DEVELOPMENT (PRIVATE)

- mixed use development
- residential
- medical / professional office

## PHASE TWO (YEARS 11-20)

Phase II will benefit from a metropolitan town center already vibrant and in operation, with adequate retail, public amenities, recreational areas, over 500,000sq ft of R+D facilities, a hotel and office space. Development is anticipated to concentrate in the southern section of the Science City (Las Amapolas property, Sector A), as well as along the eastern most edge of Oso Blanco, adjacent to the Antonsanti neighborhood (Sector D and E), Phase II will complete the Science City program with a second core of mixed use facilities, and a series of stand-alone parcels that will present a cohesive set of masses defining and marking the eastern edge of Science City. To the north, the remaining 50% program related to the Life Sciences agenda will be developed by third parties to complete the development mass around the primary open space and mark the completion of the Oso Blanco/Las Amapolas development efforts.

## PHASE TWO INFRASTRUCTURE TEMPLATE

While the vast majority of the primary infrastructure components are implemented as part of Phase I, Phase II will complete the framework by developing most secondary roads within the science city through private sources. Completing the mobility network will fully integrate the science city's recreational and open spaces into the overall urban fabric.

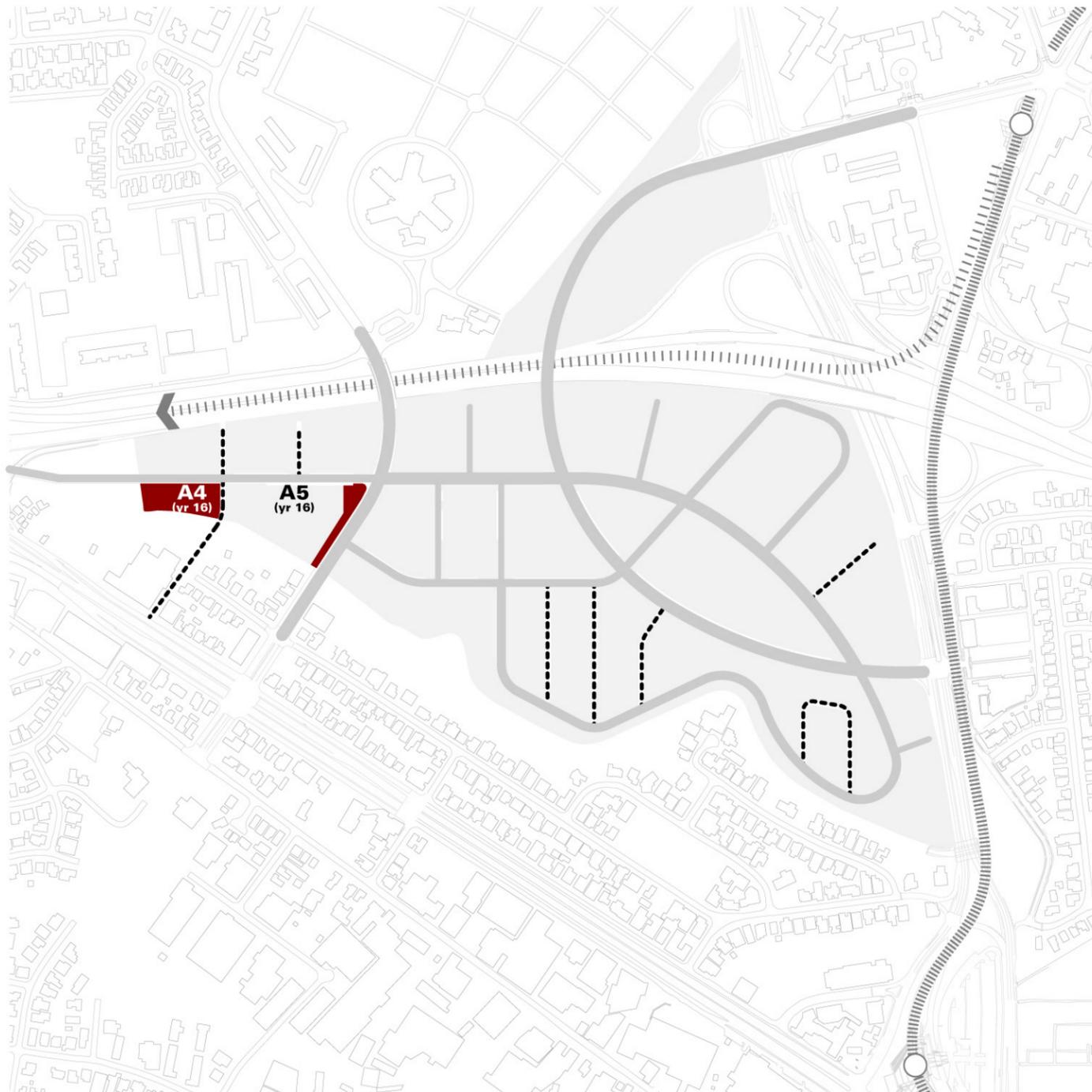
## PHASE TWO DEVELOPMENT TEMPLATE

Development activities during this phase will impact the remaining half of the blocks defined in the proposed Development Template. They will be implemented by the private sector throughout a competitive process organized and managed by the STRT Master Development Entity. Among these activities, two laboratory buildings are expected to be constructed by private developers on parcels to be issued through RFP's by the STRT.

### Phase II Total Development Program

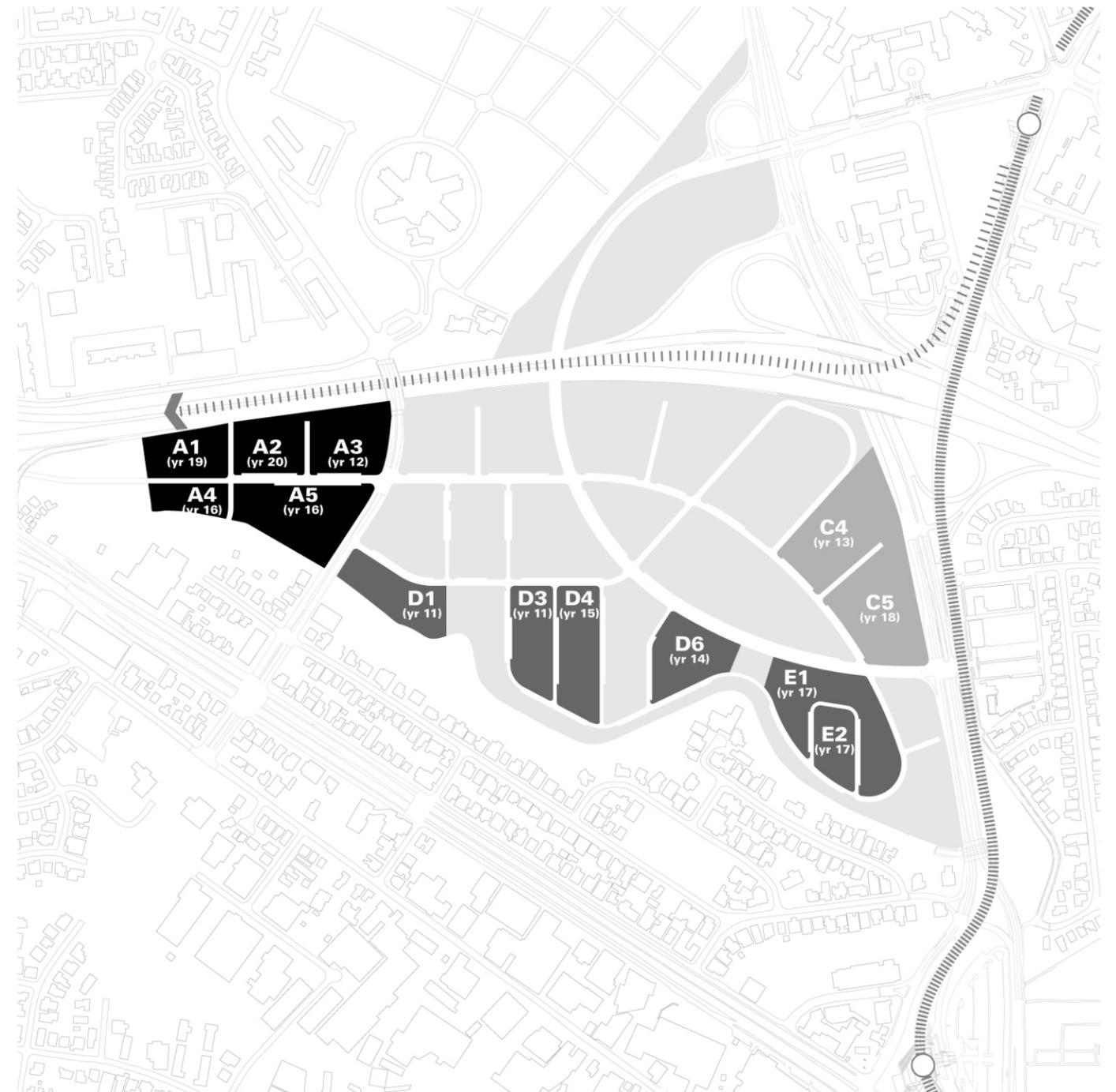
- Residential: 1,538 units
- Laboratories: STT to sell or long-term lease 2 parcels with a total of 21,124 s.m. net developable area, for the private development of 500,000 gsf in 2 buildings.
- Office: 200,000 gsf
- Retail 120,000 gsf
- Parking
- Open Space

# PHASE TWO INFRASTRUCTURE + OPEN SPACE / DEVELOPMENT TEMPLATE



## INFRASTRUCTURE / OPEN SPACE

-  existing roads (phase 1)
-  vehicular infrastructure (private development)
-  public open space (private development)



## DEVELOPMENT (PRIVATE)

-  mixed use development
-  residential
-  laboratory



## RETURN ON INVESTMENT ANALYSIS

## SCIENCE CITY ECONOMIC IMPACT AND RETURN ON INVESTMENT ANALYSIS

### 1. Project Economic Impact

The development of a Life Sciences Industry in Puerto Rico is projected to have significant economic impacts via the creation of jobs and the generation of income through high paying employment positions and profits to the firms engaged in R+D and manufacturing activities.

In addition to the direct impacts attributable to the development of the new R+D infrastructure, there are other effects that go beyond the industry itself. These effects are not only associated with the derived economic activity generated by R+D, but also from the investment activity that will take place at the Science City in Oso Blanco. A significant investment estimated at approximately \$353 million will be undertaken by the Science, Technology and Research Trust (STRT) in infrastructure, site development and some key institutional components geared to foster and expedite the commencement of scientific activity and applied research at the proposed site. In addition to the STRT's investment, millions of dollars will flow into the project in the form of new housing units, office space, retail space, parking structures and additional lab facilities built by private firms.

The economic impact of the STRT and private developers on the Puerto Rican economy as a whole can be measured using techniques provided by the economic theory and its methods. Aside from the direct impacts on income and employment produced by the investment in construction activities through time, other effects – or impacts – can be calculated. For example, derived economic activity among suppliers that cater to developers and construction activity to be undertaken at the Oso Blanco site is known as the indirect impacts of the investment. Also, the expenditures in goods and services furnished by suppliers generate a flow of other expenditures by suppliers firms and employees that in turn creates additional economic activity in the local economy. These effects are known as the induced impacts of investment. To estimate the indirect and induced effects of the investment – and the creation of jobs in the Life Sciences industry – a multiplier effects analysis was conducted. The first step in this analysis was to estimate the investment to be performed by the STRT and private firms at the Science City in different uses through a period of time.

The table shown below provides a summary of estimated investment to be performed at Oso Blanco site in connection with the development of the Science City during years 1 through 20. As can be observed, the investment to be performed by the STRT - \$353 million – is expected to leverage a correlative investment of approximately \$1,412 million from the private sector. In other words, the STRT will make possible an investment in development activities of 4 times its initial investment in the Science City. Therefore, a total of \$1,765 million are expected to be invested at the Oso Blanco site over a period of 20 years.

**Science City at Oso Blanco  
Statement of Uses and Total Development Investment  
STRT and Private Investment  
Years 1-20  
(in millions of 2007 Dollars)**

Phase	Year	STRT Investment in Site Dev. and Institutional Project Elements	PRIVATE INVESTMENT										Total Private Investment	Total STRT + Private Investment	
			Residential-Mixed Use	Residential-Stand Alone	Retail Mixed Use	Labs. Parcels	Office Space	Retail Parking	Office Parking	Residential Parking	Labs Parking				
PHASE I	1	\$ 5.0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5.0
	2	22.0	-	-	-	-	-	-	-	-	-	-	-	-	22.0
	3	10.8	86.5	-	24.8	-	-	-	5.5	-	7.8	-	-	124.6	135.5
	4	127.9	73.6	24.9	24.8	-	9.2	5.3	1.6	8.9	3.8	-	-	152.0	279.9
	5	70.7	-	46.0	2.4	-	40.6	-	7.1	4.2	-	-	-	100.3	170.9
	6	3.2	-	20.9	1.2	-	-	-	-	1.9	-	-	-	23.9	27.2
	7	11.9	-	-	-	-	-	-	-	-	-	-	-	-	11.9
	8	82.6	39.5	-	7.1	-	-	1.6	-	3.6	3.8	-	-	55.5	138.1
	9	16.9	-	44.7	-	-	-	-	-	4.1	-	-	-	48.8	65.7
PHASE II	10	-	46.7	-	7.1	-	-	1.6	-	4.2	-	-	59.6	59.6	
	11	-	-	56.9	2.4	-	-	-	-	5.2	-	-	64.4	64.4	
	12	-	32.1	-	7.1	-	-	1.6	-	2.9	-	-	43.6	43.6	
	13	2.0	-	-	-	165.0	-	-	-	-	3.8	-	168.8	170.7	
	14	-	-	51.2	1.2	-	-	-	-	4.6	-	-	57.0	57.0	
	15	-	-	35.0	1.2	-	-	-	-	3.2	-	-	39.4	39.4	
	16	-	63.1	-	13.0	-	-	2.9	-	5.7	-	-	84.7	84.7	
	17	-	111.8	-	2.4	-	-	-	-	10.4	-	-	124.6	124.6	
	18	-	-	-	-	165.0	-	-	-	-	3.8	-	168.8	168.8	
	19	-	-	-	1.2	-	50.8	-	8.9	-	-	-	60.9	60.9	
	20	-	-	32.1	-	-	-	-	-	2.9	-	-	35.0	35.0	
<b>Total</b>		<b>\$ 353.0</b>	<b>\$ 453.4</b>	<b>\$ 311.7</b>	<b>\$ 95.7</b>	<b>\$ 330.0</b>	<b>\$ 100.7</b>	<b>\$ 18.4</b>	<b>\$ 17.7</b>	<b>\$ 69.5</b>	<b>\$ 15.0</b>	<b>\$ 1,411.9</b>	<b>\$ 1,764.9</b>		

Based on the investment estimates shown in the previous table, a multiplier economic impact analysis was performed to measure the jobs and additional income to be generated as a consequence of the investment in the Science City at Oso Blanco. Two methodologies were employed to calculate the effects on income of programmed investments. The table shown below presents the results from the project's economic impact analysis using the methodology of multipliers.

**Knowledge Corridor - Science City  
Investment Activities Jobs and Income Generation Potential  
(Excluding Financing Costs)**

**Jobs**

**Methodology: Application of Input-Output Matrix Coefficients (1992)**

Direct Jobs	<b>18,704</b>
Direct and Indirect Jobs	<b>28,087</b>
Direct, Indirect and Induced jobs	<b>41,922</b>

**Income**

**Economic Impact on Income Scenario 1**

**Methodology: Application of Input-Output Matrix Coefficients (1992)**

Direct Income	<b>\$ 163,000,543</b>
Direct and Indirect Income	<b>\$ 285,250,950</b>
Direct, Indirect and Induced Income	<b>\$ 438,063,959</b>

**Economic Impact on Income Scenario 2**

**Methodology: Construction Average Salary (\$17,660)**

Direct Salary	<b>\$ 330,318,155</b>
Direct and Indirect Salary	<b>\$ 496,016,968</b>
Direct, Indirect and Induced Salary	<b>\$ 740,337,260</b>

The project's economic impact analysis reveals that a total of approximately 41,922 permanent jobs – among direct, indirect and induced jobs – are estimated to be created as a result of the investment to take place at Oso Blanco for the development of the Science City.

On the other hand, new income to be created as a direct, indirect and induced consequence of development activities at the Science City is estimated to range from a low of \$438 million to a high of \$740.3 million depending upon the methodology used for the analysis.

## 2. PROJECT INVESTMENT RETURN ANALYSIS

### A. Net Present Value (NPV)

In order to establish the project's financial feasibility, two techniques of analysis were used. The first technique employed was the Net Present Value (NPV) Analysis. This technique discounts future yearly net cash flow of the project (project's revenues less disbursements in investment activities and project related expenses through time) and transforms those money flows to the value of \$1 today. The decision rule here to undertake or discard a project is – projects with a positive NPV (greater than 0) are financially feasible and could be built, while projects with negative NPV should be discarded.

To calculate the Science City's NPV, revenues and disbursements projected for the first twenty years were used to estimate annual net cash flows. Annual net cash flows were discounted using a discount rate of 5%. This rate is an estimate of the prevailing long term cost of money for tax exempt debt instruments at the moment of performing the financial analysis. The table that follows presents a twenty year cash flow for the project (excluding financial costs) and the corresponding calculation of the NPV. As can be observed, the project produces a positive NPV of approximately \$150 million valued at 2007 dollars. This means that the project, over its life, is able to cover its hard and soft costs and produce a superavit of funds, or a profit. In accordance with the decision rule, the project should be undertaken. If the proponent has the option of performing other alternative investments, the rule is to choose that investment with the higher NPV among all possible alternatives.

#### Knowledge Corridor - Science City Schedule of Discounted Net Revenues (Excluding Financing Costs)

Year	Revenues	Disbursements	Net Cash Flow	Cummulative Cash Flow
1	\$ -	\$ 7,100,000	\$ -7,100,000	\$ -7,100,000
2	-	24,050,122	-24,050,122	-31,150,122
3	30,204,952	23,280,336	6,924,616	-24,225,506
4	36,181,910	130,038,768	-93,856,858	-118,082,364
5	28,477,059	67,719,296	-39,242,237	-157,324,601
6	15,669,863	4,051,850	11,618,013	-145,706,588
7	9,875,880	12,768,100	-2,892,220	-148,598,808
8	27,299,509	83,475,000	-56,175,491	-204,774,299
9	35,502,313	17,725,000	17,777,313	-186,996,986
10	38,328,596	850,000	37,478,596	-149,518,390
11	37,593,755	850,000	36,743,755	-112,774,635
12	33,007,049	850,000	32,157,049	-80,617,587
13	31,817,959	850,000	30,967,959	-49,649,628
14	213,437,421	850,000	212,587,421	162,937,792
15	11,525,467	850,000	10,675,467	173,613,259
16	36,897,238	850,000	36,047,238	209,660,497
17	180,726,438	850,000	179,876,438	389,536,935
18	10,659,706	850,000	9,809,706	399,346,641
19	16,603,938	850,000	15,753,938	415,100,579
20	11,085,138	850,000	10,235,138	425,335,717
<b>Totals</b>	<b>\$ 804,894,189</b>	<b>\$ 379,558,472</b>	<b>\$ 425,335,717</b>	

NPV @ 5% Discount Rate = \$149,982,285

IRR = 12.5%

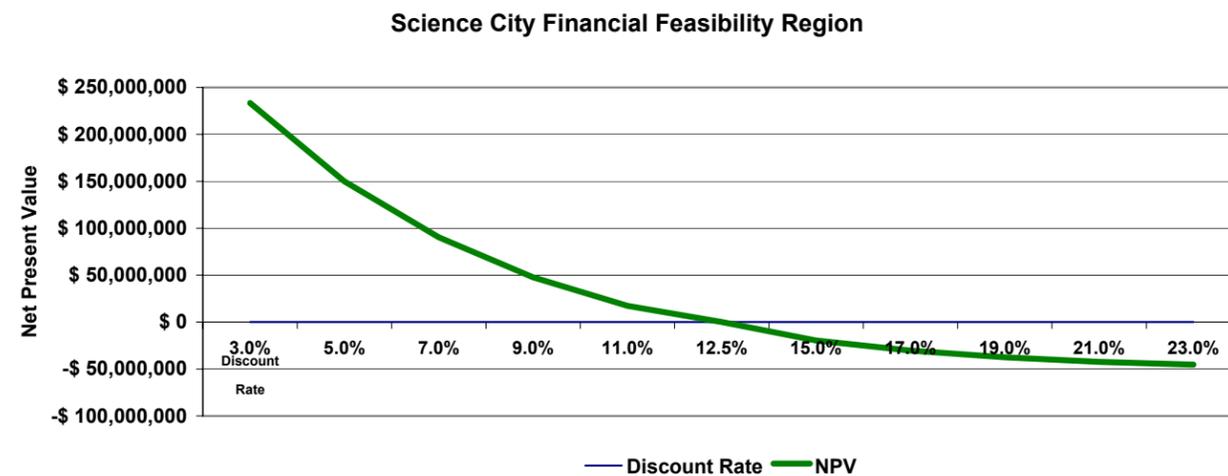
## B. Internal Rate of Return (IRR)

Another technique of project financial evaluation was applied to determine the feasibility of the Science City. This technique is known as the Internal Rate of Return (IRR). It consists of finding the interest or discount rate that makes the present value of the project's revenues equal to the present value of the project's disbursements or outflows – to get a present value of the net cash flow equal to zero (0). The decision rule here is to accept a project which reflects an IRR which value is higher than the cost of money. In the light of competing investment options, the rule is to choose that option with the higher IRR value.

In the case of the Science City – as can be observed in the preceding table – the rate that equalizes the present value of project revenues to the present value of disbursements is 12.5%. This rate is considerably higher than the cost of tax exempt debt obligations and consequently, the project is considered highly viable.

With the purpose of conducting a sensitivity analysis to determine the range of interest rates (cost of money) for which the project results are feasible, a combination of NPV and IRR analyses were performed. This type of analysis allows one to identify the region under which the project is feasible within varying interest rate scenarios.

The graph shown below depicts the results of the combination of the NPV and IRR analyses.



From the graph, it could be observed that an NPV=0 where the discount rate assumes the value of 12.53%. This is a good graphic representation of the IRR concept as explained before. The graph indicates that the project can hold a cost of money close to 12% and still be rendered feasible. The lower the discount rate, or estimated cost of money, the larger the NPV of the project and the cash surplus it produces. This analysis suggests that the project is not only feasible, but that it can stand variations in the interest rate of up to 12.53% and still remain viable.

### C. Cash Flow and Debt Coverage Analysis

Finally, in order to have a complete picture of the Science City project's feasibility – including financial costs and debt repayment – a cash flow and debt coverage analysis was performed.

The table that follows presents a consolidated project cash flow showing all project sources of revenues and disbursements.

**Science City at Oso Blanco Site**  
**Statement of Projected Development Costs and Cash Flow**                      **Years 1-30**

Year	Disbursements					Funding Sources			Balance
	Financing Costs & Reserves <sup>1</sup>	Project Construction	Project Planning & Management	Repayment Principal of Bonds	Contribution to STT Operating Costs	From Bonds Proceeds	From Project Revenues	Interest From Investment of Excess Funds <sup>2</sup>	Cumulative Excess / Deficit
0	\$ 40,650,603					\$ 365,128,471			\$ 324,477,868
1	19,633,596	\$ 5,000,000	\$ 2,100,000		0		0	\$ 15,958,185	313,702,457
2	19,633,596	21,950,122	2,100,000		0		0	14,916,328	284,935,067
3	19,633,596	10,840,168	2,100,000		0		\$ 30,204,952	12,850,975	295,417,229
4	19,633,596	127,938,768	2,100,000		0		36,181,910	8,257,791	190,184,566
5	19,633,596	65,619,296	2,100,000		0		28,477,059	2,604,739	133,913,472
6	19,633,596	3,201,850	0		\$ 850,000		15,669,863	994,578	126,892,466
7	19,633,596	11,918,100	0		850,000		9,875,880	994,578	105,361,228
8	19,633,596	82,625,000	0		850,000		27,299,509	994,578	30,546,718
9	19,633,596	16,875,000	0		850,000		35,502,313	994,578	29,685,013
10	19,633,596	0	0		850,000		38,328,596	994,578	48,524,590
11	19,633,596	0	0		850,000		37,593,755	994,578	66,629,327
12	18,259,245	0	0	25,558,993	850,000		33,007,049	994,578	55,962,716
13	18,259,245	0	0	-	850,000		31,817,959	994,578	69,666,008
14	16,786,725	0	0	27,384,635	850,000		213,437,421	994,578	239,076,646
15	16,786,725	0	0	-	850,000		11,525,467	994,578	233,959,966
16	15,117,869	0	0	31,035,920	850,000		36,897,238	994,578	224,847,993
17	15,117,869	0	0	-	850,000		180,726,438	994,578	390,601,139
18	13,449,014	0	0	31,035,920	850,000		10,659,706	3,623,432	359,549,344
19	13,449,014	0	0	-	850,000		16,603,938	3,622,675	365,476,943
20	11,681,990	0	0	32,861,562	850,000		11,085,138	3,905,421	335,073,950
21	11,681,990	0	0	-	250,000		800,000	4,022,695	327,964,655
22	9,345,592	0	0	43,450,288	250,000		800,000	3,683,582	279,402,357
23	9,345,592	0	0	-	250,000		800,000	3,439,739	274,046,504
24	7,009,194	0	0	43,450,288	250,000		800,000	3,184,265	227,321,287
25	7,009,194	0	0	-	250,000		800,000	3,028,050	223,890,143
26	4,672,796	0	0	43,450,288	250,000		800,000	2,864,385	179,181,444
27	4,672,796	0	0	-	250,000		800,000	2,804,359	177,863,007
28	2,336,398	0	0	43,450,288	250,000		800,000	2,741,469	135,367,790
29	2,336,398	0	0	-	250,000		800,000	2,787,026	136,368,418
30	-	0	0	43,450,288	250,000		800,000	2,834,756	96,302,886
	<b>\$ 453,937,807</b>	<b>\$ 345,968,304</b>	<b>\$ 10,500,000</b>	<b>\$ 365,128,471</b>	<b>\$ 15,250,000</b>	<b>\$ 365,128,471</b>	<b>\$ 812,894,189</b>	<b>\$ 109,064,808</b>	<b>\$ 96,302,886</b>

<sup>1</sup> Considers one year bonds debt service reserve, bonds issuance costs equivalent to 2.25% of total bonds issue amount, a commission for a letter of credit to provide credit enhancement for the bonds equivalent to 0.25% on the outstanding balance of the bonds. Interest payments on bonds principal calculated at a blended interest cost of 5.13% for tax exempt serial bonds with varying maturities.

<sup>2</sup> Estimated assuming investment of unspent balance of bonds proceeds at a safe rate of 4.47% corresponding to investment in short term US Treasury Notes (arbitrage)

As can be observed in the table, the project has funds outlays in the amount of \$1.2 billion while obtaining funding from different sources in the amount of \$1.3 billion, for a cumulative cash surplus at the end of 30 years of \$96.3 million.

## **ALONG ITS LIFE, THE SCIENCE CITY PROJECT IS ABLE TO PERFORM THE FOLLOWING**

- 1. COMPLETE ALL INVESTMENTS FORESEEN IN THE DEVELOPMENT PROGRAM IN A TIMELY AND ORDERLY FASHION.**
- 2. EXPEDITE THE CONSTRUCTION OF ESSENTIAL SCIENCE CITY PROJECT ELEMENTS – RESEARCH LABS, INCUBATOR, HOTEL-CONFERENCE CENTER, K-8 MAGNET SCHOOL AND SCIENCE MUSEUM – CRITICAL FOR THE FOSTERING OF APPLIED RESEARCH ACTIVITIES AT THE SITE.**
- 3. REPAY A BOND ISSUE OF APPROXIMATELY \$365.1 MILLION JOINTLY WITH ITS ASSOCIATED RESERVES, COMMISSIONS AND INTEREST COSTS.**
- 4. PRODUCE A PROJECT PLANNING AND MANAGEMENT FUND OF \$10.5 MILLION TO ALLOW THE STRT TO DEFRAY PRE-DEVELOPMENT AND DESIGN COSTS FOR THE IMPLEMENTATION OF THE MASTER PLAN.**
- 5. GENERATE \$15.2 MILLION IN FUNDS TO PARTIALLY FINANCE THE STRT'S ANNUAL OVERHEAD.**
- 6. CREATE A CASH SURPLUS DURING THE LIFE OF THE PROJECT IN AN EXCESS OF \$96.3 MILLION TO PARTIALLY CAPITALIZE THE STRT TO ACCOMPLISH ITS MISSION.**



**THE SCIENCE CITY AT OSO BLANCO WILL PROVIDE A  
GLOBALLY RELEVANT LIFE SCIENCE CLUSTER ABLE TO  
DRAW PEOPLE, INDUSTRY AND CAPITAL TO PUERTO RICO –**

**ESTABLISHING THE FOUNDATION OF A KNOWLEDGE  
ECONOMY AND CREATING A NEW CENTER OF CIVIC LIFE  
WITHIN THE CARIBBEAN'S METROPOLIS**









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