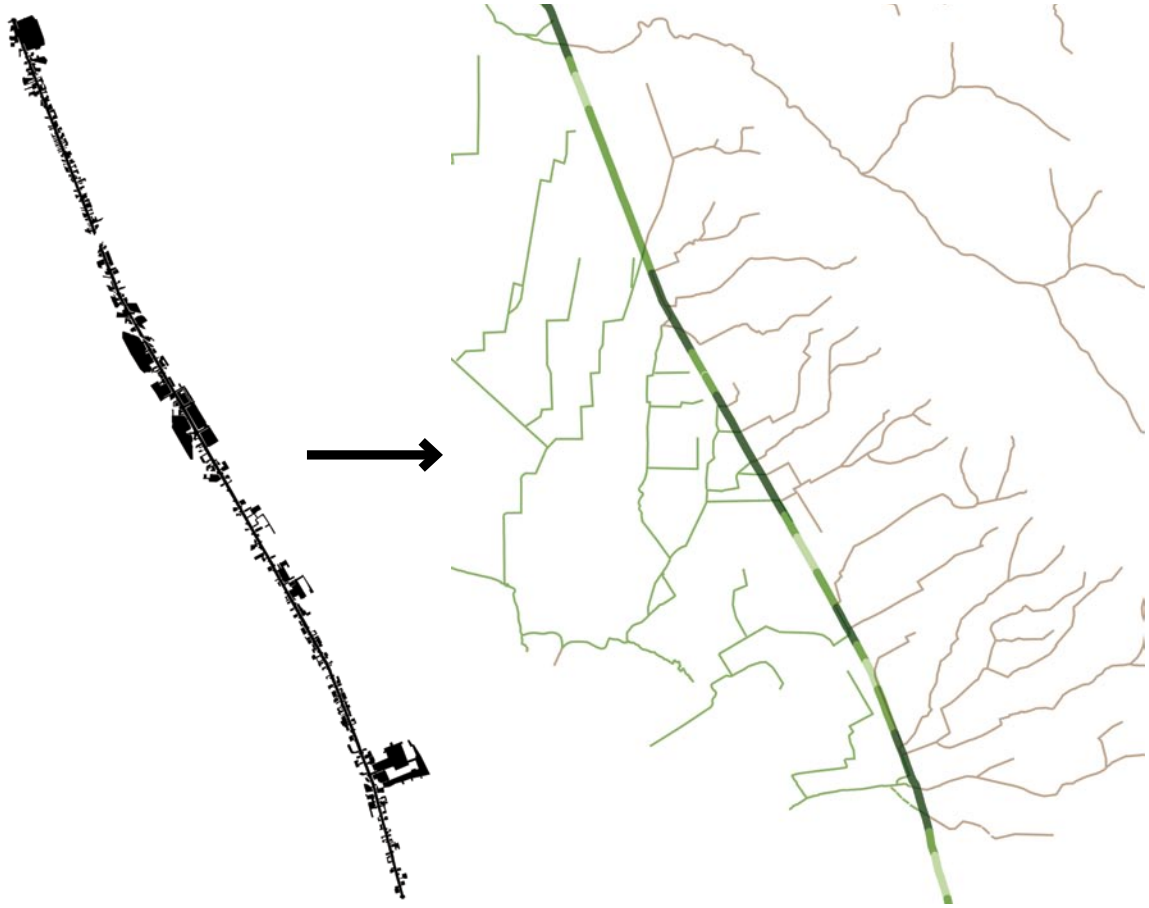
Code Design for the Public Realm

A photo-collage of the Tolbiac area of Paris super-imposed on the El Cerrito del Norte BART station area.

The Public Realm & One More Code Test

The second part of the Urban Ecotone Code addresses the public realm, the connective tissue where the urban ecotone comes alive with diversity and movement amidst the synergy of multi-functional infrastructure. The main concept driving the public realm design is the transformation from an auto-dominated space, to a balanced ecotone space. Like the private realm, the public realm considers the local hydrology, topography and community to guide the system designs that are 'emergent from place.'



Auto space transforms into ecotone space (paradigm shift).

From the headwaters of a creek down to the Bay, there are three distinct zones of hydrologic processes. The upper watershed is the sediment production zone. The middle watershed is the transport zone where disturbed sediment from the upper watershed transfers to the lower watershed. In the lower watershed, the flat areas adjacent to the bay, the water slows down and the sediment deposits in the flood plain. In urbanized watersheds, this movement of sediment also represents movement of pollutants. San Pablo Avenue lines the threshold between the transport and deposition zones for all of the creeks and drainages in the East Bay, north of Oakland, so it holds great potential for creating a green infrastructure system that can address water quality and quantity issues while providing a milieu for other benefits. A 1977 hydrology map of Contra Costa County identifies the five-mile strip of San Pablo Avenue studied in this thesis as a groundwater recharge area (California Department of Food and Agriculture 1977). This means that stormwater can be detained, filtered and infiltrated in this area.

In addition to the longitudinal transfer of water, there also exists a transverse movement of water from the ridge of the watershed down to the drainage channel. San Pablo Avenue crosses the watersheds in a transverse direction, dividing each watershed into upper, middle and low points along the avenue. (refer to map) The upper points along San Pablo Avenue divide the watersheds and the low points intersect the creek channels or culverts. Both the longitudinal and transverse movements of water are conceptually consistent in terms of the hydrologic processes described above, with distance and velocity as the variables. So what does this mean for the design of green infrastructure systems?

"San Pablo Avenue as Bio-filter" map

System, Zones & Components

Within a green infrastructure system there exist clear zones for which multi-functional components can be designed, addressing demands of both natural systems and urban form. The green infrastructure system can be divided into zones by the following parameters: position in the watershed (longitudinal and transverse) – upper, middle, lower; ownership – public or private; and direction of flow – along or across a street or parcel. Each zone presents a different opportunity for multi-functional infrastructure components that evince natural processes in an urban environment. In the interest of time, this thesis only discusses the zones that intersect San Pablo Avenue, but it needs to be acknowledged that the upper watershed zones play an integral role in the effectiveness of San Pablo Avenue as a bio filter by slowing down water and diverting pollutant flow from the culvert system to the bio-filtering system. The section of San Pablo Avenue where the BART parallels the avenue above grade provides additional space for filtering and storing stormwater while creating open space. (In this Mediterranean climate, where it only rains during five months of the year, stormwater facilities need to have other functions during the dry season.) The BART alignment parallels San Pablo Avenue above grade for almost four miles, from Gilman Street at the Berkeley/Albany border north to Baxter Creek in El Cerrito where it crosses the avenue and heads west into Richmond. The BART right-of-way provides a special condition for catching stormwater as it flows down from the hills, where it can be retained and re-distributed through a network to be reused or filtered and recharged into the ground. Actions for the private realm are presented in previous sections and will not be covered in this public realm discussion.

A Code Test Interlude

In order to design the systems for the public realm, an urban structure of the private realm is needed to test and develop ideas. The SPA4 areas of the five-mile strip present opportunities where large areas can be transformed while connecting back to the surrounding, existing conditions, which enables the demonstration of ideas for both the existing and Urban Ecotone Code conditions. The potential built form in SPA4 provides the flexibility to test the full range of public realm transformation. The only code test returned for an SPA4 development type focused on district utilities, and not formal expression. This situation necessitated another code test for the SPA4 development typology on another site near the El Cerrito del Norte BART station.

SPA 4
TRANSIT CENTER
MIXED USE NEIGHBORHOOD

JORNALERO PARK/ DAY LABOR PICK UP AREA

BAXTER CREEK GREENWAY

HOME DEPOT

OHLONE GREENWAY EXTENSION PARKS

AIR FILTER TERRACES & GREENWAY

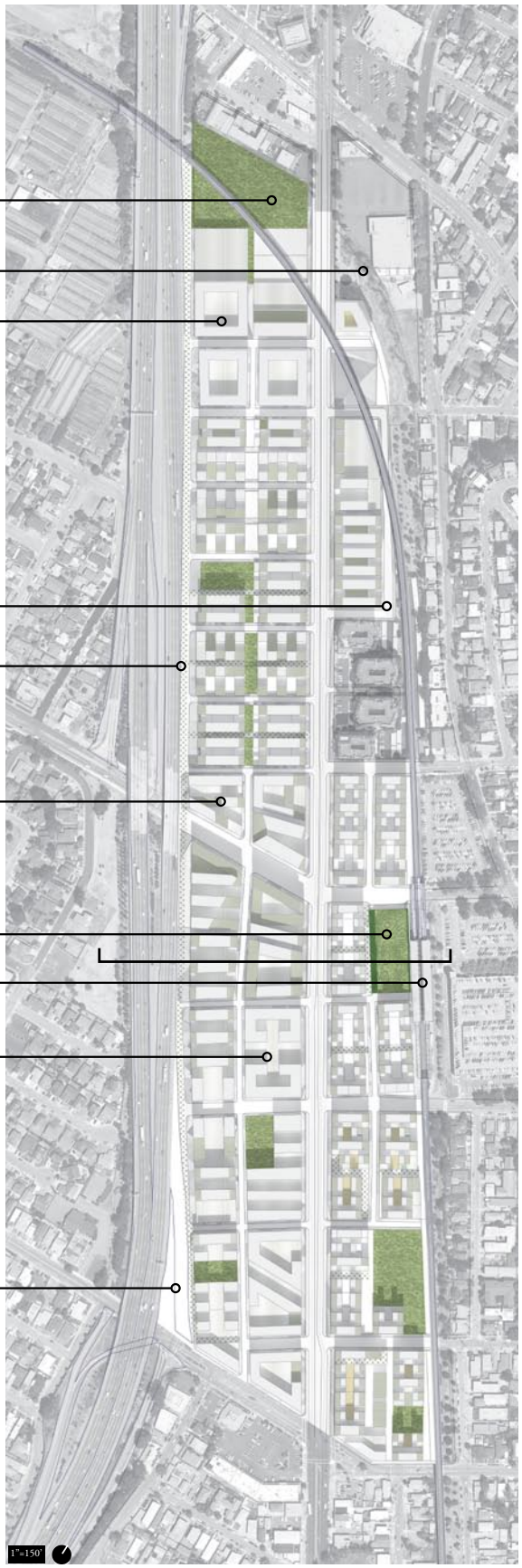
HONDA DEALERSHIP

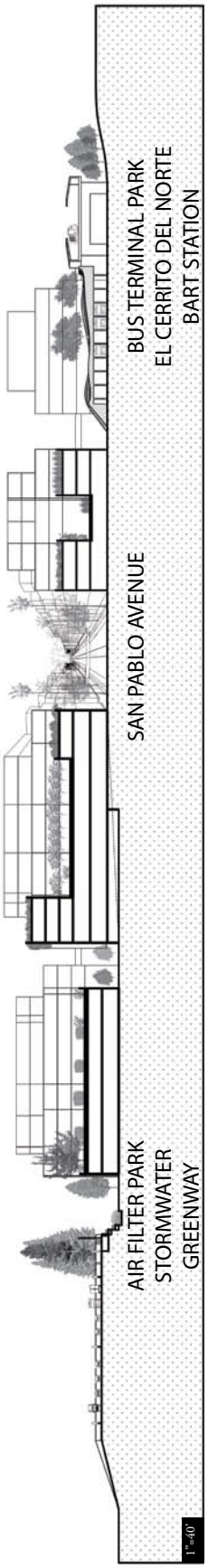
BUS TERMINAL PARK

EL CERRITO DEL NORTE BART STATION

TARGET

RELOCATED INTERSTATE EXIT





Plan and section of code test with annotation

Land Use and Investment

The SPA4 sites along San Pablo Avenue represent areas where corporate-scale investment will most likely be required for transformation. The private realm portion of the code negotiates between the community scale and the corporate profit margins to create a space for both to exist. This multi-block code test meets all of the code requirements and exceeds the density requirements on a parcel scale. In an effort to retain the big box regional retail, the parcel size limit was reconsidered for SPA4. The block perimeter remains limited at 1000 feet with the longest side not to exceed 300 feet. However, a single retailer can occupy the ground floor and second floor footprints for an entire block. This area amounts to 62,500 square feet per floor, or 125,000 square feet total, which approximates the big box retailers' current footprints. Alan Berger uses Home Depot, one of the big box retailers located in this section of San Pablo Avenue to discuss land value, a valid and important issue when considering this type of transformation.

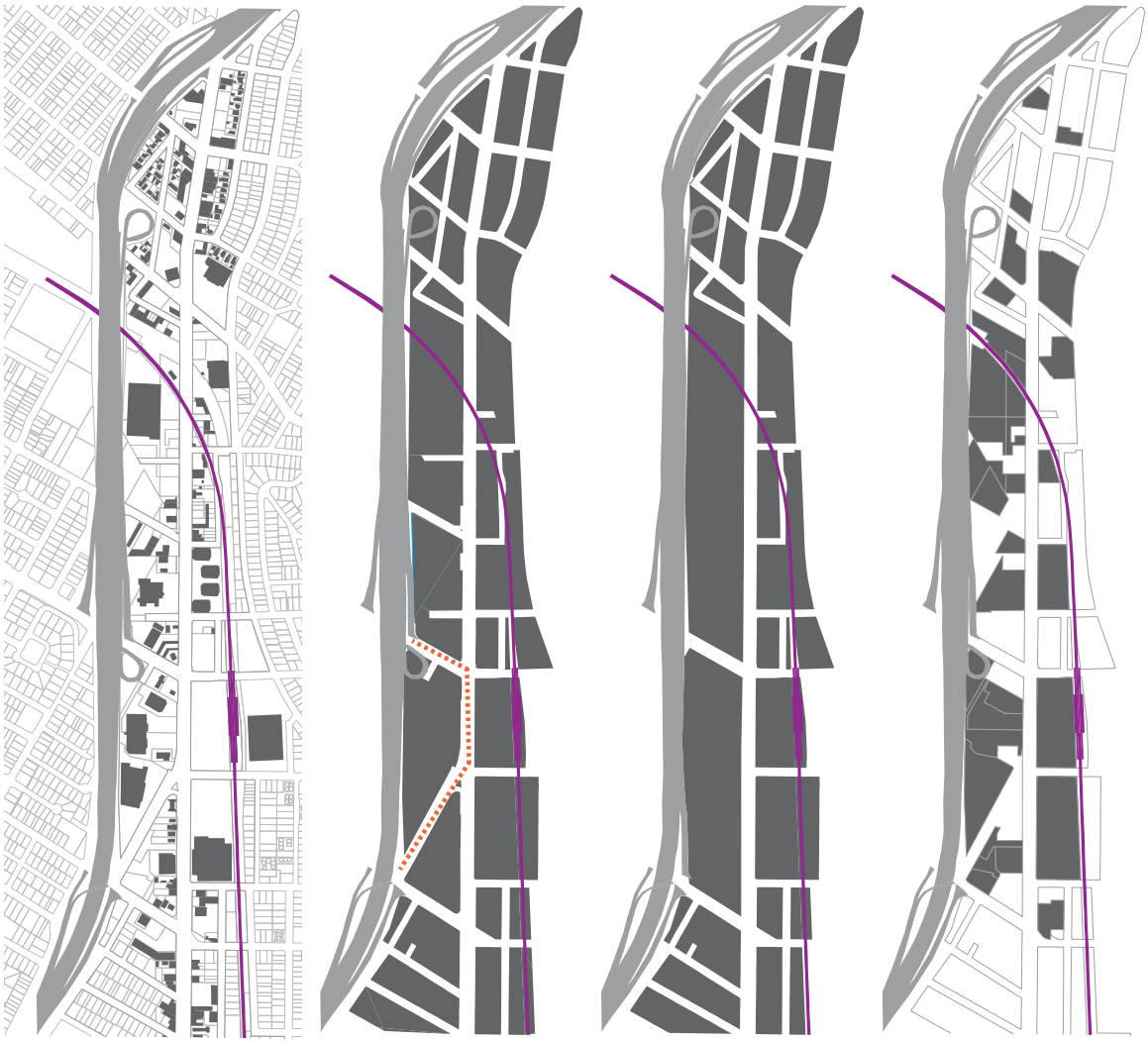
> Home Depot, the chain of home-improvement stores, actively seeks to develop stores on urban brownfield sites. Their site-development strategy typically includes the excavation and relocation of toxic soil to the parts of the site planned for the store's vast parking lot. The building footprint is then laid down on the area of clean soil or on areas where toxins were removed or reduced below legal levels. This practice is obviously quite lucrative, as Home Depot saves large sums of money on the purchase of the land, (Berger 2006, 71).

Creating space for the big box retailers in a higher intensity development situation requires that the retailers reform their land use practices along with everyone else. The aging single-family residential fabric that surrounds this higher intensity development creates an argument for the retailers to stay in the area. Corporate responsibility might compel them to reform their land use practices.

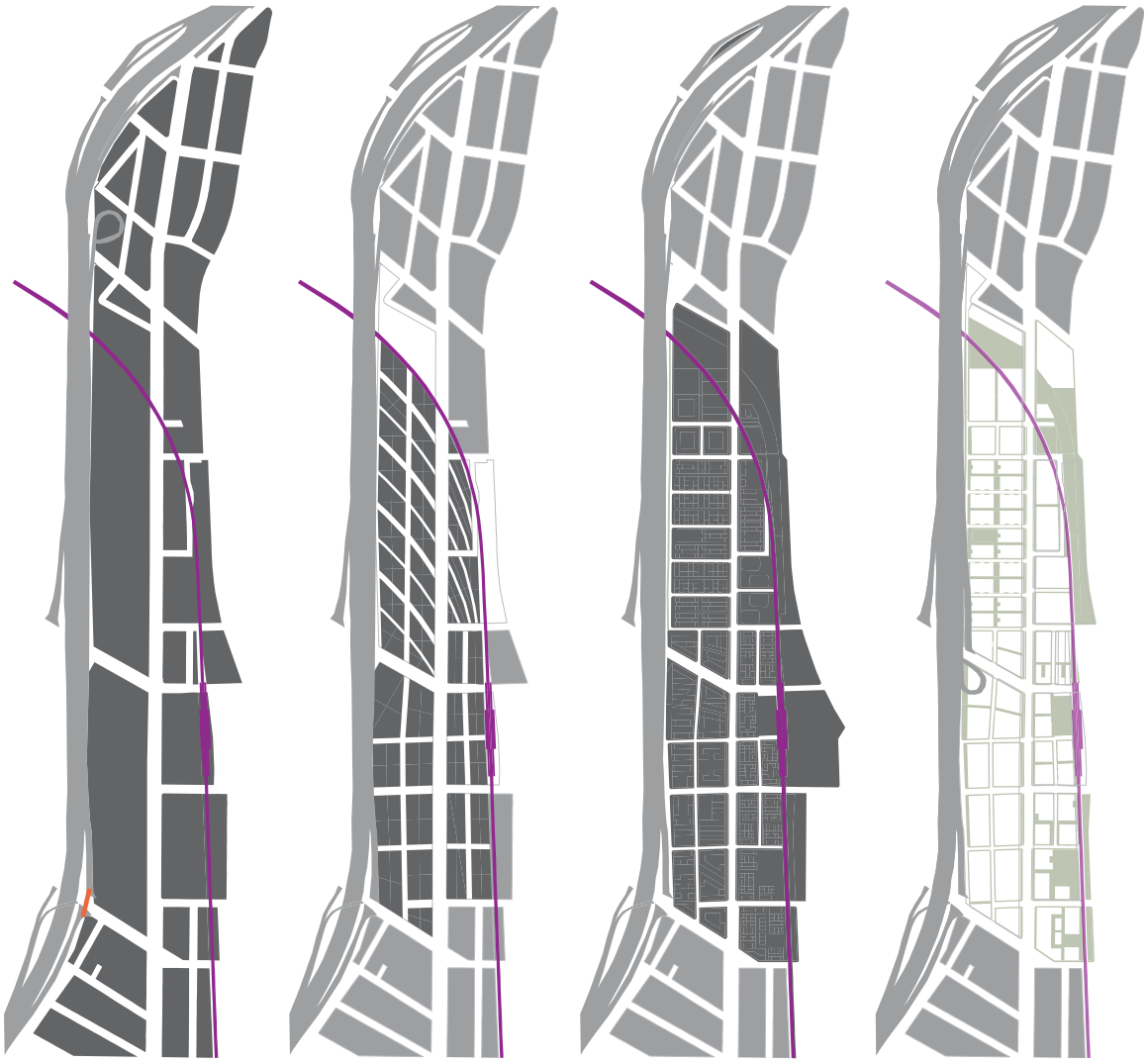
Applying the Urban Ecotone Code

Cutting Boulevard bounds the code test site to the south, BART to the east, Baxter Creek to the north and Interstate 80 to the west. The following analysis demonstrates how the existing area does not comply with the Urban Ecotone Code and illustrates two different scenarios that transform the area into compliance.

The block layout in both proposals creates a grid that responds to vehicular, pedestrian and bicycle mobility. Proposal A parcels, while more irregular, might produce a more interesting built form. However, the orthogonal simplicity of Proposal B was chosen for further development as a result of time constraints.



The street grid extends from the neighborhoods east of the BART right-of-way west to the interstate, which is a bermed structure about fifteen feet tall. A secondary system of pedestrian and bicycle paths bisects the blocks created from the street grid, creating blocks with perimeters of 1000 feet or less. A series of larger open spaces connect along the streets and paths, and provide space for the district utility infrastructure and open space area required by the Quimby Act. Two large stormwater open spaces are created on the east and west sides: in the BART right-of-way and in the reclaimed interstate right-of-way. The linear park adjacent to the interstate is a stormwater filter for Baxter Creek and also provides space for terraced air filter plantings.

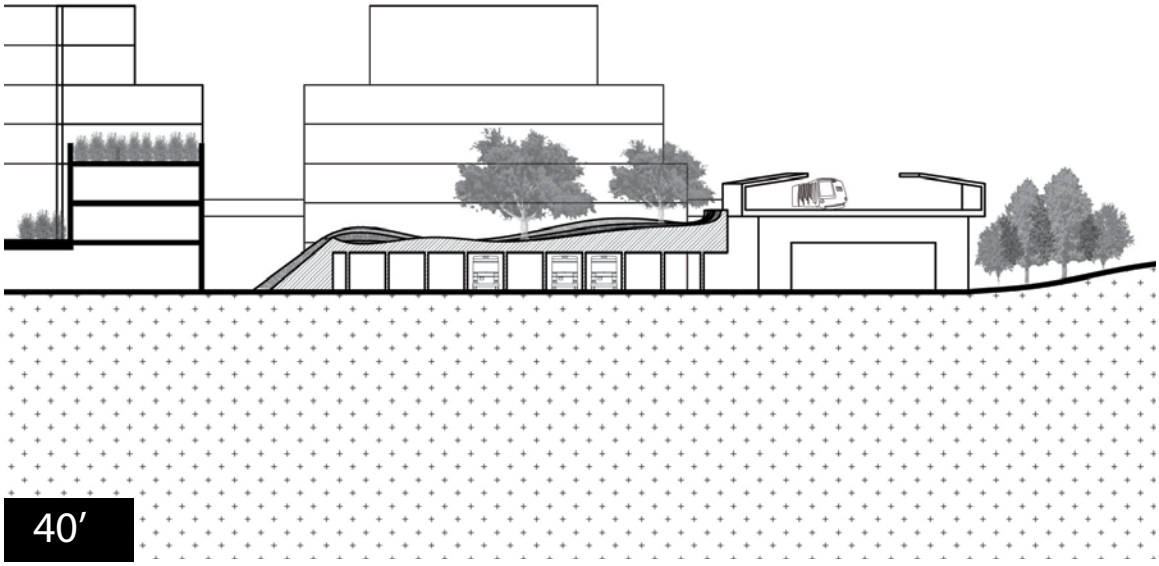


NEW EXIT FLOW

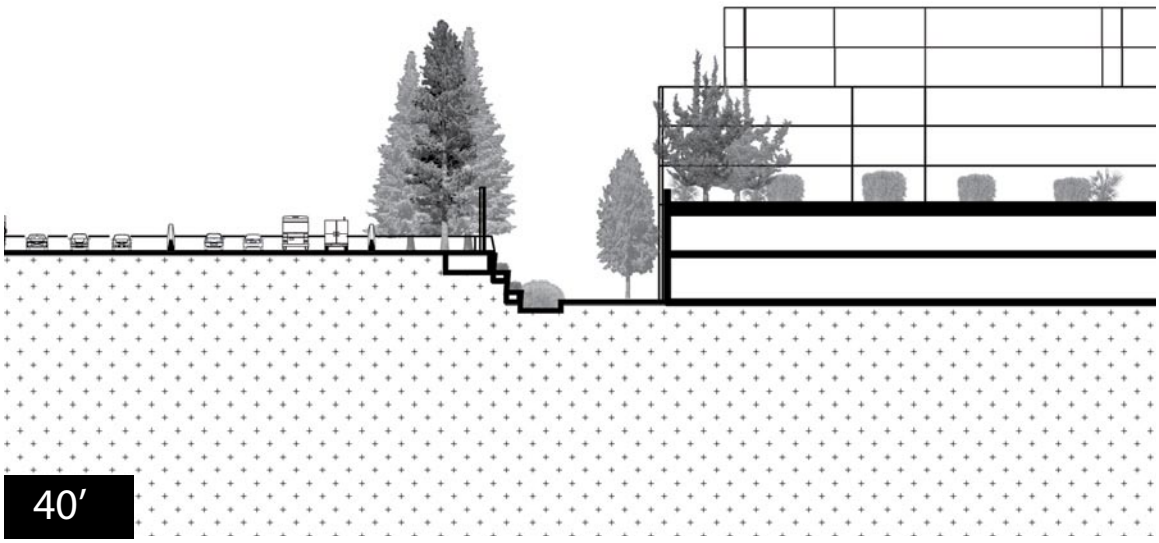
PROPOSAL A

PROPOSAL B

PROPOSAL B PUBLIC OPEN SPACE



Enlarged section showing noise barrier bus terminal park at the BART station

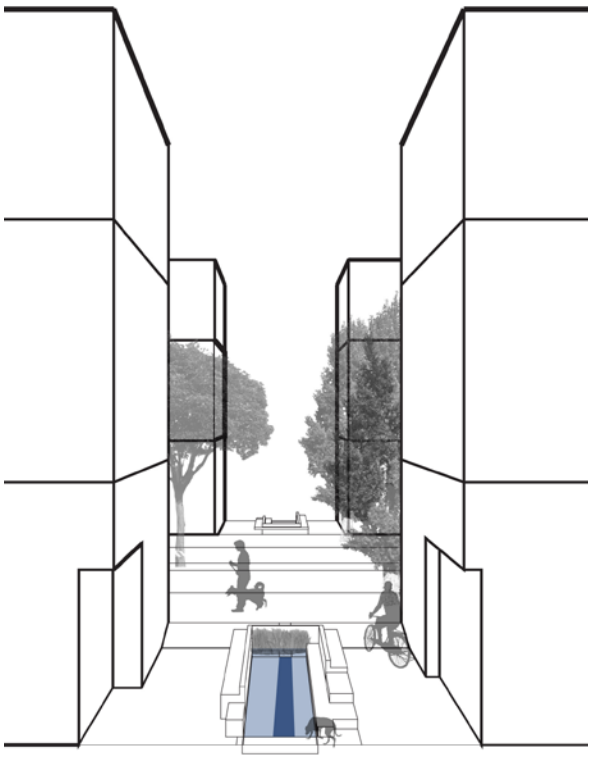


Enlarged section showing interstate air filter and terraced stormwater infiltration park

The following curb and gutter discussion returns the reader back to the public realm by linking the infrastructure systems of the urban form to the components that define the public realm.

Drop the Curb & Extend the Gutter

On the new streets and pedestrian paths, bollards take the place of curbs emphasizing pedestrian access. The removal of the curb and gutter enables a new form of stormwater management through runnels on the streets and open channels in the pedestrian paths. This system of surface hydrology conveys stormwater through a network to the opens spaces for storage and infiltration, eventually leading to the linear infiltration park adjacent to the interstate. This system can be vegetated and create pedestrian and vehicular amenities as it conveys, filters and infiltrates stormwater. The grade change from the BART to interstate is about fifteen feet, so water naturally flows towards the west.



Drop the curb and extend the gutter for flow perpendicular to San Pablo Avenue (right); Meriwether Building, Portland (Flickr User: Lisastown 2009)(top left); Open channel, Granada (Flickr User: Lisastown 2008) (bottom left); lowered curb street in Paris 2008 (bottom middle).

Why the Curb & Gutter?

The curb and gutter is a mono-functional, standardized infrastructure that conveys stormwater away from the driving surface as fast as possible and channels it directly to storm drains. Developers are required to install this infrastructure in new developments where the municipality provides the public infrastructure such as roads and sewer. The curb and gutter fulfills the developer's requirement to the city and functions to convey stormwater, but it does little more than this, and sometimes proves to be detrimental.

Extend the Gutter

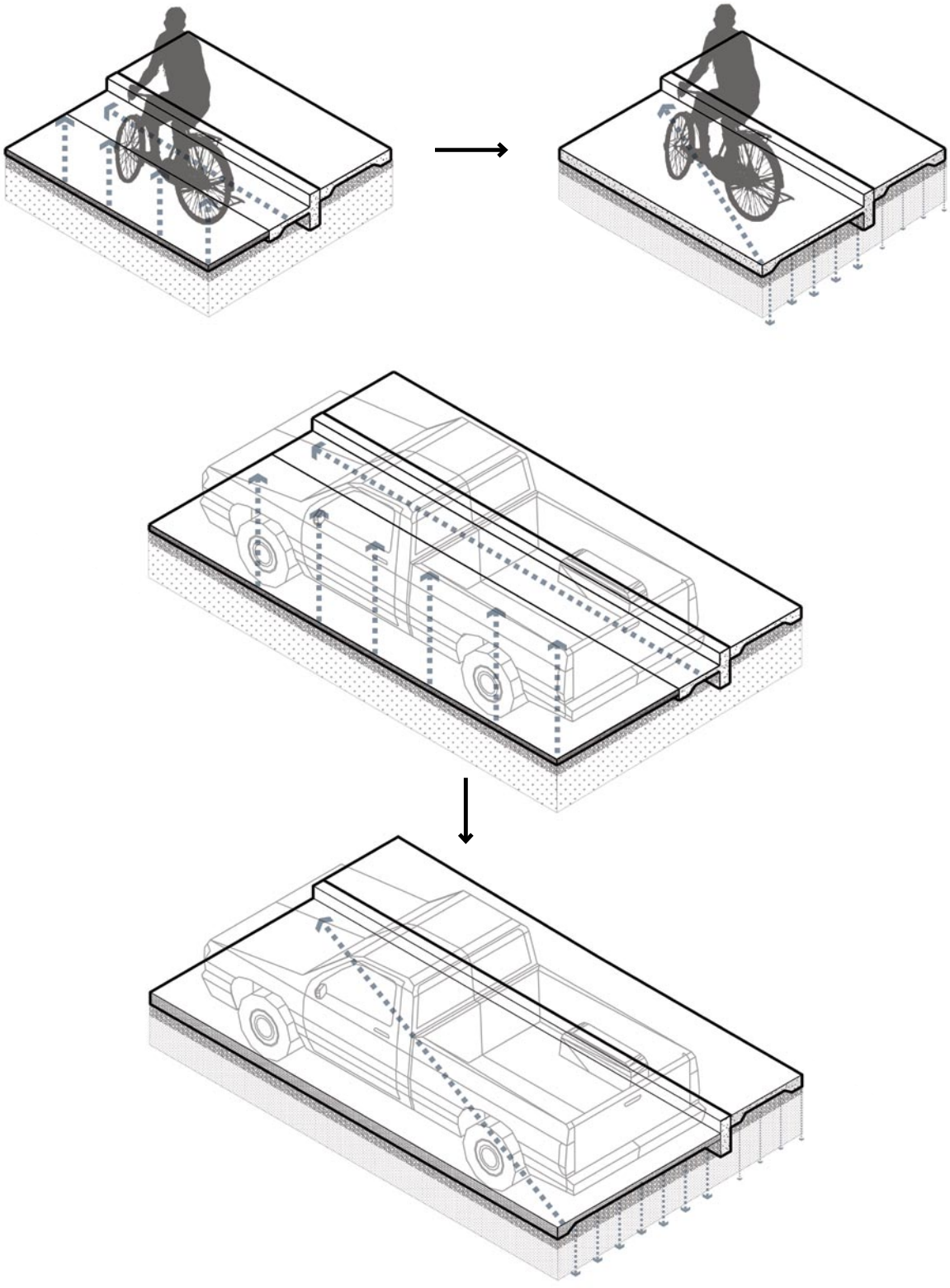
The gutter space is typically composed of a concrete unit that differs from the adjacent road surface. Bicycle lane designations are measured from the edge of the curb outward, regardless of the paving. The average gutter is 24 inches wide, while the average Class II bicycle lane is 60 inches wide with the shift in paving between the gutter and the street occurring in the middle portion of the bicycle lane. This shift creates a rut in the bicycle lane that can easily cause accidents. In the 1920's streetcar rail lines were removed from San Pablo Avenue because automobile tires would get stuck in the rails and cause accidents (Newmark and Deakin 2004). Automobile tires eventually widened to accommodate for speed and maintenance removing the initial conflict between rail and tire, but bicycle tires have remained the same width. So maybe it's time for the gutter width to expand to make way for the bicycle lane?

Bicycle Lane & Gutter: User Conflict

Expanding the gutter provides other opportunities. Harkening back to the discussion on perceptions of space and driver speeds, expanding the gutter could better delineate the parking lane when cars are not present. This would help limit the perceived driving space to the travel lane instead of expanding into the parking lane, as is currently the case on San Pablo Avenue.

Parking lane isolated in color. No difference in paving exists for the parking lane, only the gutter.

By extending the gutter for the bicycle lane and/or the parking lane, a new opportunity for stormwater infrastructure appears in the expanded surface. With the existing curb and gutter, stormwater sheets from the street to the curb and flows along the gutter into the closest storm drain. Extending the gutter surface and paving it with a permeable material such as pervious concrete, asphalt or block pavers creates a stormwater treatment facility along the length of the street. By allowing water to infiltrate, these facilities reduce the quantity of runoff entering the storm drain, and the bay.



Diagrams showing gutter extension for bike lanes and parking lanes

Extend the Curb & the Gutter on San Pablo Avenue

Extending the gutter starts to layer functions of mobility and stormwater infrastructure, but extending both the curb and the gutter takes full advantage of the curb and gutter's multi-valent potential within the context of the urban ecotone street section, transforming the mundane into a high performance infrastructure. Place identifies through its transverse location in the watershed overlaid with a particular development typology. At this point, the discussion turns to the tectonics of infrastructure that tie together the public and private realms, where the plan and cross-section are the most effective illustrations of the functions and relationships.

Existing Infrastructure Conditions

The right-of-way of San Pablo Avenue remains a consistent 100 feet for most of its 25 miles. Sidewalks range from four feet to as wide as twelve feet. Travel and turn lanes are consistently twelve feet wide and parking lanes are eight feet wide. The medians vary in width, from non-exsistent to greater than twelve feet wide. At some point in history, the electrical and telephone utilities were put underground, removing the overhead lines and poles from the visual clutter of the streetscape. The subterranean landscape of the right-of-way mimics the spatial divisions that occur above ground. The infrastructure conflicts reveal themselves in the numerous access panels in the sidewalk, breaking up any sense of paving pattern on the surface. Water and sewer rush along the streets under the cars, traveling to and from distant places for source and disposal. The public realm acts as an infrastructure conduit. This condition creates a multi-functional space, but it does not create a space for mutualism where infrastructure and the public realm interact in a synergistic manner. The private realm also plays into this mutualism when it's present and detracts when it's missing. In both of the existing condition cross-sections, the buildings and private realm lack sufficient structure to contribute to framing the public realm. Multiple Jurisdictions divide the right-of-way, exacerbating the silo effects of the public realm and the infrastructures below ground.

Existing condition street cross-section

SECTION E LOOKING NORTH 100' RIGHT OF WAY

BUILDING	12.5' SIDEWALK	2' CURB & GUTTER	6' PARKING	12' TRAVEL LANE	12' TRAVEL LANE	12' TURN LANE	3' MEDIAN	12' TRAVEL LANE	12' TRAVEL LANE	6' PARKING STRIP	2' CURB & GUTTER	9' SIDEWALK	3' PLANTING STRIP	PARKING LOT
people	people	water	cars	cars	cars	cars	plants	cars	cars	cars	water	people	plants	cars
animals	animals	garbage	trucks	trucks	trucks	trucks		trucks	trucks	trucks	garbage	animals	garbage	people
	bikes		buses	buses	buses	buses		buses	buses	buses		bikes	rats	
	cars		bikes	utilities	utilities			utilities	utilities	bikes		cars		
	informal markets											utilities		
	day labor													
	pickup													
	utilities													

Existing condition street cross-section

Transformed Infrastructure Conditions for SPA4

The transformed right-of-way creates a mutualism between the different users, modes of mobility and other infrastructures by inserting additional layers of space. The most extreme transformation occurs in SPA4 where the greatest intensity of building and people are located. The consistent right-of-way width on the avenue allows for theme and variations to manifest themselves along its length. In SPA4, district utilities appear in the street section in the form of centralized waste receptacles, but this space can easily be used for many other purposes in the less intense development typology areas. This cross-section conceptually represents the layers of space inserted into the right-of-way and celebrates the myriad possibilities of uses that can occur in and between the layers of space.

AUTO-DOMINANT STREET (EXISTING CONDITION)

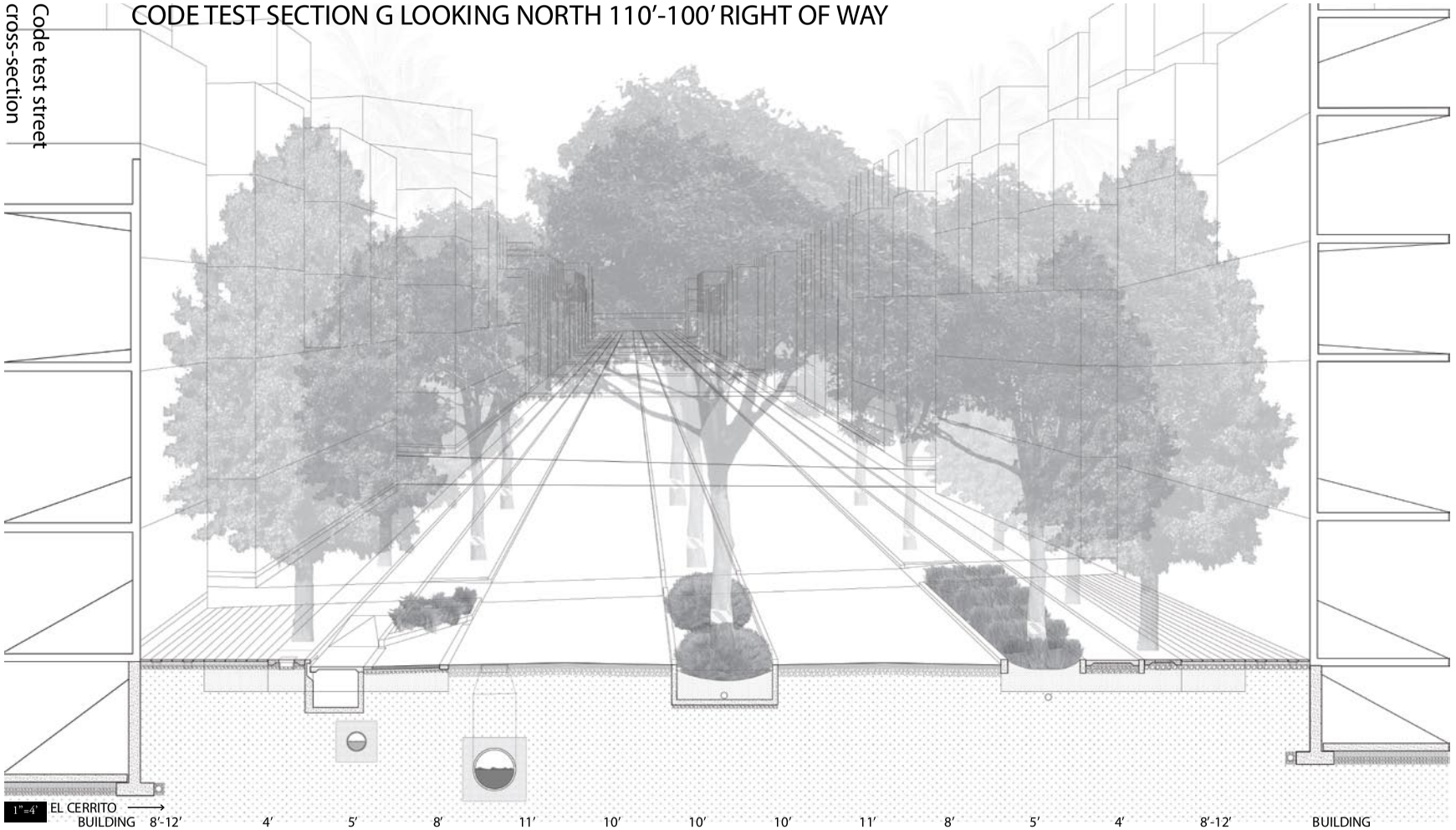
MULTI-MODAL STREET (PROPOSED CONDITION)

Pedestrian Layers of Space

Moving out from the private realm, the sidewalks extend eight to twelve feet, depending on the width of the right-of-way. Only the sidewalks vary in width, the other layers of the cross-section remain consistent. The sidewalk width provides sufficient space for a semi-public realm to create a fuzzy transition between the public and private realms. The width makes room for a multi-functional pedestrian realm. Adjacent to and also part of the sidewalk space is a four-feet-wide layer for trees and utility access boxes. This space contributes to the microclimate, air quality, light quality, habitat, and the invisible connections between the buildings and the district utility infrastructure. Next, a slightly raised curb separates the pedestrian space from the Class I bicycle lane that is on grade with the sidewalk. The bicycle lane sits in an allé created by the tree strip and the "infrastrip," which also contains trees. The area of the cross-section referred to as the "infrastrip" mixes users, modes and infrastructure with the greatest intensity. The "infrastrip" evidences synergy in the form of a high-performance buffer between the speeds of the automobile traffic and the pedestrian traffic. The "infrastrip," an eight-feet-wide space, snakes in between the motorized and non-motorized realms of the street to accomodate on-street parking, transit stops, centralized waste infrastructure for recycling, garbage and compost, bicycle parking, street lights, trees, and stormwater facilities.

Code test street
cross-section

CODE TEST SECTION G LOOKING NORTH 110'-100' RIGHT OF WAY



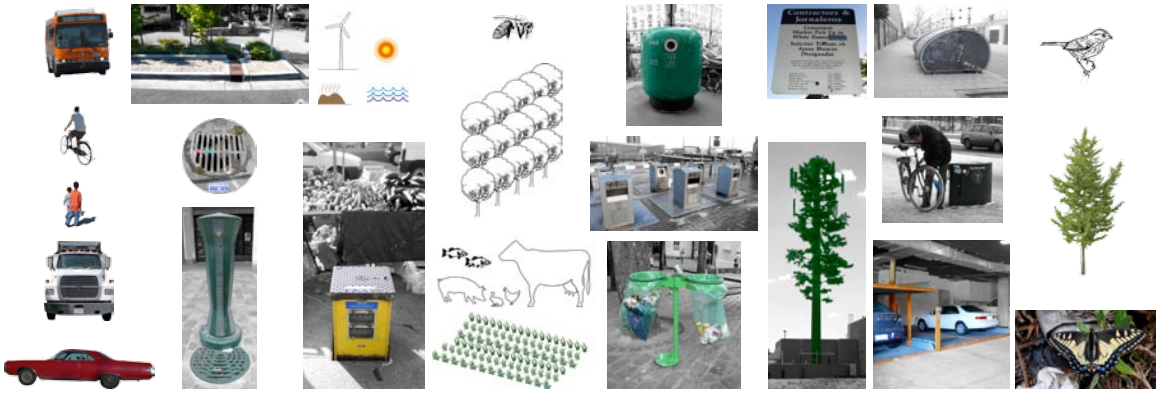
1" =4' EL CERRITO →

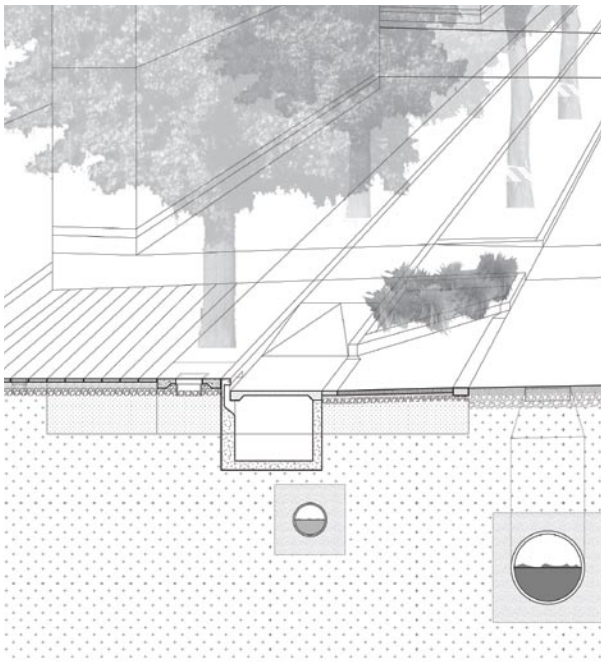
BUILDING	8'-12'	4'	5'	8'	11'	10'	10'	10'	11'	8'	5'	4'	8'-12'	BUILDING
people animals bikes cars	SIDEWALK people animals cafes other retail spill	TREE & UTILITY STRIP people animals	BIKE LANE bicycles rollerblades skaters stormwater	INFRASTRIP parking garbage recycling compost trees stormwater solar lights	TRAVEL LANE cars trucks buses utilities	TRAVEL LANE cars trucks buses utilities	MEDIAN/ TURN LANE plants pedestrians animals stormwater	TRAVEL LANE cars trucks buses utilities	TRAVEL LANE cars trucks buses utilities	INFRASTRIP parking garbage recycling compost trees stormwater solar lights	BIKE LANE bicycles rollerblades skaters stormwater	TREE & UTILITY STRIP people animals	SIDEWALK people animals cafes other retail spill	people animals bikes cars

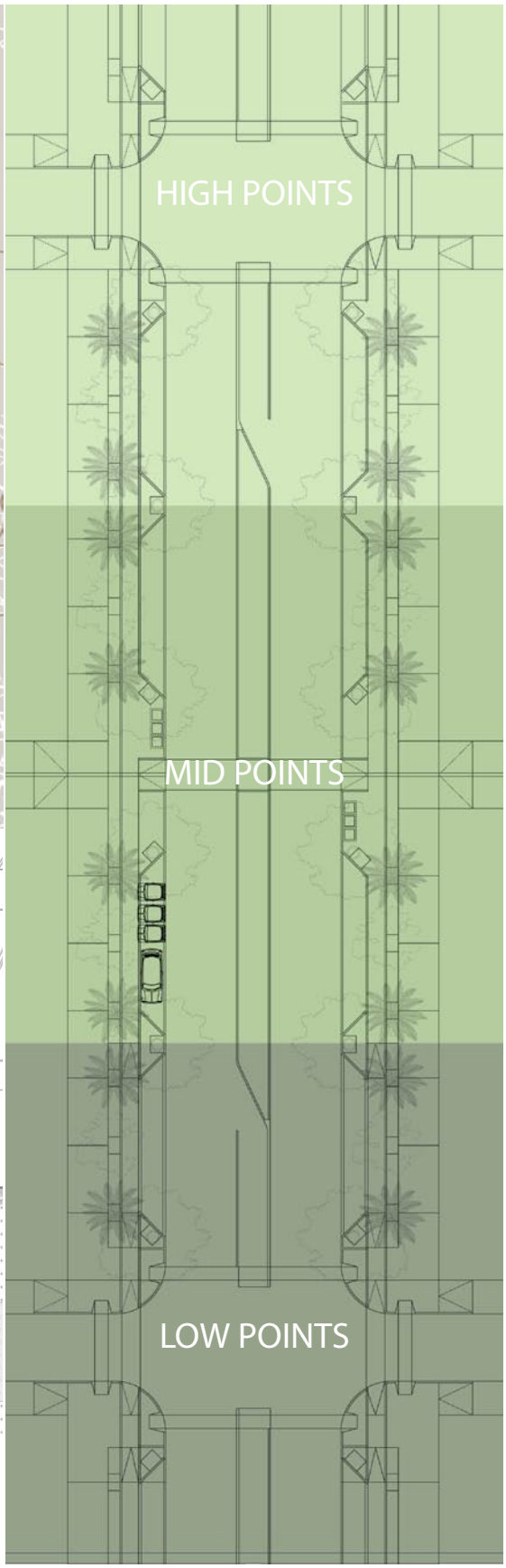
In additon to visual cues in the topography, the “infrastrip” stormwater components indicate transverse location in the watershed. The stormwater facilities at the high points of the watersheds consist of vegetated planters and different types of permeable paving in the parking areas and the pedestrian realm. Along the mid-points, flow-through planters mitigate the volume and flow of stormwater from the street and the pedestrian realm. In the low points where water accumulates, the bicycle lane that parallels the parking areas ramps down from the sidewalk grade to street grade so stormwater can flow into an underground cistern. The stored water can be used for irrigation in the right-of-way or could be plumbed back to the buildings to be used as a non-potable water source. The flow-through planters at the mid and low points help filter the water before it reaches the cistern. The permeable paving allows for on-site infiltration. The existing storm drain infrastructure functions as the overflow for this system. The potable water supply infrastructure aligns with “infrastrip” for ease of access.

The “infrastrip” functions as a transition between the pedestrian-bicycle space and the automobile space. As a transition, it provides a flexibility of uses that can be temporal in nature. Solar and wind powered streetlights with electrical outlets for vendors add a temporal layer to the right-of-way. Pop-up utilities can turn parking lanes into market spaces, or recharge electric cars. The “infrastrip” becomes the liminal space in the right-of-way.

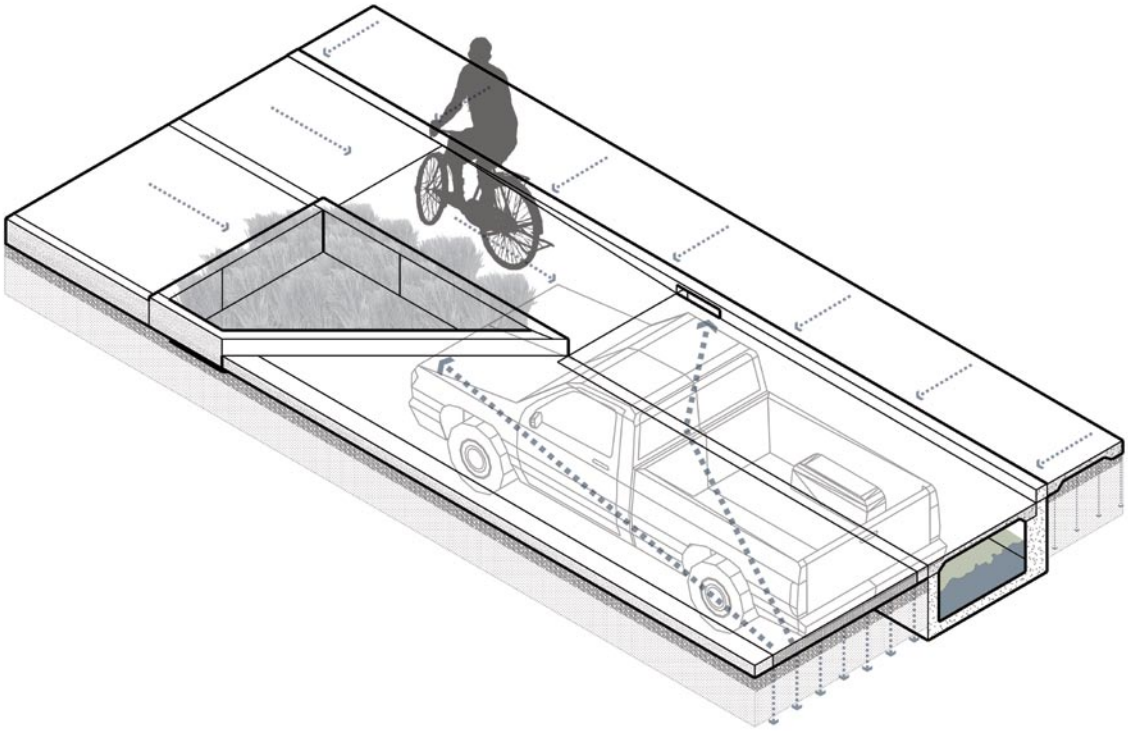
MOBILITY | WATER | ENERGY | FOOD | WASTE | COMMUNICATION | HABITAT







High-mid-low points map and plan
Detail of street section illustrating cistern/sidewalk.



Multi-functional infrastructure creates multi-functional spaces in the "infrastrip" zone: a bike lane is also a stormwater filter and cistern; a parking lane stormwater filter becomes a market stand area. Rain garden planters provide habitat and a space for successional planting within the streetscape.

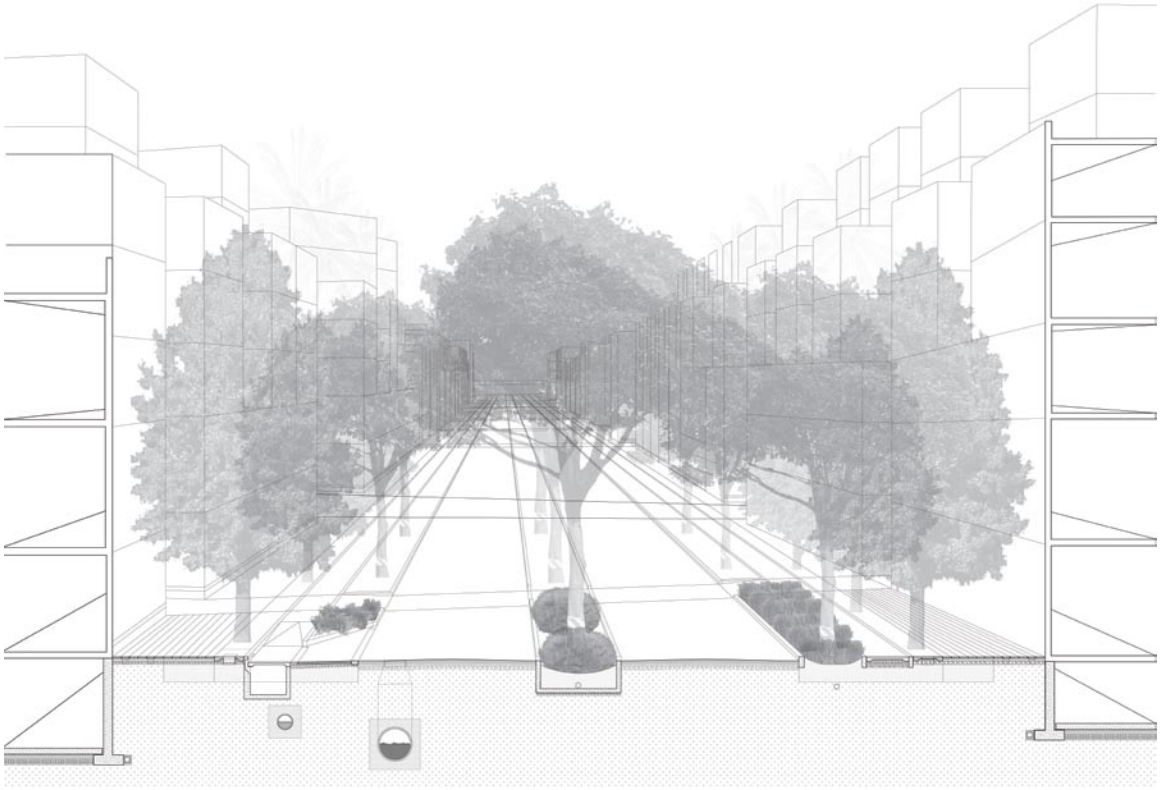
The travel lanes, although reduced in width, still carry 30,000 ADT at 25 miles per hour. The outside lane accommodates trucks and buses, and could be a transit priority lane. The existing sewer infrastructure remains under the street and serves as the overflow for the district waste infrastructure; these are Living Machines located in the buildings adjacent to the large open spaces throughout the district.

The existing median, when it's not a continuous turning lane, separates the directions of traffic and functions as a placeholder for turning lanes. When it's planted with trees, the functions of controlling microclimate and providing habitat can be added to the median's performance. When planted with other vegetation it can provide some infiltration benefits, increase habitat value and provide aesthetic benefits. Or, if the vegetation is too tall, it impedes visibility and creates dangerous situations for pedestrians and drivers alike. The existing medians perform no stormwater functions, nor do they provide pedestrian refuge. The transformed median becomes the primary stormwater filter and conduit. The travel lanes crown so water flows to both the side and medians. The district stormwater network connects to the medians under the roads at the mid-block bicycle and pedestrian crossings. The water goes under the road but there is a visual connection between the two open channel water features on either side of the road. The channels run perpendicular to the median, taking water to the linear infiltration park near the interstate. The transformed median performs the same functions as the existing median, but adds several other layers of infrastructure to this space in the middle of the street. The symmetrical cross-section relies on solar orientation for variation in microclimate experience, and traffic patterns for noise and air quality variation.

Conclusion

On the scale of the street, users, mobilities and infrastructures mix to create balanced multi-functional spaces. On the building scale, uses are mixed in a cogent building form that contributes to the framing of the public realm while addressing market demand for different uses. On the urban scale landscape, infrastructure and buildings mesh to rebalance space from an auto-oriented ecotone to a well-balanced urban ecotone that is emergent from place. The urban ecotone code provides the framework for all of these conditions.

Auto Space Landscape



Urban Ecotone Landscape