

Literature Review

Introduction to Literature Review

Urban arterials frequently traverse multi-jurisdictional spaces. Sometimes they are state highways where the state control of the right-of-way sits directly adjacent to private property subject to municipal regulation. This condition makes for a complex space in which to achieve a productive, multi-modal urban design. The urban arterial and its adjacent uses have depreciated in value since they were by-passed by the limited-access interstate system. This decline in land value has allowed for low-rent businesses to move into these spaces, typically grouping together in ethnic enclaves or agglomeration economies. Heading into a future where planning for climate change, the end of cheap oil and the overhaul of infrastructure systems will be paramount, the urban arterial, once again, becomes a space of directed interest. The question then becomes, how to plan for and negotiate these essential transformations without displacing the current community? In essence, the question is: how to plan and design for a sustainable urban arterial that is “emergent from place” (Petrucci 2005). The following literature review attempts to distill these questions and present precedents for how others have addressed these issues.

Literature Review Method

Overlapping the study of urban arterials and sustainable urbanism creates a web of knowledge in which one must be well versed. The literature review should serve to span the distance between a broad discourse of urban arterials and sustainable urbanism within the disciplines of city planning, urban design, architecture and landscape architecture, while supplying enough specificity to address the unique qualities of the explicit site of San Pablo Avenue. The second purpose of the literature review is to identify where these subjects overlap and where are the gaps. It is the goal of this thesis to fill in some of the gaps in the discourse of planning and designing for sustainable urban arterials.

The literature review is broken down into topic categories: urban arterials, San Pablo Avenue as exemplar, corridors and strips, multi-jurisdictional geographies, fiscalization of land use and parcellization, urban design, infrastructure, landscape urbanism, form-based and performance-based codes, and the ecotone code. Ultimately, the content of each topic will intertwine and branch out across the other categories. An expanded discussion on codes is addressed in the following chapter.

Urban Arterials

Since the time of the interstate system by-pass, the urban arterial has “atrophied” while the surrounding commercial and residential “tissues” have decayed (Davis 1997). In an Institute of Urban and Regional Development Working Paper entitled “*The uses and re-uses of major urban arterials : A study of recycling, revitalizing and restructuring “gray area” transportation corridors*” the authors propose that “streets and the areas through which they pass currently represent underutilized transportation and land use resources in what are often “gray” areas of large central cities, resources that could be part of a restructuring and revitalizing of major urban corridors, often by the use of multi-functional roadways coordinated with adjacent land use” (Jacobs, *et al.* 1997, 3). Their study identifies a set of urban arterials for which they develop a comparative analysis of the following elements:

1. History
2. Physical Characteristics and Context of the Street
3. Traffic Characteristics
4. Characteristics of Development Along the Street
5. Social Characteristics of Development Along the Street
6. Characteristics of the Surrounding Neighborhood
7. Typologies

The last element, Typologies, categorizes the analysis into different types: Character Types, Development Types, Traffic Rhythm Types, and Functional Context Types. These typologies begin to suggest a framework in which designs could emerge. Their extensive study simply

reinforces the assumptions of this thesis—that urban arterials are the oft-neglected spaces of cities where automobility has stripped away any sense of pedestrian space. The study of San Pablo Avenue in this thesis will build on this paper’s analysis and methods, which will be discussed further in the analysis chapter.

Ten years after the writing of the IURD Working Paper, the Association of Bay Area Governments studied several of the corridors mentioned in the paper that are within its geographical sphere of influence: East 14th Street/International Boulevard, El Camino Real, and San Pablo Avenue. The report, entitled “*Towards a Common Agenda on State Highways*” states that “(i)t is the first attempt to document local progress toward mutual state and regional policy objectives” concerning growth that “impacts housing costs, mobility, the environment, and social equity” (ABAG 2007, 1). This report charts the progress of the 2002 Bay Area Alliance for Sustainable Communities’ multi-sector regional collaboration entitled *The Network of Neighborhoods Vision*, “the first regional ‘smart growth’ vision for a major metropolitan area in California. The vision concentrates future growth in a compact ‘network of neighborhoods’ mostly in existing communities, surrounding the San Francisco Bay” (ABAG 2007a, 2). One of the ways in which localities have addressed these issues is by changing their zoning ordinances and general plans for their state highway corridors by increasing density and allowing for mixed-use development.

Most communities along the corridors target their highways as areas for new growth, at relatively higher densities than other areas within the community. The amount of density a community is willing to accept and therefore plan for is highly dependent on the context of the existing community, especially existing densities. A strong, existing pedestrian-oriented infrastructure and access to transit seems to make density more acceptable to community members, (ABAG 2007a, 5).

The *Guide to California Planning*, the seminal textbook for planning in the state, contends that an underlying theme of the book acknowledges a paradigmatic shift in California from a suburban to an urban society, which supports ABAG's Smart Growth report (Fulton, 2005). However, Fulton is cautious about seizing upon the urban arterial's most dominant landform as the prime mode of smart growth transformation. He states, "Commercial strips are much more difficult to transform with smart growth principles, but in the long run they represent California's largest stock of reusable land for future urban growth," (Fulton, 2005, 303). Smart Growth transformation is difficult for commercial strips because it implies complete redevelopment of an area. There are more surgical options for a slower transformation; two such proposals: *Flip-a-Strip* "Urban Battery" and *Stripscape*, are presented later in this literature review.

San Pablo Avenue as Exemplar for Planning Efforts on Urban Arterials

Although there have been numerous studies conducted on San Pablo Avenue, none of them have been a corridor-wide assessment of land use and transportation opportunities. Below is a list of studies that have addressed planning issues along San Pablo Avenue over the past fifteen years. The first section includes plans created by cities along San Pablo Avenue, county planning agencies, and regional government associations. The following section represents articles that were developed from a University of California Berkeley Transportation Planning Studio about San Pablo Avenue held in 2004. These articles will be referred to as the "Deakin Effect" since Elizabeth Deakin was the professor of the studio and is cited as co-author for all of the articles. She heads the University of California Transportation Center. The final section presents a list of the University of California theses that directly address San Pablo Avenue.

Table 1. Planning and academic studies about San Pablo Avenue (partial list Deakin 2004).

Title of Document	Geographic Location	Year
Golden Gate Neighborhood Commercial Revitalization Report	Oakland	1994
Amended and Restated Storefront Improvements Program Guidelines	El Cerrito	1996
San Pablo Avenue Housing Market Assessment	Emeryville	1996
San Pablo Avenue Corridor Market Assessment and Implementation Plan	Emeryville and Oakland	1997
San Pablo Avenue Vision Plan	Albany	1997
San Pablo Avenue Corridor Study	Alameda County Congestion Management Agency	1997
City of El Cerrito General Plan	El Cerrito	1999
Golden Gate Neighborhood Existing Conditions Report	Oakland	2001
San Pablo Avenue Streetscape Master Plan	Albany	2001
San Pablo Avenue Transit Corridor Design Standards	Alameda County Congestion Management Agency	2001
El Cerrito Plaza BART Station Access Plan	BART in El Cerrito	2002
San Pablo Avenue Public Improvements Plan	Berkeley	2003
El Cerrito del Norte Area Design Guidelines - Built Space	BART in El Cerrito	2003
San Pablo Avenue Corridor Analysis - Phase 2	AC Transit	2004
Design Guidelines . A Summary El Cerrito del Norte Area	El Cerrito	2004
ABAG FOCUS Study for San Pablo Avenue	Oakland to Hercules	2007
San Pablo Avenue Specific Plan	El Cerrito and Richmond	2009
Richmond General Plan Update	Richmond	2009
Articles -- The "Deakin Effect"		
Systems-level approach to sustainable urban arterial revitalization : Case study of san pablo avenue, san francisco bay area, california	Oakland to El Cerrito	2006
Optimizing transit priority on a high volume urban arterial a case study of san pablo avenue.	Oakland to Richmond	2004
Views of the Street: Using Community Surveys and Focus Groups to Inform Context-Sensitive Design."	Oakland to El Cerrito	2006
Exploring the Development of Multi-use Urban Arterials: The Case of San Pablo Avenue."	Oakland to Richmond	2004
"Redevelopment and Revitalization Along Urban Arterials: Case Study of San Pablo Avenue, California, from the Developers' Perspective."	Oakland to El Cerrito	2005
Theses		
A study of the effect of lighting on injury accidents on san pablo avenue in berkeley, california.	Berkeley	1935
Towards good places along san pablo avenue in berkeley.	Berkeley	1994
Assessing community needs in emeryville : A market analysis of the promenade center and the san pablo avenue corridor.	Emeryville	2004

The full extent of the San Pablo Avenue corridor runs from Oakland to Crockett. As noted from the list, none of these planning efforts or studies encompass the entire length of the corridor. The committee of planners formed by Assemblywoman Loni Hancock, *Destination San Pablo Avenue*, only includes the areas from Oakland to Hercules. The ABAG study also falls short because it does not include the areas of San Pablo Avenue north of Hercules—the unincorporated portions of the corridor in Contra Costa County. The areas at the north end of the corridor are the least developed and have experienced significant growth pressure in the past ten years. This is also where the last major industrial parcel on San Pablo Avenue is located.

All of the other articles and studies written about the San Pablo Avenue environs fall even shorter in geographical scope, typically confined to the jurisdictional boundaries of a single municipality or county, with little mention of regional goals. The level of attention directed at San Pablo Avenue as a state highway urban arterial could be considered exemplary in terms of the efforts put forth by the regional agencies and the local governments, but it still falls short of what would be required for a holistic approach of addressing, on a corridor scale, the regional issues of “housing costs, mobility, the environment, and social equity” identified as key issues by the ABAG study.

The Deakin Articles

The Deakin articles present useful background data that describe general conditions of land use and transportation on San Pablo Avenue; the history paper written by Greg Newmark is especially informative. The timeline developed in the analysis chapter draws directly from his paper and his primary sources. The bus-rapid-transit study conducted in *Optimizing Transit Priority on a High Volume Urban Arterial: A Case Study of San Pablo Avenue* provides significant documentation on the transit issue, enabling me to not have to address the issue in my thesis (Higgins *et al.* 2004). The survey results and raw data from *Views of the Street: Using Community Surveys and Focus Groups to Inform Context-Sensitive Design* provided invaluable data for the five-mile study scale, indicating how people who live near San Pablo Avenue use the space. The factors encouraging and discouraging development along San Pablo Avenue identified in *Redevelopment and Revitalization Along Urban Arterials: Case Study of San Pablo Avenue, California, from the Developers' Perspective* affirmed some of my assumptions about improving the street design, and how the block and parcel size morphology affects development decisions. One of the main conclusions of the paper recommends developing a form-based code to facilitate development that is based on community consensus. The article, *Systems-Level Approach to Sustainable Urban Arterial Revitalization: Case Study of San Pablo Avenue, San Francisco Bay Area, California*, carries forward the form-based code and transit recommendations from the other Deakin articles in order to analyze the existing regulations and identify specific policy changes. The nexus between land use and transportation planning identified in the article above is primary to this thesis. To achieve context-sensitive design, the whole space of San Pablo Avenue needs to be considered, and it is through this lens that transportation planning will be discussed in this thesis, with the focus on re-balancing all transit modes along the urban arterial.

Research Methods on San Pablo Avenue

Teresa Caldeira's research methods class in the Spring of 2008 and 2009 focused on the social/qualitative aspects of San Pablo Avenue. The course employs various research methods, with the entire class focusing on San Pablo Avenue as a way of learning how to refine the methods. I participated in the course in 2008, which led to a study on the perceptions of San Pablo Avenue as a strip, the qualities that contributed to this condition and the indicators of transformation from this condition. Other students' interviews and presentations also contributed to the development of this thesis topic. The interviews and documentation conducted by Kristen Podalak, Rebecca Sanders and Jessica Look in the 2009 class informed me about the day-labor population surrounding the Home Depot near the El Cerrito del Norte BART station. Since this thesis is attempting to discuss transformation that is 'emergent from place,' it was important to learn about this informal economy and its spatialization on San Pablo Avenue. The information gathered through the various planning efforts referenced in the table above, the Deakin articles and Caldeira's research methods course provides a well-framed context from which this thesis moves forward. Not everyone between the Assemblywoman and the undocumented worker is accounted for, but the distribution is representative of the conditions and people along San Pablo Avenue.

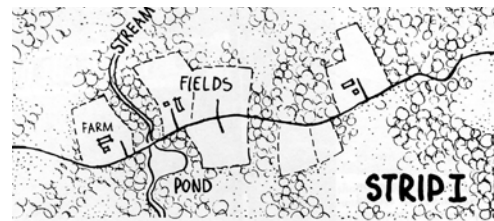
Corridors and Strips

The regional planner's task is to consider San Pablo Avenue as a corridor, while acknowledging the actual fragmented "strip of strips" that make up the corridor, which is a more succinct description of people's experience of the corridor. When searching the terms "corridor" and "urban arterials" on the WorldCat online catalogue, the majority of citations address the management of traffic, and only a handful of articles, including the Deakin articles, mention aspects other than traffic and transportation. So, while not much has been written about the urban arterial as an urban space, there exists a condition of the urban arterial for which much has been written: the commercial zone referred to as "The Strip." J.B. Jackson, an early figure

of cultural landscape studies coined the term “odology” to describe the study of roads and roadside culture. It is within this field of Odology that strips are most frequently discussed (Davis in *Everyday America* 2003).

Practically every urban arterial in America has or had some form of a strip along its length; this can be evidenced through a quick study of zoning maps indicating commercial zoning as the primary zone along arterials, and this notion can be confirmed with aerial photographs of the urban arterials indicating the quintessential strip mall architecture of clustered buildings located at the rear of a lot with a sea of parking adjacent to the street. The strip did not always appear this way, nor was it always referred to as the strip; it transformed into this typology as the automobile became ubiquitous. The term “strip” initially became associated with commercial-building-form during the private-developer-streetcar-neighborhood period. “The term *taxpayer block* or *taxpayer strip* stems from the temporary manner in which these commercial buildings were regarded,” (Rowe 1991, 111). These neighborhood-serving commercial buildings were meant to be temporary land uses, used by developers to attract homebuyers to their subdivisions (Rowe 1991). The temporary land use “strip” has turned into a dominant typology. The evolution of the strip is explained with the following set of diagrams taken from Grady Clay’s book *Close Up: How to Read the American City*. Clay states, At each stage, the strip puts on a separate act, and before one decides what ought to be done about a strip, it is essential to first discover what stage it is at in the recurring cycle of energy investment and decay. For some strips are ripe for change and others are not; still others may revert to an earlier phase, (Clay 1973, 90).

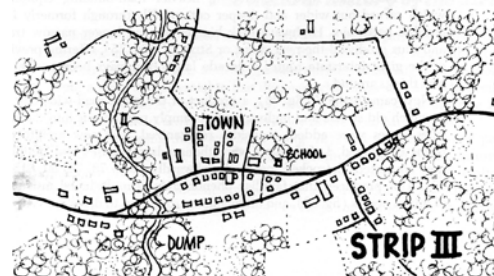
Strip I – the path in the landscape most responsive to topography and other natural factors. This is the oldest form of path that persists in the landscape today, originally formed by Native-Americans or migrating animals.



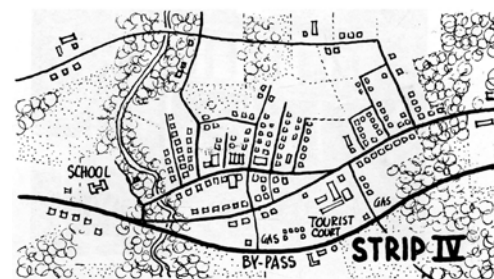
Strip II – A wider version of Strip I “gradually improved for wagons until the coming of the automobile, sometimes becoming a linear village,”(91).



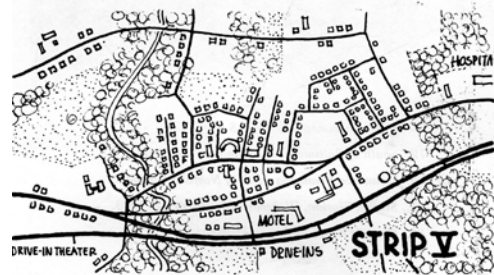
Strip III – typically formed in the 1920’s as early paved roads, meaning they were the important trade routes of an area.



Strip IV – the era of the highway: in the 1930’s and 1940’s cars and road engineering jumped to a much greater scale in the landscape. “Highways became the biggest thing around,”(91).



Strip V – the beginning of the golden age of the automobile: “old streets and highways were simply pushed out into roadsides; lanes were added, roadsides reorganized, and new architectural forms developed. Left behind were thousands of houses and buildings, now truncated, defrocked, perched awkwardly,”(91).



Strip VI – the strip as a connector between the historic highway strip and its adjacent interstate interchange. “(H)ere you find variations of ‘Motel Row’, ‘Drive-in Gulch’, or ‘Gasoline Alley’,” (97).



Strip VII – “a radical reorganization of nearly everything within the influence of the interstate interchange...An interchange zone is a real-estate merchandising device manufactured with public funds; it is an economic cockpit where only the largest operators can afford to compete – oil and motel chains, national land developers, new town promoters,” (97). This phase of the strip deals with parcel assembly, and the resulting loss of the remaining fine-grain urban fabric that would have developed in phase II.

Grady Clay’s “Evolution of the Strip”

The Strip has become a trope for the urban arterial; as such the following quotation about the Strip is an extremely apt description of the urban arterial and its environs—built as a landscape in service to the automobile: “A good landscape was not one that impressed elite observers as a suitable subject for aesthetic contemplation, but one that answered the myriad needs of its inhabitants” (Davis reflecting on JB Jackson’s philosophy of Odology in *Everyday America* 2003, 64). This relationship has been built on the configuration of auto-dependent businesses for which the urban arterial is very efficient at conveying. Planners often refer to this type urban arterial as a corridor for the purposes of economic and transportation planning. Clay describes this phenomenon in the following: “On the strip, automobility runs rampant, carrying that valuable cargo called “accessibility” to be dropped off anywhere along the way,” (Clay 1973, 87). The growth of the middle class led to an increase in accessibility to automobiles, which brought about a massive transformation of the American landscape. The urban arterial set up the condition for urban expansion, which was later taken up by the highway and interstate system. The creation and evolution of the strip is directly tied to consumption demand, which was facilitated by automobile accessibility. Therefore, it is the car and auto-mobility that has dominated the formation of the urban arterial’s landscape over the past century, and it is the reason why the strip and the corridor of the urban arterial are not pedestrian-friendly landscapes.

Reconsiderations of the Strip

Below are several examples of the reconsideration of the urban arterial as a multi-modal space, in which the authors address the transformation of the strip/ urban arterial /corridor from an auto-dominated space into a community space of mobility.

The Scottsdale Museum of Contemporary Art held a design competition in 2008 calling for a reconsideration of the strip mall. It is entitled *Flip-a-Strip: New Ideas for Old Strip Malls*. The following quotation speaks to the essence of why the museum decided to hold the competition:

“It is hardly an uncommon scenario: the ‘dead mall’ syndrome across the United States testifies to the battlefield of retail evolution and devolution.” (Susan Krane Editorial <http://www.flipastrip.org/wc.html> accessed October 20, 2008.) These strip malls are all located on urban arterials, and all share the characteristic of low-rent businesses configured in auto-oriented architectures.

The winners of the competition MOS design: Michael Meredith and Hilary Sample describe their project in the following way:

In terms of zoning, Urban Battery is a physical structure similar to a power station, vertical greenhouse, and a billboard, all rolled into one...Urban Battery acts as an energy producer, filtering air, housing oxygen regenerating plants, provides bike paths, public gardens within the structure, and stores bio-products for fuel. It also includes an additional building for community events that is attached at the base of the structure. This additional program could be for either teens or seniors dedicated to expanding activities from the neighborhood and accessible through a new bike and walking path converting the alley into part of an urban infrastructure, removing the existing fences that line the perimeter of the site to open up what has typically been an eyesore the back of the strip mall. Here the strip mall can be accessible from the front and the back, and reconnects to the neighborhood. It is more of a piece of urban infrastructure like a billboard, which typically is exceptional to their contexts, they stick out for a purpose. The problem with the Billboard is that it operates only at the scale of the automobile. (The Urban Battery) is urban infrastructure; an identity for the strip mall, and it also situates itself into its context at the ground drawing on the local neighborhood for a bike path extension to slip underneath and through the structure. The act of redecoration of the strip mall trivializes architecture. The strip mall has specific identity and purpose, to provide goods to a local neighborhood, not to function as high art. This is not about producing boutique architecture. Our primary goal is to produce something that performs (<http://www.flipastrip.org/content/173spec.pdf> accessed 11 May 2009).

Urban Battery



The strip mall is already **perfect and abject**. Redecorating a strip mall makes no sense; all they need is some maintenance perhaps a fresh coat of paint. Reconfiguring a strip mall with an attempt to bring some life back into it, to make a glorious architectural spectacle, or somehow produce a small urban fragment, a reproduction of a lively part of New York's West village that's been radically cropped and condensed is flawed.

They are about an **economic efficiency**, doing the least, stripped-down. The most pragmatic solution from a developer's point of view would be to renovate the existing facades, making a Wild West storefront, but as an "ideas" competition, we decided to explore **radical alternatives and potential futures** where the strip mall calibrates the local environment as a giant filter, exposes its backside to the surrounding neighborhoods essentially opening what has been typically enclosed, and creating a program that reflects environmental and societal concerns.

Strip malls are a symptom of a greater problem, where private development has trumped the public good, providing the minimum amenities without defining a collective identity of urban space. The public square of the strip mall is a **hot asphalt parking lot**, which is both the center of attention for the surrounding strip buildings and its leftover, unconsidered space. If anything what is universally common and economically necessary amongst all strip malls is the parking lot.

The strip mall type is made up of discontinuous volumes. Here, we decided to unify the disparate strips through the site's most contested component the parking lot. This is our site of interest and where we thought the design could perform, integrated into urban infrastructures.

Our proposal **URBAN BATTERY** is an attempt to reframe and recycle the leftover parking and motivate it towards a utopian desire at a very local scale, a **micro-utopia**. To counteract the effects of obesity, pollution, and urban sprawl we propose a prototype with a minimal footprint and a maximum surface to offset the negative effects of the strips.

The Scottsdale competition site lacks any healthy urban infrastructures, no community centers, no pools, no green space, it's a dead quadrant. **URBAN BATTERY** reinvigorates it.



Greater Scottsdale Healthy Infrastructure Study 02



Site Shading Diagram 05



Urban Battery repeated 04



Urban Battery changing with climate 03

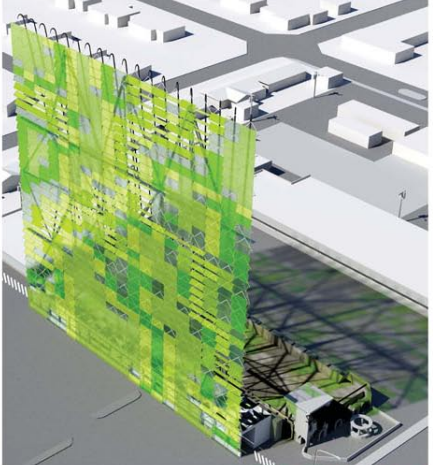


Scottsdale's 496,384 population is up +68.2%
Fa'n-happy...Scottsdale is 54% obese.
 Annual cost water utilities \$45,823,000.
 Yearly sewerage \$75,823,000
 It costs 2.5x more for water than parks.
 60% population 10,500' annual rainfall.
 105 Dr. visits 40 in January.
 Latitude: 33.33 N. Longitude: 111.98 W
 Heating days 3,088; cooling days 1,889.
 Median home price \$422,000.
 Median age 33.
 There are more shopping malls than hospitals.
 22 sports fields 48 golf courses.
 42 parks & public swimming pools.
\$3.1 billion in tourism, 2005.
 Urban Battery produces 100kWh per year.
Traffic accidents are at an all time high.
 Urban Battery generates biofuel.
 Urban Battery generates biofuel.



Algae walls 16

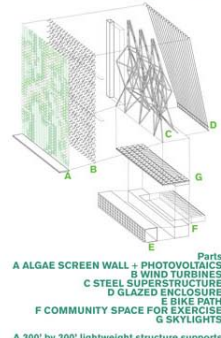
Algae walls 15



Urban Battery casting a green shadow 10



Optimizing sunlight 14



A ALGAE SCREEN WALL + PHOTOVOLTAICS
B WIND TURBINES
C STEEL SUPERSTRUCTURE
D GLAZED ENCLOSURE
E BIKE PATH
F COMMUNITY SPACE FOR EXERCISE
G SKYLIGHTS

A 300' by 300' lightweight structure supports a series of thin glass channels housing a network of pipes, tubes, and algae to produce filtered, clean air and gases for biofuel. A system of wind turbines generates electricity supporting the activities of the strip mall and the surrounding neighborhood. It dispenses electricity through wind turbines, breezes and healthy air offsetting the effects of Scottsdale Road and the parking. Of the elements inserted into the site includes a newly created bike and walking path connecting into a larger infrastructure for exercise.



remove existing fences 13



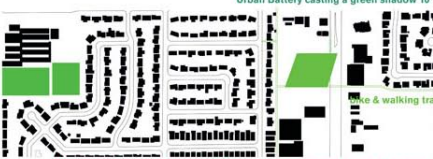
Healthy Infrastructure bike/walk trails 12



Urban Battery aerial view 11



Urban Battery Structure 08



Urban Battery creates additional green space and new bike/walking trails linking neighborhoods across Scottsdale Road 07



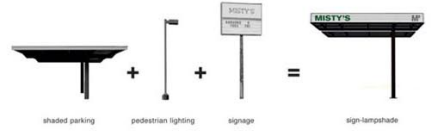
Urban Battery 06

While the Urban Battery project focuses on an energy-producing infrastructure object in the landscape, it is the system of these objects that reinforce pedestrian and bicycle networks and create community facilities throughout Scottsdale that make them significant contributions to a community space in an auto-dominated landscape. The cooling effect provided by the shading of the urban heat island parking lot is a benefit of the contextual location. The micro-climate benefit provided by a quotidian object was perhaps the starting point of this project, but the ideas of community space and decentralized/autonomous infrastructure are what allowed their project to become transcendent of zoning categorization. This proposal represents an incremental transformation, where their project functions as an indicator of larger changes to come.

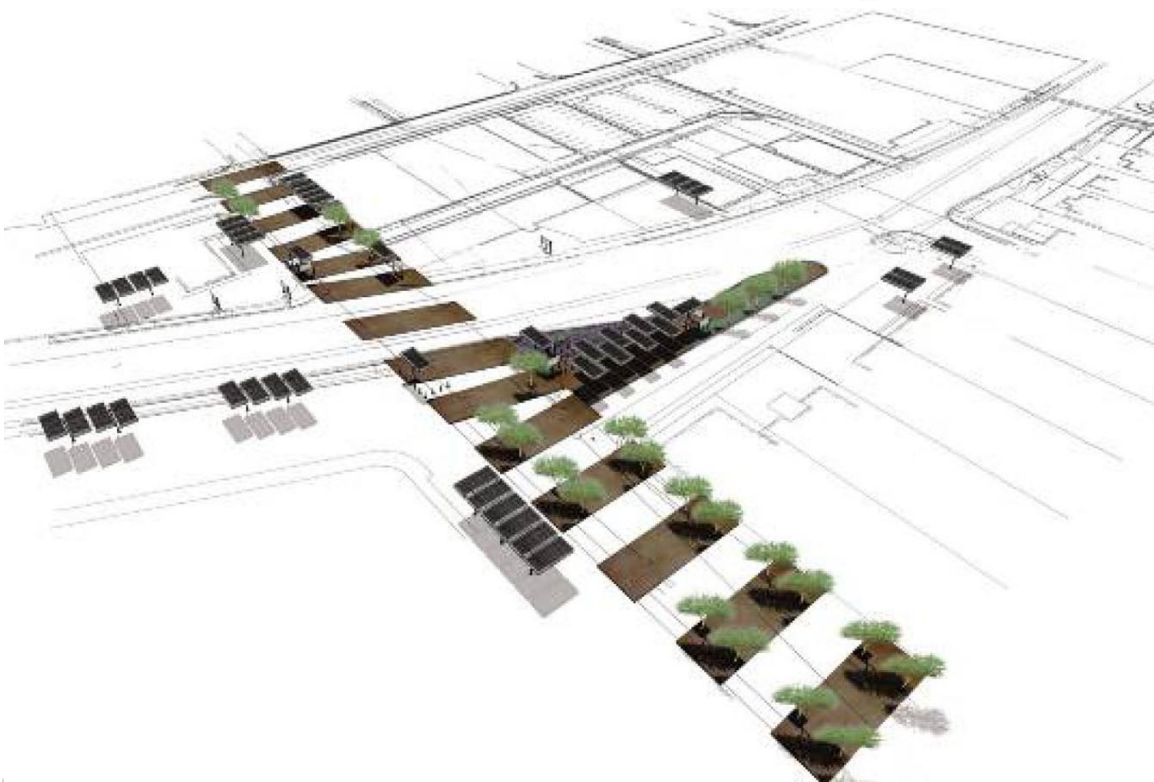
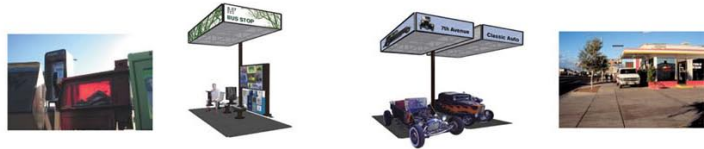
The second project, *Stripscape: Pedestrian Amenities along 7th Avenue* in Phoenix, Arizona represents a public-private collaborative planning and design effort between the city, the Seventh Avenue Merchants' Association, Arizona State University, and the Arizona Department of Transportation. This multi-agency project "attempts to graft a new type of infrastructure onto this generic landscape in an attempt to develop a connective tissue that can facilitate the rich complexity of urban life" (Petrucci 2005). With funding from a Federal Transportation Enhancement grant, the group established three main principles for the project: "to establish a character for the strip that would be identifiable within the metropolitan area; to increase business by promoting renovations and new development; and to form stronger pedestrian connections with surrounding neighborhoods" (Petrucci 2005). The group developed a kit of parts, which would be responsive to local input and conditions. These projects were initially placed in the public right-of-way, but could also be adapted to the private parcels along the arterial, as interest arose. Below are images of the demonstration project that was built as a result of this planning and design process.



The main architectural element in the project is the "lamphade." This iMensity infrastructure combines shade, lighting, and signage for graphic art into one flexible unit. The lamphade does in one move what typically was done in three moves, thereby cleaning up the visual and physical clutter along the commercial corridor. These elements have been optimized for cost and maintenance. They are durable and affordable for the private business owner to purchase. The lamphade has been approved by the City of Phoenix for private installation and as a new signage opportunity for merchants.



Art is an integral part of the infrastructure. A new program has been established with the Phoenix Public Art Department for the project. Vertical wall elements that function as shading devices for the lower afternoon sun are designed as light boxes for graphic art. Reproductions of the artists' work are printed on translucent panels and are illuminated at night. Every 6-12 months the panels are replaced with a new artist. Therefore, in keeping with the dynamism of the site public art is conceived of as an urban gallery.



"Stripscape" design kit of parts and masterplan (Petrucci in *Places* 2005)

The transformation of the billboard from a single-use object into a multi-functional infrastructure sits at the heart of this project. The commercial signage built to be viewed at high speeds, from long distances is flipped ninety-degrees to become a shade structure for pedestrians. The advertising component remains a functional part of the system, but is reduced in scale to represent the intention of signifying that the right-of-way is a multi-use space, where billboards are made for slower vehicular traffic as well as pedestrian traffic. The scale of the new ad/shade structure responds more directly to the pedestrian scale in design and can be clustered together for a larger effect of shading and advertising coverage.

The history of the transformation of the strip is important because it represents the adaptability of uses across classes. The reconsideration of the urban arterial in this thesis draws upon the uses that have developed from the history of collapse and renewal—“evolution and devolution” of the arterial and the adjacent land uses. “While motels and strip developments might seem unlikely environments for the development of community spirit and the maintenance of class or ethnic identity, parking lots and motel courtyards can assume important roles for those who frequent them and transform the generic automobile-oriented spaces into subtly differentiated and personalized places” (Davis 1997, 101). The two infrastructure projects presented above represent attempts at creating a stronger sense of identity along the strip by creating specialized pedestrian spaces. The designs are derivatives of ubiquitous objects from the landscape of the strip that intervene in the auto-domination factor without heavy-handed design solutions.

The third and final example comes from the 2007 History Channel “Design and Engineering Challenge” which was a competition held in Los Angeles, New York City and Chicago to design “The City of the Future.” The winning proposal *Growing Water* by Urban Lab divided the city of Chicago into its sub-continental divide watersheds to propose a closed loop water system for the city by returning cleaned water back to Lake Michigan, instead of the current system of sending the treated water out of the watershed, eventually down into the Gulf of

Mexico. “Eco-boulevards” are the primary types of infrastructures that would clean and convey the water back to the lake. “Essentially, the eco-boulevards would be long strips of publicly owned land transformed from gray infrastructure (roadways and sidewalks) to restored green infrastructure,”(Felsen and Dunn in *Places* 2008, 37). Urban Lab’s proposal would create 50 “eco-boulevards” along existing east-west rights of way in the Chicago urban fabric, creating linear, natural-process-based wastewater and stormwater treatment systems. The Living Machine digesters to treat the black water sewage could be envisioned like the icehouses located in the 19th century parks of Paris, and thereby be designed as civic green house structures in the public realm. Since this proposal represents a framework plan, the authors note that, “The design of each eco-boulevard would differ to meet the needs of its adjoining neighborhoods,” allowing for customization of the spaces based on local uses and cultures, including but not limited to plazas, recreational facilities, and community gardens, (Felsen and Dunn in *Places* 2008, 38).

While not exclusive to the strip or the corridor, this project presents a long-range framework plan for reconsidering the public right-of-way as a sustainable multi-functional infrastructure, which is a primary goal of this thesis to consider for San Pablo Avenue. All three of the above-mentioned projects represent current trends in the re-consideration of the urban arterial towards a more balanced environment, where the automobile no longer dominates the landscape and the infrastructures within the landscape are multi-functional components contributing to the construction of the public realm as a civic space.

The *Growing Water* example is a utopian vision for the future of a city that would entail a tremendous reconstruction of the city over a century of time, while the other two projects look at the urban fabric, *in situ*, and propose precise moves to reconstruct the fabric by establishing discrete, connected spaces for pedestrians and automobiles along the arterial/strip. Both long-term frameworks and “shelf-ready” solutions are needed to rebalance urban arterials.

The fragmenting of the urban arterial into islands of pedestrian refuges in a sea of auto space is precisely the reason that it is not perceived as a pedestrian-accommodating space. This fragmentation is not limited to the confines of the roadway. The car invades the pedestrian space with the auto-related land uses that appear along the urban arterial: car dealerships, car repair/maintenance, the motor court hotel, the drive-thru fast food, and the parking lot for the strip mall. All of these erode the space of the pedestrian into disparate patches. In thinking about the short-term transformation of the corridor into a sustainable, multi-modal space, it is the discrete, calculated actions and designs that can begin to address a question like: how can auto-related land uses adapt to a balanced space for pedestrians and autos? Auto-related land uses on urban arterials typically form agglomeration economies that serve a regional purpose. Destination retail for specific market sectors is another form of agglomeration economy that is well served, based on the connectivity and low-rent districts along the urban arterial. How can these business types adapt to a ‘smart growth’ urban form? This discussion continues later.

Multi-jurisdictional Geographies

Despite the fact that regional planning does not exist in California, nor is there a state mandate to have inter-governmental coordination in California, there does exist a mentality of regionalism which is reflected in a myriad of regional commissions and organizations. The Association of Bay Area Governments (ABAG) puts forth recommendations about how the region's local governments can carry forward plans that will be beneficial to all in the region. Since land use is controlled and decided upon at the local level, it is the level at which the regional recommendations will be put into action. The reality of the regional recommendations being carried through is based upon intermediary efforts to translate the regional goals to local action without getting lost in translation. The Study *"Towards a Common Agenda on State Highways"* of three urban arterial state highways, including San Pablo Avenue, suggests there are gaps in these efforts in which a type of model ordinance development code or a multi-jurisdictional special district designation could play a significant role in setting a unified agenda and garnering local community support. Acceptance of change by local communities was noted in this report as the largest barrier to achieving regional goals, so without consensus little will be carried forward: "Public resistance to new development, especially housing, is one of the most significant barriers to community change" (ABAG 2005, 3).

However, local consensus on land use is only one of the barriers to creating sustainable urban design along a state highway urban arterial. In the cases of the three state highways in the ABAG study, the rights-of-way are governed by CalTrans, which has had issues dealing with modes of non-mechanized mobility. Streetscaping almost always has a negligible budget and funding for maintenance of streetscaping is not typically within the purview of the highways department. Often municipalities will take responsibility of streetscaping and maintenance of the state highway that runs through their jurisdiction, but what happens when you have two different jurisdictions on either side of the road, with two very different tax bases? It becomes difficult to negotiate these issues. Fortunately, in September 2008, the state signed into effect

AB1358 the Complete Streets legislation, which requires localities to “include complete streets policies as part of their general plans so that roadways are designed to safely accommodate all users, including bicyclists, pedestrians, transit riders, children, older people, and disabled people, as well as motorists” (<http://www.completestreets.org/CaliforniaCS.html> accessed 22 October 2008). This now links the Caltrans Director’s Policy 22, Context Sensitive Solutions published in 2001 to local government planning initiatives for roads. It is worth mentioning the Caltrans document, *Main Streets: Flexibility in Design & Operations*, which was published in 2005 is a step in the right direction except that as noted in the ABAG state highways study: “That Caltrans has adopted CSS and other policies...to balance the needs of all transportation modes is still not widely known – many cities remain unaware of the agency’s ability for flexibility” (ABAG 2007, 15). The lack of awareness indicates an institutional barrier between municipalities and Caltrans and within the transit agency itself.

Given the significant barriers of planning for a state highway urban arterial that runs through numerous jurisdictions, what are the options for addressing the region’s goals for these complex corridors? A step in the right direction was congresswoman Loni Hancock’s creation of *Destination San Pablo Avenue*, a committee of planners from all of the municipalities along the avenue, as well as the pertinent transit agencies. Formed in the year 2000, the committee met to discuss the planning efforts along the corridor, however the accords from these meeting have no direct consequence to not following the goals. The relationships established in these meetings may create a positive relationship for the time when the Metropolitan Transportation Commission establishes its Sustainable Communities Strategies (SCS) plan in compliance with Senate Bill 375. It is expected that the SCS plan will designate funding to existing and planned transit nodes along San Pablo Avenue, as identified in ABAG’s 2005 Smart Corridor report. This infrastructure funding would significantly assist transit-oriented, mixed-use development. Even with all of these efforts, there still appears to be a disconnection between regional goals and local planning decisions, so what are some options for strengthening this connection?

One option would be to create a multi-agency district or committee for the corridor in which planning decisions are directed by the local jurisdictions' ordinances and policies but with final discretionary action assigned to the district's council or committee. An example of this type of situation is the City of Los Angeles Ad Hoc Committee on the Los Angeles River, which was formed to control development adjacent to the river in keeping with the goals of the Los Angeles River Revitalization Master Plan. While the master plan only covers the 32 miles of the river within the city of Los Angeles, the city council committee is advised by Los Angeles Water and Power, and the US Army Corps (http://www.lariver.org/lariver_management.htm accessed 2 November 2008).

The opposite end of the spectrum would be to look at initiating a program such as the *Flexible Design of New Jersey's Main Streets*, which advocates for de-designation of state highway status in areas where the road functions more like a main street. This would return all control back to the local government. This type of transfer could be constructed with a conditional agreement of corridor-scale planning accords (Ewing and King 2003).

The passage of AB32-the Climate Change Bill, AB1358 and more importantly SB375 which ties metropolitan transportation funding to municipalities with transit-oriented development opportunities in response to the Regional Housing Needs Assessment demand means that local jurisdictions with state highway urban arterials would be wise to begin planning their transportation and land use goals at a corridor scale to maximize the potential benefits to their communities.

Model Ordinances, which are fill-in-the-blank legal texts for cities to institute regional, state or federal policies, present another option for multi-jurisdictional coordination. Code construction is expensive, so model text is often scripted to facilitate government mandated policy shifts. The model ordinance option is discussed in more detail in the codes chapter, since codes are often initially constructed as model ordinances.

Fiscalization of Land Use and Parcellization

In 1978, with the passage of Proposition 13 in California, the land use decisions of cities changed virtually overnight. Sales tax revenues quickly trumped property taxes and fueled a competition between municipalities that, to this day, prevents regional or state-coordinated planning from taking hold in the Golden State.

In California, the nation's largest state, a portion of the state-collected sales tax is returned to the general fund of the local government where the sale took place—the so-called situs jurisdiction. This 'situs rule' means that localities with larger retail sectors will also enjoy greater sales tax revenues, and it may thus provide incentives for municipalities to attract and retain retail businesses to a greater degree than residential or industrial land uses, (Lewis 2001, 21).

Speaking directly to the fiscalization of land uses of the urban arterial, Lewis addresses the automall:

The most obvious form of such competition has been the quest for retail development that provides sales tax revenues. Fulton claims, for example, that the "auto mall," although now common throughout the country, was invented in California—not by the auto industry trying to sell cars, but by local governments trying to capture sales taxes, (Lewis 2001, 25).

So, it can be inferred that, in the past, infill housing has been a low-priority land use for the urban arterial. In recent decades, the "big box" retailer has been the boon for sales tax revenue generation, and this form of land use requires large parcels and is amenable to suburban zoning ordinances (Mejias and Deakin 2005). Returning to San Pablo Avenue, it is worth noting that the majority of parcels are smaller-sized parcels. The exceptions are the areas adjacent to Interstate 80, which saw a transformation in land assembly contemporaneous to the planning of the interstate system. This is where most of the "big box" retail is located.

A glimmer of hope for multi-jurisdictional coordination is the East Bay Green Corridor Partnership, which is an economic development alliance established between UC Berkeley, the Lawrence-Berkeley Labs, and the cities of Oakland, Emeryville, Berkeley, and Richmond. The partnership was formed to promote the “lab to street” process of taking start-up research companies and providing them with space adjacent to the labs with the intention of forming an agglomeration economy for “green industry” development. Although a geographic area has yet to be identified for the ‘Green Corridor’ it is worth noting that San Pablo Avenue is the only road that links all of the partnering cities, has a significant stock of low-rent building stock and is adjacent to various mass transit facilities. In the Fall of 2008, as part of a UC Berkeley-sponsored conference promoting and discussing the goals of the ‘Green Corridor’ partnership, the director of the Apollo Alliance gave a presentation in which she gave precedents for revenue sharing between municipalities who were in a form of economic agreement similar to the ‘Green Corridor’ partnership. This type of agreement could release the municipalities from fiscalization of land use issues for the geographic area determined for the ‘Green Corridor’.

Lewis comments on this type of financial structure in the following:

Developing a shared (socialized) component of local revenue bases would reflect the serious need for some equity among communities. At the same time, it would be important to retain a substantial component of local revenue-raising responsibility and discretion via the property tax, allowing rewards and risks for local development decisions. Doing so would provide opportunities for local governments to be entrepreneurial and relatively independent laboratories of democracy, (Lewis 2001, 31).

If the ‘Green Corridor’ were to identify San Pablo Avenue as the spine of its corridor and the partnership developed an economic model for revenue sharing along the ‘Green Corridor’, this would present a very strong case for developing coordinated planning efforts for the San Pablo Avenue corridor across the different jurisdictions.

Sustainability

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission 1983).

Using the Brundtland Commission Report's definition of sustainable development as a starting point, I contend that sustainability is not an adjective applied to products, but a concept on which we can generate a litmus test on a variety of scales. There is no ultimate achievement of sustainability -- this is not realistic—but there is clearly a gradient upon which we can strive to perform. This gradient accommodates all scales of action, from a single person to global compliance. I use the often-referenced categories of performance defined as the three E's – Ecology, Economy, and Equity to describe the dynamics between human and natural systems in an urban context. This construct, also known as the “triple bottom line” represents sustainability within the context of American neoliberal (free market -- capitalist) governance. Below is an excerpt of Barry Commoner's construction of a sustainable model society, which is arguably the inverse of the neoliberal construct.

“The economic system ought to conform to the requirements of the production system, and the production system to the requirements of the ecosystem. The governing influence should flow from the ecosystem through the production system to the economic system” (Commoner 1976, 2). In an article entitled, “The Sustainability of Privilege: Reflections on the Environment, the Third World City, and Poverty,” the authors conceptualized Commoner's relationship of sustainability as if it were layers of an onion. The authors summarize the outermost layer of Commoner's model in the following: “Finally, the outermost layer contains the social and political system. That system governs the economy, and through it, the production system, and then, twice removed, the state of the ecosystem” (Olpadwala and Goldsmith 1992, 629).



Commoner's model of market-place sustainability in the form of a lotus flower, with the ecosystem at the center. The inverted lotus represents the *status quo*.

The diagrams represent society as a lotus flower. The inverted lotus flower represents our current neoliberal model whereas the image of the perfect lotus represents the idealist model of a sustainable society.

While the lotus flower diagram above represents the same ideas described in the onion, it is worth noting that an onion can be chopped up and is still a viable product for consumption. The lotus flower, used often in eastern mythology to signify totality, is a much more apt symbol for describing Commoner's model. Drawing from the mantra, *om mane padme hum* (behold the jewel in the center of the lotus,) the ecosystem represents the jewel in the center of totality. When the lotus flower is inverted, it ceases to be a lotus flower. The pieces of the flower become classifiable objects, but do not represent the whole of the lotus flower. This is the point of Commoner's model: Without the central consideration of ecosystems, there cannot be a balanced system within which equity and economy can operate. Olpadwala and Goldsmith reinforce this notion by stating, "If the process were to work properly, society would organize the economy to design a production system that would sustain the environment" (Olpadwala and Goldsmith 1992, 629).

The necessity of rebuilding infrastructure systems in this country presents an opportunity for a reconsideration of the current model of sustainability, one in which the lotus flower could re-emerge from its former inversion.

So how do these concepts translate to urban design? Is it through urban ecology, or perhaps, 'ecological democracy'?

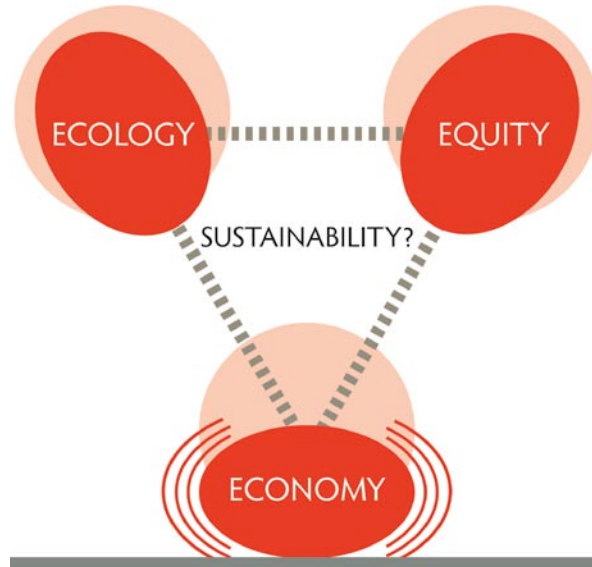
Randy Hester, in his book *Design for Ecological Democracy* succinctly summarizes the principles of sustainable urbanism used in this thesis:

The following rules of resilient design are held in common across all these scales: 1) increase diversity, (2) integrate parts of urban ecosystems that have been segregated, (3) consider the many and diffused indirect interconnections of urban systems, (4) follow the flows and cycles of biological processes, (5) evolve the design from the intrinsic character of the locale, (6) rely on renewable energy and resources, (7) live and design within the natural limits of the bioregion, (8) solve multiple problems with few actions, (9) reveal natural processes through design, (10) use democratic decision-making processes, and (11) coevolve human development, human habitation, and nature to achieve human fulfillment and the restoration of ecosystems, (Hester 2006, 142).

The concepts of inter-generational equity and intra-generational equity in relation to sustainability and sustainable design are typically not discussed, but left unaddressed can produce significantly different environments. William Adams defines these terms in the textbook *Introducing Human Geographies* in the following:

Inter-generational equity refers to the concept of equality in access to resources or wealth between one generation of people and another (usually a future generation, or people as yet unborn). Intra-generational equity refers to the concept of equality in access to resources or wealth within a single generation (usually between different groups of people today – for example, between rich and poor classes in one country, or between rich and poor countries such as between ‘first world’ and ‘third world’ countries,) (Adams 2005, 285).

Sustainable design should aim to achieve both inter- and intra-generational equity, with an emphasis on attaining intra-generational equity to address environmental and social justice issues.



In the market-based model of sustainability, economic decline weighs heavily on the ecological and social equity components.

The **three e's** represent a form of **market-based sustainability**, while the **lotus model** of Commoner's construct of represents a version of **market-place sustainability**. If the market has failed, then maybe it's time to focus on the market place.

Infrastructure

Writing about infrastructure is, it seems, like writing about the background: it is always there, but the closer you get to it, the more background there is behind it (Raxworthy and Blood 2004, 10).

There are numerable gaps that exist to challenge the relationship between human and natural ecological systems. One significant gap lies in our infrastructure systems of single-use and limited-access, such as--roads, water, electricity, natural gas and waste.

During the period between about 1850 and 1960, there was a general movement, particularly in Western cities, from the piecemeal and fragmented provision of networked infrastructures to an emphasis on centralized and standardized systems, (Marvin and Graham 2001, 40).

The 19th and 20th century modernization of infrastructure fragmented human and natural ecological systems for notions such as “steady flow”, however I see infrastructure systems of-the-future as enormous opportunities for becoming the primary systems of integration. The landscape urbanism discourse embraces infrastructure in such a manner:

Explorations in landscape urbanism have focused on infrastructure as the most important generative public landscape. In the course of the twentieth century we have seen the increasing standardization of infrastructural systems as they meet higher standards of technical efficiency. These ubiquitous urban environments have been considered and evaluated solely on technical criteria and somehow exempted from having to function socially, aesthetically, or ecologically, (Mossop 2006, 171).

I believe integrated infrastructures can address environmental justice issues, which are key components to my definition of sustainable urbanism, where we are fully accountable for issues of equity, ecology, and economy. As Star writes in “The Ethnography of Infrastructure”, “Study a city and neglect its sewers and power supplies (as many have), and you miss essential aspects of distributional justice and planning power,” (in Marvin and Graham 2001, 379).

Amory Lovins described the modern infrastructure project as a “hard energy path... involving capital-intensive systems with complex, large-scale, centralized and resource-depleting technologies that alienated human beings, generated inequality and damaged the environment,” (Marvin and Graham 2001, 133). As Lovins was writing in the 1970’s, he was

speaking for a larger movement of environmentalism, which grew partially in response to lack of regulations of industry but also due to the deterioration and collapse of standardized systems of infrastructure, (Marvin and Graham 2001). Marvin and Graham comment on the same time period in the following, “The rapid growth of environmentalism was linked with the realization that technology had insidious effects on health and the environment. It was increasingly obvious that harmful impacts could arise from the unforeseen side effects of technology,” (Marvin and Graham 2001, 134). Decentralized infrastructures emerged from this relocalization movement: “New approaches to infrastructure development, based on Schumacher’s famous dictum ‘Small is beautiful,’ were developed, based on notions of grass-roots-scale technology, minimizing capital costs and technological complexity, and maximizing the degree to which communities could support their own infrastructural needs,”(Marvin and Graham 2001, 134).

Nan Ellin, in *Postmodern Urbanism*, argues that society, by emphasizing ecology and wholeness, has moved beyond the fear of technology as a force that fragments the environment: “The question is no longer whether to grow or apply new technologies, but how best to accomplish these. Some of the manifold ways in which this re-integration is apparent are a shift back from monoculture to polyculture and from functional zoning to mixed use,” (Ellin 1999, 7). The Modern infrastructure project contributed to a fragmentation of natural systems, decreasing their legibility in the landscape. Could there be an inverse relationship? Could fragmentation of infrastructure—types of decentralized autonomous infrastructure, help to reconnect natural systems and increase their legibility in the landscape? Gary Strang writes in an article entitled *Landscape as Infrastructure*, “Significant sources, paths and transition points of our collectively owned resources should be made legible in the landscape,” (Strang 1996, 223). How can this be coordinated with the planning of a corridor? Can this be delineated in terms of a hybrid form/performance-based code that addresses both the public and private realm?

An architectural method that exploits the un-ignorable marriage between nature and technology provides an opportunity for new spatial and visual possibilities that result from using infrastructure as a fundamental component of architectural design, (Strang 1996, 226).

How can infrastructure systems be used to appreciate and commemorate the cultural and physical landscape? How can we incorporate the spirit of the Public Works Era into the current neoliberal framework? Marvin and Graham speak to this last question with the following statement: “A reverse tendency to infrastructural invisibility and political obfuscation does periodically emerge. Rather than being hidden, here infrastructure networks are revealed, celebrated and constructed as urban landmarks, as embodiments of the ‘phantasmagoria’ of particular urban times and places,” (Marvin and Graham 2001, 20). Strang also comments on this notion: “We must find ways to allow the natural landscape and the landscape of infrastructure, which occupy the same space, to coexist and perform multiple functions,” (Strang 1996, 223).

The current state of infrastructure in the United States is one of deterioration. The 2008 Urban Land Institute report *Infrastructure 2008: Competitive Advantage* identifies the US infrastructure systems as “coasting on prosperity” and that all levels of government are not planning or investing nearly enough funds in maintenance and development of new infrastructures (ULI 2008, 11). Since the completion of the federal highway project in the 1970s, the federal government has not participated in large-scale, national infrastructure projects (Marvin and Graham 2001). Meanwhile, state and local authorities have control over land use policy, and it has been their responsibility to manage their relative infrastructure systems. Where there is no regional planning authority, decisions about infrastructure investment remain fragmented despite the widespread threat if these networks should fail, (ULI 2008). (Think of the Sacramento-San Joaquin Delta, which holds the drinking water supply for millions of people in the Bay Area and is protected by a seismically unfit levy system.) The fiscal deficiency brought about by

the housing foreclosure crisis pushes infrastructure funding even further down the municipal budget priority list because they are struggling to maintain basic services with a shortage of tax and permit fee revenues (ULI 2008).

The ULI report looks at infrastructure investment from a global perspective and notes that countries with centralized infrastructure planning and funding have a competitive global advantage over those countries, like the United States, which rely on decentralized planning. The estimated cost of repair and regeneration of infrastructure systems in this country sings to the tune of THREE TRILLION DOLLARS. And yet there is no public alarm. The failure of the levees in New Orleans and the collapse of the I-35 bridge in Minneapolis were not enough. The ULI report comments, “America must suffer ‘more infrastructure failures’, ‘funding cutoffs’, and congestion snafus before the public forces action and willingly accepts the cost,” (ULI 2008, 13). If and when Americans accept the cost of infrastructure maintenance, “these large budgets can be used to produce urban designs that simultaneously solve utilitarian problems and help repair cities and regional landscapes at a scale not dreamed of since the days of the great dams,” (Strang 1996, 225). Assuming that the US is not going to return to the Public Works era in 2009, the burden of infrastructure “repair and regeneration” falls on state and local governments. Taken as an opportunity instead of a burden, municipalities could apply the multi-functional principle to their development policies and find creative ways to alleviate their current infrastructure systems by creating decentralized systems that are directly responsive to the incremental nature of development.

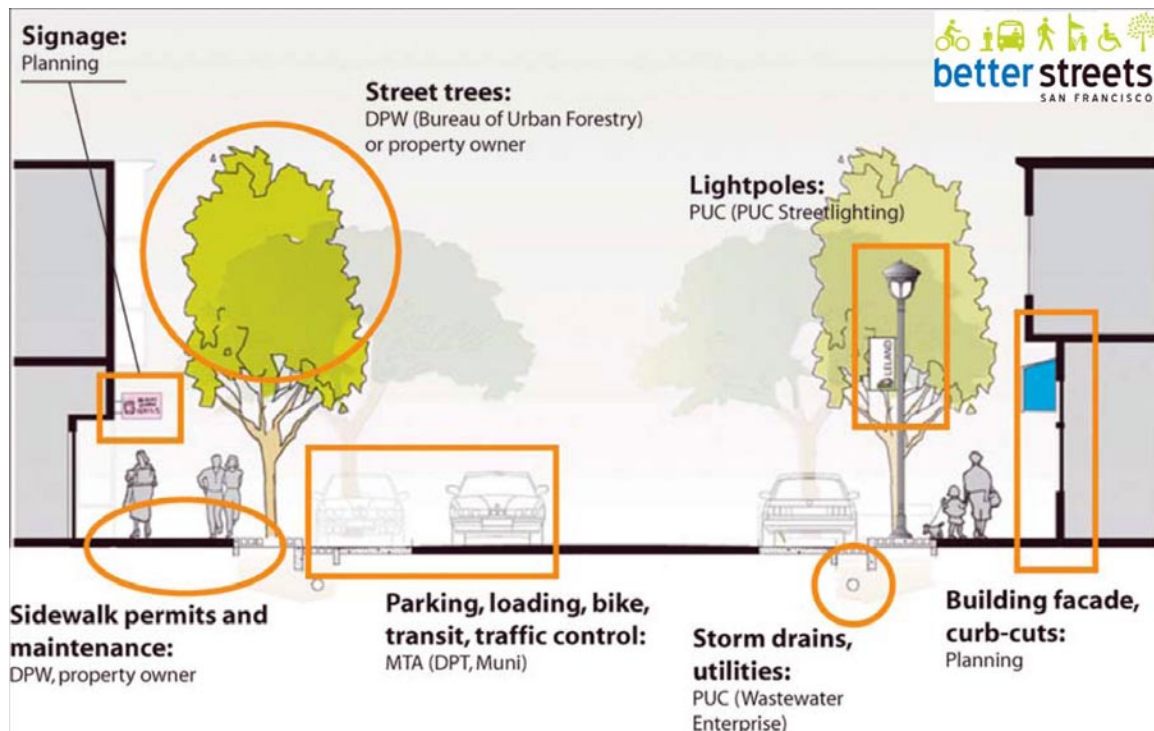
Urban arterials such as San Pablo Avenue are conduits for the decaying, modern-era infrastructure systems of separated single-uses, but they are also ripe for a transformation towards multi-functional, multivalent systems. The IURD Working Paper *The Uses and Re-uses of Major Urban Arterials : A study of Recycling, Revitalizing and Restructuring “Gray Area” Transportation Corridors* strongly supports the idea that urban arterials are prime locations for infrastructure

reconsideration by identifying the excess space in the right-of-way not being used efficiently. The research that Clark Wilson developed for that Working Paper led him to his Master's Thesis topic: *Pragmatics and Presence: The Use of Over-Capacity Arterials for Urban Stormwater Treatment*, which proposes using the excess rights-of-way as decentralized, vegetated stormwater facilities. These vegetated stormwater sites provide numerous benefits for the community and the environment, such as micro-climate enhancement, reduction in urban heat island, habitat, flood relief and an evincing of watershed processes. Wilson's research represents the beginnings of the current trend in multi-functional, multivalent right-of-way infrastructures, including the New York City guidelines and the San Francisco plans mentioned below.

Below are two examples of cities that have already begun addressing their infrastructure capacity issues through planning efforts that coordinate agencies so as to generate multi-functional infrastructures while enhancing the public realm. These examples were chosen for their relevance to the infrastructure issues related to the urban arterial. Market-driven initiatives such as Leadership in Energy Efficient Design (LEED) and the Sustainable Sites Initiative (SSI) are also noteworthy in their reconsideration of infrastructure in terms of promoting multi-functional and multivalent projects.

New York City and the Design Trust for Public Space created in 2005 the *High Performance Infrastructure Guidelines*, which outline an integrated approach to managing right-of-ways. Below is the illustrative section from this report, which identifies the human and natural ecological benefits within each component of the right of way. The section, while diagrammatic, provides a visual explanation of how different components, when coordinated, create a greater whole by creating multiple, synergistic benefits.

The following image is an illustrative street section from the San Francisco's 2007 *Better Streets Draft Master Plan*, which demonstrates the jurisdictional control over the different elements within the right-of-way. This type of diagram is extremely useful for explaining the relationships of who controls what in the public and private realms, especially in a multi-jurisdictional space like San Pablo Avenue. Understanding who controls what part of a space is imperative to coordinated, comprehensive planning.



Right-of-way jurisdictional cross-section (City of San Francisco 2007).

The coordination issues and benefits of transformation in the San Pablo Avenue right-of-way need to be illustrated so all of the involved agencies can negotiate this otherwise invisible terrain. Cross-sections illustrating jurisdictions and the potential ecological benefits will be drawn for the different areas of San Pablo Avenue, using the concept of a productive landscape as an organizational tool. Two additional elements to be included in the San Pablo Avenue sections are types of energy production: food and electricity. Returning to the broad discussion of infrastructure, a reconsideration of the infrastructures associated with auto-related businesses

should also be addressed. How can the auto-related industries situated on San Pablo Avenue co-exist with pedestrian-related spaces? How do new industries, such as the Green Corridor Project fit within this reconsideration of the urban arterial? How can the reconsideration of infrastructure address these transformations so as to contribute to a sustainable urban arterial? These questions are addressed in the analysis and design chapters.

Landscape Urbanism

The constant flux of this urban process is constituted through many superimposed, contested and interconnecting infrastructural ‘landscapes’. These provide the mediators between nature, culture, and the production of the city, (Marvin and Graham 2001, 8).

Infrastructure is the primary connective tissue between the public and private realms of the city, and as Strang mentions, infrastructure and landscape often “occupy the same space” so both can and should be multi-functional and complementary systems (Strang 1996, 223). The idea that landscape, or its trope-nature, and infrastructure should share space and function belongs to a much larger discussion about the relationship between man, nature and technology. Jane Amidon, in a lecture entitled “Big Nature” referred to the six degrees of nature, as they exist in western socio-cultural constructs from the past few centuries.

- 1st Nature – Wilderness
- 2nd Nature – Agriculture
- 3rd Nature – Parks
- 4th Nature – Nature + Mechanization
- 5th Nature – Nature + Post-industrialization = Reclamation
- 6th Nature – Big Nature – seamless infrastructure.

From the industrial era of Ebenezer Howard’s Garden Cities of Tomorrow to the post-industrial theory of the Transect, cities, as a symbolization of technology, and nature have been pitted against one another. From this construct, nature has been carefully injected into cities like gardens while the wild nature has been tamed by technology and controlled with

infrastructure projects. The post-industrial reclamation projects begun in the 1970's and 80's represent a shift in the relationship between technology and nature, which Amidon labels the 5th paradigm of nature. The sixth paradigm of nature transforms the previous forms of infrastructure that divided landscapes, the Locally Unwanted Land Uses (LULU's) into Locally Loved Land Uses (L♥LU's) that reconnect the divided landscapes with a new form of nature.

The Los Angeles River, which today, is more an infrastructure conduit than a river is an apt example of a LULU. Strang comments on this condition, "Today it is fair to say that the machine is not so much in the garden as it is indistinguishable from the garden; they are inexorably intertwined," (Strang, 1996, 220). The recently released Los Angeles River Restoration Masterplan calls for the redistribution of stormwater throughout the city, in order to re-introduce the natural systems that once occupied the LA River ecosystem. In this case, the machine (the city) becomes the garden by functioning like a machine (stormwater management) in order to restore the original garden. In other words, the garden is the machine inside the "machine in the garden." Simply put, nature and technology finally meet on common ground, and fuse; they don't choke each other. Elizabeth Mossop explains this concept clearly, "The strategy is an attempt to make the necessities of dealing with human impact a part of the making and generation of urban landscapes" (Mossop 2006, 171). The taboo surrounding waste has been removed and the general level of environmental awareness has increased to an extent that the relationship between nature and technology becomes amicable.

Reconsidering the urban arterial through the lens of landscape urbanism provides a way for infrastructure to rebalance the auto-dominated space into one that supports the urban arterial as an urban ecotone that evinces the underlying natural systems.

Urban Design: an orchestration of systems

The infrastructure systems under consideration in this thesis also include the zoning code, which is a type of policy infrastructure that defines the majority of the urban landscape. The zoning code, primarily in reaction to industrialization and facilitated by auto-mobility, has siphoned land uses into single-use zones, restricting natural systems to subterranean pipes and allocating nature to neatly trimmed topiary lawns adjacent to the suburban front door, also known as the garage. As Michael Hough writes in *Cities and Natural Process*, “The availability of cheap fossil fuel has been an overriding determinant of urban form” (Hough 2004, 13). Therefore, recognizing and conveying the differences between urban form generated by auto-mobility and that generated by a multi-functional public realm is the first step an urban designer needs to take when considering the transformation of an urban arterial. Urban design takes on the space between the codes, policies, architecture, landscape architecture and traffic engineering in attempt to coordinate the overall space so that a place can emerge. An urban designer would be remiss in not seeking input from the local community in which she is working to determine which issues to address. The basic implication of this thesis is that San Pablo Avenue is not a greenfield site; it is a complex mix of grey and brown conditions that require agile navigation that a reconsideration of infrastructures can transform into a balanced urban ecotone.

Negotiating Transformation: Codes as Design Tools

Development codes, also known as zoning codes, are the policy tools that planners and decision-makers employ to shape the majority of built form. The first modern codes were instituted to address health and public safety issues, but they have since devolved into a regulatory framework mired in inefficient standardization (Ben-Joseph 2005). The following matrix from Eran Ben-Joseph’s book *The Code of the City: Standards and the Hidden Language of Place Making* succinctly compares and contrasts the different types of codes in use today.

Table 2. Code Matrix (Ben-Joseph 2005, Appendix B).

Type of Code	Characteristics	Examples	Advantages	Disadvantages
Conventional zones and districts (Euclidean)	Includes "districts," "uses," and "dimensional and density standards." "Proscriptive": prohibits development not consistent with the code. Generally text-based with mapped districts.	Base districts Use classifications Dimensional standards: setbacks, height, lot size, density, floor-area ratio.	Fairly easy for staff to implement and for the public to interpret, if well organized. Familiar to professionals, staff, public officials, and the public. Flexibility for varied design within parameters of use and dimensional standards. Results are predictable.	Lack of flexibility to address different site characteristics and surroundings. Often disregards existing development patterns, creating numerous nonconformities. Does not prescribe qualitative development outcome, allowing for uncertainty as to product design. Generally text-based, difficult for the public to interpret the physical consequences, particularly if not well organized.
Planned development	Allows flexibility from standard rules to permit mixed uses, creative design, and/or public benefits. Highly discretionary (negotiation) with findings usually required.	"Planned development" zones. "Planned unit development" allowances and districts. "Planned community" zones.	Flexibility to allow creative design, mixed uses, to achieve preferred site development and public benefits. Ability to forecast and see final plan and design solutions over time.	Highly discretionary process leads to high degree of uncertainty. Negotiations may result in perceptions of public "give-aways" to or unreasonable "exactions" from developer. Time-consuming; may require central management and covenants.
Performance standards	Regulates development "impacts" such as nuisance factors, impervious surface, landscape surface area, trip generation, etc.	Nuisance (odor, noise, vibration, glare, toxics, etc.) standards in industrial or commercial zones. Performance criteria (floor area, impervious surface, trip generation, etc.) to compare development alternatives.	Flexibility to vary uses, density, and intensity of development and to address impacts instead.	Impact approach may not address site-specific conditions or constraints. Difficult to implement—requires complex calculations.
Incentive-based codes and guidelines	Flexibility to achieve objectives through "incentives" such as density or floor-area bonuses in exchange for provision of selected uses and public amenities.	Exemption from FAR for child care or cultural uses. FAR bonuses for preserving historic structures. Density bonuses for affordable housing.	Optional to developer. Relies on a carrot rather than stick approach. May provide public amenities with "win-win" approach	Incentives may not be used, and amenities not provided. Bonus and benefits offered may be perceived as excessive.
Form-based codes or design-oriented codes and districts	Graphic-based and design approach to outlining regulations, including design "typologies" for homes, shop fronts, commercial areas, public spaces, streetscapes, etc. "Prescriptive": outlines what is expected of development, especially design. Uses and dimensional standards downplayed. "Regulating plan" to outline design typologies.	Traditional neighborhood development (TND) zone. Urban village zone. Neighborhood marketplace zone. Transit-oriented development (TOD) zone.	Graphics and illustrations more readily understood by public, public officials, developers, and professionals. Preferred or required development approaches conceptually rendered or illustrated. Integrates principles of mixed-use and pedestrian orientation. Useful for developing areas and redevelopment or infill sites.	Not readily applicable to built-out urban or suburban areas. Requires significant, upfront effort to develop regulating plan and design specifics. Perception of initial market resistance. May not provide enough design flexibility to applicants.

Source: Partly based on "Types of Zoning Codes and Formats." Discussion Paper. Palo Alto, CA: City of Palo Alto Department of Planning and Community Environment, 2001.

The most recent trend in the code evolution is the form-based code, which Ben-Joseph simplifies as a set of building typologies that prescribe specific form. Since the form-based code is such an integral component of this thesis, and is more nuanced than what is presented in the matrix above, it is discussed in greater detail in the following chapter.

The Urban Ecotone Code presented in this thesis is a hybrid form/performance-based code. Performance standards are included in the code to address the environmental components of sustainable design. The following examples are precedents for incorporating environmental performance standards into development codes. In January of 2009, San Francisco became the first city in the US to incorporate LEED performance standards into their municipal code for new development. As market support for this performance standard continues to grow, more cities may adopt it into their municipal codes. New York City's *High Performance Infrastructure Guidelines* and *High Performance Building Guidelines* while only addressing municipally-controlled properties, are consistent with LEED so adopting the LEED standards for private development would not conflict with the city's internal policies.

The Seattle Green Factor, enacted in 2007, is a performance-based landscape standard that addresses the greening of neighborhood business districts along the city's urban arterials. The Green Factor codifies the city's goal to be "the Emerald City" but then also explains the multiple benefits of vegetation in addition to aesthetic improvement. The calculations required to meet this building permit condition are clearly illustrated with graphics and text, facilitating what would otherwise be a difficult process to describe.

How it Works

When a new project is proposed for development in Seattle's commercially-zoned areas, applicants must demonstrate how they intend to meet the new landscaping requirement. An electronic worksheet is available for download at the Seattle Green Factor website. This tool helps applicants calculate their score. The worksheet keeps a running score so applicants can test different landscaping arrangements to meet the requirement.

Applicants will submit the worksheet, a plan showing landscape areas, and a chart calling out planting areas and how the score was achieved.



The electronic worksheet is available online.

Learn More at:

www.seattle.gov/dpd/greenfactor

Questions or Comments? Contact:

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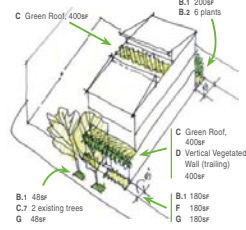


SEATTLE *green factor*



Department of Planning and Development

Typical landscape sketch calling out green factor planting areas with final score.



SCORE: 0.365

Landscaping visible to passersby, as seen below, will be scored more highly than landscaping that is not visible to the public.



printed on 30% post-consumer recycled paper
Graphic Design by Liz Martin



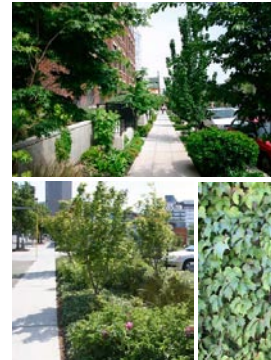
SEATTLE *green factor*

The Greening of Seattle's Neighborhood Business Districts

JANUARY 2007

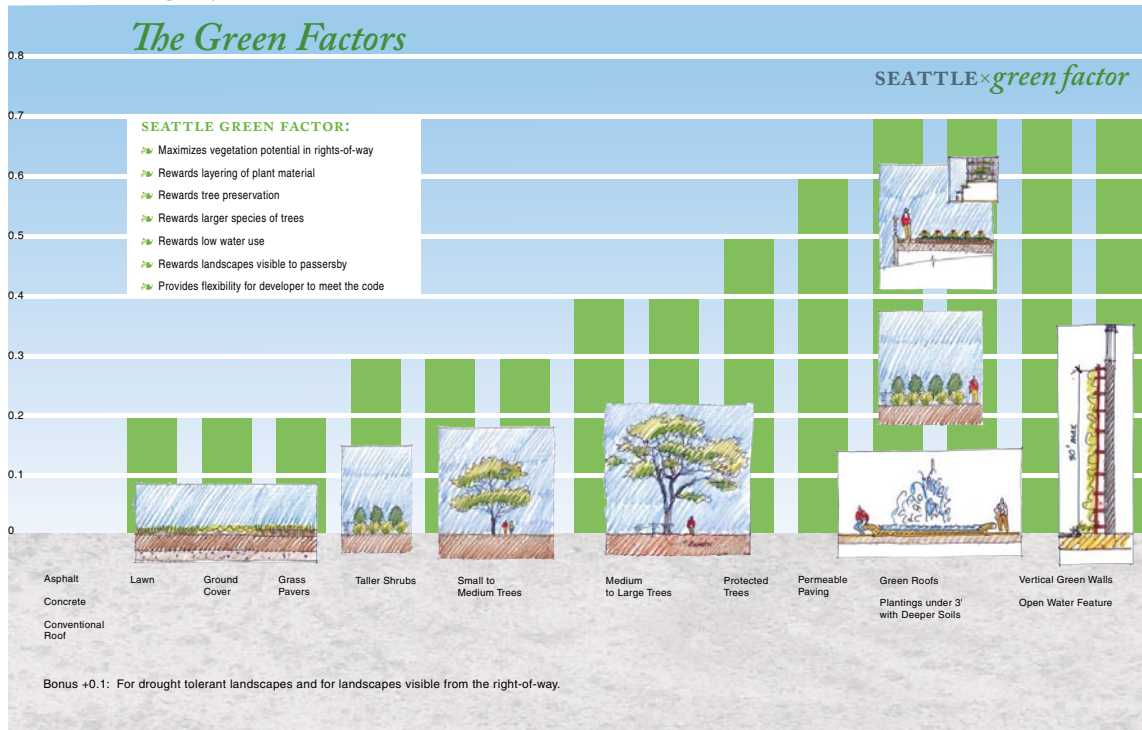
The Seattle Green Factor is a menu of landscaping strategies for new development in neighborhood business districts. It is designed to increase the amount and quality of urban landscaping in dense urban areas while allowing increased flexibility for developers and designers to efficiently use their properties.

The Green Factor encourages the planting of layers of vegetation and larger trees in areas visible to the public and in the public rights-of-way directly adjacent to the property. There are additional bonuses for using rainwater harvesting and/or low-water-use plantings. Use of larger trees, tree preservation, green roofs and even green walls is encouraged.



URBAN LANDSCAPING: *Not Just an Aesthetic Amenity*

- Increases evapo-transpiration due to increase of surface area
- Increases tree canopy
- Absorbs carbon, releases oxygen
- Captures urban dust, helps clean air
- Muffles sound reflectivity
- Provides habitat for birds and bees
- Increases property values
- Cools buildings with shade
- Cools cities – urban heat island effect
- Insulates buildings
- Green roofs increase the life of roof membrane
- Green walls increase life of building cladding



Seattle Green Factor landscape ordinance information sheets (City of Seattle website 2009)

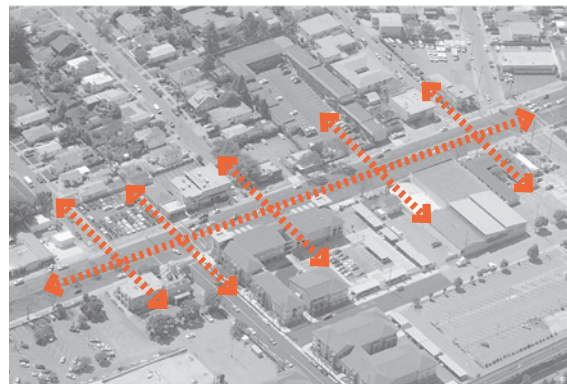
San Pablo Avenue as an Urban Ecotone & The Ecotone as Code

An ecotone is a transition area between two adjacent ecological communities – ecosystems (Forman, 1995). It may appear on the ground as a gradual blending of the two communities across a broad area, or it may manifest itself as a sharp boundary line. Ecotones are particularly significant for mobile animals, as they can exploit more than one set of habitats within a short distance. This can produce an edge effect along the boundary line, with the area displaying a greater than usual diversity of species. Animal movement occurs in both longitudinal and transverse directions. As mentioned in the introduction, the qualities of an ecotone are completely applicable to the urban arterial and its role in the urban fabric.

The word *ecotone* was coined from a combination of *ec* + *-tone*, from the Greek *tonos* or tension – in other words, a place where ecologies are in tension (Merriam-Webster Dictionary online).



Natural ecotone



Urban ecotone

The urban arterial San Pablo Avenue is an urban ecotone for communities in the Eastern Bay Area north of Oakland. The corridor serves as a transition zone between adjacent communities where jurisdictional and natural boundaries appear as both seams and edges, depending on the location along the corridor. There is an abundance of longitudinal and transverse movement along the corridor meeting both local and regional demands. The land use and populations adjacent to the corridor are extremely diverse. All of these conditions create a tension of place along the corridor.

The tensions along San Pablo Avenue derive from its diversity and multiplicity of place: high traffic volumes and automobile-based urban form create an unpleasant pedestrian realm. The constructed infrastructure systems that run along the corridor are in direct conflict with the natural systems that cross the corridor at regular intervals. These are the imbalanced tensions associated with the urban arterial. The corridor's proximity to many different transit options and the relatively low land values make the avenue a prime candidate for mixed-use redevelopment, but this transformation threatens the diversity of land uses and populations that characterize San Pablo Avenue as an urban ecotone. The transformation of San Pablo Avenue can capitalize upon its status as an urban ecotone while developing its capacity as an ecological ecotone by addressing infrastructure issues. A hybrid form/performance-based code for the public and private realms of this multi-jurisdictional corridor can establish a framework for which the processes of creating a healthy ecotone can occur. San Pablo Avenue as an urban ecotone is an idea supported by Sim Van der Ryn in his book *Ecological Design*. "The intentionally cultivated ecotone promotes contact among people and between people and nature" (Van der Ryn 1996, 133).

By designing ecotones rather than hard edges, we intensify interactions. We bring together a greater diversity of life in an ecological ecotone, and we encourage greater cultural and economic diversity in an urban ecotone. In doing this, we facilitate the flows of materials, energy and information that can catalyze self-designing processes. (Van der Ryn 1996, 134).

The urban arterial persists, despite its history of growth and decay and this represents economic adaptability. The number of commercial vacancies on San Pablo Avenue has increased every month since Fall 2008, so the flexibility of uses is integral to the corridor's survival. If the Climate Change bill planning follows through on its plans to redirect funds to ABAG's Focus Initiative corridors, San Pablo Avenue will experience a period of growth and transformation, perhaps only paralleled by the era of the streetcar development. For San Pablo Avenue to remain an urban ecotone, it is imperative that it retain the characteristics of adaptability that define an ecotone.

The following statement by geographer David Harvey succinctly explains the intent behind this proposal for the Urban Ecotone Code, which is a hybrid form/performance-based code that addresses issues of sustainable policies for both the public and private realms of a multi-jurisdictional space:

“A more proper antidote to the underlying spatial determinism of both modernism and the new urbanism is not to abandon all talk of the city (or even of the possibility of utopia) as a whole, but to understand urbanization as a group of fluid processes in a dialectical relation to the spatial forms to which they give rise and which in turn contain them. A utopianism of process looks very different from a utopianism of spatial form” (Harvey 1997, 3).

The code, as a meta-structure, addresses the process of transformation and leaves ample room for negotiation.

Linking the Pieces Together

The following set of graphics attempts to link all of the components of this literature review together in a consistent framework. The five slices represent the components that are necessary for considering the transformation of an urban arterial into a balanced urban ecotone: urban arterials, multi-jurisdictional geographies, infrastructure, codes, and sustainable design. Each circle represents a plan, initiatives or project presented in this literature review. Here is the list of projects with their abbreviations.

1. *Smart Code*—the New Urbanist’s Transect-theory, Form-based Code. (Smart Code)
2. *Los Angeles River Revitalization Master Plan* and the LA River District Ad Hoc Committee (LA River District)
3. New York City’s *High Performance Infrastructure Guidelines* and *High Performance Building Guidelines* (NYC HPIG HPBG)
4. *ABAG Focus Initiative* identifying Smart Growth Corridors in the Bay Area (ABAG Focus Study)
5. *San Pablo Avenue Specific Plan* is a plan that is currently underway for the section of San Pablo Avenue that runs the length of the city of El Cerrito and the adjacent parts of Richmond. (SPA Specific Plan)
6. *Seattle Green Factor*—an performance code addresses the multiple benefits of vegetation in the urban fabric (Seattle Green Factor)
7. LEED as a market-based program is being adopted by cities as performance-based development codes. The Sustainable Sites Initiative and LEED are considering merging for a more comprehensive set of performance standards for development. (LEED SSI)
8. “Stripscape,” the urban arterial streetscape design proposal (Stripscape)
9. “Urban Battery,” the urban arterial design proposal from the Flip-a-strip competition (Urban Battery)
10. *Flexible Design of New Jersey Main Streets* (NJ Flexible Streets)
11. Assembly Bill 32 and Senate Bill 375, The Climate Change Bills (AB32 SB375)
12. The Urban Ecotone Code (Thesis)

Obviously the bias is that this thesis is the comprehensive model... The other image to conjure is of these five slices representing the plan of a vortex, a form where things are spun together with force, producing tremendous energy.

Table 3. Literature review comparison charts

