

LLOYD CROSSING
Sustainable Urban Design Plan & Catalyst Project

Portland, Oregon
July 1, 2004

Acknowledgements

Portland Development Commission

Matt Hennessee	Commission Chair
Donald F. Mazziotti	Executive Director
Abe Farkas	Development Director
Michael McElwee	Development Manager
Sloan Schang	Project Manager

Advisory Committee Membership

Hank Ashforth	Ashforth Pacific
Reg Wobig	Kaiser Permanente
Tim McCabe	PacifiCorp
Wanda Rosenbarger	Lloyd Center
Rick Williams/Owen Ronchelli	LDTMA
Chris Lonigro	LDCA & Lloyd Resident
Nathan Corser	Irvington
Peyton Snead	Sullivan's Gulch
Mike Warwick	Eliot
Nathan Good, AIA, IIDA, CH2M Hill	Sustainability/Design
Michael McElwee	Portland Development Commission
Sloan Schang	Portland Development Commission

Technical Committee Membership

District

Lisa Miles	Ashforth Pacific/Sustainability
Virinder Singh	PacifiCorp/Energy
Rick Williams/Owen Ronchelli	LDTMA

City Staff

Sloan Schang	Portland Development Commission – Development
Michael Prothe	Portland Development Commission – Housing
Stuart Cowan	Portland Development Commission – Sustainability
Greg Acker/ Rob Bennett	Office of Sustainable Development
Steve Iwata	PDOT
Linda Dobson	Environmental Services
Arun Jain/ Phil Goff	Bureau of Planning/Urban Design Team
Nicholas Starin	Bureau of Planning/Area Planning

Consultant Team

Team Leader, Architecture and Urban Design

Mithun Architects+Designers+Planners

Bert Gregory, AIA, Team Lead

Richard Franko, AIA, Project Manager

John H Thomas, AIA, Catalyst Lead

Bryon Ziegler, Urban Design

Lee Copeland, FAIA, Urban Design

Roger Gula, AIA, Idea Boards

Ron van der Veen, AIA; Matthew Coates; Bruce Kinnan; Catalyst Design
models & renderings

Kuei-Hsien Liao, diagrams & graphics

Tim Meldrum, models & renderings

Diane Scheaffer, graphics

Water System And Stormwater Strategies

Tom Puttman, PE, AICP

KPFF – Portland

Landscape and Habitat Strategies, Street Sections

Mike Abbaté, ASLA

GreenWorks

Cory Gallo

Neighborhood Energy Analysis and Strategies

Mike Hatten, PE

SolArc

Real Estate/Financial Analysis

Laura Lohman,

Heartland

Matt Anderson, AICP

Urban Design- Zoning, Vibrancy Index

Joseph Readdy, AIA

Urbsworks

Marcy McInelly, AIA

Catalyst Buildings: Mechanical/Electrical

Jerry Yudelson, PE

Interface

Ian Theaker, PE

Branding Strategies

Jon Lee

ID

Cost Estimating

Randy Boehm

Walsh Construction

Jennifer Sharp

Chet Klock

Table of Contents

Acknowledgements	2
Executive Summary	5
Vision and Goals.....	14
Lloyd Crossing Study Area Context.....	15
Development Potential.....	19
Pre-development Metrics	20
Sustainable Urban Design Strategies	21
• Habitat	22
• Water	30
• Energy	38
• Placemaking	52
• Materials	70
Implementation	71
• Study Area Economics	72
• Resource Management Association	78
• Branding	80
Catalyst Project	82
Conclusion and Recommendations	106
List of Figures	109



Executive Summary

Introduction and Background

An ecosystem is defined as an ecological community that, together with its environment, functions as a unit. The Lloyd Crossing Sustainable Urban Design Plan looks at an urban ecosystem in which individual properties and the neighborhood public realm function together as an environmentally low-impact unit with high economic potential. This reduced impact can create significant value for each participant including property owners, the community, and the environment. The property owners can benefit from lower operating costs and increased property valuation through the creation of a strong neighborhood identity. The environment can be improved by dramatically reducing the impact of urban development on local and global ecosystems. The community and their public agencies can benefit from the plan through increased property valuation and resultant taxes, reduced demand for future infrastructure investments, and increased future

resource capacity generated for others outside the study area. Together, these benefits allow for more secure long range economic and community development within an environmentally and economically sustainable model.

Portland's Lloyd District has existing uses, development, proximity to downtown, intersecting transit connections, availability of undeveloped land, and people that make it an important strategic area for future urban infill development. The Portland Development Commission (PDC) has sponsored this study in order to examine the benefits of an integration of urban design strategies, green infrastructure opportunities, shared building systems: innovative financial models for the 35-block Lloyd Crossing Study Area within the larger district, and to serve as a catalytic sustainable urban design model.

"Sustainability is an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations. It can also be expressed in the simple terms of an economic golden rule for the restorative economy: leave the world better than you found it, take no more than you need, try not to harm life of the environment, make amends if you do."

Paul Hawken
"The Ecology of Commerce"

Note: Identified sites and land uses in the Plan are for study purposes only and do not necessarily indicate private development proposals



Lloyd Crossing Goals

Reduce environmental impact to pre-development levels.

Restore pre-development habitat metrics.

Live within the site's rainfall budget.

Live within the site's solar budget.

Achieve carbon balance.

Preserve urban density.

Vision and Goals

The 2001 Lloyd District Development Strategy commissioned by the PDC established a vision of the Lloyd District as a vibrant urban neighborhood with a diverse and dynamic mix of uses, high density, a distinct identity, an optimal network of shared building systems, and a variety of transportation options and linkages for pedestrians, vehicles, and mass transit. The Development Strategy identified mobility, activity, livability, and identity as key principles to guide major public and private

decisions about future development within the Lloyd District.

The 2004 Lloyd Crossing Sustainable Urban Design Plan and Catalys Project (the Plan) builds on this vision and adds the key concepts of sustainability and achievability as a central part of its strategies and recommendations for a 35-block area of the district. The vision of this plan is to create a study area that is environmentally and financially sustainable, and which has the kind of critical urban qualities that distinguish it within the context of the greater Portland area as a unique, vibrant, attractive and healthy community.

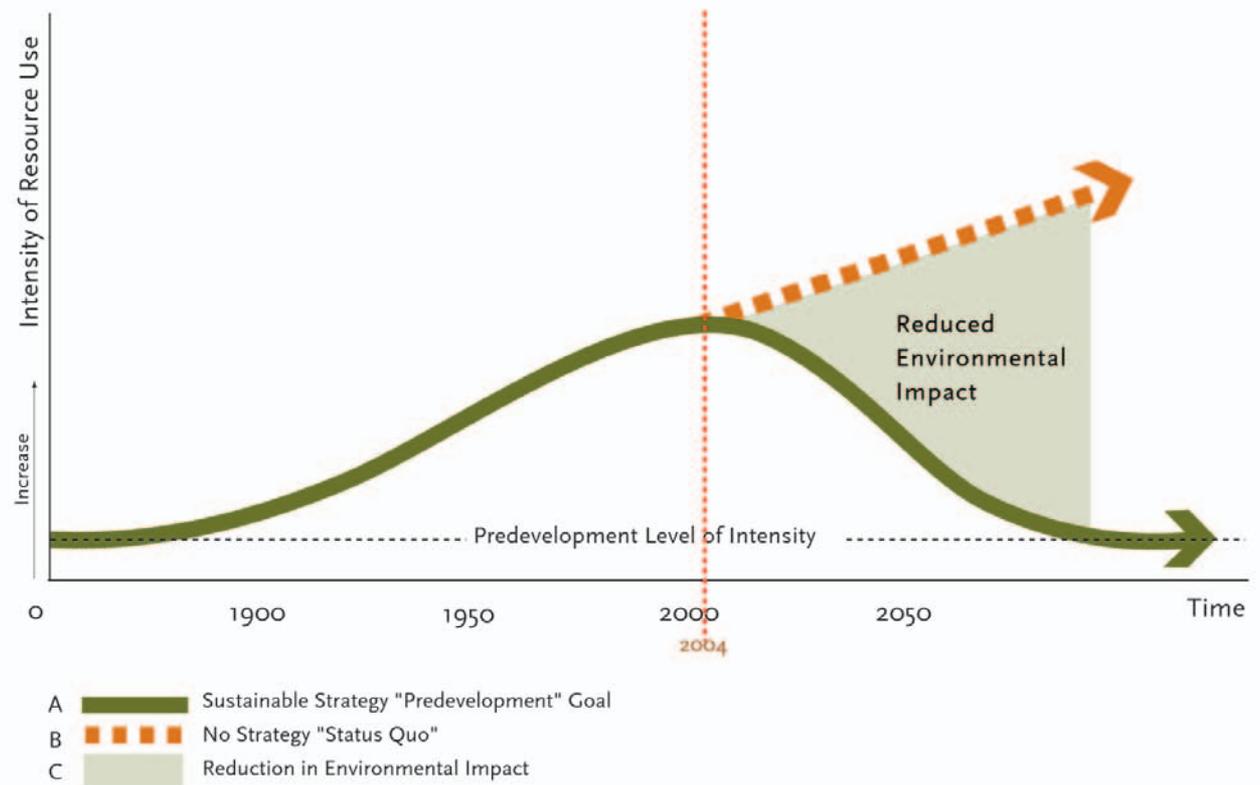
The Plan provides the vision, goals, and strategies that establish a sustainable framework and identity for the neighborhood and which can provide guidance for future development. It examines how these strategies can be implemented at both the neighborhood and project level, and models the financial performance of the projected development over a 45-year period. The overarching goal of the Plan is to reduce the net environmental impact of anticipated development in the study area over the next 45 years to an absolute level approaching (or exceeding, in the energy strategies) that of the



pre-development conditions on the site. Several objectives have been established that will contribute to achieving this goal, in the areas of *Habitat, Water, Energy, and Development Potential*.

The Plan was also commissioned to develop a conceptual design for a Lloyd Crossing Signature Project (the Catalyst Project) that integrates the sustainable vision for the neighborhood into a financially feasible, vibrant, mixed-use development that will catalyze future private investment in this central core neighborhood. The Catalyst Project concept also provides a basis for the growth of public/private partnerships necessary to support the development of the project over the next three to five years.

A Project Advisory Committee and Project Technical Committee were established by the PDC to provide a forum for discussion and feedback to the consultant team. The vision for the Sustainable Urban Design Plan was conceived and refined through a series of interviews, meetings, background research, and collaborative work sessions with key stakeholders from these groups.



Environmental Impact Reduction



Overview

The 35-block Lloyd Crossing study area currently contains approximately 2.8 million square feet of developed building area, in a mix of office, retail, lodging, residential, restaurant, and above grade parking use. The baseline Floor Area Ratio (FAR) established by Portland's zoning code allows a total of approximately 15.6 million total square feet of above grade development on these blocks. Over the next 45 years, the study model anticipates that the market for real estate in the study area could potentially absorb the addition of approximately 8.1 million square feet of new above-grade building development, for a total of 10.9 million square feet. This represents approximately 70% of the baseline FAR capacity in the study area.

As development increases over time, the vision of this plan is to achieve a net reduction in overall environmental impact, as illustrated in the chart on page 9, ultimately approaching a "pre-development" environmental impact level through a combination of on-site and off-site strategies. These include the restoration of pre-development habitat metrics, the implementation of water-neutral and carbon-neutral resource strategies, and the development of energy systems and strategies that will increase the utilization rate of renewable energy such as solar and



wind power. Another key goal is to create a blueprint for a sustainable urban infrastructure capable of meeting the demand of potential development in one of Portland's major urban centers.

The end result of implementing the Plan would be to add over 8,000,000 square feet of building area and up to 8,000 new residents in less environmental footprint than today's 2,000,000 square feet.

Sustainable Urban Design Strategies

Prior to development, the site consisted of a mature mixed-conifer forest. Environmental metrics were estimated in this pre-development condition for habitat and tree cover, precipitation and water flows, solar energy input, release of oxygen, absorption of carbon dioxide, and carbon fixation. These metrics were used as targets to measure the reduction of environmental impact over the next 45 years of development.

The plan identifies resource strategies within the study area to reduce environmental impact in the general categories of habitat, water, and energy. Off-site strategies are also identified in situations where a resource strategy cannot realistically be accommodated entirely within the study area, such as habitat and carbon balance.

Habitat – Restore habitat and tree cover

The plan envisions a study area that integrates an abstraction of a mixed conifer forest into the urban streetscape, through the use of a hierarchical system of green streets, pedestrian streets, bioswales, and public open space. Small-scale habitat corridors would connect north from Sullivan’s gulch to habitat “islands” within the study area open space.

Over the course of the study period, the plan recommends implementation of approximately two acres of mixed conifer forest “patches” within the district, with an additional one to two acres of habitat

corridor to provide connectivity between these patches and Sullivan’s Gulch. Tree cover is targeted to increase from 14.5% currently to 25 – 30% by 2050. Another 50 acres of restored forest habitat would need to be implemented in off-site strategies in order to reach the pre-development goal of approximately 54 acres.

Water – Live within the site rainfall budget

In order to reach the goal of living within the site’s annual rainfall budget of 64 million gallons per year, the plan recommends a water use strategy that results in 30% water conservation through use of efficient fixtures, and provides 100% of non-potable water supply through rainwater harvesting and blackwater reuse by the year 2050, resulting in an overall 62% reduction in water demand over code.

The water strategy also includes a plan for stormwater treatment in the public right-of-way via a system of bioswales at each street intersection, improves river quality and reduces demands on a combined stormwater/sewer system. This creates an opportunity for increased landscape and habitat areas, a unifying streetscape design concept and a more vibrant pedestrian experience within the study area.

Energy – Live within the site’s solar budget

The energy vision of the plan is to create a neighborhood in which the carbon balance and the use

of incident solar energy match as closely as possible to (and ultimately improve upon), pre-development conditions, dramatically reducing environmental impact. This is accomplished by:

Implementing building efficiency upgrades

Thermal transfer between buildings

Use of renewable energy

Purchase of carbon and wind offset credits

As the study area is built-out, building efficiency strategies will generate increasingly significant energy cost savings. Study area energy infrastructure such as photovoltaic and wind systems will not only generate cost savings but will serve to identify the area to the larger community as one that is committed to sustainable urban development.

The study area is at a planned nexus of Portland’s light rail and street car system, and with the bus network, provides for maximum opportunity for utilization of mass transit, minimizing green house gas emissions. The district’s existing Transportation Management Association has focused programs for improved public transit, ride sharing, alternative work hour programs and programs promoting parking management, bicycle and pedestrian measures. This is a very appropriate location for high urban density.



Placemaking – Preserve urban density

The sustainable urban design vision is to preserve all the potential development area within the neighborhood (as expressed by its floor area ratio, or FAR). Over time this will reduce the pressure on development in other outlying areas that have less developed infrastructure and which are more sensitive environmentally. The plan also recommends a combination of strategies for street level and upper level land use, street hierarchy, open space, landscape and habitat, ground level building

character, and tower setback requirements that would contribute to the development of a vibrant, attractive urban neighborhood. Some of these strategies build upon design review guidelines already in place in the district.

In order to create vital open space and to preserve the FAR capacity of the study area, the plan recommends exploring the idea of an FAR transfer mechanism between selected sites in the neighborhood in order to maximize development within the existing urban transportation and infrastructure framework, minimizing demands outside the urban growth boundary.

A successful and sustainable approach to parking and transportation is critical to the feasibility of the Plan. The study area is well served by existing mass transit systems, and a streetcar line is planned along 7th Avenue that will provide additional connectivity to adjacent neighborhoods and to downtown. Surface parking for existing uses will be displaced by open space and future building development, and a portion of existing street parking will be displaced by stormwater, streetscape, and habitat strategies. Added to the demand created by new development, a substantial replacement parking requirement may be created which could be alleviated by constructing a new underground garage. Further study is recommended to confirm assumptions for

parking demand, and to consider ways to reduce the magnitude of this investment and its inevitable environmental impacts.

Materials – Achieve carbon balance

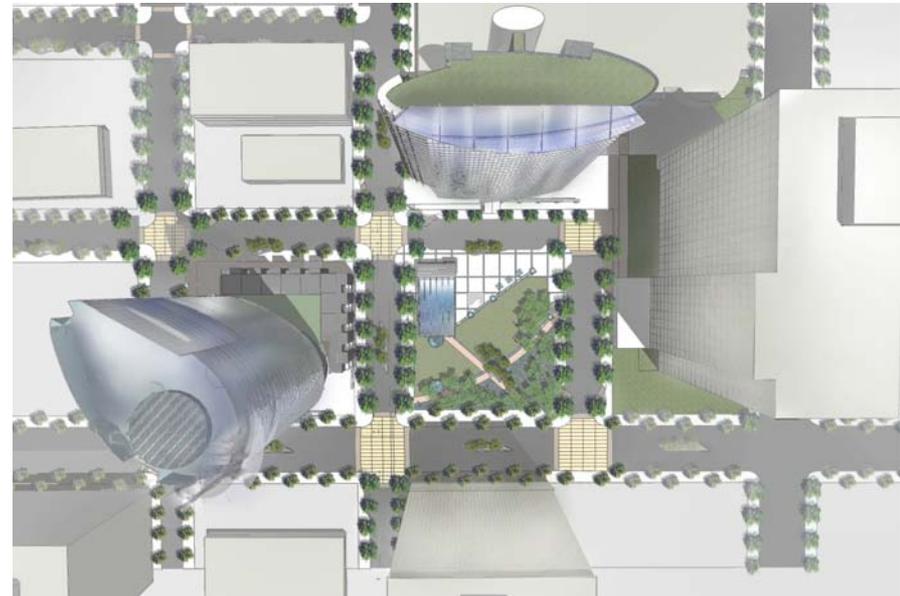
The materials vision of the Plan is a neighborhood in which construction materials are evaluated and selected based on long-term energy efficiency and low embodied CO₂ content, in order to contribute to achieving the goal of a carbon-neutral study area. The Plan outlines the basic principles for establishing a materials strategy that will contribute to realizing this vision.

Catalyst Project

The Lloyd Crossing Catalyst Project is envisioned as a mixed-use development that incorporates many of the concepts and strategies outlined in the Plan for open space, habitat, water, and energy, and which serves as a successful example of visionary sustainable planning and design for the study area. The project concept includes public, private, and shared infrastructure components which incorporate many of the recommendations contained in the Plan.

A major goal for the development is to meet environmental performance standards that exceed LEED™ platinum level, and the buildings utilize a variety of sustainable strategies which are projected to exceed the energy performance of existing buildings in the study area by at least a factor of 3. Implementation of the project will require a strong public / private partnership in order to have the desired impact in the community and to set the stage for the next phases of development in the area.

Public improvements anticipated for the Catalyst Project include acquisition and development of a one-acre public park, implementation of streetscape improvements in selected areas, the introduction of stormwater bioswales and mid-block conifer forest “patches”, and replacement



Catalyst Project – High-rise scenario

EXECUTIVE SUMMARY

of displaced on-street parking in an underground garage.

Design concepts have been illustrated for mid-rise and high-rise development options as part of this study, along with a cost summary and financial analysis. The building program for the mid-rise alternate consists of 150 residential units in two separate structures of approximately 75 units each, while the high-rise alternates range from 240 to 300 residential units. Both options include associated ground-level retail space and underground parking.

Private investment returns for the smaller mid rise scenario are projected at approximately 21%, while the high rise alternates show returns of 16.6% and 17.3%.



Catalyst Project – High-rise scenario

Conclusions and Recommendations

The Sustainable Urban Design Plan establishes a vision for Portland's Lloyd Crossing as a vibrant, attractive urban neighborhood that reverses the predominant trend of increasing environmental impact through a coordinated set of strategies that can be implemented incrementally over the next 45 years. Over time, this produces a dense urban ecosystem whose performance characteristics mimic the historic pre-development conditions of the site in the key environmental areas of habitat, water, and energy. In this vision, the Lloyd Crossing neighborhood becomes synonymous with the concept of healthy urban living, incorporating a diverse mix of uses, a highly desirable identity, and convenient transportation connections to the rest of the metropolitan area.

The Plan demonstrates that this vision can be achieved by utilizing a combination of existing tax credits, incentives, and reinvestment of operational savings over the course of the study period. Implementation of the vision will require strong public/private partnerships, patient capital, and a long-term perspective. Applying certain assumptions regarding the amount of operational savings and tax offsets assumed to be

reinvested, these revenues alone are adequate to repay upfront capital costs over the 45-year study period; however, it will be important to identify additional public sources of capital to both make the required initial investments in infrastructure and to supplement the private capital sources identified in the Plan.

The Plan's recommendations provide a set of integrated strategies that can be used as a platform for further study as well as a tool to begin planning the first phases of implementation.



Vision and Goals

The 2001 Lloyd District Development Strategy commissioned by the Portland Development Commission established a vision of the Lloyd District as a vibrant urban neighborhood with a diverse and dynamic mix of uses, high density, a distinct identity, and a variety of transportation options and linkages for pedestrians, vehicles, and mass transit. The Development Strategy identified mobility, activity, livability, and identity as key principles to guide major public and private decisions about future development within the Lloyd District.

The 2004 Lloyd Crossing Sustainable Urban Design Plan builds on this vision and adds the key concepts of sustainability and achievability as a central part of its strategies and recommendations. The vision of the Plan is to create a district that is environmentally and financially sustainable, and which has the critical urban qualities that distinguish it within the context of the greater Portland area as a unique, vibrant, attractive and healthy community.

The overarching goal of the Plan is to reduce the net environmental impact of anticipated development in the study area over the next 45 years to an absolute level approaching or exceeding that of the pre-development conditions on the site. “Pre-development Metrics™” (i.e., the environmental performance characteristics of the site in its natural or “pre-development” state) will allow success to be measured against a goal of living within the natural systems envelope of a site or community. The plan postulates significantly lower environmental impact, even with a five-fold increase in the intensity of urban development over the next 45 years.

Habitat Goal

Restore pre-development habitat metrics through on-site and off-site strategies.

Water Goal

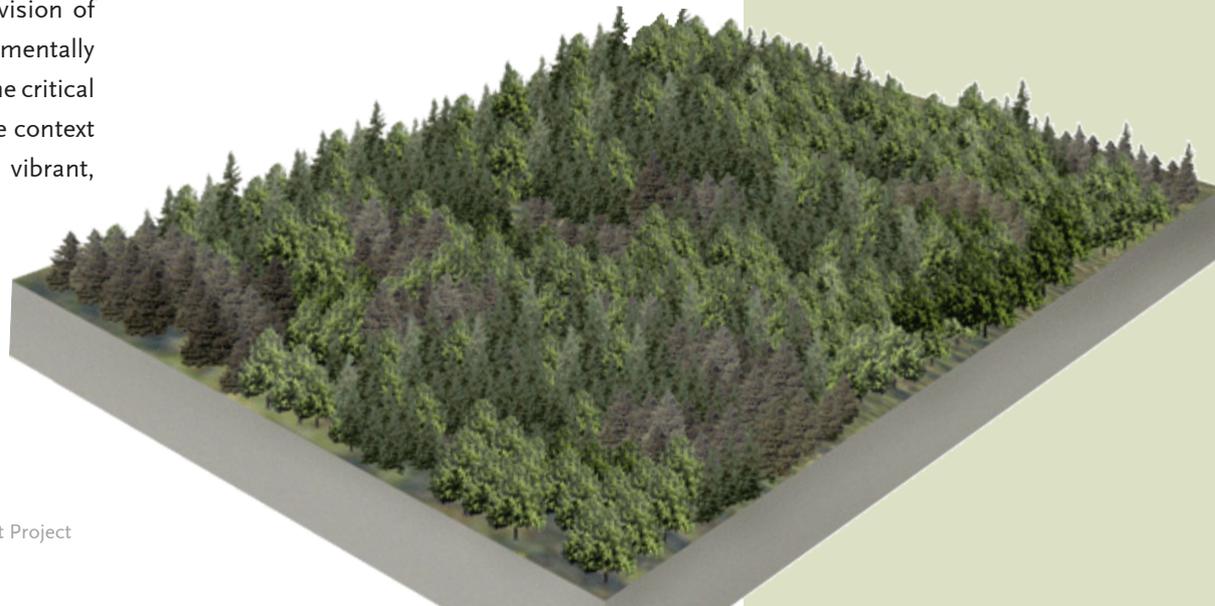
Achieve a “water neutral” study area functioning within the rainfall budget falling on the site.

Energy Goal

Live within the study area’s usable annual solar budget and achieve a “carbon neutral” study area.

Development Goal

Achieve the maximum allowable development potential in the study area as measured by allowable floor area ratio (FAR).



Lloyd Crossing Study Area Context

History

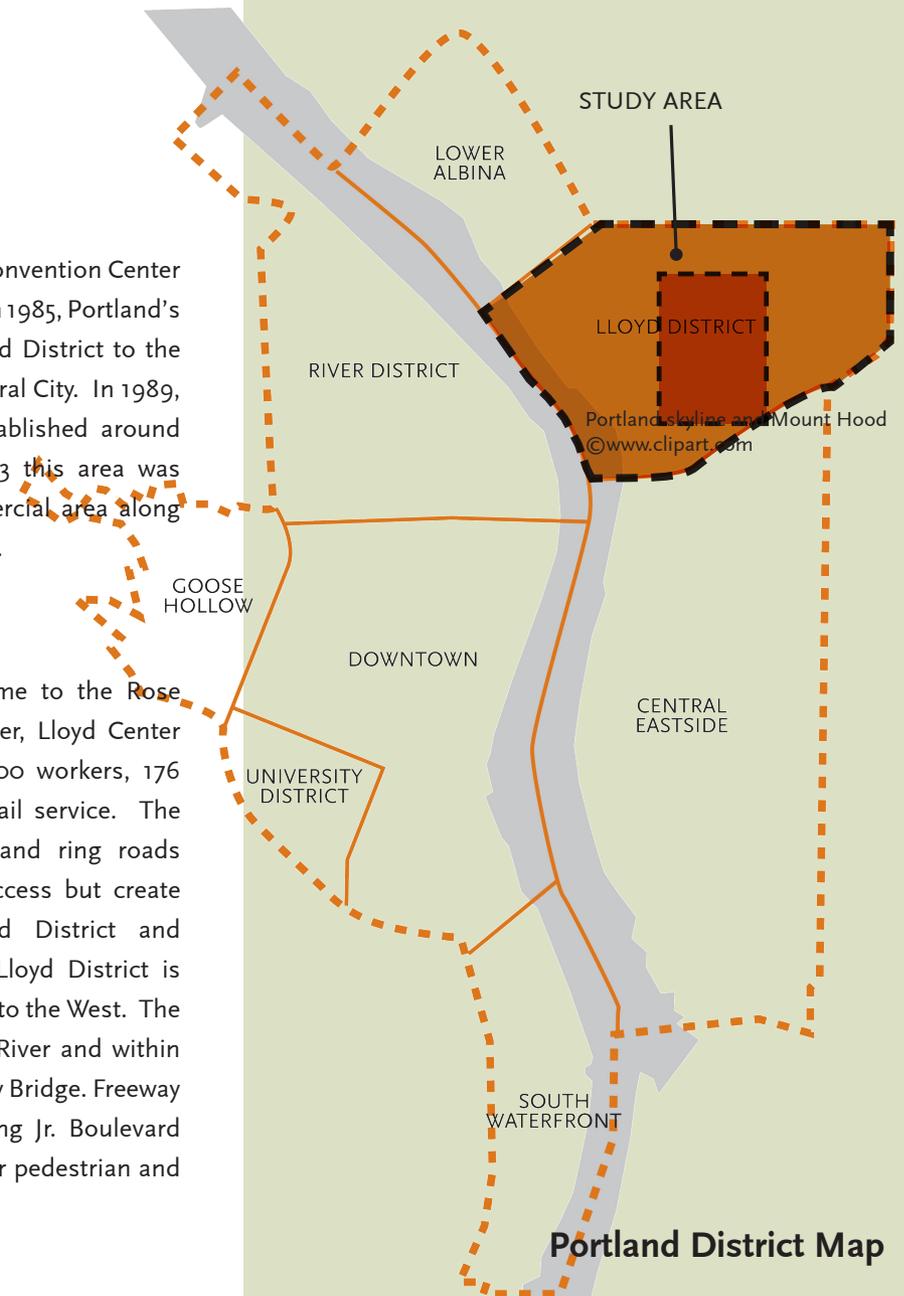
From 1910 through the 1930s, Ralph Lloyd, a California oilman and developer, purchased property throughout the area now known as the Lloyd District. At the time, the neighborhood consisted of single-family homes, commercial buildings along its major streets, and several streetcar lines. After establishing the Union State Bank and adding a Sears department store in the 1920s he proposed a major civic center capable of rivaling downtown Portland in 1931. The depression prevented most of the plan from proceeding.

In the 1940s, the State of Oregon began an east-west highway through Sullivan's Gulch, later known as I-84 and the north-south Minnesota Freeway (I-5). Land values in the neighborhood rose due to convenient automobile access. The Lloyd Center shopping mall opened in 1960. In the 1960s and 1970s, the area's convenient transportation access, proximity to downtown, and high profile shopping mall led to the development of several new housing projects, two of the three Lloyd Towers, and the Memorial Coliseum. The east-west light rail transit route was added in the 1980s and contributed to

decisions to locate the Oregon Convention Center and Rose Garden in the district. In 1985, Portland's Central City Plan added the Lloyd District to the area defined as the Portland Central City. In 1989, an urban renewal area was established around the Convention Center. In 1993 this area was expanded to include the commercial area along Martin Luther King, Jr. Boulevard.

Physical Context

Today, the Lloyd District is home to the Rose Garden Arena, Convention Center, Lloyd Center Mall, offices for more than 5,000 workers, 176 dwelling units, and MAX light rail service. The area is bordered by couplets and ring roads that provide convenient auto access but create boundaries between the Lloyd District and adjacent neighborhoods. The Lloyd District is bordered by the Willamette River to the West. The Pearl District is just across the River and within walking distance via the Broadway Bridge. Freeway infrastructure, Martin Luther King Jr. Boulevard and Grand Avenue couplets deter pedestrian and



Portland District Map



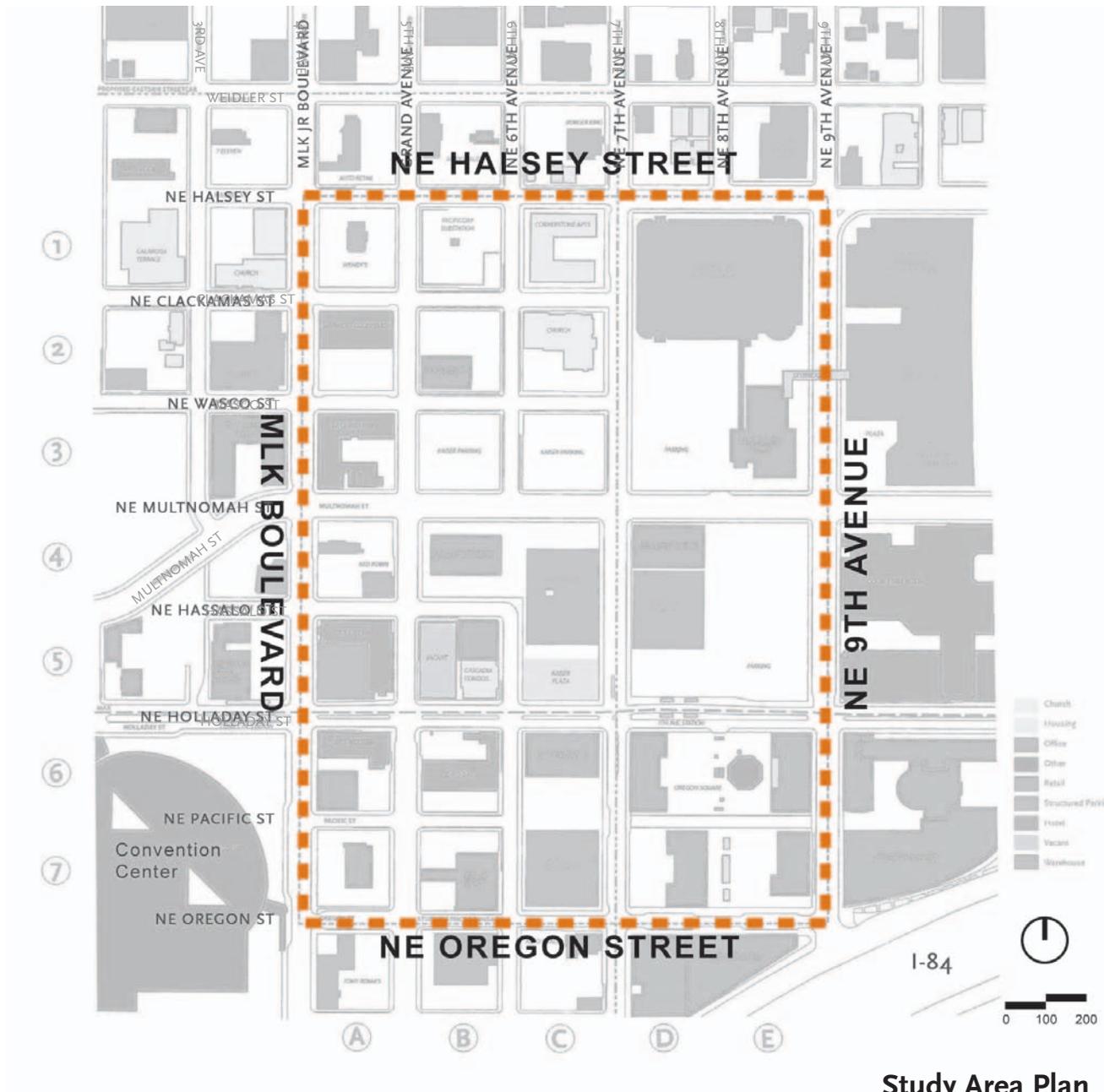
bicycle access to the River and the Pearl District. To the South, the Lloyd District is bound by I-84, which is located in Sullivan’s Gulch and isolates the area from adjacent neighborhoods. Portland’s desirable Irvington neighborhood is north of the Lloyd District and offers the most potential for connectivity but is bound by the NE Broadway and NE Weidler couplets. The Lloyd District, even though it is part of the Central City, is unique among Central City subdistricts in having blocks larger than Portland’s typical 200’ x 200’ blocks. These superblocks were created in the 50s, 60s and 70s, combining two or four 200’ blocks plus the street Right of Way (generally ~84’ wide).

Regulatory Context

For the 35-block Study Area bounded by MLK Jr. Boulevard, NE 9th Avenue, NE Halsey Street, and NE Oregon Street, the entire area is zoned Central Commercial with a design overlay (CXD). The Study Area as well as the rest of the Lloyd District is in the Central City Plan District. It is also a part of the Oregon Convention Center Urban Renewal Area, which is designated by the Portland Development Commission (PDC) for a tax increment financing program, administered by PDC.

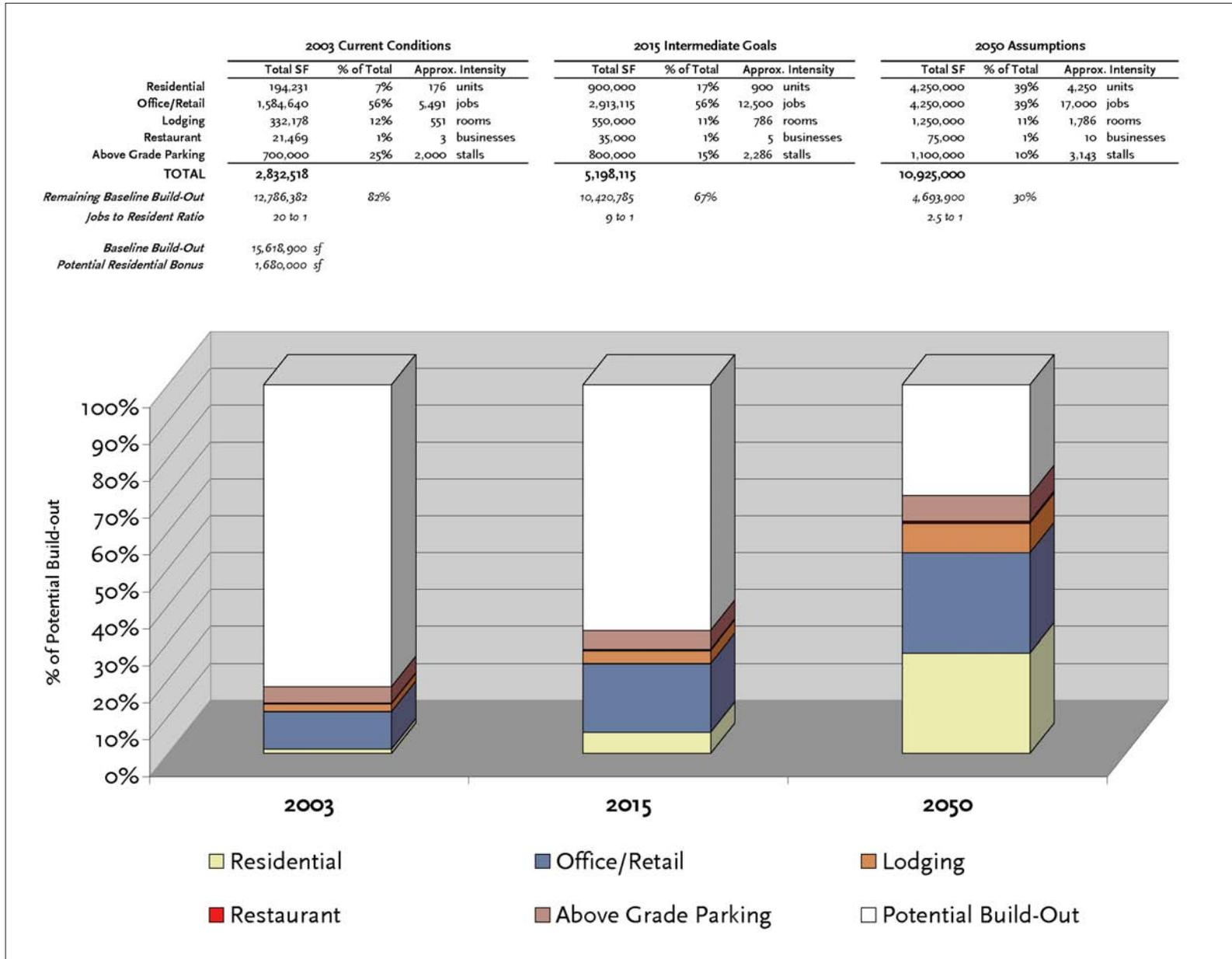
The Central Commercial (CX) zone is intended to provide for commercial development within Portland’s most urban and intense areas. A broad range of uses is allowed to reflect Portland’s role as a commercial, cultural and governmental center. Development is intended to be very intense with high building coverage, large buildings, and buildings placed close together. Development is intended to be pedestrian-oriented with a strong emphasis on a safe and attractive streetscape.

The Design Overlay Zone promotes the conservation, enhancement, and continued vitality of areas of the City with special scenic, architectural, or cultural value. This is achieved through the creation of design districts and applying the Design Overlay Zone as part of community planning projects, development of design guidelines for each district, and by requiring design review or compliance with the Community Design Standards. In addition, design review or compliance with the Community Design Standards ensures that certain types of infill development will be compatible with the neighborhood and enhance the area. Several of the requirements include incorporating active uses in parking structures, reinforcing the Broadway/Weidler Corridor, and using masonry and light colors on buildings.



Study Area Plan

DEVELOPMENT POTENTIAL



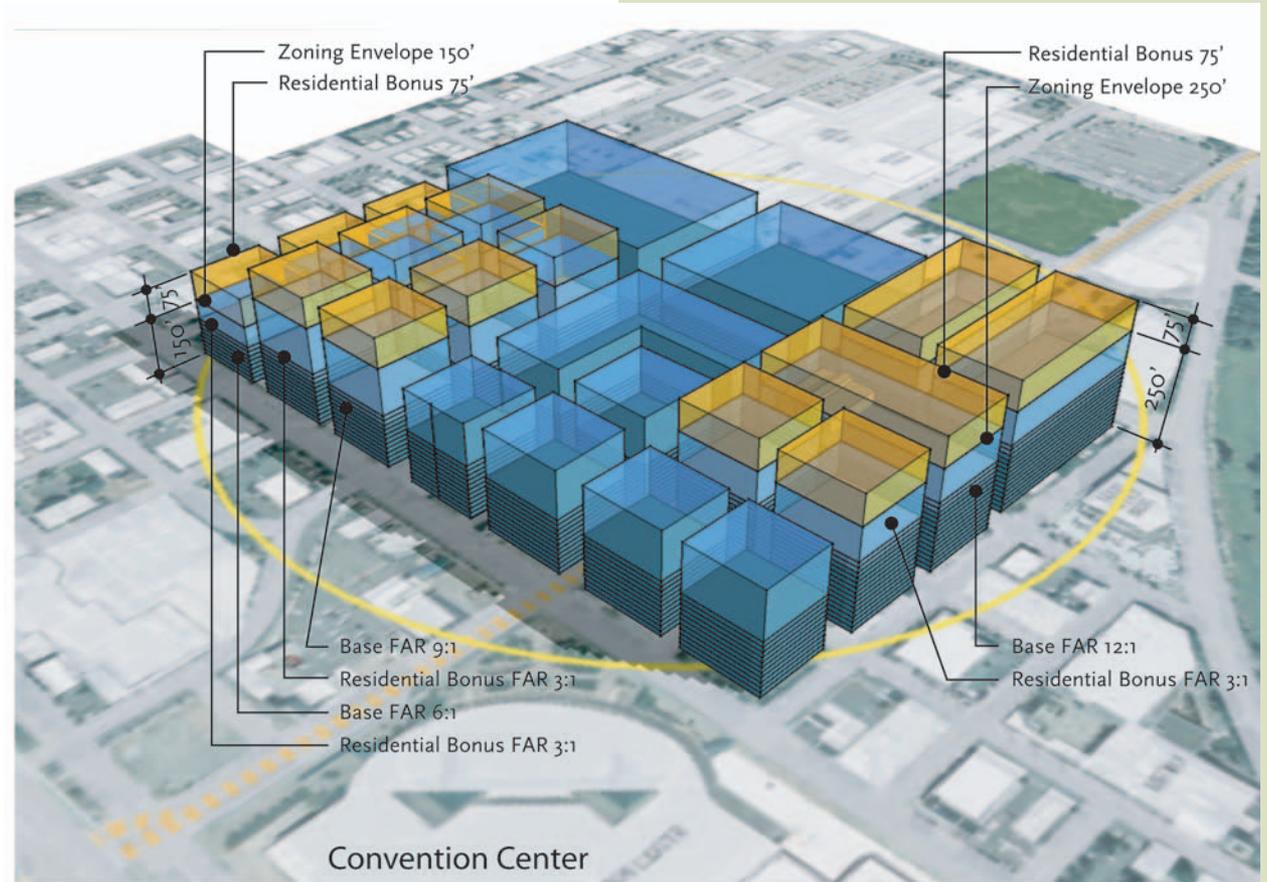
Lloyd Crossing Study Area Development Potential

Development Potential

The 35-block Lloyd Crossing Study Area currently contains approximately 2.8 million square feet of developed building area, in a mix of office, retail, lodging, residential, restaurant, and above grade parking use. The baseline Floor Area Ratio (FAR) established by the zoning code allows a total of approximately 15.6 million total square feet of above grade development on these blocks.

Over the next 45 years, the study anticipates that the market could potentially absorb approximately 8.1 million square feet of additional above-grade building development, for a total of 10.9 million square feet in the year 2050. This represents approximately 70% of the baseline FAR capacity in the study area. Residential use in the area is predicted to increase so that a ratio of approximately 1:1 is achieved between residential and commercial use (as measured by total square footage) in the year 2050.

Certain blocks within the study area qualify for FAR bonuses of up to 3:1 and height bonuses up to 75 feet when developed with conforming residential uses. This is in addition to the development area and height allowed by the baseline zoning requirements.



Pre-development Metrics™: Baseline Concept

To measure the success of sustainable strategies at the urban neighborhood scale, the Plan creates the concept of Pre-development Metrics™. Pre-development Metrics™ allow progress to be measured towards the goal of living within the constraints of the natural forces within a site or neighborhood. The plan establishes baseline environmental metrics that assume a pre-development site condition approximating that of a mature mixed-conifer forest.

In its pre-development condition, the 54-acre study area generated the following metrics:

Habitat

- 90% tree cover
- broad diversity of wildlife species

Water (per year)

- 64 million gallons of total precipitation over study area
- 19.2 million gallons of stormwater runoff
- 32 million gallons of groundwater recharge
- 9.6 million gallons of transpiration
- 3.2 million gallons of evaporation

Solar Energy (per year)

- 161 million kwh incident on site
- 8 million kwh used by photosynthesis
- 153 million kwh reflected / absorbed / re-radiated

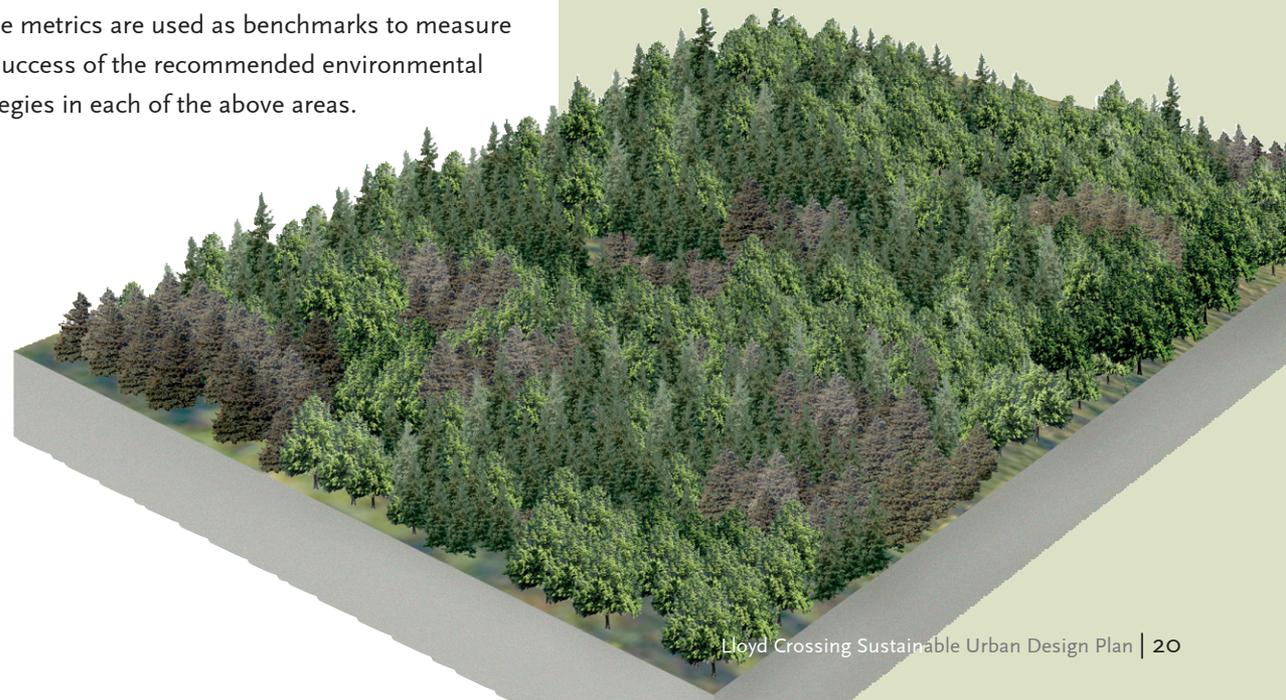
Carbon Balance (per year)

- 681 tons of CO₂ used
- 495 tons of oxygen released
- 186 tons of carbon fixed as biomass

These metrics are used as benchmarks to measure the success of the recommended environmental strategies in each of the above areas.

Pre-development Metrics Goal

Use the pre-development condition of the 35 blocks as a 54 acre mixed-conifer forest as a target environmental impact metric.



Sustainable Urban Design Strategies

Over the course of the next 45 years, the Study Area is projected to add approximately 8.1 million square feet of building development to the neighborhood. The Plan establishes a broad range of Sustainable Urban Design Strategies which, implemented incrementally over time, will result in a vibrant, high density urban neighborhood that substantially reduces its net environmental impact, with environmental characteristics that match the historic performance of the site in pre-development conditions.

As development and density in the neighborhood increases over time, the Sustainable Urban Design Strategies work together to improve habitat quantity, quality, and connections; minimize reliance on imported water and demand on off-site water treatment systems; reduce demand for non-renewable energy resources and increase utilization of on-site solar energy resources; and to generate development projects and public spaces that respond to the unique character of the community.



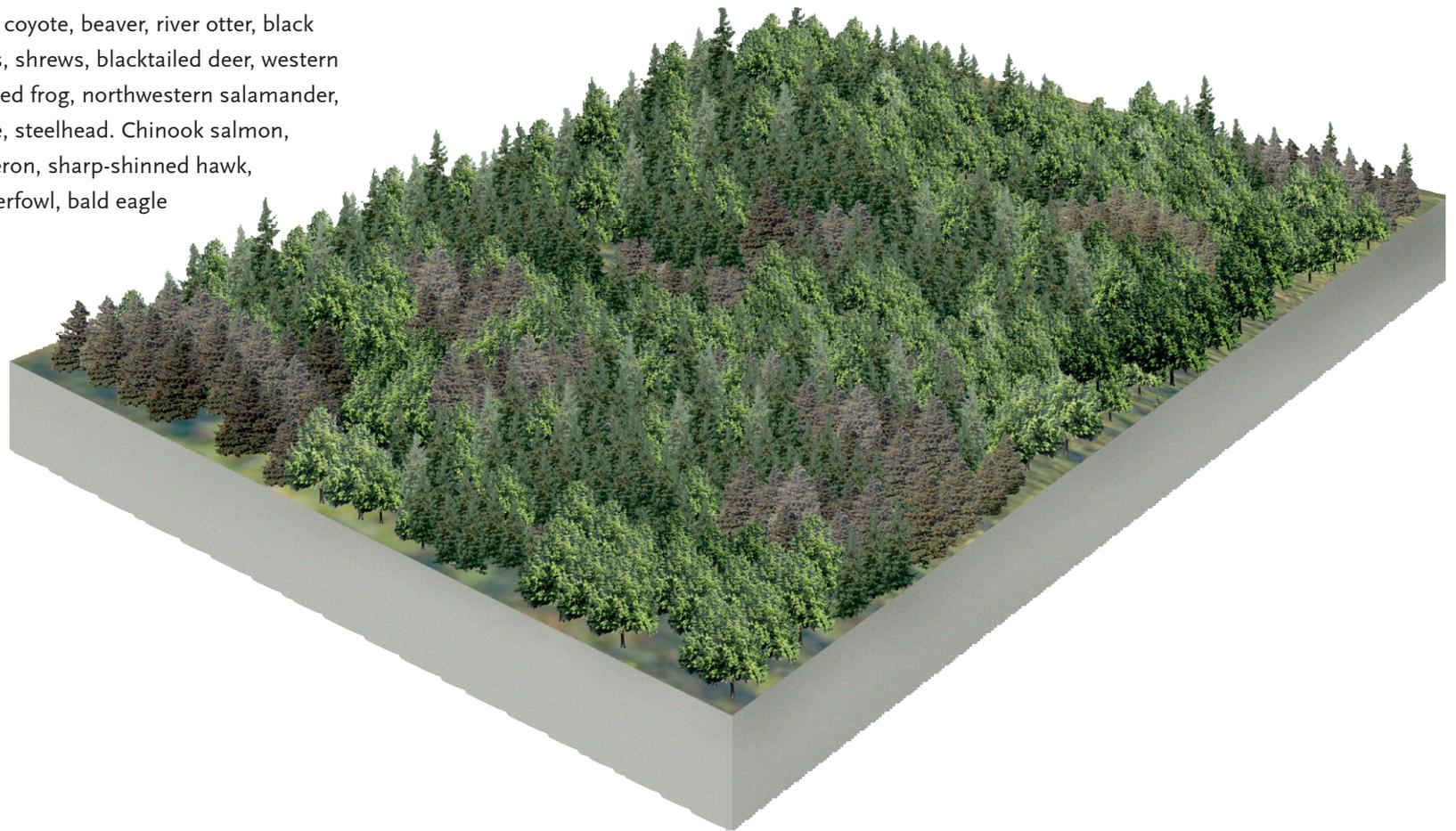
Pre-development Habitat Conditions

Tree cover **90%**

54 acres of Mixed Conifer Forest

Broad Diversity of Wildlife Species

The species include: coyote, beaver, river otter, black bear, raccoon, moles, shrews, blacktailed deer, western pond turtle, red-legged frog, northwestern salamander, western garter snake, steelhead, Chinook salmon, osprey, great blue heron, sharp-shinned hawk, red-tailed hawk, waterfowl, bald eagle



Habitat and Tree Cover

Vision and Goals

The habitat vision of the Plan is a neighborhood in which the pre-development metrics of the site (a 54-acre mixed conifer forest) have been matched through a combination of on-site and off-site strategies. This is an ambitious goal for a developed urban area. The plan proposes increasing the quantities of tree cover and habitat in order to mix the dense urban areas with linked green spaces, providing a higher intensity of functioning native habitat. These measures would create habitat zones, and provide links from open space to improved mixed conifer forests adjacent to the Study Area.

Pre-development Conditions

In pre-development conditions, the 54 acre study area would have been a mixed conifer forest with diverse range of species, including; beaver, river otter, black bears, western pond turtle, Chinook salmon, red-tailed hawk and the great blue heron. Trees would have covered 90% of the site.

2050 Primary Goals

Establish wildlife connectivity through the creation of 'partial' wildlife corridors linking the Lloyd Crossing area with significant adjacent habitats such as the Willamette River and Sullivan's Gulch.

2050 Secondary Goals

On-site:

Creation of a partial habitat corridor, providing avian, aquatic and invertebrate habitat.

Rooftop gardens providing avian and insect habitat.

Increased tree canopy providing avian habitat.

Understory planting along greenway providing avian habitat.

Stormwater treatment and detention facilities providing avian, invertebrate and possibly aquatic habitat.

Use of conifers wherever possible.

Off-site Recommendations:

Sullivan's Gulch Wildlife Corridor providing avian, terrestrial and insect habitat.

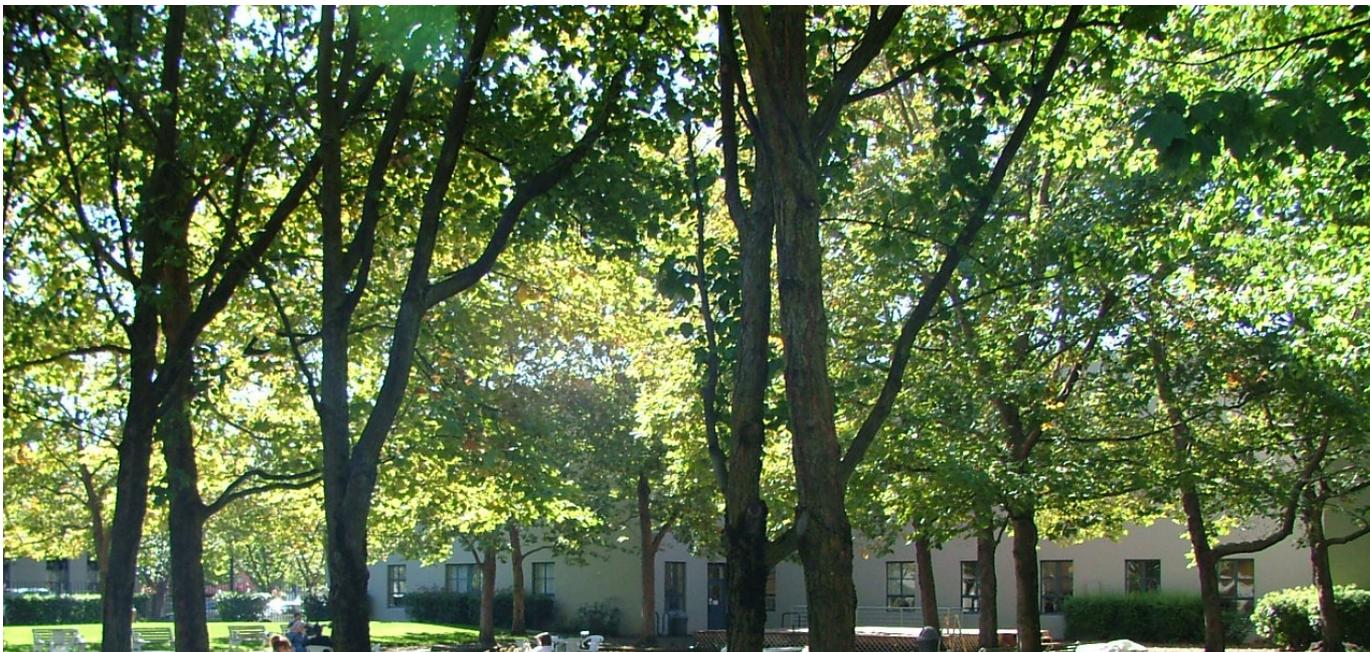
Stream Restoration along Sullivan's Gulch providing avian, invertebrate and aquatic habitat.

Community Benefits of Restored Habitat

Enhanced biodiversity within neighborhood and through off-site habitat restoration.

Reduction of "heat island" effect through introduction of improved landscaping in public right-of-way

Improved public streetscape and pedestrian linkages





Existing Conditions

The existing study area tree coverage is 7.9 acres or approximately 14.5% of the site area, and includes red maples, scarlet oaks, sweet gum and tulip tree. The reduced tree canopy and vegetated middle story, combined with expanses of paving and building, provide little habitat for birds or arboreal mammals.

There is little habitat for terrestrial mammals, invertebrates and aquatic species because the existing streams have been placed in pipes below

the street surface. Connectivity to Sullivan's Gulch and the Willamette river edge has been lost. The remaining inhabitants are urban adapted species such as starlings, pigeons, ravens, squirrels, rats and feral cats.

Open space is privately owned and provides 2.5 acres of plazas and green spaces (5.4% of study area). Because these areas are privately owned, they may be developed over time and need to be supplemented by public open space.



2004 Existing Habitat Conditions

Tree cover **14.5%**

Tree species include: red maple, scarlet oaks, sweet gum, tulip tree

Existing On-Site Conditions

Lack of tree canopy and middle story provide little habitat for birds or arboreal mammals.

Virtually no habitat for terrestrial mammals such as beaver, deer and raccoon.

Virtually no habitat is left for invertebrates because of the large percentage of impervious surfaces in the study area.

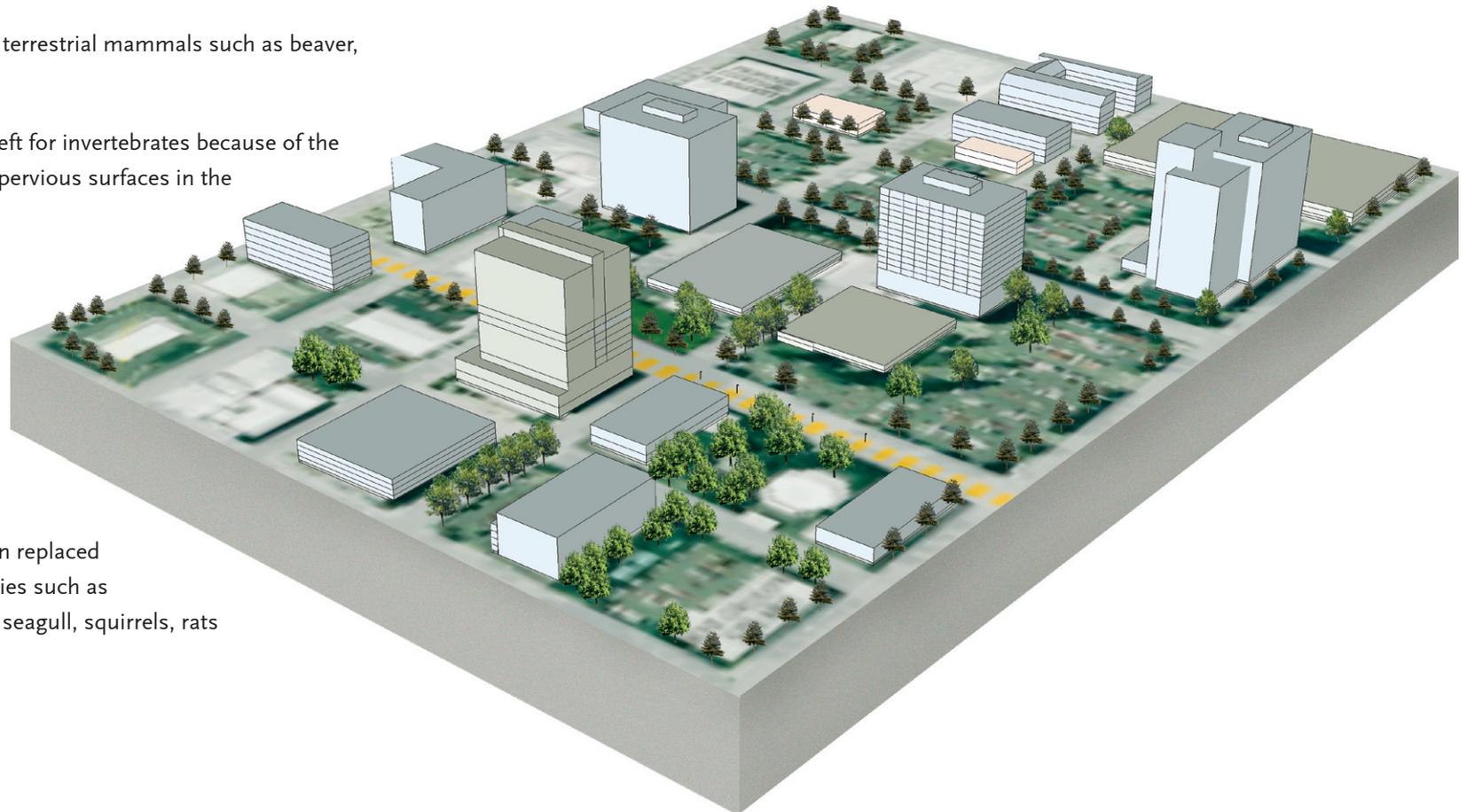
No aquatic habitat such as streams, creeks or wetlands remain from pre-development condition.

Natural predator/prey relationships have been replaced by urban adapted species such as starling, raven pigeon, seagull, squirrels, rats and feral cats.

Existing Off-Site Conditions

Increased water temperatures from stormwater harms aquatic and amphibious species

Sediments and pollution carried in stormwater runoff harm aquatic and amphibious species





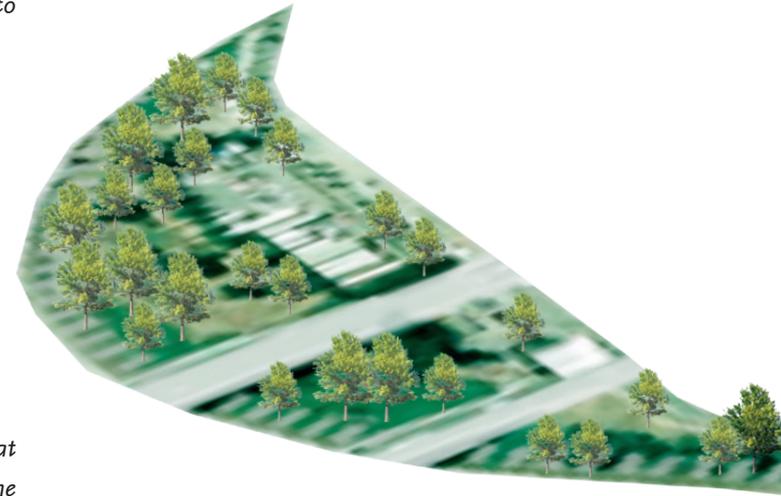
SUD Habitat Strategies

The habitat and tree cover strategies combine to form an abstraction of a mixed conifer forest¹ woven into the urban infrastructure, with a layering of green streets, pedestrian streets and bioswales creating an integrated urban streetscape. The weaving would include integration of habitat corridors that would connect north from Sullivan’s Gulch to the heart of the study area. The proposed design would provide:

- *Increase the overall canopy coverage, designing to a goal of 25–30%*
- *High vegetative structural diversity vertically and horizontally*
- *Two acres of mixed conifer forest “patches” within the district, in conjunction with the development of the “green streets”*
- *1–2 acres of habitat corridor providing connectivity between forest “patch” and Sullivan’s Gulch.*
- *50 acres of restored mixed conifer forest habitat created off site in Sullivan’s Gulch and along the Willamette River.*

These elements would provide habitat for many species, including: beaver, western pond turtle, great blue heron, raccoon, red-legged frog, sharp-shinned hawk, moles, northwestern salamander, red tailed hawk, shrews, western garter snake, and waterfowl.

The habitat plan would need to be phased with careful monitoring to insure a complimentary mix of species and resolution of maintenance and housekeeping issues.



¹This has an historic precedent in the Ira Keller fountain inspired by the Cascade mountain streams and North Park Square inspired by Willamette Valley wetlands.

2050 Habitat Conditions

Tree cover 25-30%

Potential native tree species include: Douglas fir, red alder, bigleaf maple, gum

Note: this concept plan is not intended to represent specific planned or required development proposals

2050 Primary Goals

Establish wildlife connectivity through the creation of wildlife corridors linking the Lloyd Crossing area with significant adjacent habitats such as the Willamette River and Sullivan’s Gulch.

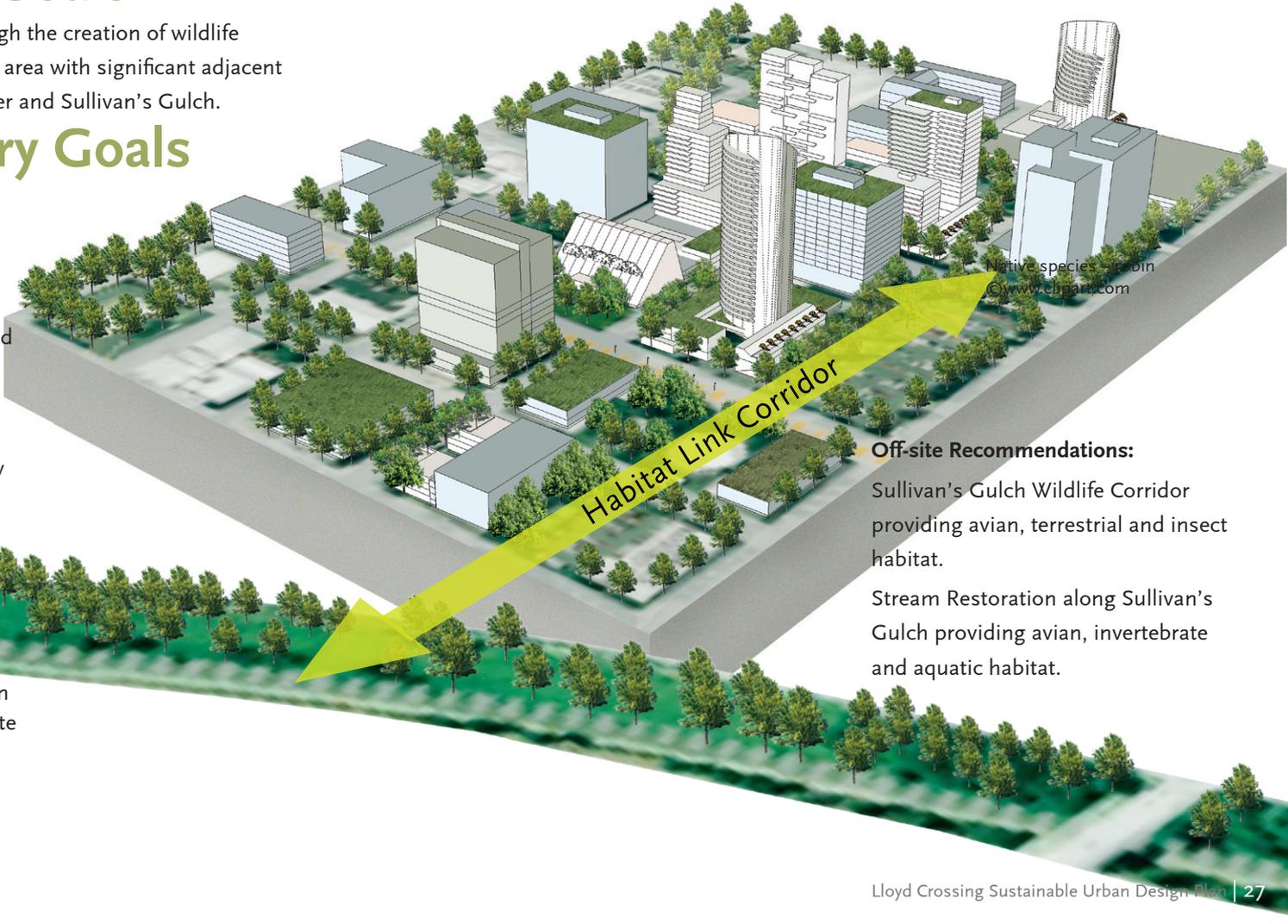
2050 Secondary Goals

On-site:

- Creation of a habitat corridor, providing avian, aquatic and invertebrate habitat.
- Rooftop gardens providing avian and insect habitat
- Increased Tree Canopy providing avian habitat.
- Understory planting along greenway providing avian habitat.

- Stormwater treatment and detention facilities providing avian, invertebrate and possibly aquatic habitat.
- Use of conifers wherever possible.

- Off-site Recommendations:**
- Sullivan’s Gulch Wildlife Corridor providing avian, terrestrial and insect habitat.
 - Stream Restoration along Sullivan’s Gulch providing avian, invertebrate and aquatic habitat.





SUD Habitat Implementation

The Habitat strategies combined with open space recommendations (discussed later in the Plan under Placemaking) include a mix of study area and off-site open space improvements, with the associated land acquisition costs for study area parks projects. Total capital costs in 2004 dollars for these strategies are estimated at \$32 million, of which approximately \$20 million is associated with the acquisition of 5.5 acres of land within the study area (at an assumed 2004 market value of \$85 per square foot of land).

Specific sources of funding to repay the investment in land acquisition or parks improvements have

not been identified. Funding sources could include typical parks levies, Urban Renewal dollars, some portion of any System Development Changes that are earmarked for use in the District, or private dollars generated by taking advantage of regulatory incentives.

As currently modeled, the \$32 million represents approximately 8% of the total study area costs, and is repaid over time through operational savings and other offsets available given the range of water and energy strategies employed.

Uses:	Total	2005	2010	2015	2020	2025	2030	2035
Rooftop Gardens	N/A	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Land Acquisition	\$ 20,213,000	\$ 3,702,600	\$ 3,702,600	\$ 8,255,200	\$ -	\$ 4,552,600	\$ -	\$ -
Catalyst "Town Square"	\$ 2,178,000	\$ 2,178,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Habitat Friendly Open Space	\$ 7,078,500	\$ -	\$ 1,769,625	\$ 3,539,250	\$ -	\$ 1,769,625	\$ -	\$ -
Pocket Parks	\$ 1,250,000	\$ -	\$ -	\$ 625,000	\$ -	\$ 625,000	\$ -	\$ -
Sullivan's Gulch Improvements	\$ 1,406,250	\$ -	\$ -	\$ -	\$ 1,406,250	\$ -	\$ -	\$ -
Total Uses:	\$ 32,125,750	\$ 5,880,600	\$ 5,472,225	\$ 12,419,450	\$ 1,406,250	\$ 6,947,225	\$ -	\$ -
Sources:								
% of SDCs	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Parks Levies	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Sources:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Net Cash Flow:								
5-Year Cash Flow:	\$ (32,125,750)	\$ (5,880,600)	\$ (5,472,225)	\$ (12,419,450)	\$ (1,406,250)	\$ (6,947,225)	\$ -	\$ -

Habitat / Open Space: Cash flow analysis 2005–2035

Pre-development Water Use Conditions

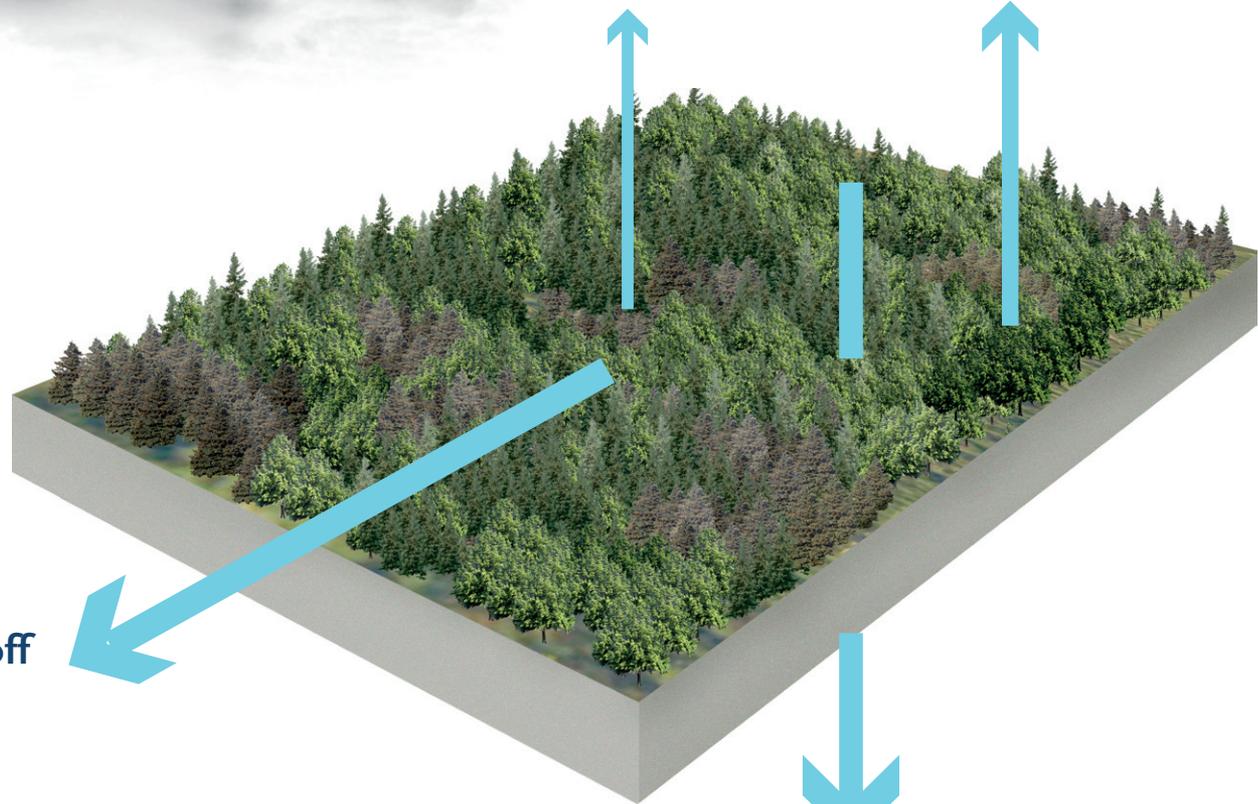
100%
Precipitation
64,000,000 gallon/yr

5% of precipitation
Evaporation
3,200,000 gallon/yr

15% of precipitation
Transpiration
9,600,000 gallon/yr

30% of precipitation
Stormwater Runoff
19,200,000 gallon/yr

50% of precipitation
Groundwater Recharge
32,000,000 gallon/yr



Water

Vision and Goals

The Plan envisions a “water-neutral” Lloyd Crossing Study Area that minimizes its reliance on imported water, and radically reduces its demand for off-site wastewater treatment systems. The neighborhood lives within the average annual rainfall budget that falls on the site in terms of its potable water consumption. All stormwater and wastewater streams are treated on-site prior to being recycled, infiltrated, or discharged. In this way the neighborhood is able to replicate as closely as possible the natural pre-development characteristics of the site, while simultaneously accommodating significant increases in urban density.

Pre-development Conditions

The study area receives an average annual rainfall of 64 million gallons. As a mature mixed-conifer forest, the site would generate 19.2 million gallons of stormwater runoff, 32 million gallons would be recharged into the groundwater, 9.6 million gallons would be absorbed through transpiration, and 3.2 million gallons would be absorbed through evaporation, as shown in the diagram on the facing page.

Water Use Goals

Mimic natural watershed characteristics.

Live within the annual precipitation budget that falls on the site.

Satisfy all non-potable water demand through water reuse.

Treat all wastewater streams on-site.

“Disconnect” from the municipal sewer.

Disconnect stormwater from the municipal system.

Community Benefits of a Water-Neutral Lloyd Crossing

Reduction in demand for public waste water treatment systems.

Reduction in demand for public potable water systems.

Use of reclaimed water for irrigation in public right of way.



2004 Existing Water Use Conditions

100% **Precipitation**
64,000,000 gallon/yr

10% of precipitation
Evaporation
6,400,000 gallon/yr

2% of precipitation
Transpiration
1,280,000 gallon/yr

Potable Water
22,956,288 gallon/yr
100%

88% of precipitation
Stormwater Runoff
56,320,000 gallon/yr

90% of potable water
Waste Water
20,660,659 gallon/yr

10% of potable water
**Building System/Occupant
Consumptions (System Loss)**
2,295,629 gallon/yr

Groundwater Recharge
negligible

Note: This concept plan is not intended to represent specific planned or required development proposals

Existing Conditions

The adjacent figure illustrates the precipitation and potable water inflows to the site, and the outflows from the site in terms of stormwater runoff, groundwater recharge, transpiration, evaporation, and wastewater streams for existing 2004 conditions.

When applied to the projected build-out area of the neighborhood in the year 2050 the combined water strategies allow Lloyd Crossing to live within its

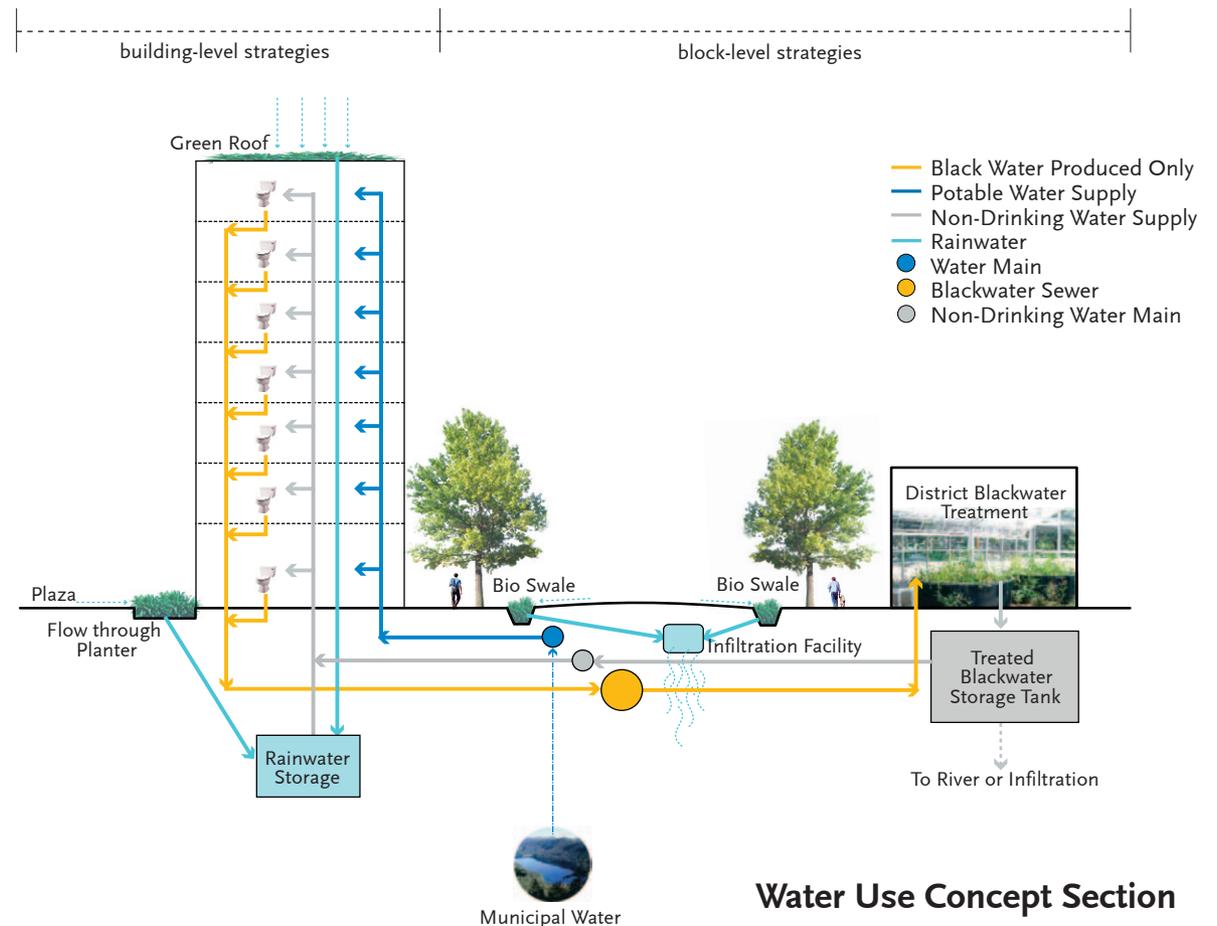
annual rainfall budget of 64 million gallons per year, and radically reduce its future demand for off-site water treatment systems.

SUD Water Strategies

Building and Block Level Strategies

The water strategies illustrated in the Water Use Concept Section to the right include completing phased efficiency upgrades for existing and new buildings within the Study Area, incremental implementation of a district-wide storm water system, rainwater harvesting, and the development of a black water treatment system for non-potable water re-use.

A 62% reduction in potable water consumption is realized through fixture efficiency, rainwater harvesting, and blackwater treatment and reuse. This demand reduction, combined with the incremental implementation of an area-wide stormwater treatment system, results in an 89% savings in water-related utility costs compared to a strategy that employs only minimum current code requirements.



Water Use Concept Section

2050 Per Code Water Use Conditions



Note: This concept plan is not intended to represent specific planned or required development proposals

2050 Per Plan Water Use Conditions

100% Precipitation
64,000,000 gallon/yr

10% of precipitation Evaporation
6,400,000 gallon/yr

10% of precipitation Transpiration
6,400,000 gallon/yr

Potable Water
57,736,439 gallon/yr

45% of precipitation Stormwater Runoff
28,800,000 gallon/yr

90% of potable water Waste Water
51,962,795 gallon/yr

10% of potable water Building System/Occupant Consumptions (System Loss)
5,773,644 gallon/yr

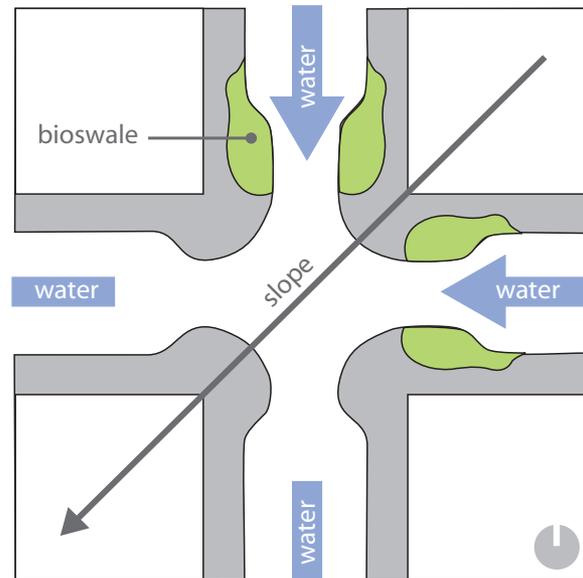
35% of precipitation Groundwater Recharge
22,400,000 gallon/yr



Note: This concept plan is not intended to represent specific planned or required development proposals

	Pre-Development		2003 Existing		2050 per Current Code		2050 per Plan	
	millions of gallons / year	% of Rainfall	millions of gallons / year	% of Rainfall	millions of gallons / year	% of Rainfall	millions of gallons / year	% of Rainfall
Inflows								
Rainfall	64.0	100%	64.0	100%	64.0	100%	64.0	100%
Potable Water	0.0	0%	23.0	36%	160.4	251%	57.7	90%
Total Inflows	64.0	100%	87.0	136%	224.4	351%	121.7	190%
Outflows								
Runoff	19.2	30%	57.6	90%	57.6	90%	28.8	45%
Sanitary Sewer	0.0	0%	20.7	32%	144.3	226%	52.0	81%
Groundwater	32.0	50%	0.0	0%	0.0	0%	22.4	35%
Transpiration	9.6	15%	1.3	2%	1.3	2%	6.4	10%
Evaporation	3.2	5%	6.4	10%	6.4	10%	3.2	5%
Total Outflows	64.0	100%	85.9	134%	209.6	328%	112.8	176%
System Loss	0.0		1.0		14.8		9.0	
% of Total Inflows	0%		1%		7%		7%	

Water Metrics Summary



Bio-swales infiltrate water at the downhill corners of each block.

Comparison to Current Code Requirements

The diagrams on the preceding pages illustrate how implementation of the recommended strategies would affect water metrics for the site over the course of the study period, in comparison to a development scenario based on current building code requirements.

As density increases in the neighborhood, the key effects of implementation are a reduction in potable water demand from 160 million to approximately 58 million gallons per year, and a reduction in wastewater from 144 million gallons to 52 million gallons per year, as shown in the adjacent water metrics summary table. In this way, the water strategies help Lloyd Crossing to more closely mimic the environmental performance of the site in its natural state.

Stormwater

The recommended stormwater treatment strategy for the study area utilizes the natural flow of the site to capture and treat stormwater in a system of bioswales at the downhill side of each block and intersection. Stormwater flow in the right of way would be recharged into the ground.

This intersection stormwater strategy combines with the development of the intersections and streetscapes (discussed in the Plan as part of the Placemaking section) as an integrated public signature for the neighborhood.

SUD Water Implementation

Total capital costs for the recommended water strategies are estimated at \$18 million. Over the 45-year period, a total of \$40 million in revenues was identified by assuming that the majority of the operational savings (80%) realized over the 45-year study period is reinvested by area landowners (via a Resource Management Association) to help fund the necessary district-wide infrastructure improvements to implement the proposed strategies. The assumption that building owners retain only 20% of their savings is critical to the financial viability of the

implementation strategy. Without the presumed “reinvestment” by the area landowners of savings that they receive, the capital costs required for both building-level and district-level improvements cannot be repaid.

The results of the Study Area Economic Analysis suggest that the approximately \$18 million in capital costs is repaid by 2020, and that an additional \$22 million in revenues are generated by the reinvestment of operational savings.

In addition to relying upon the reinvestment by the private building owner, the team has raised the possibility of earmarking a percentage of System Development Charges (SDCs), which are now imposed as an impact fee as part of project approvals. Particularly if the strategies implemented take the Lloyd District off the City’s infrastructure “grid” for certain functions, it seems reasonable that a portion of these fees could be made available to support capital improvements in the District.

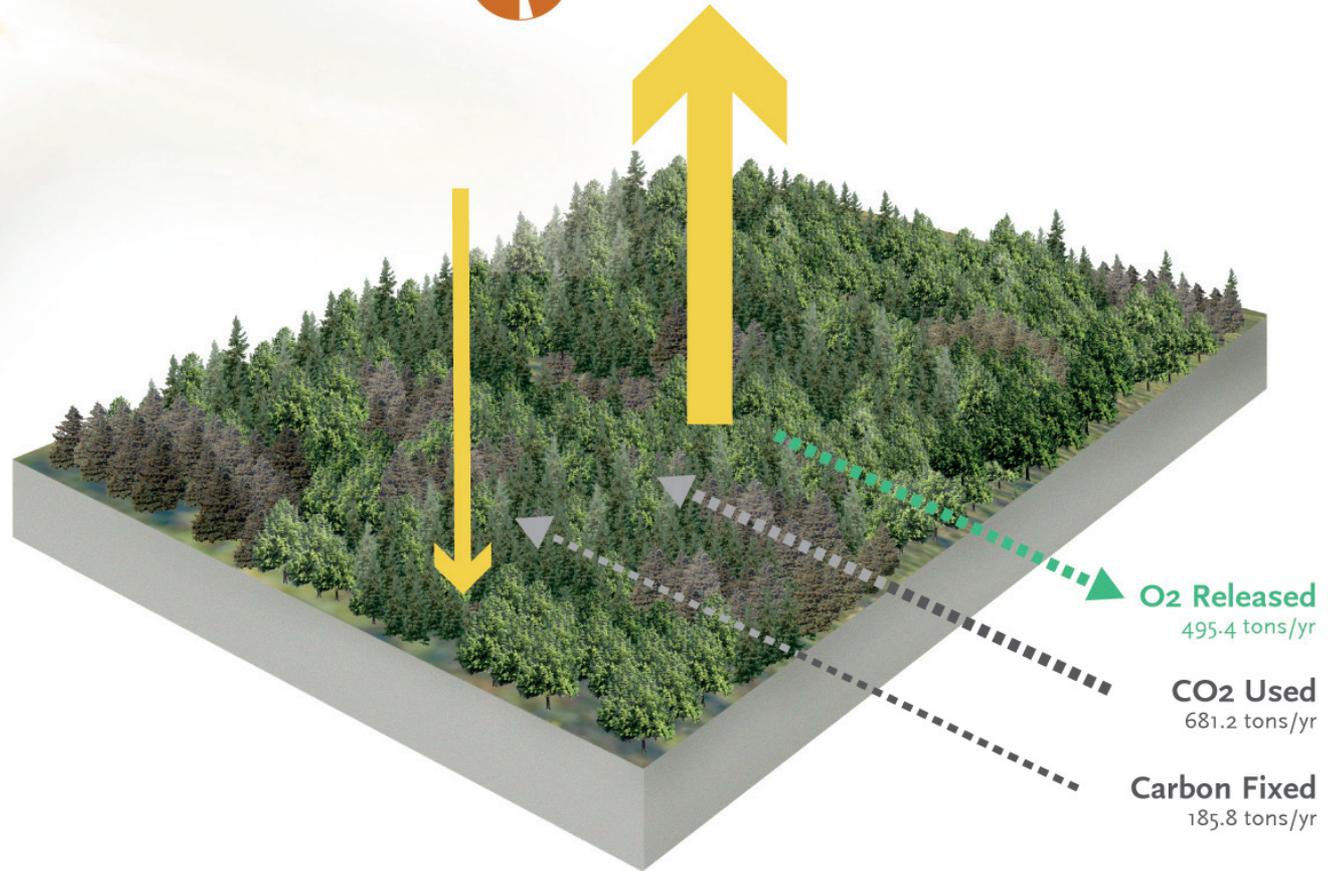
Uses:	Inflation @ 0%	Total	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Efficiency Upgrades		\$ 1,965,000	\$ 597,398	\$ 170,950	\$ 170,950	\$ 170,950	\$ 170,950	\$ 170,950	\$ 170,950	\$ 170,950	\$ 170,950	\$ -
Stormwater Mgmt - Buildings		\$ 620,491	\$ 155,070	\$ 50,096	\$ 51,733	\$ 53,370	\$ 55,007	\$ 56,644	\$ 58,281	\$ 59,918	\$ 61,555	\$ 18,818
Additional Plumbing - Buildings		\$ 3,930,000	\$ 768,348	\$ 768,348	\$ 341,901	\$ 341,901	\$ 341,901	\$ 341,901	\$ 341,901	\$ 341,901	\$ 341,901	\$ -
Rainwater Harvesting		\$ 2,965,000	\$ 579,682	\$ 583,104	\$ 264,791	\$ 266,313	\$ 267,836	\$ 269,358	\$ 270,880	\$ 272,403	\$ 273,925	\$ 17,500
Building Improvements		\$ 9,480,491	\$ 2,100,499	\$ 1,572,498	\$ 829,374	\$ 832,534	\$ 835,693	\$ 838,853	\$ 842,012	\$ 845,172	\$ 848,331	\$ 36,318
Stormwater Management - Green Street		\$ 2,056,353	\$ 1,717,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635	\$ 37,635
Additional Pipes - Streets		\$ 634,500	\$ -	\$ -	\$ 634,500	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Greywater Treatment/Storage		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Blackwater Treatment/Storage		\$ 5,645,396	\$ -	\$ -	\$ 4,179,512	\$ 209,412	\$ 209,412	\$ 209,412	\$ 209,412	\$ 209,412	\$ 209,412	\$ 209,412
Rainwater Treatment (Potable Use)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
District Improvements		\$ 8,336,249	\$ 1,717,635	\$ 37,635	\$ 4,851,647	\$ 247,047						
Total Uses:		\$ 17,816,741										
Sources:	Savings Reinv. @ 80%											
% of SDCs		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
% of BES Capital Budgets		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Operational Savings - Water		\$ 8,049,198	\$ 240,645	\$ 342,126	\$ 700,183	\$ 768,225	\$ 836,467	\$ 904,908	\$ 973,548	\$ 1,042,387	\$ 1,111,425	\$ 1,129,285
Operational Savings - Sewer		\$ 28,867,220	\$ 863,036	\$ 1,226,984	\$ 2,511,099	\$ 2,755,123	\$ 2,999,861	\$ 3,245,314	\$ 3,491,480	\$ 3,738,361	\$ 3,985,956	\$ 4,050,007
Operational Savings - Storm		\$ 3,296,027	\$ 98,540	\$ 140,096	\$ 286,714	\$ 314,577	\$ 342,521	\$ 370,546	\$ 398,653	\$ 426,842	\$ 455,112	\$ 462,425
Total Sources:		\$ 40,212,445	\$ 1,202,221	\$ 1,709,206	\$ 3,497,996	\$ 3,837,925	\$ 4,178,849	\$ 4,520,768	\$ 4,863,681	\$ 5,207,590	\$ 5,552,493	\$ 5,641,717
Net Cash Flow:												
5-Year Cash Flow:		\$ 22,395,705	\$ (2,615,917)	\$ 99,072	\$ (2,182,133)	\$ 2,758,344	\$ 3,096,108	\$ 3,434,868	\$ 3,774,622	\$ 4,115,371	\$ 4,457,114	\$ 5,358,352
Payback Year:				2010		2020						

Water – Cash Flow Analysis 2005–2050

Pre-development Energy Use Conditions

100% **Solar Energy Input**
161,006,000 kWh/yr

95% **Solar Energy Reflected, Absorbed & Released**
152,956,000 kWh/yr



4.5% **Solar Energy Used by Photosynthesis**
8,050,000 kWh/yr

O2 Released
495.4 tons/yr

CO2 Used
681.2 tons/yr

Carbon Fixed
185.8 tons/yr

Carbon Balance
Net removal from atmosphere: 681.2 tons/yr

Energy

Vision and Goals

The Plan's energy vision for Lloyd Crossing in the year 2050 is a vital, attractive urban community that has achieved a neutral carbon balance by implementing a series of incremental energy efficiency strategies, both on-site and off-site. These strategies work together to reduce the neighborhood's reliance on non-renewable sources of power, to increase its utilization of available solar energy, and to generate cost savings that can be reinvested in other areas. The result is a neighborhood in which carbon dioxide emissions closely match the pre-development conditions of the site, and in which solar energy utilization exceeds pre-development conditions by a significant percentage.

Pre-development Conditions

Total incident solar budget for the 35-block study area is approximately 161,000,000 kWh/year. In pre-development conditions with approximately 90% of the land area covered with tree canopy, the use of the incident solar energy is projected as follows:

- *Used for photosynthesis (net):* 8,000,000 kWh/yr
- *Reflected, absorbed, and/or re-radiated:*
153,000,000 kWh/yr

As a result of solar energy utilization, carbon dioxide is used, oxygen released, and a certain amount of carbon fixed as biomass, as summarized below:

- *CO₂ Used:* 681 tons/yr
- *O₂ Released:* 495 tons/yr
- *Carbon Fixed:* 186 tons/yr

The specific energy resource goals and strategies are a mix of concepts that apply to individual buildings and those that apply to the larger Study Area as a whole, prioritized as follows:

Energy Use Goals

Exceed solar utilization of pre-development study conditions.

Reduce CO₂ emissions to pre-development level.

Energy Resource Strategies

Existing building operations and efficiency improvements.

Efficiency by design in new buildings.

Installation of a incremental district thermal system to facilitate heat sharing.

Installation of 10 mW of total photovoltaic capacity.

Installation of 1.4 mW of total wind turbine capacity.

Biogas generation from district waste processing.

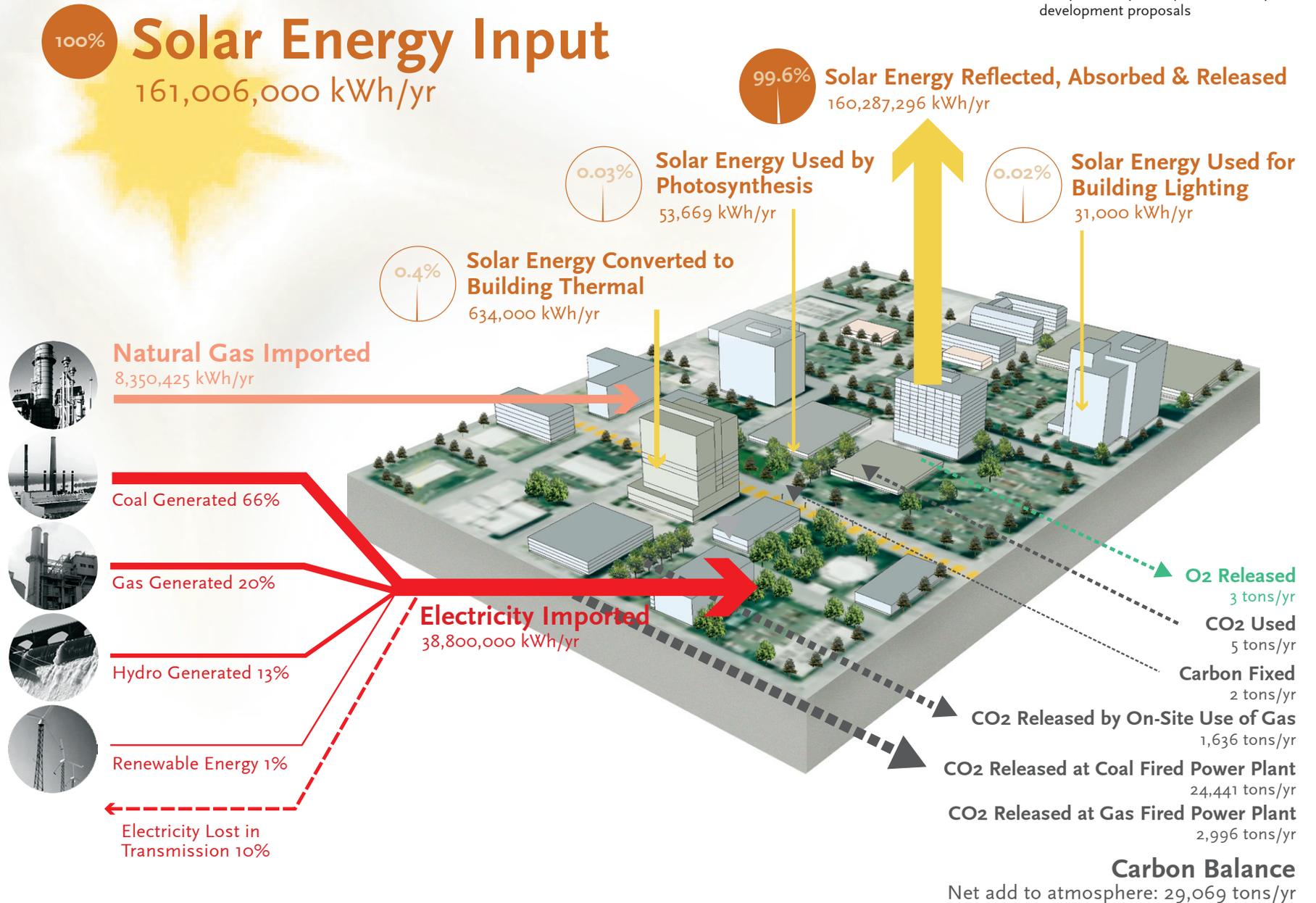
Purchase of wind power for 100% of remaining imported electricity.

Purchase of carbon offset credits for remaining imported fossil fuel.



2004 Existing Energy Use Conditions

Note: This concept plan is not intended to represent specific planned or required development proposals



Energy: Existing Conditions

The 2004 study area supports approximately 2.1 million square feet of building infrastructure with associated streets and utilities. Existing study area energy use is predominantly electricity and natural gas. Annual use is estimated below:

- *Electricity used in buildings: 38,800,000 kWh/yr*
- *Natural gas used in buildings: 285,000 therms/yr*
- *Total energy used in buildings: 47,100,000 kWh/yr*

In order to meet the electricity import needs of the existing study area, it is estimated that about 42,600,000 kWh/yr of electricity must be generated (assuming 10% transmission loss). Of electricity generated, source splits are estimated as follows:

- *Coal-fired power: 66%*
- *Gas-fired power: 20%*
- *Hydro-electric and renewables: 14%*

The use of the incident solar energy in the study area has declined from pre-development conditions. Solar energy utilization for photosynthesis and internal building energy needs is estimated to be less than 1,000,000 kWh/yr. Solar energy utilization is over 90% lower than pre-development conditions, primarily due to decline in tree canopy and green space.

Whereas pre-development biological systems consumed 681 tons of carbon dioxide annually, the existing systems add over 29,000 tons of carbon dioxide – a primary greenhouse gas – to the atmosphere each year. Most of the emissions are occurring outside of the study area at coal- and gas-

fired power plants throughout the Pacific Northwest. Within the study area, over 1,600 tons of CO₂ is generated due to on-site combustion of natural gas. Study area biological systems are only able to consume about 5 tons of the CO₂ generated.



2050 Per Plan Energy Use Conditions

100% **Solar Energy Input**
161,006,000 kWh/yr

86.3% **Solar Energy Reflected, Absorbed & Released**
138,905,309 kWh/yr

0.27% **Solar Energy Used by Photosynthesis**
446,656 kWh/yr

2.8% **Solar Energy Converted to Building Thermal**
4,534,000 kWh/yr

2.8% **Solar Energy Used for Building Lighting**
4,534,000 kWh/yr

7.8% **Solar Energy Used for On-Site Generation**
12,586,000 kWh/yr



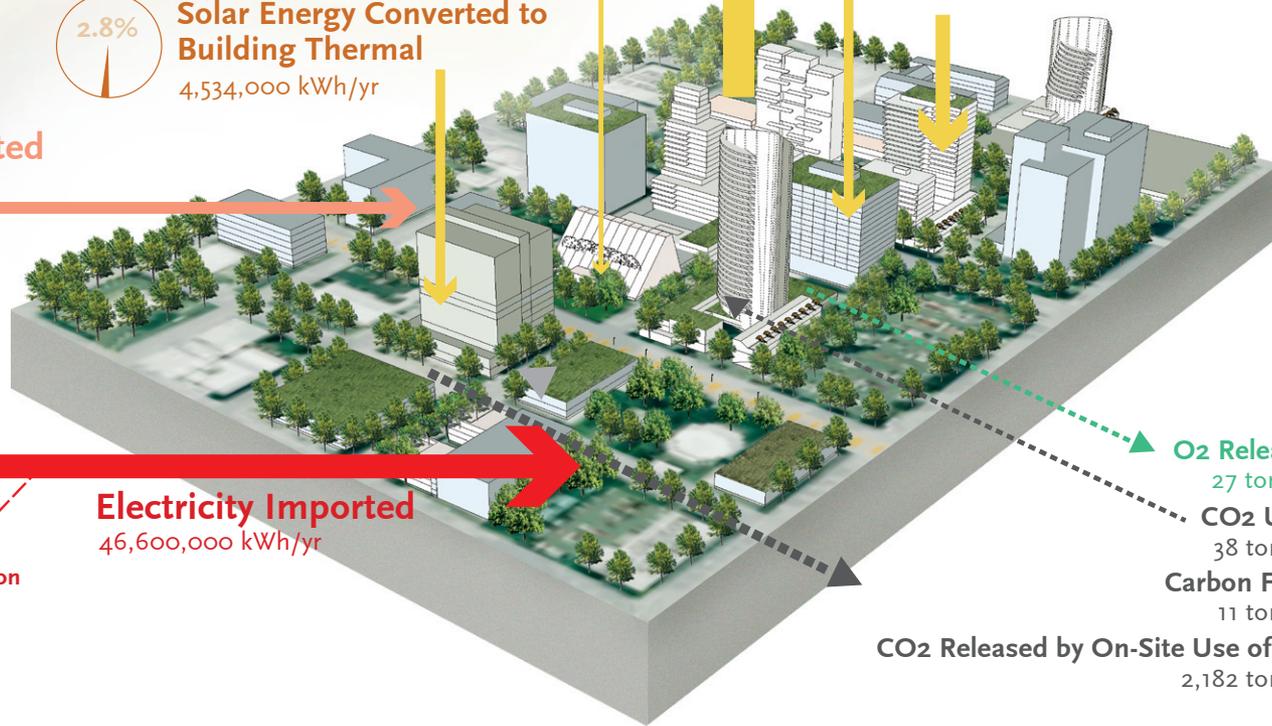
Natural Gas Imported
11,100,000 kWh/yr



Electricity Generated at Wind Farms
51,300,000 kWh/yr

Electricity Lost in Transmission
4,700,000 kWh/yr

Electricity Imported
46,600,000 kWh/yr



O₂ Released
27 tons/yr
CO₂ Used
38 tons/yr
Carbon Fixed
11 tons/yr
CO₂ Released by On-Site Use of Gas
2,182 tons/yr

Note: This concept plan is not intended to represent specific planned or required development proposals

Carbon Balance
Net add to atmosphere: 2,144 tons/yr

SUD Energy Strategies

2050 Build-out

By 2050, the study area is projected to support approximately 10,000,000 square feet of building infrastructure with associated streets and utilities. Tree canopy and green space will be increased relative to existing conditions. A number of energy strategies are projected to have been implemented including:

- *Existing building operations and efficiency improvements.*
- *Efficiency by design in new buildings.*
- *Installation of a comprehensive district thermal system.*
- *Installation of 10 Mw of total photovoltaic capacity.*
- *Installation of 1.4 Mw of total wind turbine capacity.*
- *Biogas generation from district waste processing.*
- *Purchase of wind power for 100% of imported electricity.*

Study area energy use is projected to be predominantly electric. Annual use is estimated below:

- *Electricity used in buildings: 46,600,000 kWh/yr*
- *Natural gas used in buildings: 380,000 therms/yr*
- *Total energy used in buildings: 57,700,000 kWh/yr*

In order to meet the electricity import needs of the study area in 2050, it is estimated that about 51,300,000 kWh/yr of electricity must be generated. By 2050, all of the imported electricity is projected to be generated at

wind farms. No purchases of coal-fired, gas-fired, or hydro-generated energy are planned.

The use of the incident solar energy will be significantly improved from existing conditions and pre-development conditions. Solar energy utilization for photosynthesis, internal building energy needs, and area solar electric generation is estimated to be about 22,000,000 kWh/yr. This represents a 2- to 3-fold improvement over pre-development conditions.

Upon completion of projected 2050 build-out, energy use and generation will result in a net addition of slightly over 2,100 tons of carbon dioxide to the atmosphere each year. No emissions are occurring outside of the study area. Emissions are due to on-site combustion of natural gas. Study area biological systems are expected to consume about 38 tons of the CO₂ generated.

To offset the net addition of CO₂ to the atmosphere, it is anticipated that carbon offsets can be purchased. This should have the net effect of using at least 2,100 tons of carbon dioxide per year, to achieve a neutral carbon balance associated with study area energy use. A neutral carbon balance is defined as a condition where the carbon dioxide produced by the energy systems is equal to the carbon dioxide consumed by biological systems associated with the study area.

Community Benefits of Carbon-Neutral Lloyd Crossing

Reduces demand for energy generated from non-renewable sources (coal- and gas-fired power plants).

Supports development of renewable energy sources (wind power purchases).

Increased utilization of local energy generation systems (photovoltaic, wind, biogas).

More efficient utilization of energy at the neighborhood level (thermal loop system) and the building level (Efficiency by Design).

“Environmentally efficient” neighborhood development that can be used as a model for other areas.

2050 Per Code Energy Use Conditions

100% **Solar Energy Input**
161,006,000 kWh/yr

98% **Solar Energy Reflected, Absorbed & Released**
157,888,489 kWh/yr

0.03% **Solar Energy Used by Photosynthesis**
53,669 kWh/yr

0.08% **Solar Energy Used for Building Lighting**
142,824 kWh/yr

1.8% **Solar Energy Converted to Building Thermal**
2,920,984 kWh/yr

Natural Gas Imported
57,611,881 kWh/yr

Coal fired Generated
90,700,000 kWh/yr

Gas fired Generated
27,500,000 kWh/yr

Hydro-Electric Generated
20,000,000 kWh/yr

Renewable Energy
1,400,000 kWh/yr

Electricity Lost in Transmission
12,700,000 kWh/yr

Electricity Imported
126,900,000 kWh/yr

Note: This concept plan is not intended to represent specific planned or required development proposals

O2 Released
3 tons/yr

CO2 Used
5 tons/yr

Carbon Fixed
2 tons/yr

CO2 Released by On-Site Use of Gas
11,300 tons/yr

CO2 Released at Coal Fired Power Plant
79,938 tons/yr

CO2 Released at Gas Fired Power Plant
9,799 tons/yr

Carbon Balance
Net add to atmosphere: 101,042 tons/yr

Comparison to current code requirements

The energy infrastructure plan will achieve goals that are compared to pre-development conditions. Perhaps more interesting is the comparison of the plan's projected CO₂ emissions and solar energy use with a build-out scenario that proceeds without any sustainability guidance, other than the current energy code.

Without implementation of this plan or similar strategies, annual CO₂ emissions associated with energy use are projected to increase to just over 101,000 tons. This represents a 3-fold to 4-fold increase over existing conditions.

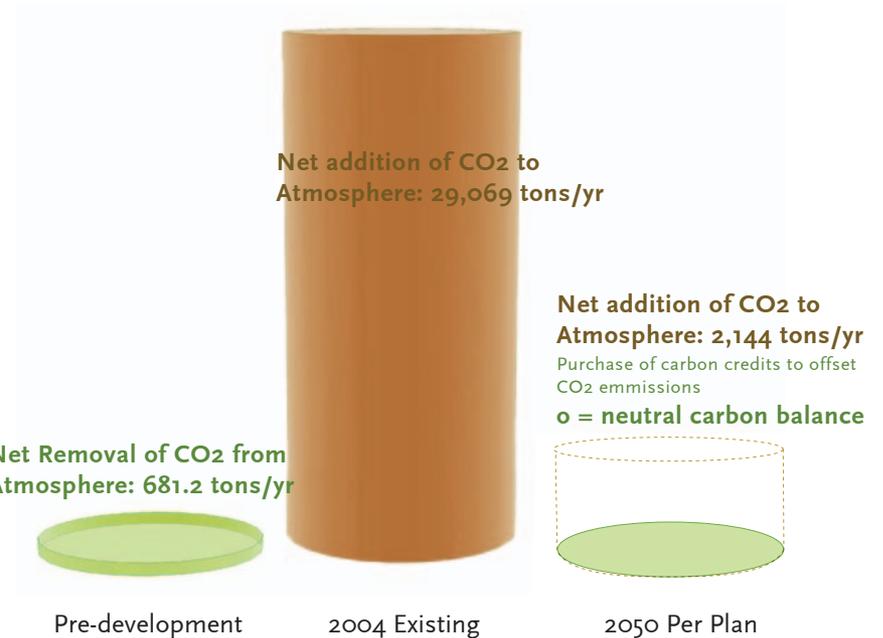
Solar energy utilization is expected to improve with build-out of the district regardless of the implementation of the plan. However, following the course charted within this plan is expected to result in the effective use of solar energy at a level 7 times higher than could be achieved without implementation of the plan within the study area.

Solar Energy Input

161,006,000 kWh/yr



Solar Utilization



Carbon Balance



Detailed Study Area Strategies

Existing Building Operations and Efficiency Improvements:

The improvements to be initiated by building operators and/or occupants will include a significant re-commissioning, training, and occupant education component. This is expected to include improvements and modifications associated with the systems listed in the adjacent column.

The operator and occupant-initiated improvements are anticipated to reduce existing energy use by at least 15%. The remaining capital improvements are expected to result in an additional reduction in energy use of at least 8%.

Building Operator-initiated Improvements

- Space temperature setpoint optimization.
- Mechanical and lighting system scheduling optimization.
- Minimum ventilation rate adjustments.
- Mechanical fan system internal temperature setpoint optimization.
- Delamp existing lighting to achieve actual required light levels.

Occupant-initiated Improvements

- De-energized plug loads when not needed.
- Shut off lights when spaces are not in use.
- Ultra-high efficiency lighting systems.
- Daylighting.
- Linear fluorescent ambient lights.
- Compact fluorescent task lights.
- LED exit signage.
- Automatic controls.

Improved Mechanical System Part Load Controls:

- Premium efficiency motor retrofit.
- Variable frequency drive retrofit for fans and pumps as applicable.

'Efficiency by Design' in New Buildings

The efficiency strategies for new buildings in the study area are proposed to meet two thresholds over time – one for buildings constructed between now and 2015, and one for buildings constructed after 2015. As indicated in the adjacent table, the first threshold is an approximate Factor 3 performance. The second threshold is an approximate Factor 6 performance.

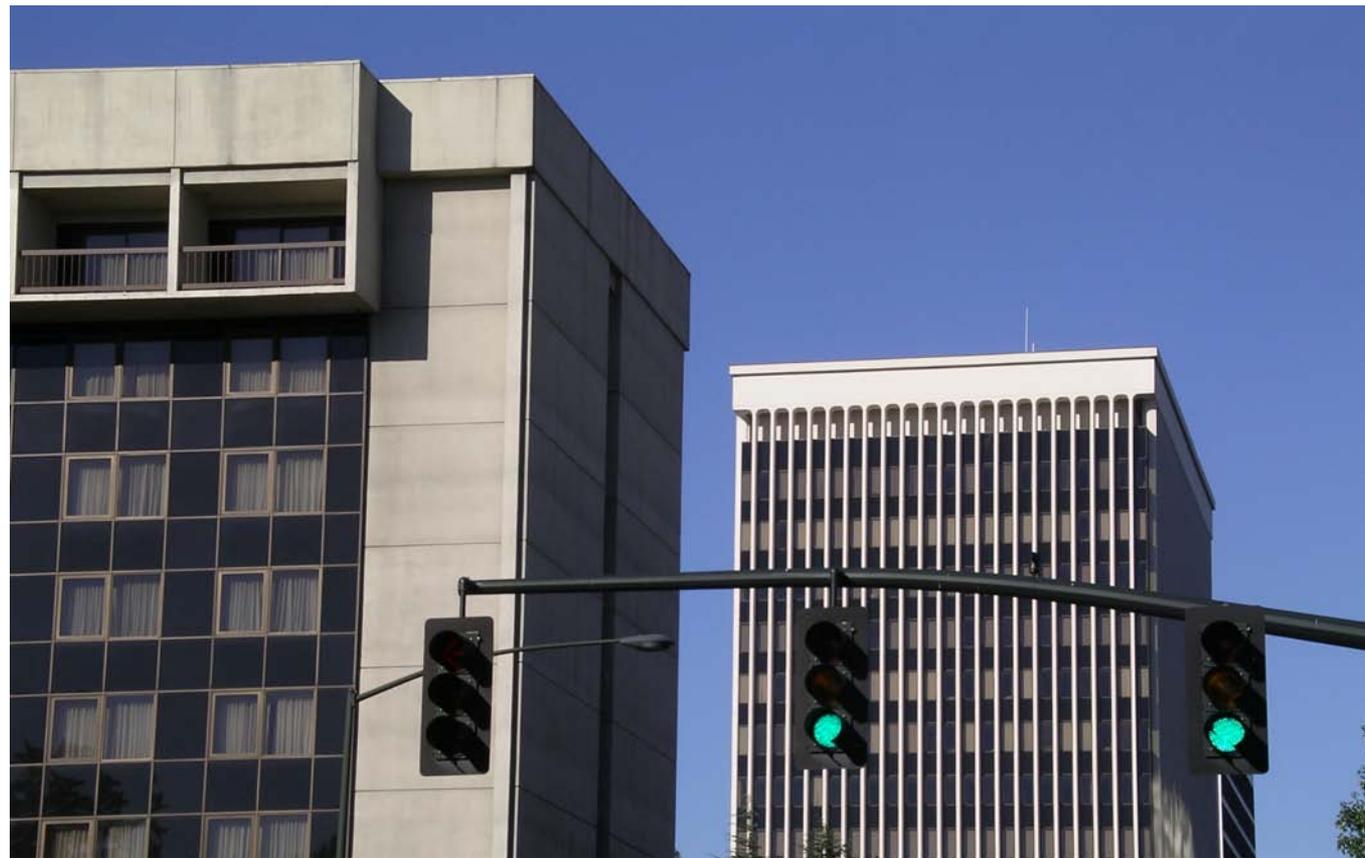
Incremental Building Efficiency Improvements

Factor 3 (or 6) performance implies an average building efficiency level 3 times (or 6 times) higher than existing building stock within the study area.

While the actual mix of specific strategies will be tailored to each building during its design and construction, an integrated design approach is strongly promoted where energy concepts are considered according to the following sequential categories: *create small loads, reduce loads, efficient systems, efficient plant, and integrative controls.*

Within the context of current systems and technology, it is expected that most buildings will include the following design drivers as part of the basic energy program for the project: *optimized orientation and building envelope, daylighting, natural ventilation, heat sharing / heat pumping / heat recovery, and comprehensive automatic controls.*

Year	Energy Use Index, kWh/sq ft/year	Efficiency Factor (Improvement relative to 2004)
Existing Buildings	28.2	1.0
2004 (Code)	17.0	1.7
2015	9.1	3.1
2050	4.2	6.1



Installation of a Study Area thermal system

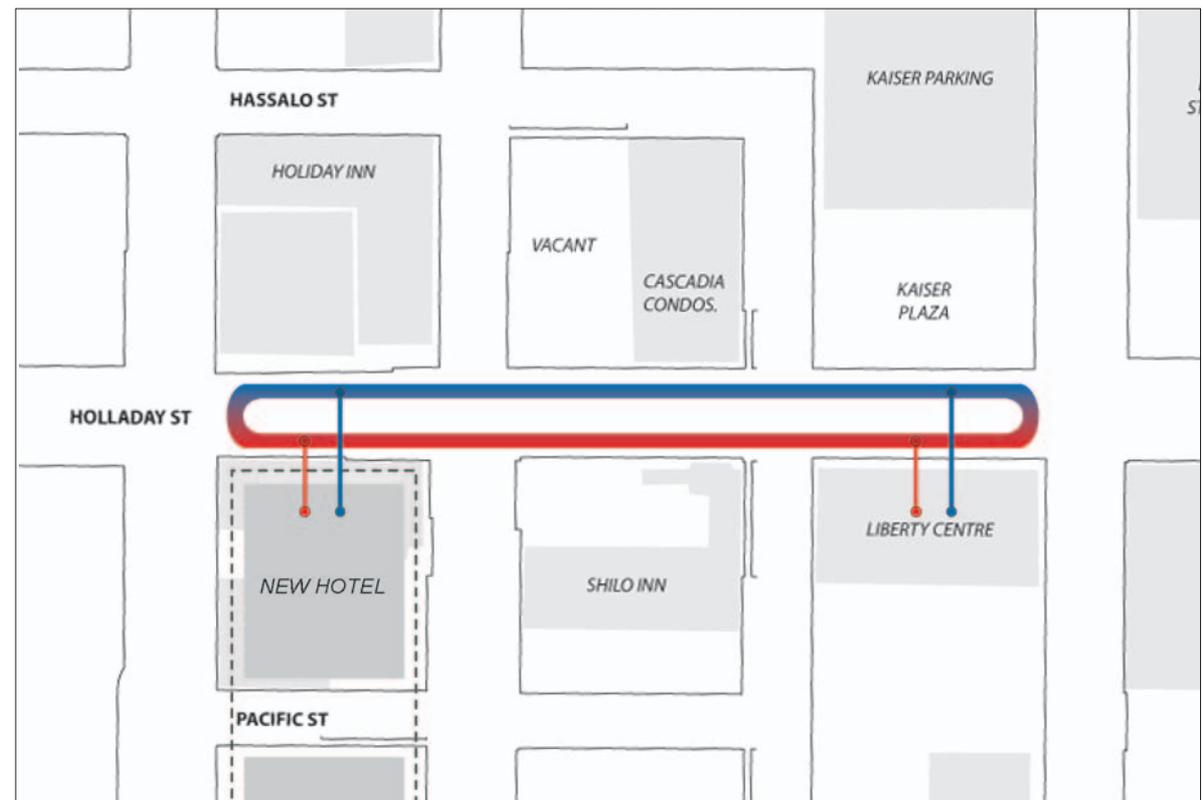
The Lloyd Crossing Thermal System (LTS) is proposed to be a low temperature system that allows heat energy to be recovered from waste heat sources, such as office exhaust air streams, and delivered to buildings that have a relatively continuous need for heat, such as lodging and residential buildings.

Study area (common) infrastructure would consist of the piping distribution system to be installed underground. The distribution system piping is proposed to be large diameter pipe, between 24 to 48 inches, that will allow the system to function as a thermal reservoir. Two pipes, connected at the ends, can allow a “hot” side and “cold” side to the system. Fluid temperatures on the hot side are expected to be 60° F (+/- 5° F). Fluid temperatures on the cold side are expected to be 40° F (+/- 5° F). Distribution system may not require insulation. Innovative installation techniques such as horizontal drilling should be investigated.

All other system infrastructure – pumps, valving, heat exchange devices, heat pumps, and controls - are proposed to be installed within the individual buildings. Buildings could connect to the system for heating or cooling.

Because the study area infrastructure is limited to basic distribution system connections, the implementation sequencing for the LTS is very flexible. Initially, two synergistic buildings could be connected. Two other

buildings might be connected elsewhere in the district with ultimate area-wide interconnections of smaller systems occurring at full build-out.



Lloyd Crossing Thermal System Concept

Installation of 10 mW of Total Photovoltaic Capacity

The key in-district renewable energy generation strategy is installation of photovoltaic equipment to facilitate solar electric generation. The photovoltaic system concepts, as applicable to the Lloyd study area, have several components:

- *Rooftop photovoltaic installation to about 5 mW of capacity.*
- *South-facing photovoltaic wall cladding to about 3 mW of capacity*
- *Photovoltaic window shades for south facing glazing resulting in about 1.2 mW of capacity*
- *Photovoltaic arrays lining a ¾ mile stretch of Interstate-84 through Sullivan's Gulch resulting in about 0.8 mW of capacity.*

Total annual solar electricity generation at full build-out is projected to be 11,200,000 kWh/yr.

Installation of 1.4 mW of Total Wind Turbine Capacity

Wind power generation within the study area is proposed to include two elements – small (5 – 10 kW) vertical axis turbines located on the roof of high rise office towers and large (600 kW) horizontal axis turbines mounted on 60 meter poles in two selected locations within the district. Total annual wind electricity generation at full build-out is projected to be 1,400,000 kWh/yr.

Biogas Generation from Waste Processing

This area-level strategy is dependent upon other sustainability strategies being implemented. Specifically, if an on-site area wastewater plant is implemented, via a living machine or other treatment technology, then the collection and digestion of the volatile solids to produce biogas is proposed as a study area energy strategy.

Based on full build-out, a projection of the study area population load results in enough volatile solid waste to produce 52,500 cu.ft. per day of biogas using anaerobic digestion technologies. This translates to about 314 equivalent therms of biogas per day. Large quantities of organic solids introduced into the wastewater stream from other sources (besides people) such as restaurant food disposal will increase the biogas production. If cogeneration were pursued as a use for the biogas, this translates to an electric generation capacity of 115 kW (30% fuel conversion efficiency). Another 30% of the heat is projected to be available to meet local building heating needs. The remainder of the recovered heat is assumed to be used in the anaerobic digestion process. If operating for 50 weeks per year, biogas cogeneration is projected to produce 970,000 kWh/yr of electricity and to offset 33,000 therms/yr of natural gas use.

Purchase of Wind Power for 100% of Imported Electricity

At full build-out, the study area would require roughly 46,600,000 kWh/yr of imported electricity. The current electricity supplier is PacifiCorp. PacifiCorp is actively investing in centralized wind power projects, and offers retail customers a option for purchasing up to 100% wind-generated electricity. The current offering is referred to as the Blue Sky program, and sells wind-generated electricity with a cost ladder of \$1.95 per 100 kWh block. If an area-wide purchase arrangement was pursued, it is possible that greentag program support of wind power purchase could be made at prices on the order of \$5.00 per mWh (\$0.50 per 100 kWh block).

It is proposed that incremental targets for purchase of wind power be established with 20% wind power purchases on a district-wide basis by 2015, and 100% purchase of wind power by 2050.

Purchase of Carbon Offset Credits for Imported Natural Gas

At full build-out, the sustainable Lloyd Crossing is expected to consume roughly 380,000 therms/yr of imported natural gas. The current natural gas supplier is Northwest Natural. Combustion of this imported gas within the district will release roughly 1,288 tons of carbon dioxide into the atmosphere each year. To offset this carbon pollution that will contribute to greenhouse gas emissions, carbon offsets can be purchased through carbon exchange brokers.

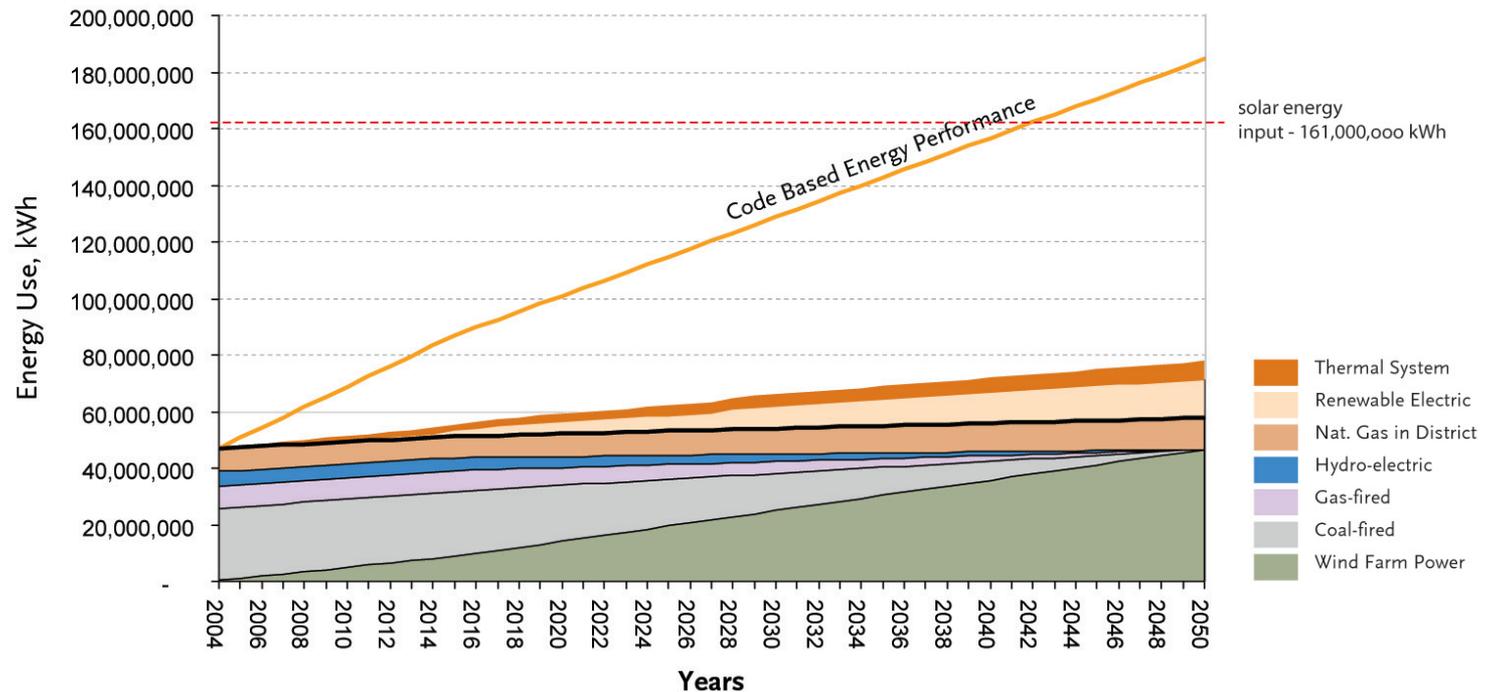
SUD Energy Implementation

Implementation of the energy strategies requires substantial front end capital and has the longest timeframe for repayment. Total capital costs through 2050 for the energy strategies are estimated at \$316 million in 2004 dollars.

Over the 45-year period, a total of \$85 million in offsets was identified by assuming that all available state and

federal tax credits and incentives were utilized as “cash” available to offset required capital costs over time. The vast majority of these savings are currently offered by the State of Oregon, in the form of Oregon Energy Trust incentives and the State BETC tax credit. The team recognizes that these programs may not be available throughout the life of the project, and the model can test the impacts to feasibility if one or both of these existing benefits were not available in the future.

In addition to these offsets, it is assumed that the majority of the operational savings (80%) realized over the 45-year study period are reinvested by area landowners. These savings help fund the necessary district-wide infrastructure improvements to implement the proposed strategies. This assumption is critical to the financial viability of the implementation strategy – without the presumed



Energy mix transition

“reinvestment” of savings at this level by the area landowners, the capital costs required for both building-level and district-level improvements cannot be repaid over this extended study period. By assuming that area landowners retain only 20% of their operational savings, an additional \$261 million is generated by the year 2050 to support area improvements.

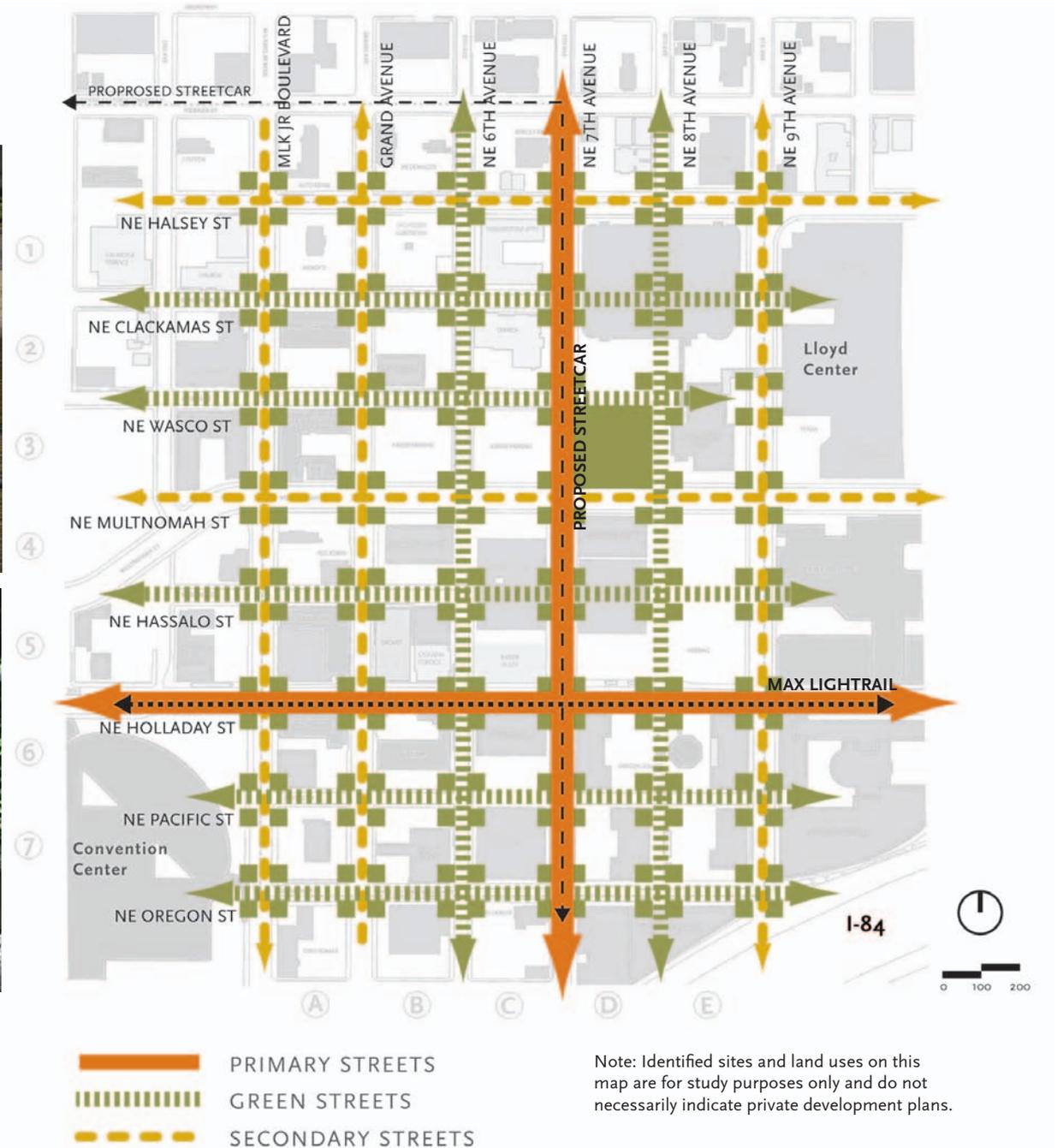
The results of the study area economic analysis suggest that the approximately \$316 million in capital costs is repaid by 2025, and that an additional \$30 million in revenues is generated by tax offsets, incentives, and operational savings by the year 2050.

Both costs and revenues have been inflated within the energy strategies by 2%. If more aggressive

assumptions regarding utility cost inflation into the future were employed, even greater operational savings could result and, therefore, be retained by area landowners or reinvested into the district. Similarly, if utility costs remain flat or decline over time, the revenues available in the form of operational savings would not be adequate to repay the necessary capital investments.

Uses:	Inflation @ 2%	Total	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
District Thermal System		\$ 5,078,823	\$ 129,416	\$ 348,320	\$ 383,720	\$ 431,980	\$ 488,814	\$ 545,647	\$ 602,481	\$ 659,315	\$ 716,148	\$ 772,982
Photovoltaic Power System		\$ 49,915,623	\$ 631,299	\$ 2,125,989	\$ 2,908,475	\$ 3,738,126	\$ 4,599,220	\$ 5,460,314	\$ 6,321,408	\$ 7,182,503	\$ 8,043,597	\$ 8,904,691
Wind Power System		\$ 2,268,637	\$ 38,250	\$ 81,198	\$ 1,098,133	\$ 1,051,055	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Co-Generation Plant		\$ 434,278	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 434,278	\$ -	\$ -	\$ -	\$ -
Wind and Carbon Purchases		\$ 11,826,278	\$ 11,635	\$ 112,731	\$ 232,221	\$ 506,436	\$ 883,800	\$ 1,261,163	\$ 1,638,527	\$ 2,015,891	\$ 2,393,255	\$ 2,770,619
District O&M Adder		\$ 11,566,558	\$ 91,366	\$ 334,560	\$ 486,196	\$ 709,386	\$ 980,278	\$ 1,251,170	\$ 1,522,062	\$ 1,792,954	\$ 2,063,847	\$ 2,334,739
Building O & M		\$ 75,196,490	\$ 637,310	\$ 2,151,647	\$ 3,153,704	\$ 4,611,007	\$ 6,371,806	\$ 8,132,605	\$ 9,893,404	\$ 11,654,203	\$ 13,415,002	\$ 15,175,802
Efficiency by Design		\$ 159,760,389	\$ 2,532,255	\$ 13,893,269	\$ 15,977,640	\$ 12,984,894	\$ 14,721,226	\$ 16,457,557	\$ 18,193,889	\$ 19,930,221	\$ 21,666,553	\$ 23,402,884
Total Uses:		\$ 316,047,076	\$ 4,071,532	\$ 19,047,715	\$ 24,240,090	\$ 24,032,884	\$ 28,045,143	\$ 33,542,736	\$ 38,171,772	\$ 43,235,087	\$ 48,298,402	\$ 53,361,716
Sources:												
OET Incentives - Eff.		\$ 17,967,784	\$ 327,482	\$ 1,680,411	\$ 1,757,511	\$ 2,028,911	\$ 2,028,911	\$ 2,028,911	\$ 2,028,911	\$ 2,028,911	\$ 2,028,911	\$ 2,028,911
Oregon BETC Tax Credit - Eff.		\$ 55,916,136	\$ 886,289	\$ 4,862,644	\$ 5,592,174	\$ 4,544,713	\$ 5,152,429	\$ 5,760,145	\$ 6,367,861	\$ 6,975,577	\$ 7,583,293	\$ 8,191,010
OET Tax Incentive - PV		\$ 2,250,000	\$ 30,682	\$ 97,159	\$ 97,159	\$ 289,286	\$ 289,286	\$ 289,286	\$ 289,286	\$ 289,286	\$ 289,286	\$ 289,286
Federal BETC Tax Credit - PV		\$ 3,152,564	\$ 30,682	\$ 259,091	\$ 259,091	\$ 371,957	\$ 371,957	\$ 371,957	\$ 371,957	\$ 371,957	\$ 371,957	\$ 371,957
Federal MACRS Tax Reduction - PV		\$ 4,991,562	\$ 63,130	\$ 212,599	\$ 290,848	\$ 373,813	\$ 459,922	\$ 546,031	\$ 632,141	\$ 718,250	\$ 804,360	\$ 890,469
Federal REPC Tax Credits - Wind		\$ 251,142	\$ 239	\$ 2,634	\$ 16,700	\$ 111,505	\$ 108,632	\$ 11,432	\$ -	\$ -	\$ -	\$ -
Federal MACRS Tax Reduction - Wind		\$ 35,600	\$ 600	\$ 1,274	\$ 17,232	\$ 16,493	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Federal REPC Tax Credits - Bio-Gas		\$ 174,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 52,380	\$ 87,300	\$ 34,920	\$ -	\$ -
Green Tag Purchases		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Offsets	Inflation @ 2%	\$ 84,739,389	\$ 1,339,105	\$ 7,115,812	\$ 8,030,715	\$ 7,736,679	\$ 8,411,137	\$ 9,060,142	\$ 9,777,456	\$ 10,418,902	\$ 11,077,807	\$ 11,771,633
Building O & M		\$ 53,721,344	\$ 518,910	\$ 1,790,045	\$ 2,494,002	\$ 3,477,711	\$ 4,647,921	\$ 5,818,131	\$ 6,988,341	\$ 8,158,551	\$ 9,328,761	\$ 10,498,971
Efficiency by Design		\$ 171,176,836	\$ 104,945	\$ 2,098,907	\$ 4,722,541	\$ 8,720,721	\$ 13,635,263	\$ 18,549,806	\$ 23,464,349	\$ 28,378,892	\$ 33,293,435	\$ 38,207,977
Thermal Savings		\$ 4,611,088	\$ 3,948	\$ 78,961	\$ 177,662	\$ 284,536	\$ 396,858	\$ 509,180	\$ 621,502	\$ 733,824	\$ 846,146	\$ 958,469
PV Savings		\$ 25,625,709	\$ 6,234	\$ 155,851	\$ 280,532	\$ 885,325	\$ 1,789,411	\$ 2,693,498	\$ 3,597,584	\$ 4,501,671	\$ 5,405,757	\$ 6,309,844
Wind Savings		\$ 4,220,423	\$ 519	\$ 6,049	\$ 54,354	\$ 398,335	\$ 482,479	\$ 532,696	\$ 588,140	\$ 649,354	\$ 716,939	\$ 791,558
Co-Gen Savings		\$ 1,343,021	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 142,492	\$ 257,131	\$ 283,893	\$ 313,441	\$ 346,064
Savings	Reinvested @ 80%	\$ 260,698,421	\$ 634,557	\$ 4,129,814	\$ 7,729,092	\$ 13,766,627	\$ 20,951,933	\$ 28,245,804	\$ 35,517,047	\$ 42,706,185	\$ 49,904,479	\$ 57,112,883
Net Cash Flow:												
5-Year Cash Flow:		\$ 29,390,733	\$ 12,093,870	\$ 17,912,088	\$ 18,480,781	\$ 22,629,578	\$ 1,317,927	\$ 3,763,210	\$ 7,122,731	\$ 9,890,000	\$ 12,683,885	\$ 15,522,800
Payback Year:							2025					

Energy – cash flow analysis 2005–2050



Placemaking: Street Hierarchy

Placemaking

Vision and Goals

The Plan's placemaking vision for Lloyd Crossing is a neighborhood that is economically, socially, and environmentally sustainable, in which development capacity has been preserved in order to leverage urban infrastructure and mass transit, and which has successfully integrated sustainable technologies and concepts into a pedestrian-friendly urban fabric with a unique identity. As the placemaking strategies and sustainable technologies are implemented over time, Lloyd Crossing will serve as an example of sustainable urban development to Portland and to the world.

The placemaking goals are expressed through a combination of strategies for street level and upper level land use, street hierarchy, open space, landscape and habitat, ground level building character, and building setback requirements that contribute to the development of a vibrant, attractive urban neighborhood. Some of these strategies build upon design review guidelines already in place in the district.

Placemaking Goals

- Mix building uses for a vibrant and 24 hour street life.*
- Create a unique identity through the integration and expression of sustainable features.*
- Optimize solar access to all buildings and open spaces.*
- Add public open space of varying scales and character.*
- Create a pedestrian and bicycle friendly streetscape.*
- Keep density near infrastructure by utilizing as much of the allowable FAR (Floor Area Ratio) within the study area as possible.*

Community Benefits of Placemaking

- Improved public infrastructure (open space, green streets, intersection upgrades)*
- Improved solar access in public right-of-way through upper-level setback requirements.*
- Efficient utilization of available Floor Area Ratio (lessens development pressures on outlying areas, directs growth to urban center)*
- Active, vibrant urban neighborhood supporting a diverse range of jobs, housing, and transportation options*





Placemaking: Land Use Plan, Upper Level

Land Use

The existing study area has 3 primary uses, a hospitality zone to the west, a commercial zone in the center and several small residential sites. Current zoning encourages residential areas to the Northwest and to the Southwest. The adjacent Upper Level land Use Plan shows the hospitality zone remaining to the west anchored by the new hotel to the southwest. The commercial zone would remain to the east, building upon the existing inventory of office buildings. A new residential zone would be added to the center of the study area, built around existing commercial and residential properties, and a mixed zone would be encouraged at the south central and northwest zone.

Preferred ground floor land uses are shown in the Street Level Land Use Plan on the adjacent page. The street level of the hospitality zone and office area would remain commercial. The residential zones would get a quieter, lower volume streetscape to encourage ground floor residential and mixed commercial/residential uses.

As shown in the Street Hierarchy Plan on page 56, street character and hierarchy are essential for re-defining these zones within the study area. Holladay Street and 7th Avenue would be reinforced as primary E-W and N-S streets with ground floor commercial and pedestrian activity encouraged. The vitality

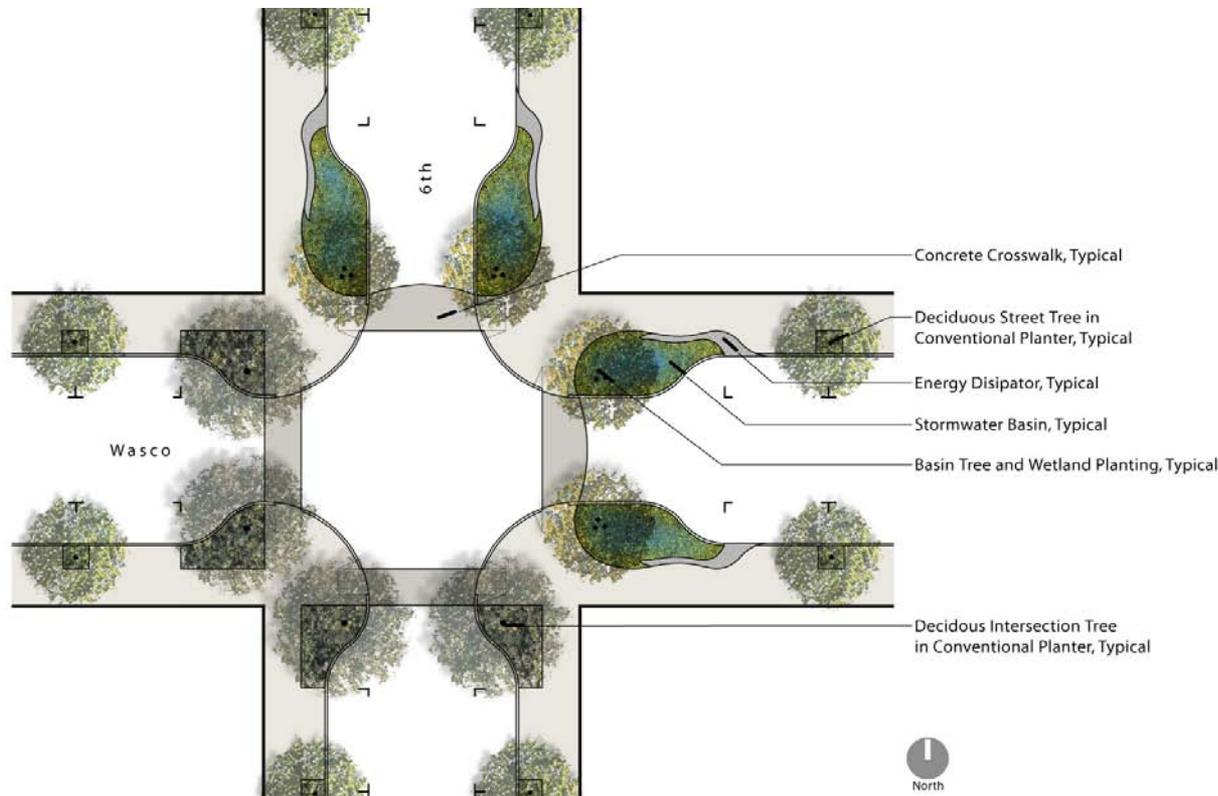
and energy of the streets are enhanced by the MAX line on Holladay and the proposed streetcar on 7th Avenue. Martin Luther King Jr. Blvd. (MLK) and Grand Street would remain as auto based arterial streets.

Multnomah and Halsey would be secondary E-W connectors, serving as pedestrian and auto connectors. Multnomah and Holladay should be designed to encourage pedestrian traffic between the Convention center and hospitality zone to the west and the Lloyd Center Mall to the east. Clackamas Street, Wasco Street and Hasalo Street would become quieter residential and pedestrian friendly E-W streets. 6th Avenue would be the quieter residential green street running N-S, and 8th Avenue would have a unique role as a habitat and green connector running north-south. 8th Avenue could fulfill its role as a habitat link with or without adjoining vehicular traffic.

The streets should be designed to encourage active recreation for biking, running and walking. Bike lanes would need to be developed in conjunction with the most current Portland Department of Transportation designated bicycle routes. The green streets will need crossings designed to link the study area to the longer and more extensive planned trails running along Sullivan’s Gulch.



Placemaking: Land Use Plan, Street Level



Note: This concept plan is not intended to represent specific planned or required development proposals.

Placemaking: Stormwater Intersection

Stormwater Intersections

Stormwater and its flow through the streets and sidewalks is a key environmental and design element in the Plan. The study area's slope towards the river (NE to SW) works well for sheet flowing the water from each block to a series of bio-swales that would detain and disperse water from within the right of way. The bio-swales would replace two parking spots on each street segment within a block. The bio-swales could be planted with a combination of low wetland plantings and a moisture tolerant deciduous tree.

The plantings would continue to all eight corners of a typical intersection with sinuous forms and wetland plants marking the four bio-swales, and smaller planters and dry-land plants at the remaining four corners. The crosswalks would have a distinctive paving that repeats throughout the 48 intersections of the study area and creates a unique district identity.

These intersections could effectively take all of the streets in the study area off of the centralized collection system and recharge all stormwater into the ground.

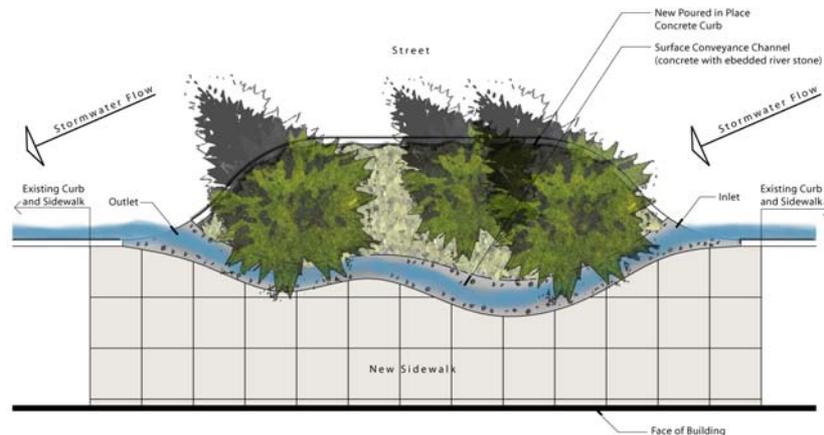
Green Streets

To implement the habitat and tree canopy goals, each street would incorporate added conifer trees and vegetation at the sidewalks or island within the street profile. Streets with 60' rights of way will have mid-block "flow-through conifer planters" on either the east or south side of the street. Streets with wider rights of way will have mid-block conifer islands. These streets are essential for creating the unique character of the neighborhood, sequestering carbon dioxide and providing limited habitat support. The deciduous trees also provide some variable shading for the lower level of building. The green streets will build upon the existing and proposed pocket parks within the study areas, while providing an armature for new development that enhances livability and identity.

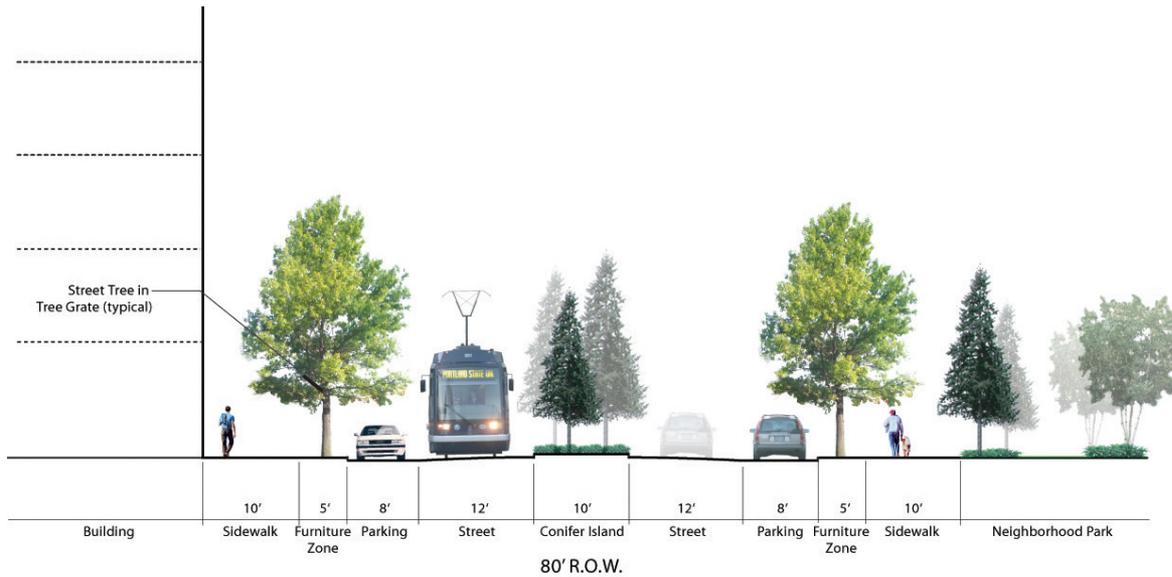


Note: This concept plan is not intended to represent specific planned or required development proposals.

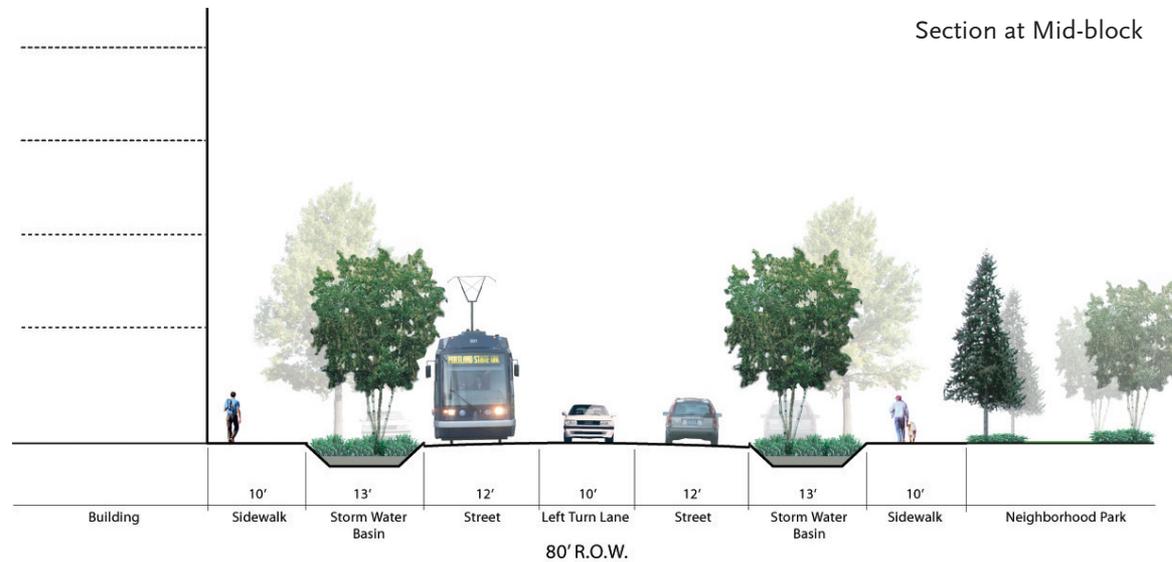
Green Streets: Concept Plan



Green Streets: Flow-through Conifer Planter



Section at Mid-block

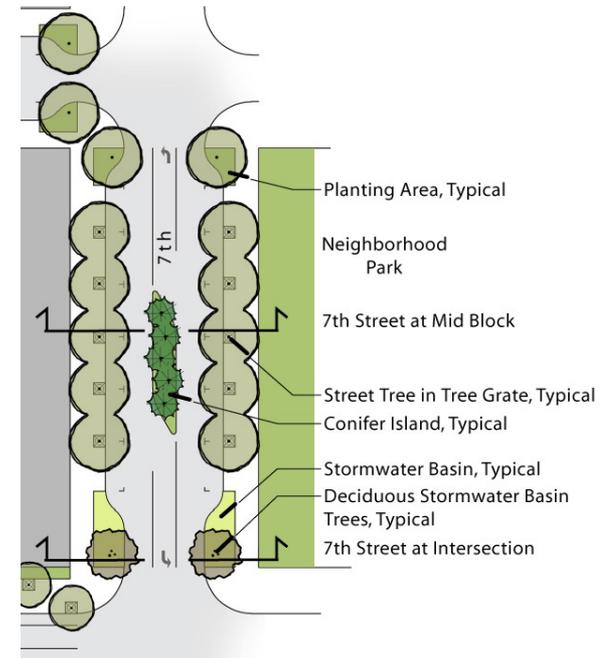


Section at Intersection

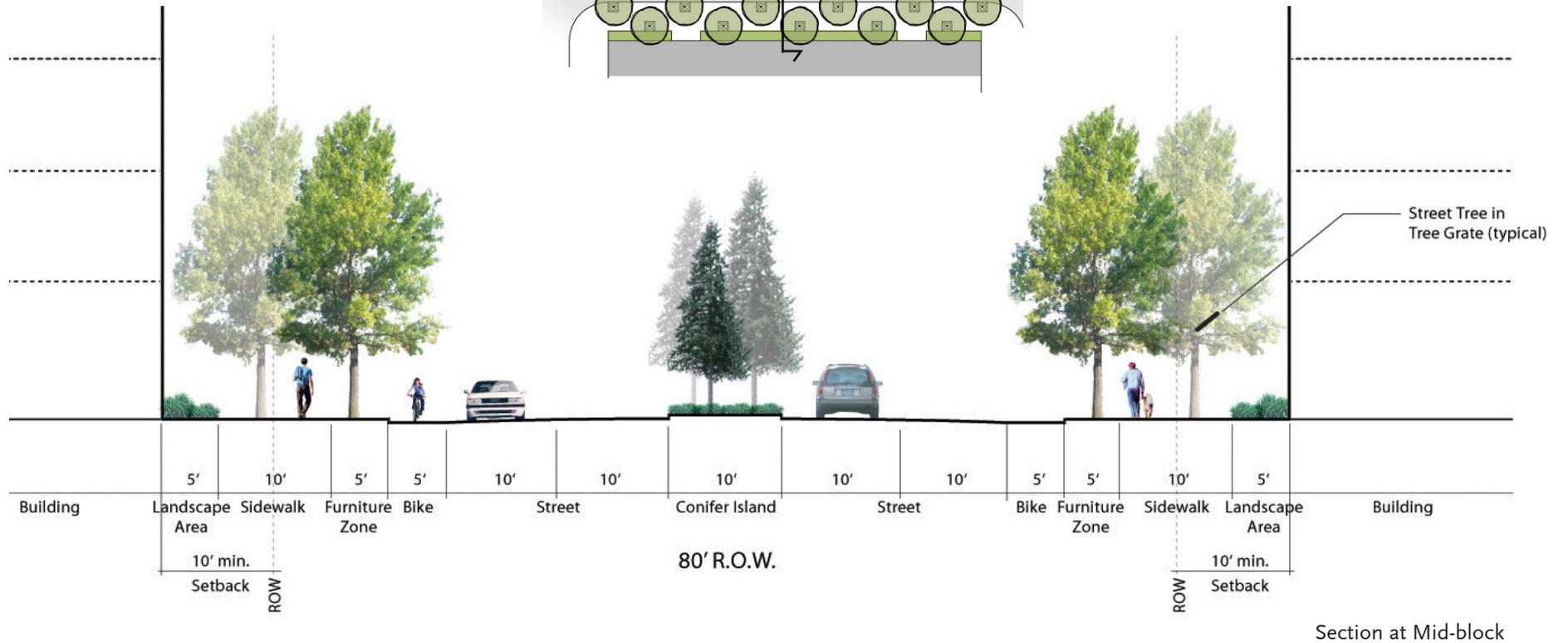
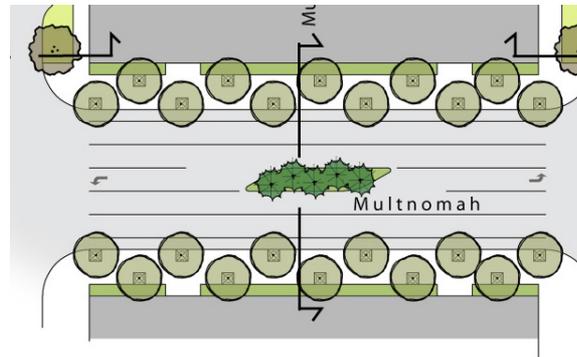
7th Avenue Streetscape Concept

Street Concepts

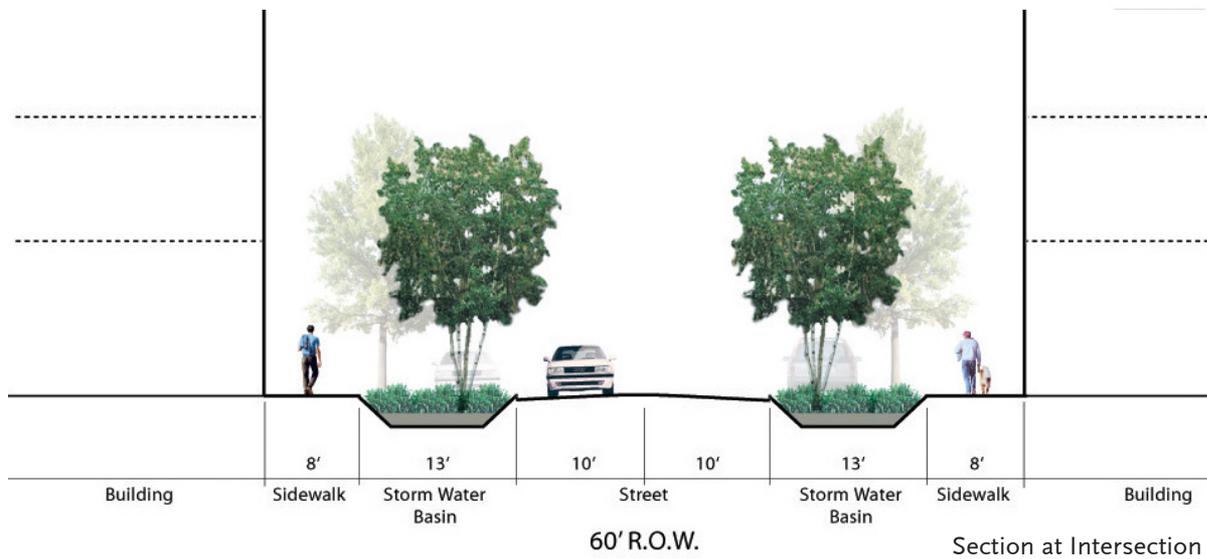
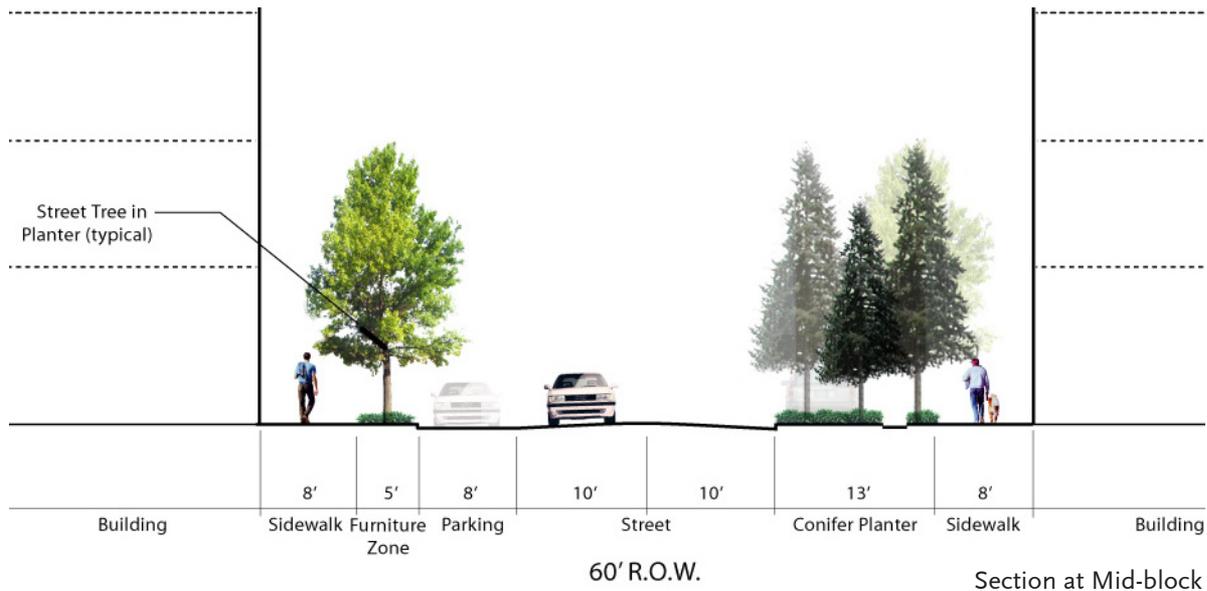
7th Avenue: A signature street for the district, incorporating the new streetcar, extensive plantings and the development of streetfront retail. The streetcar and the possible additions of islands planted with conifers may create conflicts with the existing bicycle route. Integration of bike traffic on 7th Avenue, or relocation of the bike route to 6th Avenue will need to be carefully considered.



Multnomah: A generously proportioned street with extensive sidewalk plantings and conifer islands, as well as bike lanes going east and west.

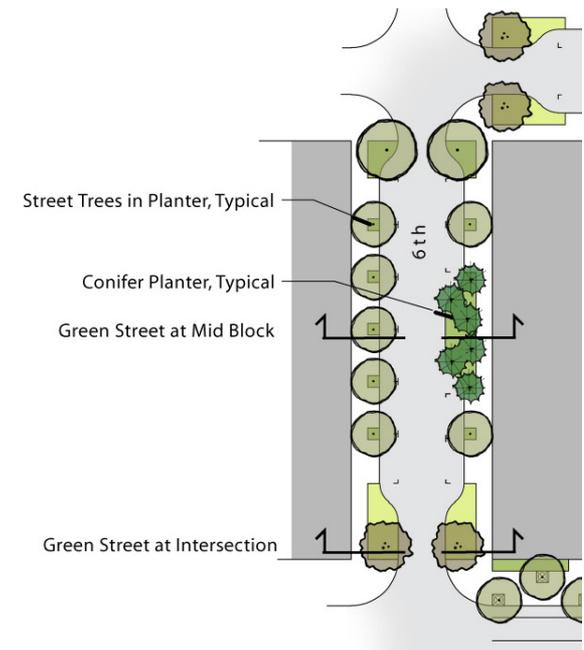


Multnomah Streetscape Concept

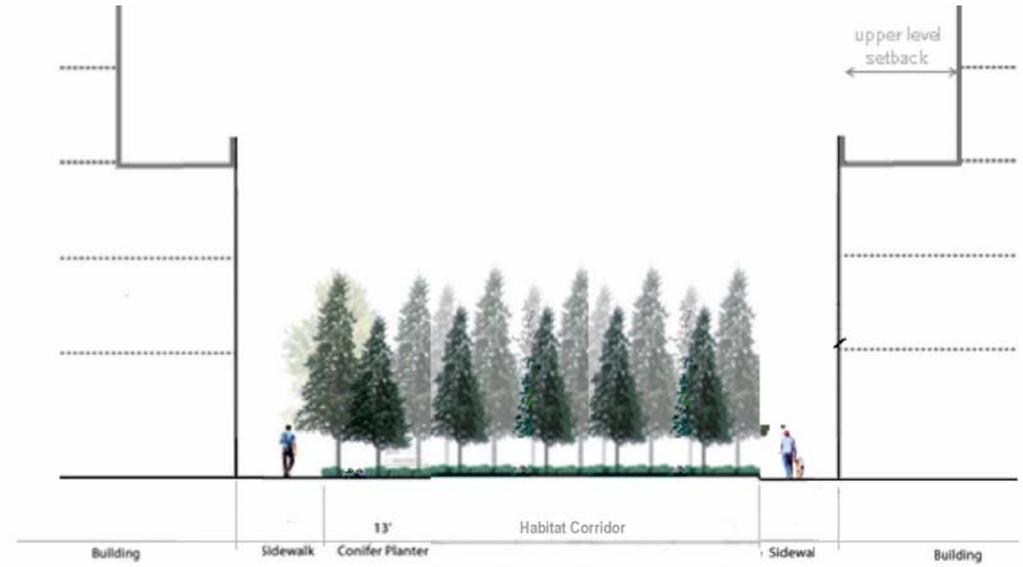


Green Streets Streetscape Concept

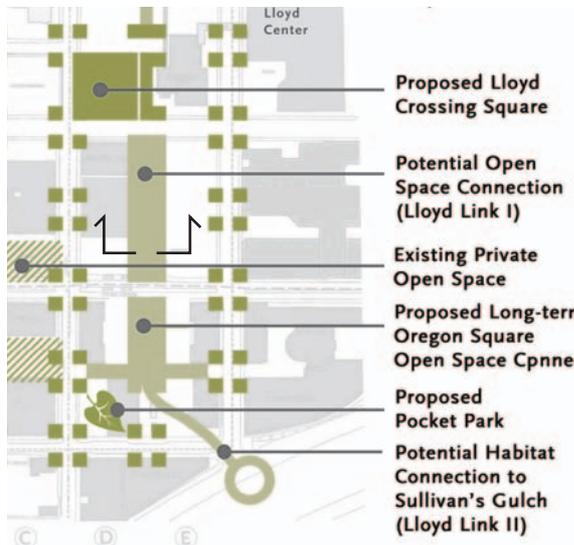
Green Streets: The quieter, narrower and more intimate streets, with generous street plantings within the 60 foot right of way. On 6th Avenue, for example, residential buildings could be pulled five feet back from the property line to establish a vegetated forecourt, buffering the building entries from the sidewalk. It may be desirable to consider one-way traffic on some streets in order to narrow the curb-to-curb width of the street.



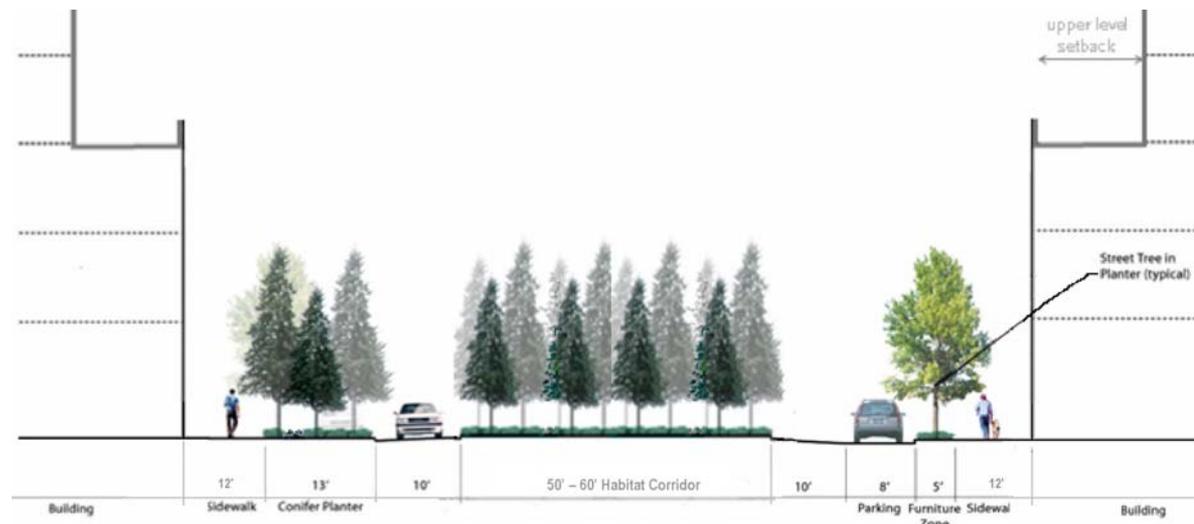
8th Avenue: The 'habitat street', providing habitat corridors wide enough to support bird and other wildlife. Its design would allow active and dense development on the East and West sides, as well as the option of vehicular lanes on each side. This would need to be designed as part of the development of the superblocks.



Habitat Walk



Detail of Open Space Plan



Habitat Lane

Green Streets 8th Ave Streetscape Concepts



Street Scale and Building Setbacks

As density increases within the district it is desirable to keep an intimate scale at the street level. This can be implemented by setting specific guidelines for street wall setbacks and pulling the tower bulk back from the street wall at some streets, while at others encouraging street wall vertical hierarchy. At the next stage of study, specific recommendations should be made for each street to reinforce the hierarchy and character established in the street sections and to maximize solar access.



Ground Level Building Character

The Lloyd District has a significant daytime population of office workers and shoppers. In the Plan's vision, Lloyd Crossing performs as a lively and engaging central city neighborhood. However, the existing context of multistory buildings, numerous surface parking lots, automobile traffic, and long distances between buildings and functions means that outdoor spaces are larger, more impersonal, and less likely to contribute to a cohesive neighborhood identity. The greater distances between buildings and functions means that there is not much to experience outdoors, and

the activities that do take place are spread out in time and place. The necessary "good" congestion of an interesting streetscape is missing.

A key urban design goal for the Lloyd Crossing project is to fill in the missing gaps in the urban street wall façade. The new pieces will be a mix of uses including residential and retail. Emphasis should be placed on achieving visual interest for the area under 35 feet in height – the quality of the architecture, as expressed by the continuity of the street wall façade, transparency, mystery, day/night design elements, and detail – since this is the zone

most directly experienced by both pedestrians and automobiles. A well-designed urban enclosure of buildings will provide pedestrians with closely spaced buildings, functions, and destinations; areas for outdoor activities; and direct connections to residences, public buildings, and workplaces. We are drawn to places where it is possible to see and feel the activity of public day-to-day life: working; shopping and stopping in outdoor areas. Further study should include in-depth evaluation of existing design review guidelines to ensure they are in alignment with these concepts





Note: Identified sites and land uses on this map are for study purposes only and do not necessarily indicate private development plans

Placemaking: Open Space and Connections



Open Space and Habitat Links

There are currently 2½ acres of open space within the study area:

- 1½ acre Oregon Square and pedestrian corridor
- ½ acre Liberty Centre Plaza
- ½ acre Kaiser Plaza at Holladay and 7th

As part of the habitat strategies two types of open space are proposed within the study area: 2 acres of forest patches and 1-2 acres of habitat corridor. The intent of these new open space additions is to provide habitat connections, public gathering spaces, children’s play areas, connectivity to Sullivan’s Gulch for wildlife, and green connectors that encourage people to walk throughout the district.



Secondary Recommendations

1. Encourage new developments to incorporate active recreation spaces such as basketball courts, tennis and passive open space such as terraces on rooftops for workers and residents.
2. Encourage urban agriculture at residential developments with raised planters on terraces
3. Provide benches and public art within the green streets and corridors to enrich and enhance these micro open spaces.



Primary Open Space Recommendations

1. Provide 4.0 acres of publicly accessible open space in the 35 block study area by 2050. This would create a park and open space level of service similar to Portland's Pearl District.
2. Provide two publicly accessible plazas of 10-20,000 square feet each for employees. The Kaiser Plaza and the Liberty Centre Plaza can cover this area.
3. Provide a new one-acre neighborhood park and plaza associated with the Catalyst project.
4. Provide two publicly accessible pocket parks for new residents of 10-20,000 square feet each, distributed evenly around proposed residential development.
5. Provide a habitat and open space connection from Sullivan's Gulch to the new neighborhood park at the heart of the district.

Summary of Recommendations

Lloyd Crossing Square: One acre

a one acre publicly accessible neighborhood park and plaza as an active and passive space

Lloyd Link I: ¾ acre

an open space to connect Lloyd Crossing Square to Oregon Square: ¾ acre of habitat friendly open space, integrated into a north-south pedestrian/vehicular link.

Lloyd Link II: ¾ acre

an open space along "8th Avenue" and ROW modification to connect Oregon Square to Sullivan's Gulch along 8th Avenue alignment.

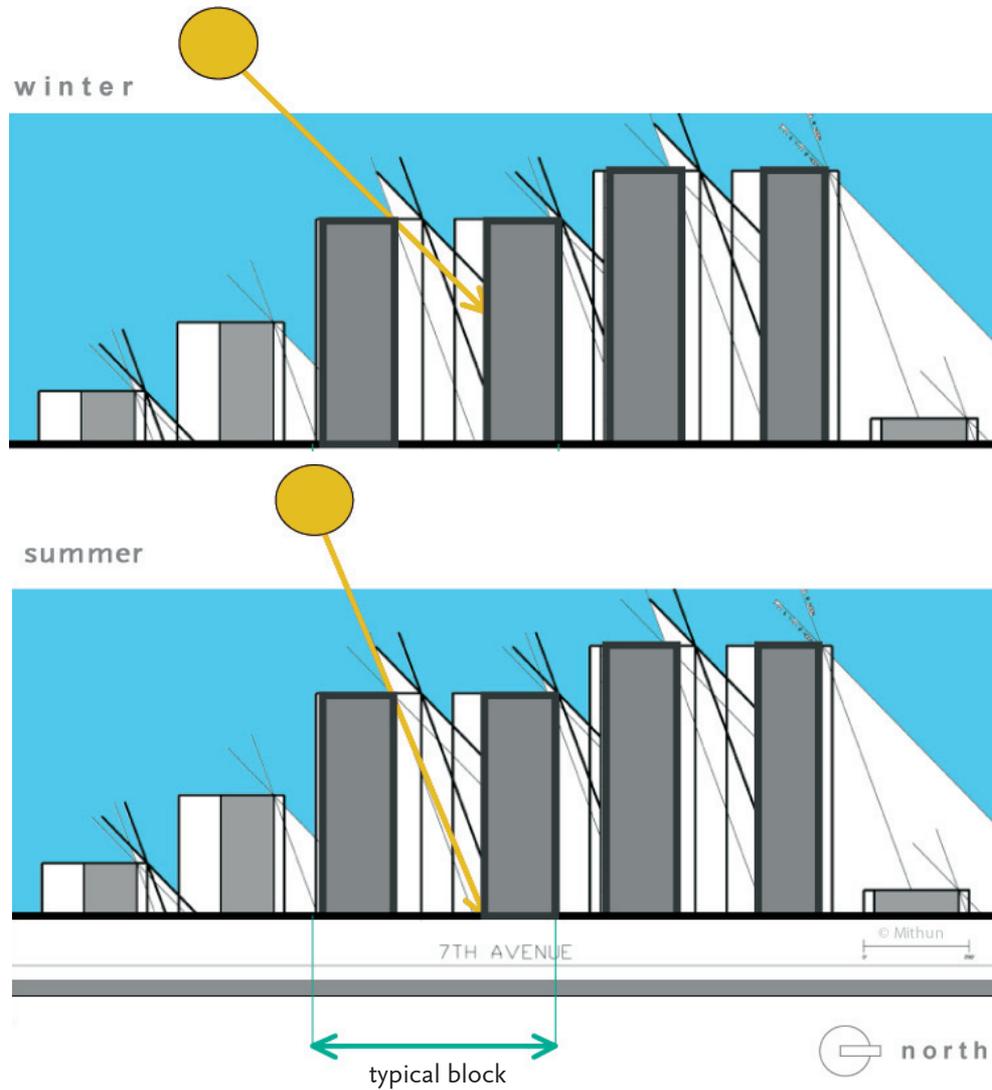
Pocket Parks: ¼ acre

provide one pocket park each for the north and south residential zones, incorporating children's play areas

Liberty Centre Plaza: ½ acre – existing

Kaiser Plaza at Holladay and 7th: ½ acre – existing





Solar Massing of Buildings

The planned massing and location of new development is crucial to optimizing solar exposure for the daylighting, heating and cooling of buildings. It is also essential to provide sun to public open spaces and to provide an expansive sky exposure plane for the pedestrian level sidewalk experience. Additional needs of maximizing views to nearby features and distant landmarks should be reviewed. The zoning of towers and building mass will take additional study to optimize all of these elements. It is recommended that a 3-D model be constructed and tested for the criteria listed above. Additional study could examine the impact of windflow patterns created by new towers and their interaction with the existing commercial towers within the district.

Solar Massing

Parking

A successful and sustainable approach to parking and transportation is critical to the feasibility of the plan. The study area is well served with the Lloyd District Transportation Management Association, by existing mass transit systems, and a streetcar line is planned along 7th Avenue that will provide additional connectivity to adjacent neighborhoods and to downtown. Surface parking for existing uses will be displaced by open space

and future development, and a portion of existing street parking will be displaced by stormwater, streetscape, and habitat strategies. Added to the demand created by new development, a substantial parking requirement is created which requires the development of strategically placed underground garages. Further study is recommended to define assumptions for parking demand, and to consider ways to reduce the magnitude of this investment and its inevitable environmental impacts.



Interim Retail

On many streets, the study area lacks a consistent pedestrian-friendly and active street wall experience due to the number of surface parking lots and garages. Activating and defining the street wall on key streets and intersections can strongly assist placemaking, street-life vitality and the encouragement of future development.

The development to the full zoning potential will take many decades. The recommended strategy is to create Interim Retail, shorter term one story buildings or structures housing retail, restaurant, gallery or other street-activating use that can enliven the street. Displaced parking spaces could be located within a new centralized parking garage. Pavilion-like structures which could be relocated after ten years or more permanent structures that could be relocated after 30 years should be investigated. The buildings could be fully demountable and designed for re-use on another location. The RMA could potentially own and manage these structures, leasing property from the landowners.

FAR Transfer Mechanisms

The Central City Plan intends that the maximum floor area ratio (FAR) accomplish several purposes, including coordinating private development with public investments in transportation systems and other infrastructure. Other purposes include limiting the bulk of building and stepping down the massing of building envelopes with respect to the Willamette River, residential neighborhoods, or historic districts. While consistent with these purposes, the floor area ratios for the central city (including the Lloyd Crossing study area) are intended to be the largest in the Portland region.

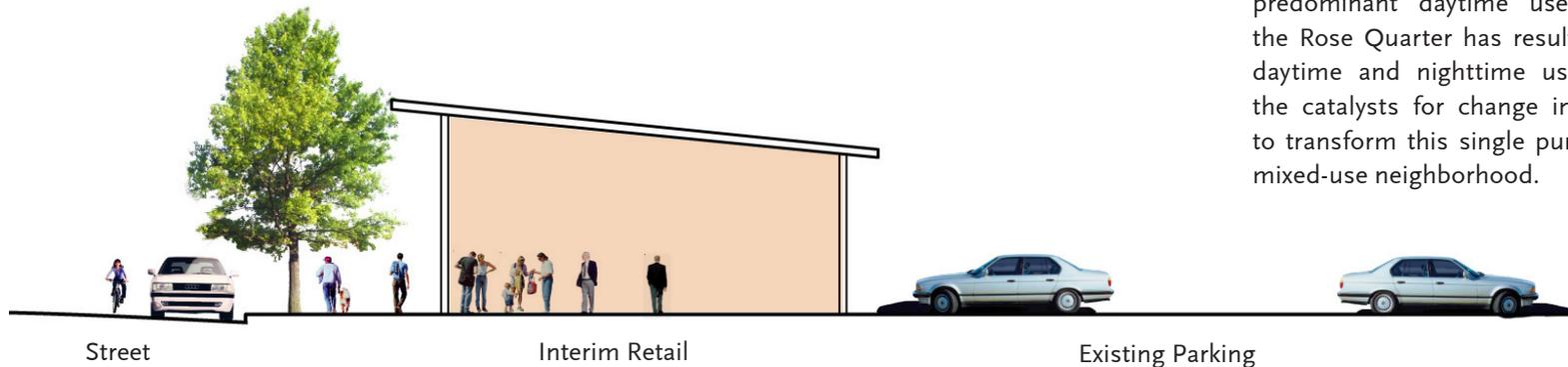
The Lloyd Crossing project team has investigated the possibility of a study area transfer mechanism that would permit transfer of unused FAR between sites within the study area. This kind of transfer mechanism is not currently possible under the current Portland Zoning Code, which currently only allows floor area transfers between abutting

lots within a site, or between sites being developed jointly. Any provision for the future implementation of such a district-wide FAR transfer mechanism will require an initiative from the Department of Planning and a change to the City Zoning Ordinance approved by the City Council. The estimated timeframe for such an undertaking is five years from initiation to adoption.

Urban Vibrancy

The study area is characterized by the superblocks developed in the 1960s. The development potential inherent in these superblocks has not yet been realized, while the loss of connectivity has put the Lloyd District “off-limits” in many resident’s conceptual maps of the city.

The development emphasis of this section of the central city has been on uses with limited duration. The emphasis on job creation in the Lloyd District has resulted in a vast single-purpose area with predominant daytime use. The investment in the Rose Quarter has resulted in acres of limited daytime and nighttime use. This Plan explores the catalysts for change in the study area; how to transform this single purpose zone into a vital mixed-use neighborhood.



Interim Retail Concept Section

SUD Placemaking Implementation

In order to produce the minimum level of urban vibrancy, the long-term program for the Lloyd crossing study area should include a minimum of 1,000 homes and 20,000 square feet of storefront, street-oriented retail. The 1,000 new homes include the 200 units currently within the study area provided by the Cascadian condominium and the Cornerstone apartments. The retail development should be concentrated for maximum effect along two sides of a street and including at least four corners.

The minimum level of urban vibrancy would be enhanced with the addition of at least one cultural facility in a storefront, street-oriented facility that reinforces the vitality of neighborhood-serving retail facilities.

The Placemaking strategies include:

Improvements within the public realm to create enhanced “green streets;”

Replacement parking for on-street stalls impacted by the in-district storm water system;

Private parking replacement for landowners whose properties are impacted by the catalyst project (as an alternative to land acquisition); and

Interim retail development to create active pedestrian experiences.

Total capital costs for the Placemaking strategies are estimated at \$14.6 million in 2004 dollars, without accounting for the costs associated with the construction of interim retail projects.

As with the Open Space strategies, we have not identified specific sources of funding to repay the investment in the placemaking strategies. Funding sources could include private funding, Urban Renewal dollars, New Market Tax Credits, or in the case of the streetscape improvements, PDOT or other federal transportation dollars.

As currently modeled, the \$14.6 million represents approximately 4% of the total District-Wide costs, and is repaid over time through operational savings and other offsets available given the range of water and energy strategies employed.

Uses:	Inflation @ 0%	Total	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Study Area Parking Pool	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Street Parking Replacement	\$	10,500,000	\$	10,500,000	\$	-	\$	-	\$	-	\$	-
Private Parking Replacement (Kaiser)	\$	2,875,000	\$	2,875,000	\$	-	\$	-	\$	-	\$	-
Interim Retail Construction Costs	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Interim Retail Tenant Improvements	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Streetscape Improvements	\$	1,278,750	\$	1,278,750	\$	-	\$	-	\$	-	\$	-
Total Uses:	\$	14,653,750	\$	14,653,750	\$	-	\$	-	\$	-	\$	-
Sources: to be identified												
Net Cash Flow:												
5-Year Cash Flow: \$ (14,653,750) \$ (14,653,750) \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -												

Placemaking – Cash Flow Analysis 2005–2050

Materials

Vision and Goals

The construction industry is resource intensive, consuming 40% (some three billion tons) of the total flow of raw materials in the global economy. The environmental impacts of extraction, manufacturing and fabrication, transportation, installation, maintenance, and disposal of construction materials are major contributors to greenhouse gas emissions, toxic emissions, habitat destruction, and resource depletion.

The materials vision of the Plan is a neighborhood in which construction materials are evaluated and selected based on long-term energy efficiency and low embodied CO₂ content, in order to contribute to achieving the goal of a carbon-neutral study area.

Materials principles

Emphasize high-performance materials.

Select all materials for durability and low maintenance.

Select materials for low embodied energy and high recycled content.

Use Life Cycle Assessment (LCA) methodology to make material choices.

Source materials within 300 – 500 miles of project site.

Use fewer materials – avoid multiple construction layers.

Use materials which contribute to high indoor air quality (low emissions).

Wherever possible, use materials which employ renewable resources.

Utilize building components that can be upgraded over time for superior energy performance.



Implementation

Vision and Goals

Implementation of the sustainable urban design strategies for Lloyd Crossing is accomplished through a combination of existing mechanisms and new concepts, which together deliver the money, the management, and the messages necessary to achieve the goals of the plan. By encouraging the growth of strong public/private partnerships, utilizing savings from existing tax incentives and projected operating efficiencies, and by identifying potential new sources of capital, the plan creates a framework for funding that will repay the required investment over the course of the study period. The plan also envisions creation of a Resource Management Association (RMA) that efficiently manages the financial and physical implementation of the sustainable strategies. Separately, the plan outlines a process for the development of a thoughtfully crafted branding campaign, in order to create a unique identity for Lloyd Crossing that will attract and retain the homeowners, tenants, and customers essential to the vitality of the neighborhood.



IMPLEMENTATION

Uses:		Total	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
WATER												
Building Improvements		\$ 9,480,491	\$ 2,100,499	\$ 1,572,498	\$ 829,374	\$ 832,534	\$ 835,693	\$ 838,853	\$ 842,012	\$ 845,172	\$ 848,331	\$ 36,316
District Improvements		\$ 8,336,249	\$ 1,717,635	\$ 37,635	\$ 4,651,647	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047
		\$ 17,816,741										
ENERGY (inflated @ 2%)		\$ 316,047,076	\$ 4,071,532	\$ 19,047,715	\$ 24,240,090	\$ 24,032,884	\$ 28,045,143	\$ 33,542,736	\$ 38,171,772	\$ 43,235,087	\$ 48,298,402	\$ 53,361,716
HABITAT / OPEN SPACE		\$ 32,125,750	\$ 5,880,600	\$ 5,472,225	\$ 12,419,450	\$ 1,406,250	\$ 6,947,225	\$ -				
PLACEMAKING		\$ 14,653,750	\$ 14,653,750	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Uses:		\$ 380,643,317	\$ 28,424,016	\$ 26,130,073	\$ 42,340,561	\$ 26,518,715	\$ 36,075,109	\$ 34,628,636	\$ 39,260,832	\$ 44,327,306	\$ 49,393,780	\$ 53,645,081
Sources:												
WATER	Savings Reinvested @ 80%	\$ 40,212,445	\$ 1,202,221	\$ 1,709,206	\$ 3,497,996	\$ 3,837,925	\$ 4,178,849	\$ 4,520,768	\$ 4,863,681	\$ 5,207,590	\$ 5,552,493	\$ 5,641,717
ENERGY	Offsets											
	Inflation @ 2%	\$ 84,739,389	\$ 1,339,105	\$ 7,115,812	\$ 8,030,715	\$ 7,736,679	\$ 8,411,137	\$ 9,060,142	\$ 9,777,456	\$ 10,418,902	\$ 11,077,807	\$ 11,771,633
	Savings Reinvested @ 80%	\$ 260,698,421	\$ 634,557	\$ 4,129,814	\$ 7,729,092	\$ 13,766,627	\$ 20,951,933	\$ 28,245,804	\$ 35,517,047	\$ 42,706,185	\$ 49,904,479	\$ 57,112,883
HABITAT / OPEN SPACE		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
OTHER POTENTIAL FUNDING SOURCES												
	Urban Renewal Funds	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Tax Increment Financing	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Local Improvement District	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	New Market Tax Credits	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	EPA Sustainability Pilot Grant	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Subtotal - Other	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Sources:		\$ 385,650,255	\$ 3,175,883	\$ 12,954,832	\$ 19,257,803	\$ 25,341,231	\$ 33,541,919	\$ 41,826,714	\$ 50,158,185	\$ 58,332,677	\$ 66,534,780	\$ 74,526,233
Net Cash Flow:												
WATER	5-Year Cash Flow:	\$ 22,395,705	\$ (2,615,913)	\$ 99,072	\$ (2,183,025)	\$ 2,758,344	\$ 3,096,108	\$ 3,434,868	\$ 3,774,622	\$ 4,115,371	\$ 4,457,114	\$ 5,358,352
	Payback Year:			2010		2020						
ENERGY	5-Year Cash Flow:	\$ 29,390,733	\$ (2,097,870)	\$ (7,802,088)	\$ (8,480,283)	\$ (2,529,578)	\$ 1,317,927	\$ 3,763,210	\$ 7,122,731	\$ 9,890,000	\$ 12,683,885	\$ 15,522,800
	Payback Year:						2025					
HABITAT / OPEN SPACE	5-Year Cash Flow:	\$ (32,125,750)	\$ (5,880,600)	\$ (5,472,225)	\$ (12,419,450)	\$ (1,406,250)	\$ (6,947,225)	\$ -	\$ -	\$ -	\$ -	\$ -
	Payback Year:											
PLACEMAKING	5-Year Cash Flow:	\$ (14,653,750)	\$ (14,653,750)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Payback Year:											
GRAND TOTAL DISTRICT CASH FLOW:		\$ 5,006,938	\$ (25,248,134)	\$ (13,175,241)	\$ (23,082,758)	\$ (1,177,484)	\$ (2,533,190)	\$ 7,198,078	\$ 10,897,353	\$ 14,005,370	\$ 17,140,999	\$ 20,881,152
Payback Year:								2030				

SUD Financial Performance Overall Summary – Cash Flow Analysis 2005–2050

Study Area Economic Analysis

Implementation of the full range of sustainability strategies outlined within this report would require approximately \$380 million in 2004 dollars. In comparison, development cost of the projected 8.1 million additional square feet in the study area represents approximately \$1.7 billion. Many of the recommended strategies, particularly those associated with the Energy strategy, are at least partially supported by existing state and federal programs geared toward encouraging environmentally sustainable building and infrastructure programs. In some instances the sources of support (through the combination of tax credits, grants and operational savings) fully cover the costs necessary to implement a particular strategy when reinvested over a 20 to 30 year planning window. In many instances, however, there are shortfalls that would require continued subsidy over the 45-year life of the study period, and potentially beyond.

The summary Financial Model has been designed as a decision-making tool that can be used when evaluating the range of possible sustainable strategies recommended by the consultant team. The model is comprised of three major components: “Uses” (costs associated with the implementation of specific strategies), “Sources” (revenue sources available to potentially offset costs) and “Net Cash

Flow” (the difference between costs and revenues). The “Net Cash Flow” section of the model looks at the financial performance of both individual and combined strategies in 5-year increments over the 45-year study period, to indicate order of magnitude funding requirements associated with the series of sustainable strategies identified by the team. Inputs to the Model can be changed (i.e., certain strategies could be eliminated or delayed) to test the resulting district-wide financial performance within the study area.

The Model can be used to conduct a sensitivity analysis to estimate the effect of changes to key assumptions on overall financial performance. For example, if costs increase by 5%, how much higher are the overall capital cost requirements? If operational savings decrease by 20% (or a larger portion of the savings is retained by landowners), what impacts does that have to the viability of certain strategies?

The Financial Model can be used to prioritize among the range of strategies, to anticipate periodic capital requirements, and to understand general payback periods so that the PDC and the Lloyd Crossing stakeholders can determine an initial implementation plan.

Financing the Creation of a Sustainable District

In order to cultivate strong public/private partnerships, and to create incentives that will encourage participation by private land and building owners, there needs to be a balance between public and private funding commitments. As currently modeled, all of the revenues supporting implementation of the Plan are generated by private participation via tax credits and incentives and the reinvestment of operational savings. Nearly \$386 million in 2004 dollars in potential revenues are identified over the 45-year study period, equating to nearly \$9 million on an annual basis.

A commitment to identifying public sources of capital is required – to both provide significant upfront capital costs and cover the shortfalls until the investments begin to break even after 20 to 30 years.

When each of the recommended strategies is implemented, total costs of \$380 million are eventually repaid, and in fact, an excess of \$5 million is evidenced by the year 2050 assuming the commitment on the part of all new building owners to the reinvestment strategies described herein.



Existing Funding Sources

Several sources have been identified that could participate in the implementation of the strategies recommended in the Plan. They include:

1. *Urban Renewal Dollars/Tax Increment Financing (TIF)*: Historically, the PDC has operated with general fund allocations from the City of Portland and tax increment bond proceeds for activities within the City. Both of these revenue sources are derived from the collection and redistribution of local property taxes. As Portland’s urban renewal, housing and economic development agency, the PDC uses tax increment funding to enhance the Portland metropolitan area’s livability within specified urban renewal areas. The TIF financing structure is designed to capture new tax revenues generated from increased property values expected to result from development. As a result, TIF districts must be located in areas capable of realizing a significant (and sufficient) increase in assessed property value in order to meet their debt service obligations in full and in time. If the tax base does not grow as projected, debt repayments may be put in jeopardy. TIF may well be a vehicle that could be employed when Urban Renewal Funding expires, to allow for continued public investment into improvements in the area.

3. *Operational Savings*:

As previously discussed, both the Energy and Water strategies outlined in the SUD plan would result in annual operational savings that would benefit building owners and, eventually, repay the capital costs incurred in making building improvements. In order for this strategy to succeed, area land and building owners would all need to commit to reinvesting large portions of these savings to support the implementation of a range of projects, beyond the specific reimbursement of upfront capital costs.

4. *Local Improvement District Financing (LID)*

5. *Federal and State Tax Incentives (for Energy Strategies)*

Potential New Funding Sources

In addition to relying upon reinvestment via tax incentives and operational savings by the private building owner, the team has identified two additional funding possibilities: (1) earmarking a percentage of System Development Charges (SDCs) which are now imposed as an impact fee as part of project approvals, and (2) reallocating a portion of existing or proposed Bureau of Environmental Services (BES) capital budgets.

Earmarking System Development Charges

The team has raised the possibility of earmarking a percentage of System Development Charges (SDCs), which are now imposed as an impact fee as part of project approvals. Particularly if the strategies implemented take the Lloyd Crossing Study Area off the City's infrastructure "grid" for certain functions, it seems reasonable that a portion of these fees could be made available to support capital improvements in the neighborhood.

Reallocating Capital Expenditures for Regional Infrastructure

A second potential source of public funding for the Water strategies could be a reallocation or re-prioritization of existing or proposed Bureau of Environmental Services (BES) capital budgets. If the improvements to be implemented as part of the Sustainable Urban Design Plan would improve environmental conditions, delay the need for a regional project, or reduce the size of an identified infrastructure improvement, a portion of those dollars might be able to be reallocated to support the Lloyd Crossing Sustainable Urban Design Plan

New Market Tax Credits

The federal New Market Tax Credit program became law in December of 2000. The purpose of this investment credit is to support businesses

in disadvantaged communities by facilitating the provision of capital provided to such businesses. The program is designed to attract new capital from institutional investors for businesses operating in communities that have trouble attracting their fair share of capital. Because the capital markets view these communities as risky, capital is either unavailable or available only at significantly higher costs than other communities. The credit is designed to assist in providing loans and equity to businesses at terms comparable to those available in other, more affluent communities.

The Portland New Markets Fund has been established to seek a substantial allocation of these investment tax credits. The New Markets Fund is designed to spur businesses and real estate investment that stimulates new jobs, training opportunities and activity in Portland's low-income neighborhoods.

Incentives

Generally, no matter how creative, developers will respond to regulatory incentives only if the added cost of compliance is exceeded by the value of the benefits they obtain by complying. Similarly, they will choose not to take advantage of an incentive, even if it offers potential financial return, when it adds uncertainty or time to the process of obtaining project approvals.



When considering creating a package of incentives to encourage redevelopment within the Lloyd Crossing Study Area, the City will need to carefully balance the benefits of specificity, and therefore certainty, against the potential to be overly prescriptive.

The consultant team has identified the following potential incentives to encourage redevelopment consistent with the Sustainable Urban Design plan objectives:

(1) *Reduced Private Open Space Requirements:*

Decrease the overall quantity of open space required for a particular development within the Study Area if fees or improvements are made in support of open space objectives. The incentive could allow for either on-site development of public open space adjacent to key public rights of way or a payment in lieu to be earmarked for enhancements to the public realm. Along key streets or at critical intersections, for example,

an opportunity to reduce or eliminate existing private open space requirements in exchange for the provision of adjacent enhancements within the public realm could be met with market acceptance. This incentive would obviously be applicable only to those properties currently zoned in such a manner that the provision of private open space is required.

(2) *Transferred Development Rights:*

Institute a TDR program that allows a property owner within the Study Area to sell twice the lost FAR dedicated to open space (if consistent with the Sustainable Urban Design Plan) to another site within the Study Area. This incentive could be designed to also encourage participation on the receiving end of the transaction. The City could motivate the potential buyer by allowing more than the FAR acquired to be constructed on a receiving site if open space TDRs were purchased.

(3) *Business Improvement Districts (BID):*

Encourage existing property owners and businesses in the Study Area to form a BID by providing tax reduction once targeted improvements are completed. The earliest BIDs appeared in the United States in the 1980s, established by downtown merchants in an effort to compete with suburban shopping malls. Typically, the activities of a BID include joint marketing, security guards, sidewalk sweepers, and a range of capital improvements. The BID is funded via a surcharge on real estate taxes, collected by the city and spent by a board of directors consisting of property owners and businesses within the district. This incentive adds to the notion of the BID the encouragement of a tax break in exchange for enhancing the public realm in a manner consistent with the Sustainable Urban Design's vision and taking on the responsibility of ongoing maintenance.



(4) Corporate Sponsorship:

Allow corporations to make improvements consistent with the Sustainable Urban Design Plan areas in exchange for public recognition, charitable deductions, or potentially advertising rights. The strategy of creating a system of pedestrian connections utilizing public rights of way supports the notion of corporate sponsorship. A built-in community of citizens and potential customers would be available to recognize the efforts and commitments of corporations and philanthropists.

(5) Transfer Open Space:

Allow private developers outside the Study Area to acquire and dedicate existing or planned open space in the Study Area to meet the open space requirements applicable to the development of their property. This concept could be established to work like a mitigation bank for open space. The opportunity would be viewed as a marketable incentive if the open space “square feet” were offered below market, beneficial because the cost to the developer would be less than providing the space on site. If the funds received from the developer were then earmarked for the ongoing maintenance of the park (either by the public or a private entity) there would be the added benefit to the City of a dedicated funding stream for the future.

(6) City Matching Program:

Subsidize the efforts of private foundations established to implement the Sustainable Urban Design Plan through a matching program that both funds the formation of the Resource Management Association (Resource Management Association) and provides \$1 from the City for every \$3 contributed by others. This concept applies the theory of leverage to allow limited public dollars to be used more efficiently. It also illustrates to the private market a public commitment to the implementation of the Sustainable Urban Design Plan that will be critical to ensure its success.

(7) Public Parking Garage:

Construct a public parking garage and allow some portion of the spaces to be allocated (at some reduced cost) to meet the parking requirements for new private development projects. The private sector participant would either provide (a) fees to support the Sustainable Urban Design Plan, or (b) construction of improvements to implement the plan.

(8) Partnerships:

Establish partnerships with large property owners in the Study Area to create co-funded programs to achieve integrated results. The ownership patterns within the Lloyd District provide a unique opportunity to see significant and cohesive change

occur within an urban environment. Working collaboratively towards common goals will ensure a more substantial near-term impact toward implementing the Sustainable Urban Design Plan.

(9) Parking Lot Redevelopment:

Subsidize construction costs and provide tax breaks to convert surface parking to an underground garage and create new public open space at the surface. The City could share in revenues from operations of a garage to be earmarked for ongoing maintenance of the created open space. Combining car storage with parkland as a means to obtain public open space in high-density areas is not a new strategy. San Francisco pioneered it in 1940 when it created a 1,700-car garage under Union Square. There are similar examples in other cities such as Los Angeles, Boston, Chicago, Pittsburgh, and Alexandria. This incentive seeks to encourage private market participation in this concept through the joint venture to facilitate the construction of an underground facility to replace existing surface lots.

The City will need to actively market the availability of all market incentives and proactively encourage participation by the private market. The City must be able to demonstrate how incentives work, that financial benefit can be achieved, and commit to making the process of utilizing the incentive clear and predictable.

Resource Management Association (RMA)

Vision

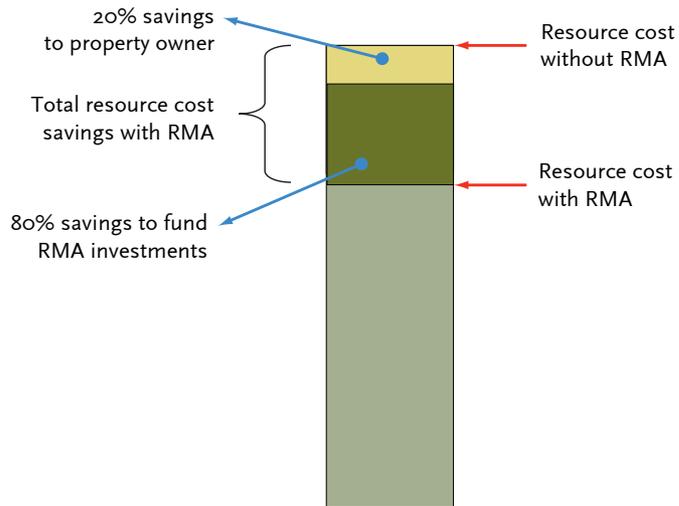
In order to create an environmentally sustainable urban Study Area, the district-wide “green” infrastructure and other programs that are necessary offshoots of the strategies will need to be prioritized, managed and strategically implemented over time. There are no existing organizations that would be able to provide the level of coordination, advocacy, financing and maintenance necessary to achieve the goals of the Sustainable Urban Design Plan. A new entity is needed to facilitate the financing, construction and maintenance of infrastructure and the implementation of sustainable development strategies and programs.

The consultant team has raised the idea of establishing a Resource Management Association (RMA) to implement sustainable development strategies and identify sources of revenue to build and maintain district-wide green infrastructure throughout the Study Area.

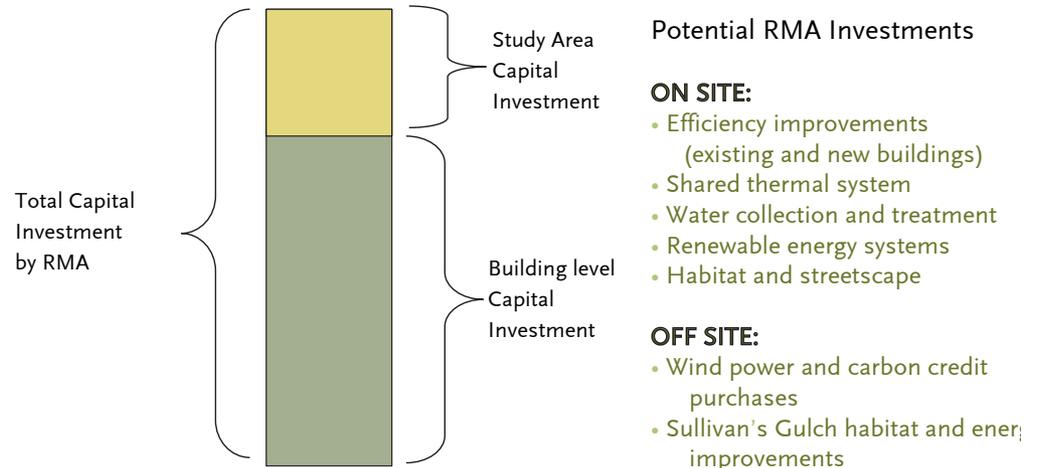
The following is a list of potential responsibilities/activities that might be undertaken by an entity such as the Resource Management Association:

- Implementation of a district-wide energy use reduction program;
- Implementation of a district-wide wastewater reduction program;

- Implementation of a district-wide potable water use reduction program;
- Implementations of a district-wide storm water management program;
- Administration of a “green” power purchasing program on behalf of association members;
- Financing, construction and maintenance of district-wide green infrastructure;
- Administration of the trading of tax credits between association members and partners outside of the district; and
- Administration of Urban Renewal Funds, operational savings, tax incentives and other sources of revenue intended for environmentally sustainable projects.



RMA Operating Model



RMA Investments

Organization

The Resource Management Association could be either a private non-profit business association (e.g. the existing Lloyd District Transportation Management Association) or a public utility district, depending on the scope of responsibilities assigned to it.

The Resource Management Association would likely need to be established as a public utility district, to the extent that its responsibilities included the ownership, operation, management or control of infrastructure designed for the production, transmission, delivery or furnishing of heat, light, water or power for the public.

The sources of revenue to support the Resource Management Association and the ways in which it might focus its resources are largely dependent on how it is organized. Most public utilities are regulated by the Public Utility Commission, which oversees rate increases, debt and the quality of service.

A Resource Management Association formed as a business association, rather than a utility, might generate revenue from a number of sources including the brokerage of tax and carbon credits, Urban Renewal funds, LID funds (project specific), grants (federal, state and local sources), and fees for services (energy surveys, etc.).

Questions for Further Study

There are numerous issues associated with the Resource Management Association concept that need to be considered by the consultant team, the Project Advisory Committee and the Technical Committee prior to forming a relevant recommendation for moving the concept toward implementation:

- *Does the Resource Management Association need to perform functions that clearly fall into the realm of a “public utility” to effectively achieve the Lloyd District’s goals for environmental sustainability? This is a fundamental issue that affects all aspects of the Resource Management Association.*

- *Could the Resource Management Association function better as a business association that acts as an advocate for sustainable development and development within the Lloyd District?*
- *Is the formation of the Resource Management Association as a public utility district legally and politically feasible/desirable?*
- *Could the Resource Management Association be formed as an investor- owned public utility with the investors being existing utilities such as NW Natural, PacifiCorp, and the City of Portland?*
- *Could the Resource Management Association provide funds for private building energy or water capital improvements in both existing and new buildings with a shared savings strategy?*

The specific business structure of the Resource Management Association needs to be evaluated further as this implementation plan is taken to the next step by the PDC.





Branding

The 2001 Lloyd District Development Strategy established identity as one of the key principles to guide major public and private decisions about future development. An essential part of establishing this identity will be to create a “brand” for Lloyd Crossing that hinges on important concepts in the Plan such as sustainability, density, diversity, livability and mobility.

A brand is not a logo or a name, it is the accumulation of impressions in the mind of an individual. Branding is the disciplined process of building a clear, positive recognition and understanding to build the brand. Branding will be critical to eliciting a groundswell of interest and support for the Lloyd Crossing Sustainable Urban Design Plan.

Audiences

For the Lloyd project, key audiences are its stakeholders, including property owners within the study area, potential tenants, funding sources, and city, state and federal agencies. Also critical are a variety of influencers—public figures, non-profit organizations and others who are both vocal and credible and can therefore help tell the story of the project.

Position, Promise and Key Messages

At the core of every successful brand-building program is its long-term “story”—its position, promise and message. These will be expressed through a variety of means to create a brand that will resonate clearly and positively with its audiences.

Position: the single concept that distinguishes this project:

- *Healthy urban*

Promise: what audiences can expect of the project, and the benefits they can expect to enjoy from it:

- *A practical vision for both livability and sustainability, giving a sense of community, healthy work- and life-style, personal and civic pride*

Key Messages: the three basic claims most important to the project, that will organize, and be substantiated by, a variety of support points:

- *Healthy Values: The Lloyd Crossing Sustainable Urban Design Plan creates a uniquely healthy, highly attractive community for living, working, shopping and accessing transportation—all within a sustainable, responsible infrastructure that showcases the neighborhood, Portland, and Oregon as the nation’s leaders in livability and sustainability.*

- *Sustainability: The project applies advanced design, materials and technology to make maximum use of the site’s naturally available water and solar budget, and to minimize the production of carbon and water wastes. The result is to maximize the site’s human uses while minimizing its developmental and environmental impacts.*
- *Sound Economics: The project is based on an incremental, financially sound approach that will build toward long-term design goals. It begins with an initial Catalyst Project that will demonstrate both the attractiveness and financial viability of the vision, generating interest and momentum for subsequent phases.*

Recommended Next Steps for Branding

1. Refine/develop messaging and personality with stakeholder input.
2. Create an identity system including name, logo, colors, graphics.
3. Develop a detailed communication plan defining audiences, marketing touch-points and budget for promoting the project.
4. Launch the brand with an initial program of communications.
5. Establish long-term funding sources and a coordinating entity for the area’s marketing and brand-building efforts.





3D Rendering of Catalyst Project

Note: Identified sites and land uses on this map are for study purposes only and do not necessarily indicate private development plans.

Catalyst Project

Vision and Goals

The Lloyd Crossing Catalyst Project is a mixed-use development that incorporates many of the concepts and strategies outlined in the Plan for open space, habitat, water, and energy, and which serves as a successful example of visionary sustainable planning and design for the study area. A major goal for the development is to meet environmental performance standards that exceed LEED™ platinum level, and the combined strategies are projected to exceed the energy performance of existing buildings in the study area by at least a factor of 3. Implementation of the project will require a strong public / private partnership in order to have the desired impact in the community and to set the stage for the next phases of development in the area.

The Catalyst Project consists of public component (parks & streets), private component (residential development), and shared infrastructure components (sustainable strategies and systems), which incorporate many of the recommendations contained in the Plan. This section illustrates a mid rise and a high rise option for the catalyst development; in addition, the high rise option was explored on two alternate sites. Financial analysis was done for each alternative scheme. Selection of a preferred direction should be based on an evaluation of the relative strengths and weaknesses of each option.

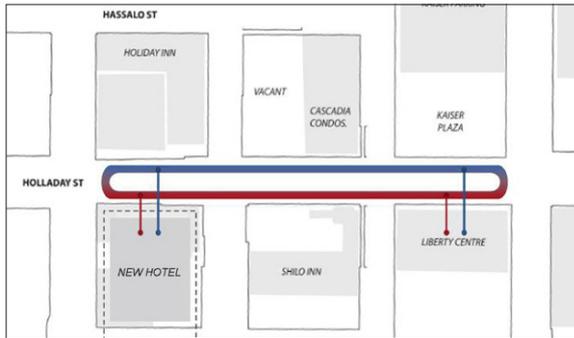
Primary Goals

- Exceed LEED™ Platinum.*
- Demonstrate neighborhood sustainable options.*
- Meet conventional targets for investment return.*

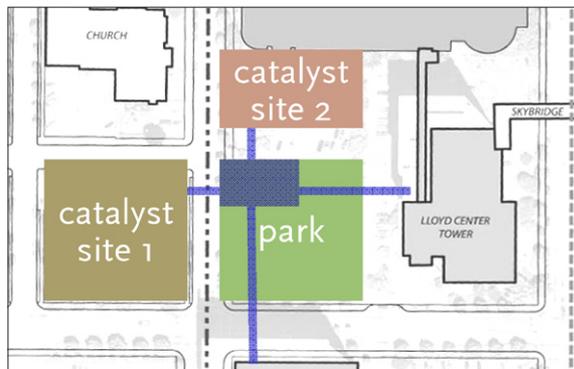
Community Benefits

- Enhanced urban vibrancy.*
- Distinct neighborhood identity.*
- Reduced environmental impact.*

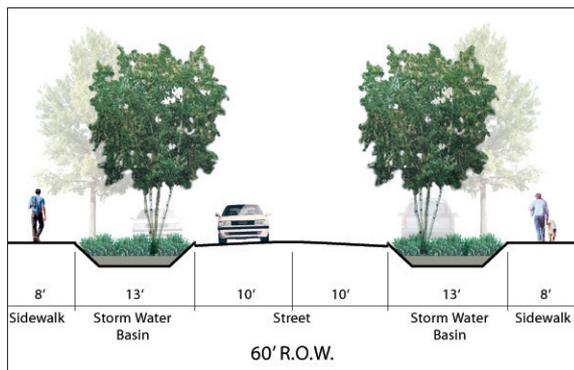




Thermal Transfer Concept



Living Machine Concept



Streetscape Improvements

Project Components

The Catalyst Project consists the following components:

public:

- streetscape improvements, acquisition and development of the public park
- construction of an underground garage to replace on-street parking

private:

- development of investment-grade residential and commercial income properties

shared infrastructure:

- stormwater bioswales at selected intersections,
- a blackwater treatment system
- a thermal transfer backbone
- conifer forest “patches”
- selected building efficiency upgrades.

The Plan envisions that shared infrastructure systems would be owned and managed by a local Resource Management Association, or RMA.

Parking

Parking is a major issue in any development project. Current market data were used to establish a parking ratio of 1.2 spaces per residential unit. Additional parking was not programmed for new ground floor street-oriented retail space since many customers will be from existing office or housing uses in the area. Parking spaces were programmed for existing private surface parking that would be displaced by the Catalyst Project development, however the value of this parking has been factored into land costs for the Catalyst Project and so is not shown as a separate cost item. Existing on-street spaces eliminated by proposed streetscape improvements are programmed to be replaced in an underground parking structure associated with the Catalyst Project.

A preliminary parking analysis (David Evans and Associates, April 2004) suggests that there may currently be a surplus of between 200 and 300 spaces in the existing parking capacity of the study area. The study also suggests that some residential uses in the area may have very low parking ratios. With the existing residential permit parking system, this may result in an unusually low turnover rate for on-street parking spaces. Further study is recommended to substantiate the actual utilization of existing private and on-street parking.

Building Program

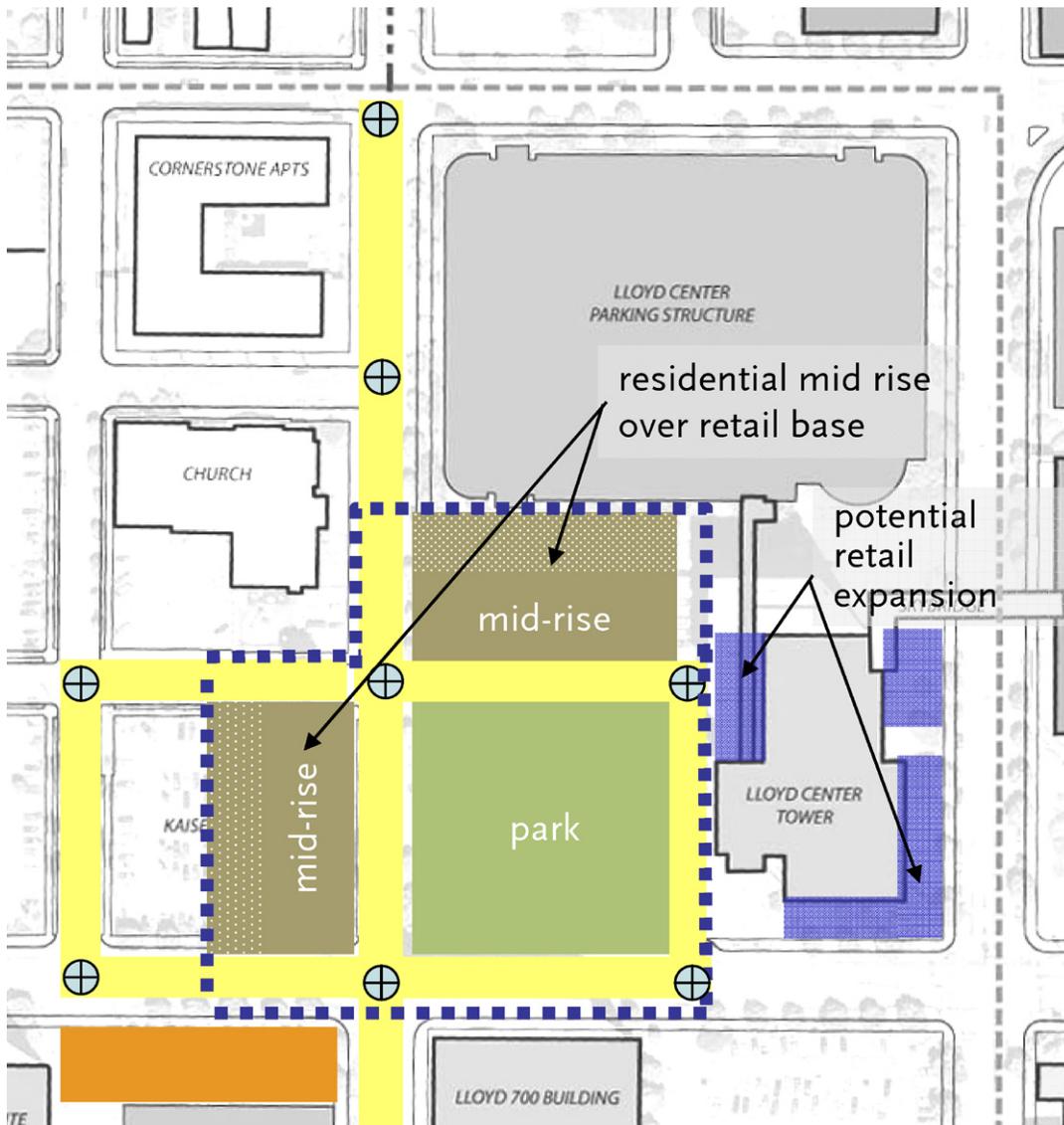
Two development scenarios (mid rise and high rise options) were examined for the Catalyst Project. The building program for the mid-rise option consists of a total of 150 residential units in two separate structures of approximately 75 units each, with supporting retail uses on the ground floor and parking in an underground garage. The mid-rise buildings are anticipated to utilize wood or metal frame construction over a ground floor concrete base.

In the high-rise option, the program anticipates between 240 and 300 residential units in a high rise concrete structure, with associated retail space in the base and underground parking. Two alternatives were illustrated for the high rise option, in order to demonstrate the concept on two different potential sites.

	mid rise on two 1/2 block sites			high rise alternate 1			high rise alternate 2		
private	# units	# spaces	square feet	# units	# spaces	square feet	# units	# spaces	square feet
residential units *	150		106,800	300		218,400	240		174,720
supporting retail			14,000			10,000			10,000
interim retail			7,000			7,000			7,000
underground parking **									
residential spaces, per unit =	1.2	180		1.2	360		1.2	288	
surface parking replacement***	estimate	281		estimate	327		estimate	212	
total parking		461	161,350		687	240,450		500	175,000
public									
public park			40,000			40,000			40,000
streetscape improvements									
intersection / stormwater improvements									
underground parking **									
street parking replacement	estimate	80		estimate	96		estimate	80	
total parking		80	28,000		96	33,600		80	28,000
r m a									
park café			2,400			2,400			2,400
park flower shop			600			600			600
living machine			4,000			4,000			4,000
thermal loop system									
grey water system									
pv systems									
total parking spaces									
					541			783	
									580

Notes:
 * average unit size: 718 net sf in mid rise; 728 net sf in high rise
 ** estimated @ 350 sf / stall
 *** replacement cost for private surface parking has been factored into land acquisition costs for Catalyst Project. (April 2004 parking analysis by David Evans and Associates indicates a potential current surplus of 200 - 300 spaces in the study area.)

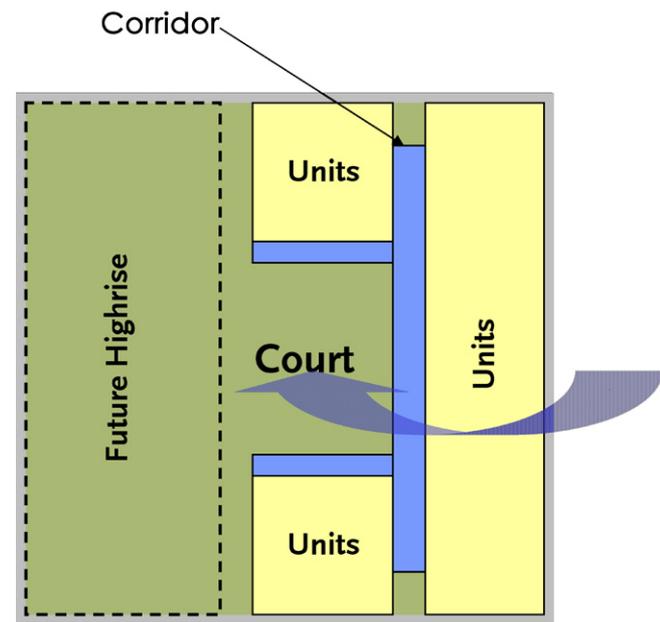




- catalyst mid-rise
 - two 75 unit buildings over retail
 - underground garage
 - interim retail along key street fronts
- underground garage (catalyst project)
- park (catalyst project)
- potential interim retail (catalyst project)
- streetscape and intersection improvements (catalyst project)
- future retail addition (not catalyst project)

Mid-Rise Alternate: Site Diagram

Note: Identified sites and land uses on this map are for study purposes only and do not necessarily indicate private development plans.



Natural Ventilation Strategy

- A** Catalyst mid-rise
 - two 75 unit residential street-level retail
 - underground garage
- B** Living machine in park
- C** Conifer forest "patches" at mid-block islands
- D** Stormwater bioswales at intersections
- E** Interim retail along key streetfronts



Note: This concept plan is not intended to represent specific planned or required development proposals.

Mid-rise Alternate: Design Concept



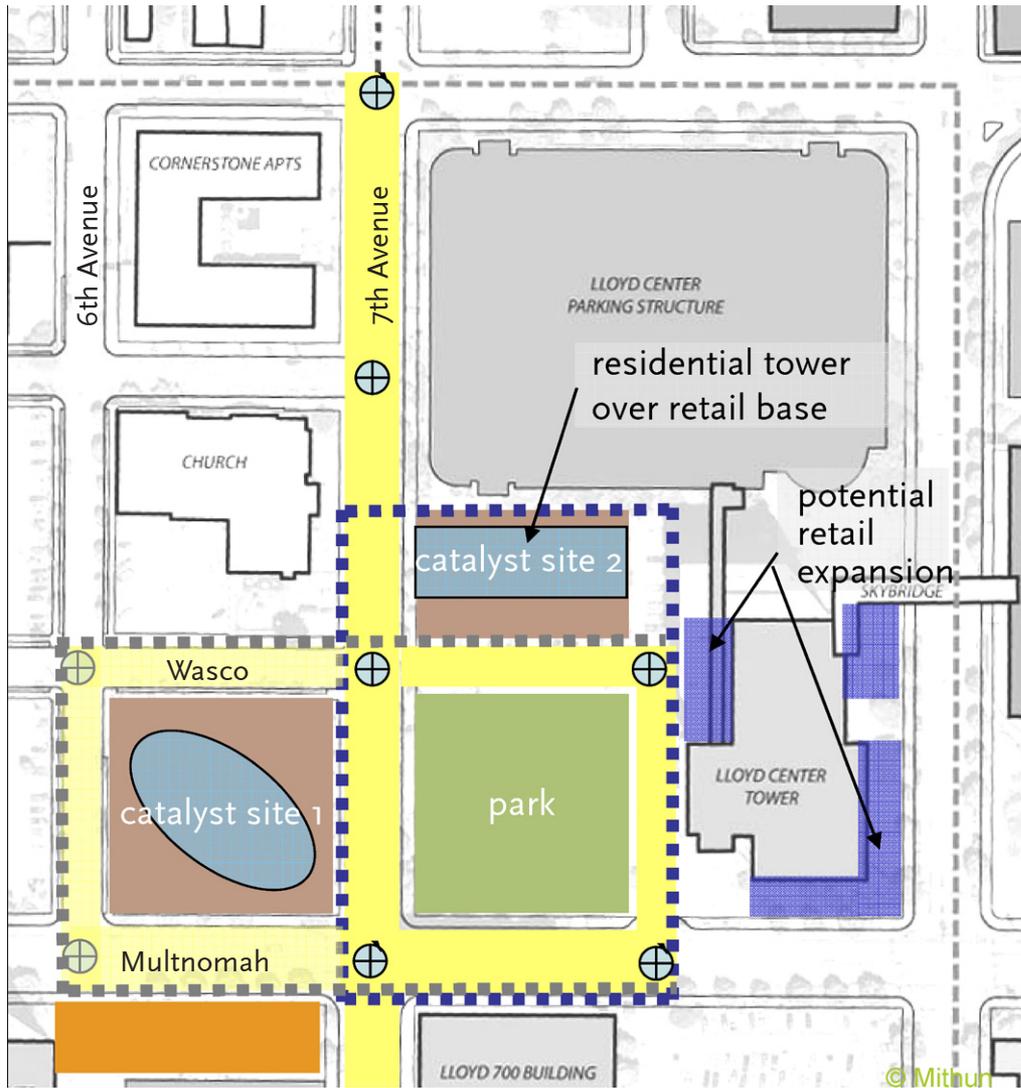
Mid-Rise Alternative: View North on 7th

Note: This concept plan is not intended to represent specific planned or required development proposals.

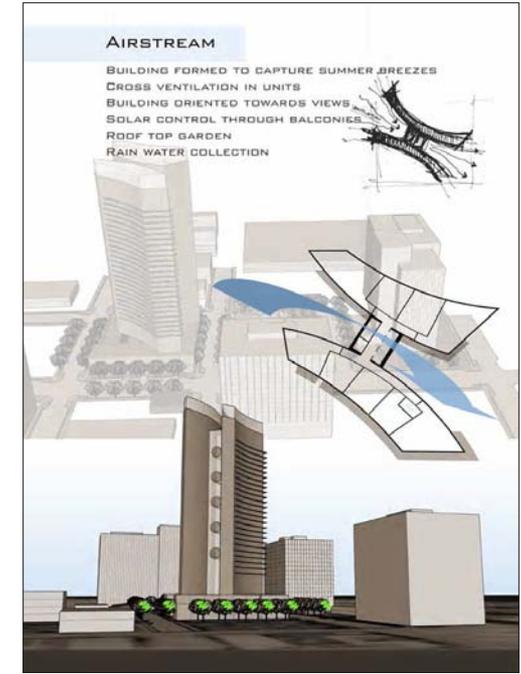


Note: This concept plan is not intended to represent specific planned or required development proposals.

Mid-Rise Alternate: View West on Wasco



- catalyst residential tower
 - 325' height limit
 - 20' retail base
 - 10' floor to floor, 30 floors
 - alt 1 = 10 units / floor; 300 units
 - alt 2 = 8 units / floor; 240 units
 - interim retail along key street fronts
- catalyst retail base
- underground garage (catalyst project)
- park (catalyst project)
- potential interim retail (catalyst project)
- streetscape and intersection improvements (catalyst project)
- future retail addition (not catalyst project)



High-rise Alternate: Site Diagram

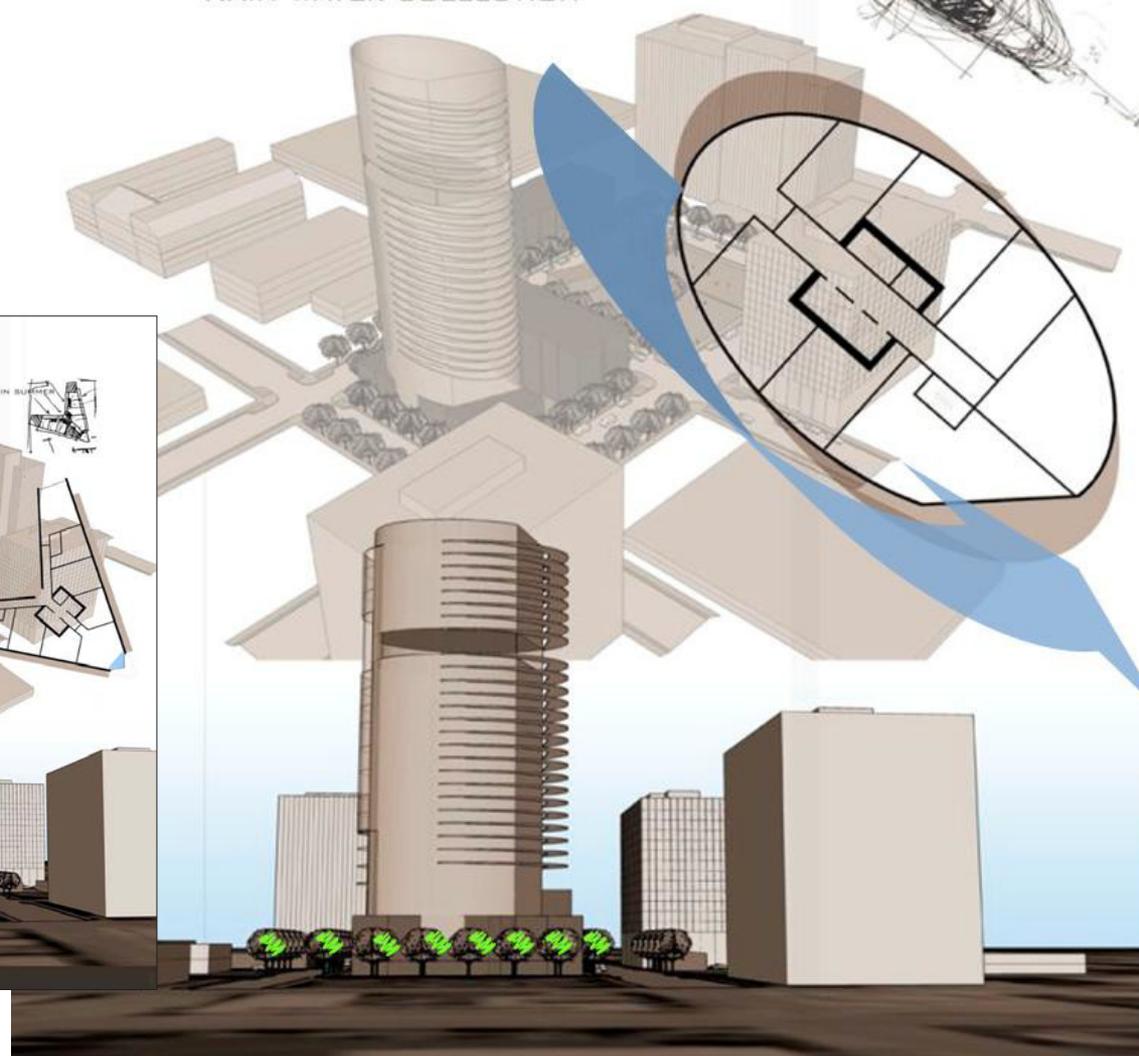
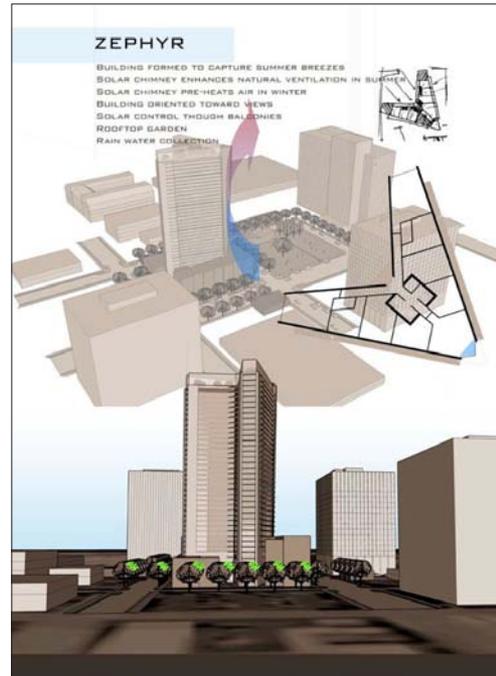
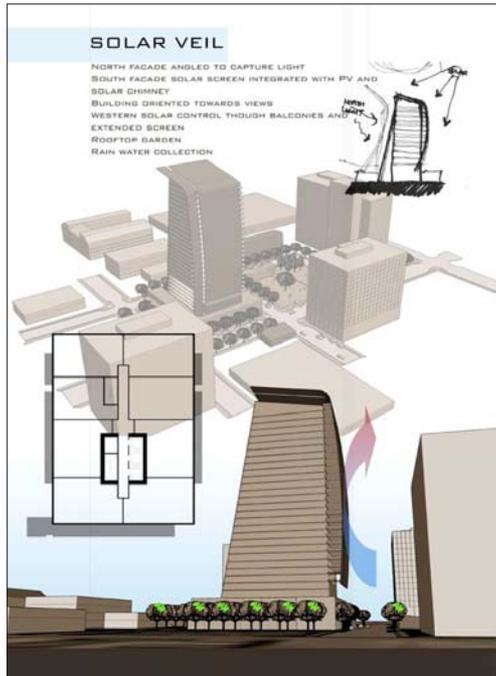
Note: Identified sites and land uses on this map are for study purposes only and do not necessarily indicate private development plans.

ECLIPSE

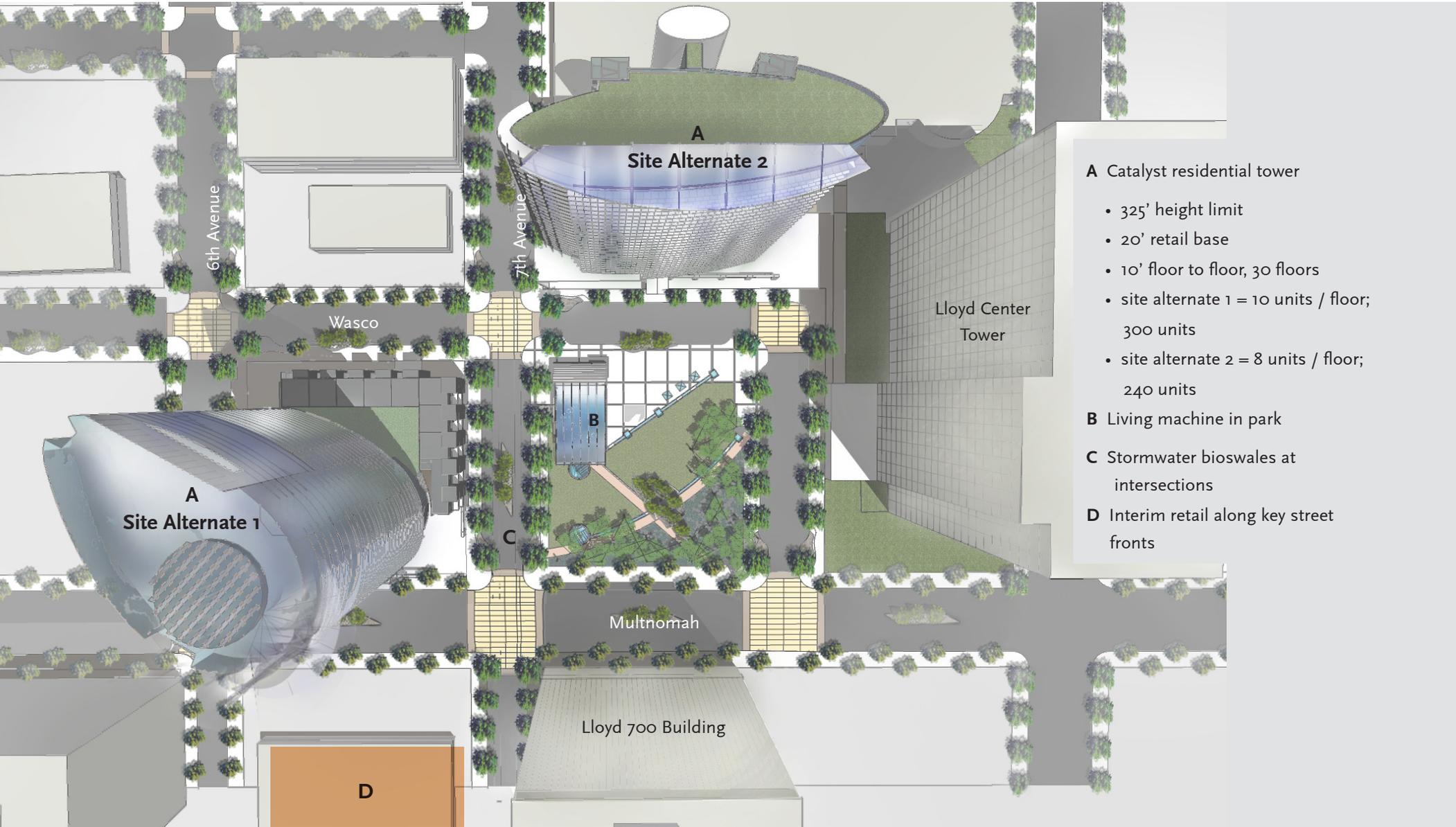
- EFFICIENT BUILDING FOOTPRINT
- BALCONIES DESIGNED TO FOLLOW SUN.
- DOUBLE WALLED GALLERY AT NORTH/EAST FACADES
- MID LEVEL COMMON USE AREA
- PV PANELS FOLLOW MOVEMENT OF SUN
- BUILDING ORIENTED TOWARDS VIEWS
- RAIN WATER COLLECTION

High-rise Alternate: Preliminary Building Form and Massing Studies

Several different design concepts were examined for the high-rise alternate. An elliptical plan was selected for inclusion in the final concept due to its potential for a balance between construction efficiency and opportunities for natural ventilation and passive / active solar energy systems.



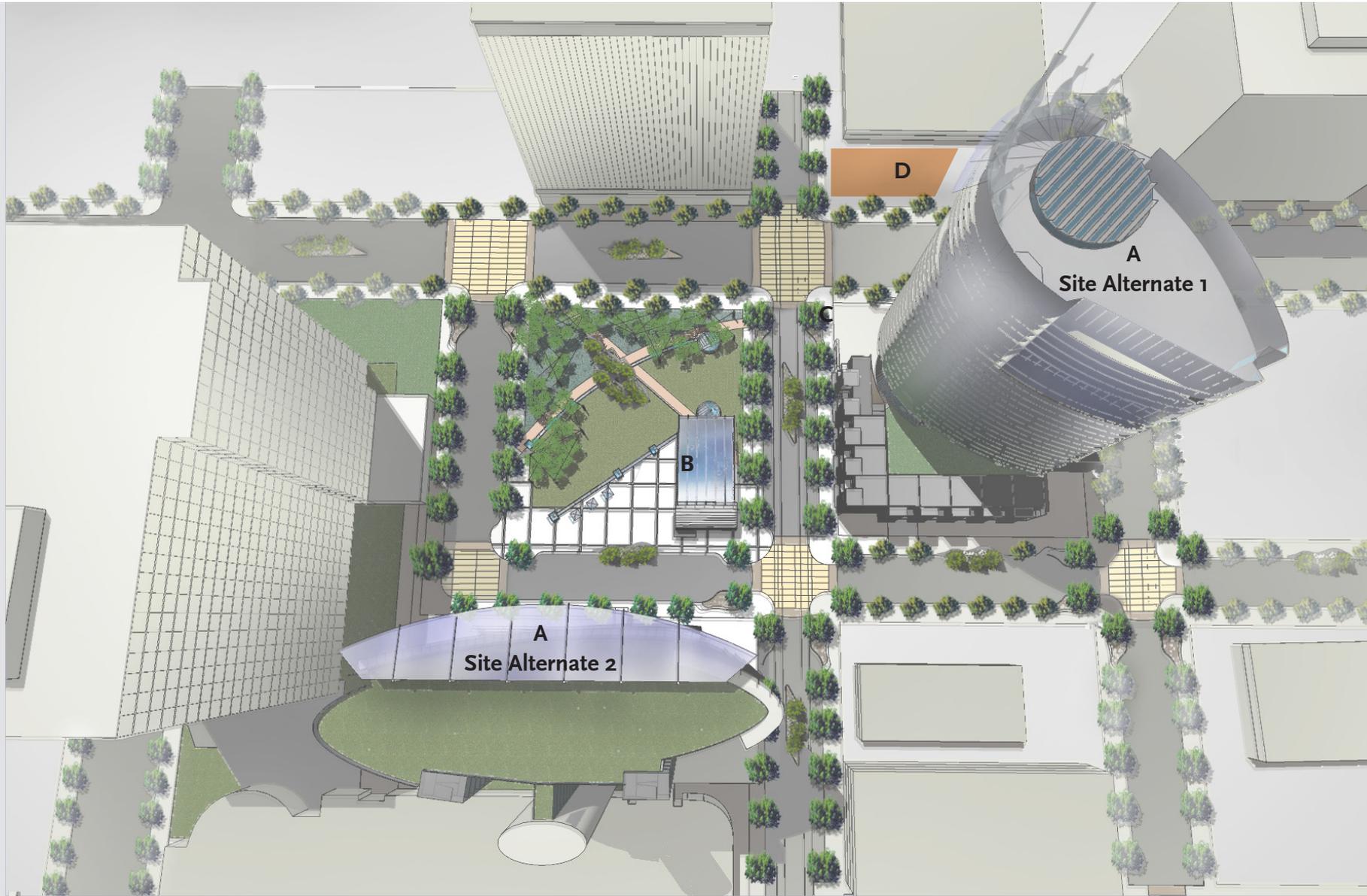
Note: This concept plan is not intended to represent specific planned or required development proposals.



- A** Catalyst residential tower
 - 325' height limit
 - 20' retail base
 - 10' floor to floor, 30 floors
 - site alternate 1 = 10 units / floor; 300 units
 - site alternate 2 = 8 units / floor; 240 units
- B** Living machine in park
- C** Stormwater bioswales at intersections
- D** Interim retail along key street fronts

High-rise Alternate: Design Concept

Note: This concept plan is not intended to represent specific planned or required development proposals.



Note: This concept plan is not intended to represent specific planned or required development proposals.

High-rise Alternate: Design Concept

Site Alternate 1

*300 unit high rise building
over retail*

Site Alternate 2

*240 unit high rise building
over retail*

Cafe/Living Machine

High-rise Alternate: View north on 7th Avenue at Multnomah

Note: This concept plan is not intended to represent specific planned or required development proposals.



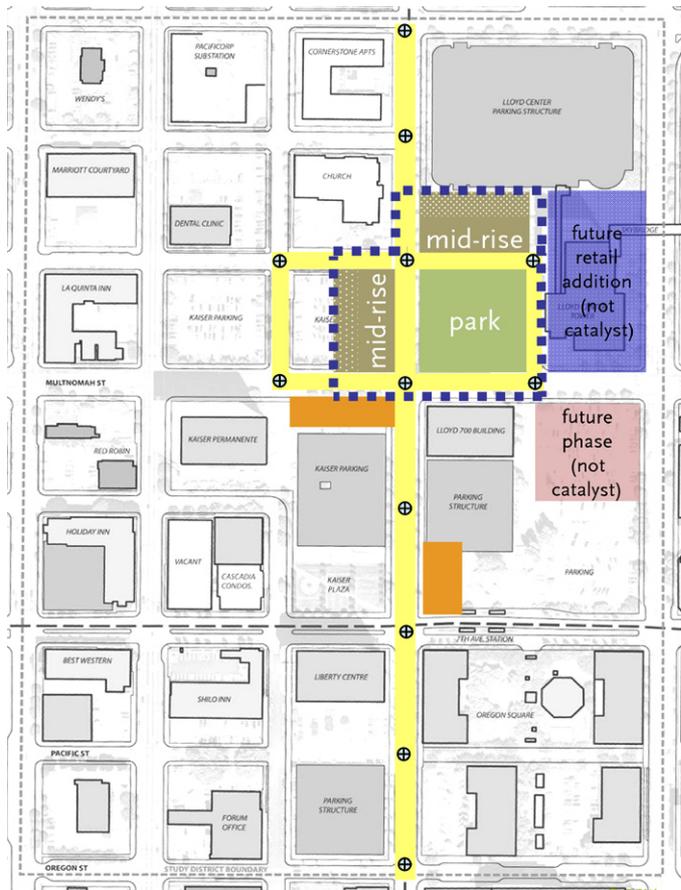
Site Alternate 1
*300 unit high rise building
over retail*

Site Alternate 2
*240 unit high rise building
over retail*

Cafe/Living Machine

Note: This concept plan is not intended to represent specific planned or required development proposals.

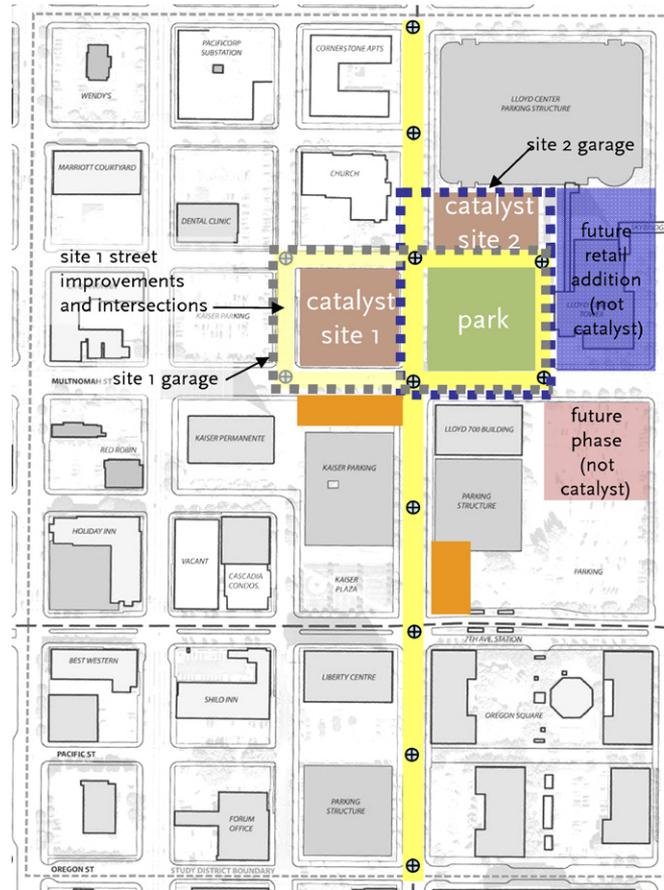
High-rise Alternate: View to Northwest at 7th Avenue and Multnomah



Catalyst Mid-rise

- two 75 unit buildings over retail
- underground garage
- interim retail along key street fronts

Mid-rise Alternate: Site Diagram



Catalyst High-rise

- 240–300 unit residential tower over retail
- underground garage
- public park
- streetscape and intersection improvements
- interim retail along key street fronts

High-rise Alternate: Site Diagram

- catalyst mid-rise
- catalyst high rise
- underground garage (catalyst project)
- park (catalyst project)
- potential interim retail (catalyst project)
- ⊕ streetscape and intersection improvements (catalyst project)
- future retail addition (not catalyst project)

Note: Identified sites and land uses on these maps are for study purposes only and do not necessarily indicate private development plans.

Placemaking and Site Selection

Habitat and Open Space recommendations in the plan anticipate that one block (approx. one acre) in the study area will be acquired as part of the Catalyst Project and dedicated as a public park. The location selected for the park (northeast of Multnomah and 7th Avenue) provides an opportunity to create significant urban space among existing major high rise buildings in a location central to the study area, as well as providing a platform for introduction of additional habitat connectivity in future phases of development.

The sites for the Catalyst Project concept provide an opportunity to complete the urban “room” defined by the public park, and to reinforce street wall definition along 7th Avenue in its role as a primary retail and transportation corridor. The Catalyst Project envisions implementation of streetscape improvements along the length of 7th Avenue and on the blocks immediately surrounding the park and the Catalyst sites, including the introduction of stormwater bioswales at intersections, mid-block conifer forest “patches”, and upgraded paving in selected areas

Interim Retail

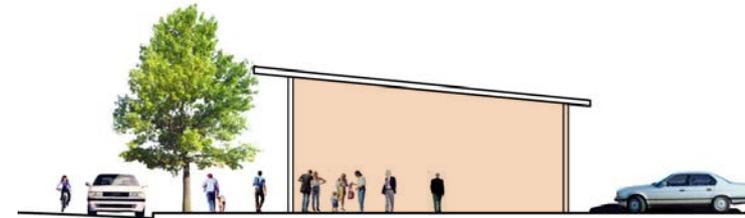
The Catalyst Project program envisions the introduction of interim retail structures along key street fronts in order to activate dynamic street life in the study area. The concept incorporates modular or prefabricated structures that can be easily erected with a minimum of site preparation, and which can be economically relocated as new development occurs over time.

Building Design and Sustainable Strategies

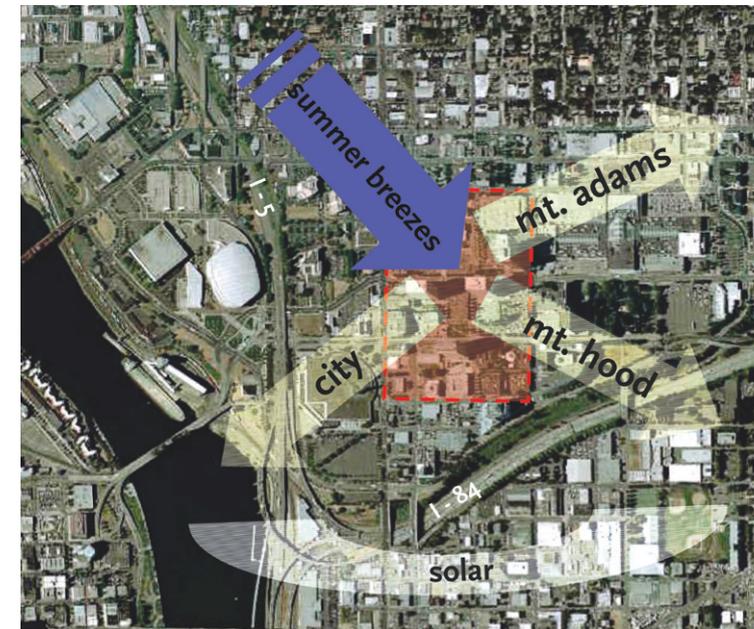
The Catalyst Project sustainable design concepts are intended to demonstrate an approach to development that will help realize the vision in the Plan through the use of a coordinated set of strategies employing best design practices and current technologies to achieve a significant improvement in environmental performance. Energy use in Catalyst Project buildings is projected to be reduced by a factor of 3, from 28.2 KWh/sf per year for existing buildings in the study area to 9.00 KWh/sf per year in the Catalyst Project buildings. Water strategies are designed to achieve 60% overall water conservation through fixture efficiency, rainwater harvesting, and blackwater reuse (via the shared Living Machine treatment system). Principles for materials use are intended to achieve a reduction in total embodied energy utilized in construction and operational systems. Together, these strategies will help establish a platform for resource use that will support long term sustainable development practices in the study area.

Form and Massing

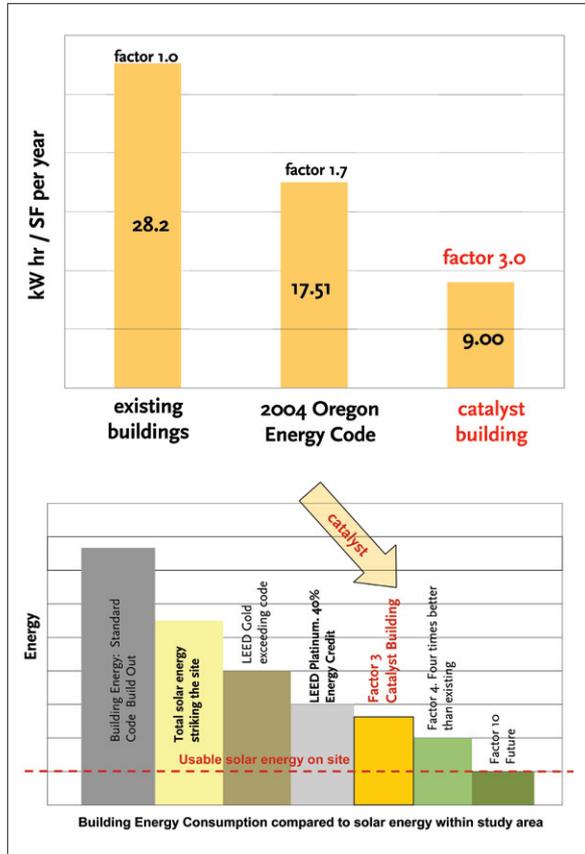
- respond to natural forces
- reach for 75% of windows located on South and West elevations for solar access
- building plan configuration for dual exposures in most apartments to maximize daylighting and natural ventilation / cooling
- passive solar shading through façade design elements



Interim Retail Concept Section



Sun / Wind / Views



Energy Use

Building Envelope

- increased insulation in walls, floors, and roof
- thermally broken, argon-filled dual-glazed low-e windows
- air leakage reduced by enhanced sealing and blower door testing
- renewable energy sources
- wind
- Photovoltaics
- Solar hot water

Lighting and Electrical

- efficient compact fluorescent lamps
- LED lighting in selected areas
- daylighting and occupancy sensors in corridors
- occupancy sensors in apartments
- premium efficiency motors

Domestic Water

- water-conserving aerators and showerheads
- drain water heat recovery
- Energy Star clothes washers
- 90%+ efficiency domestic water heaters

Efficient Heating and Ventilation

- exhaust air heat recovery
- efficient fans, pumps, water & duct systems
- 90%+ efficient boilers
- efficient cooling (high-rise building only)
- balconies & shades to reduce cooling loads
- night-flush cooling control in DDC system
- evaporative pre-cooling for central AC unit
- premium efficiency chiller

Water Management

- 60% overall water conservation through fixture efficiency, and water reuse via rainwater harvesting and blackwater treatment.
- 100% of all non-potable water demand satisfied through reclaimed water generated from the rainwater harvesting and blackwater reuse systems.
- Dual water supply systems in all new development – one for potable water and one for reclaimed water (existing development may be converted also).
- Individual rainwater harvesting systems in all new development (existing development may be modified to include rainwater harvesting also).
- A shared blackwater treatment system will collect and treat 100% of the wastewater from the Catalyst Project and the existing Lloyd Tower and Lloyd 700 buildings.
- Stormwater intersection improvements will treat and infiltrated 100% of the stormwater runoff generated from public streets.

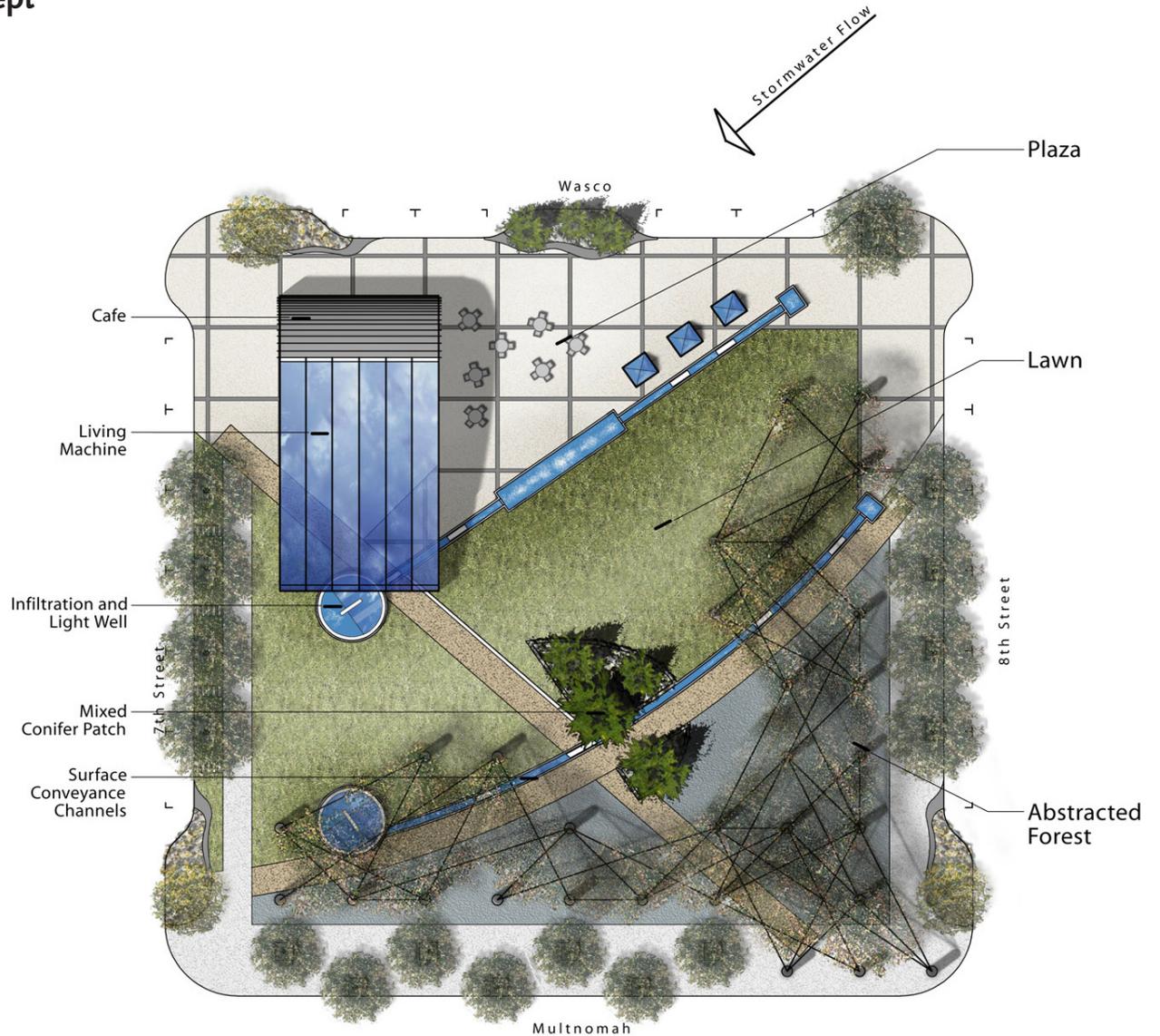
Sustainable Neighborhood Park Concept

The Neighborhood Park is intended to be an icon for the larger goals and concepts of the Lloyd District. It will provide a staging area for the living machine, a living room for the neighborhood and habitat for many species.

It is recommended that the park's plaza and lawn areas be programmed with regularly scheduled activities to promote a safe and healthy neighborhood culture.

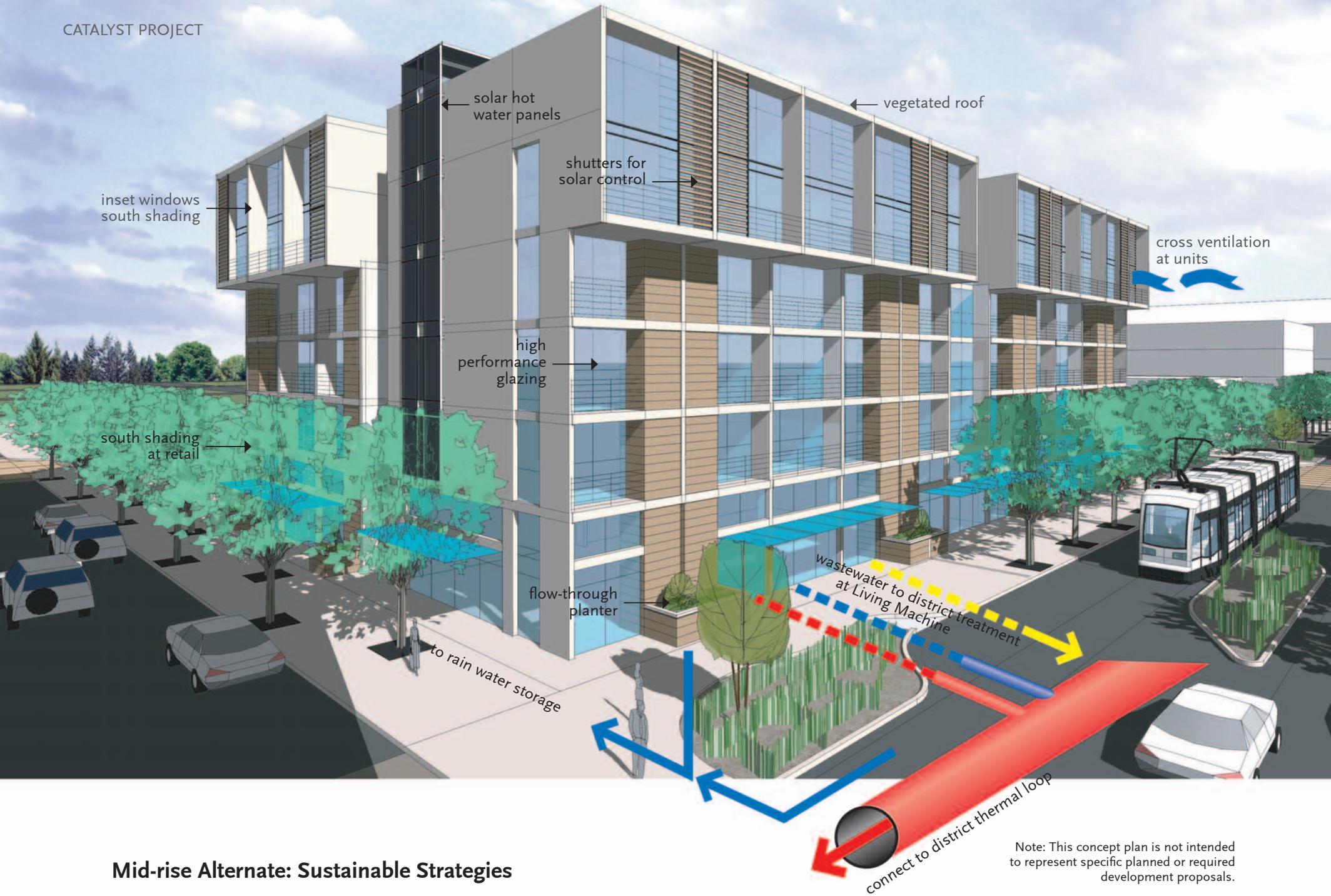
Sustainable Strategies

- Collect and infiltrate all stormwater within the one acre park through the use of conveyance channels which will direct water toward two infiltration wells.
- Create urban canopy with a series of lighted wire mesh columns and cables supporting a dense vine canopy. The site is limited, except in a few areas, from large tree planting because of the subsurface parking structure proposed below.
- Use recycled materials for as many of the hard surfaces as possible. The floor of the abstracted forest will be covered with recycled glass mulch that can be illuminated from below creating a glowing understory at night.
- Irrigate the lawn area with reclaimed stormwater or processed water from the on-site living machine.
- Allow natural light and ventilation into the parking structure through the use of light wells.



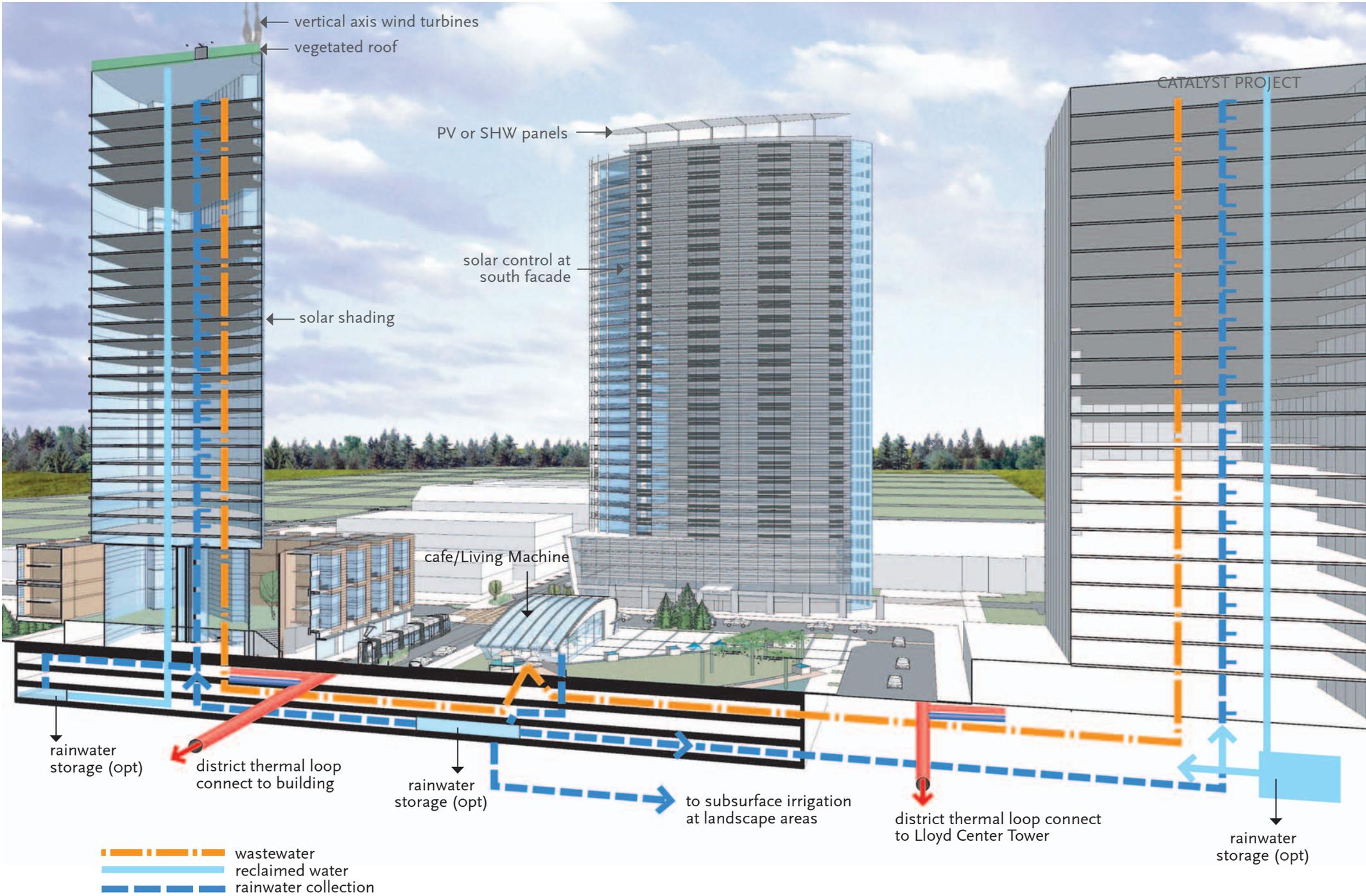
Neighborhood Park

CATALYST PROJECT



Mid-rise Alternate: Sustainable Strategies

Note: This concept plan is not intended to represent specific planned or required development proposals.



Note: This concept plan is not intended to represent specific planned or required development proposals.

High-rise Alternate: Sustainable Strategies

	mid rise on two 1/2 block sites	high rise alternate 1	high rise alternate 2			
construction costs						
Land Cost/SF	\$70	\$70	\$70			
Land Cost/Unit	\$24,394	\$9,333	\$7,292			
Green Costs/SF (1)	\$0	\$0	\$0			
Res & Pkg/Net SF	\$128	\$155	\$155			
Retail Costs/Net SF	\$110	\$110	\$110			
Total Project Costs (1)	\$27,877,541	\$62,551,085	\$49,869,924			
Total Costs/Unit (1)	\$185,850	\$208,504	\$207,791			
revenue and operating costs						
Residential Revenue	Per/SF	Per Month	Per/SF	Per Month	Per/SF	Per Month
Studios	\$1.56	\$811	\$1.64	\$852	\$1.64	\$852
1 Br/1Ba	\$1.56	\$1,061	\$1.64	\$1,114	\$1.64	\$1,114
2 Br/1Ba	\$1.49	\$1,192	\$1.56	\$1,252	\$1.56	\$1,252
2 Br/2Ba	\$1.38	\$1,380	\$1.45	\$1,449	\$1.45	\$1,449
Residential Operating Costs (Unit/Yr.)		\$3,577		\$3,571		\$3,571
Green Cost Savings (Unit/Yr.) (3)		\$67		\$73		\$73
Retail- NNN Lease Rate (SF/Yr.)		\$17		\$17		\$17
Parking- Per Stall/Per Mo.		\$80		\$80		\$80
Stabilized Lease Revenue		\$2,345,296		\$4,655,506		\$3,759,121
Vacancy		-\$117,265		-\$232,775		-\$187,956
Operating Costs		-\$553,600		-\$1,098,200		-\$879,560
Net Operating Income (Annual NOI) (2)		\$1,674,431		\$3,324,531		\$2,691,605
financing						
Construction						
Loan-To-Cost Ratio (Excl. Land)		73.17%		59.36%		59.61%
Total Equity Required		\$6,497,155		\$24,285,008		\$19,435,701
Interest Rate		6.50%		6.50%		6.50%
Permanent						
Interest Rate		7.00%		7.00%		7.00%
Financing Costs		0.50%		0.50%		0.50%
Amortization (years)		30		30		30

(1) Green Costs not included - by RMA

(2) Before debt service

(3) Represents 20% of total estimated savings.

Implementation

Construction Costs

Construction cost estimates for the catalyst project were provided by Walsh Construction and represent an average cost per square foot for similar projects in the Portland area. The adjacent table summarizes the costs for the mid rise and high rise catalyst alternatives. The estimated land acquisition cost is based on comparable land sales in the district and discussions with developers. Green costs are estimated to range from approximately 9 to 11 percent of the total construction cost. For the purposes of this model, capital for green costs (approx. \$15/sf) is assumed to be provided by the RMA. This level of investment in sustainable construction techniques and technologies would likely result in buildings that exceed the LEED platinum standards.

Revenue and Operating Expenses

The revenue and operating expense assumptions incorporated into the cash flow analysis reflect current market conditions as reported by industry participants.

In the mid rise alternative, apartment rents range from approximately \$1.38 to \$1.56 per square foot or \$811 to \$1,380 per month. Operating costs are approximately \$3,600 per unit per year, which includes an estimated \$67/Unit/Year cost savings (representing 20 percent of the cost savings generated by the RMA investment in energy efficient building systems). In this scenario the other 80 percent of the cost savings would be reinvested into RMA programs and initiatives. Overall, the Net Operating Income (NOI) for the mid

rise alternative is approximately \$1.67 million per year before debt service.

Apartment rents for the high-rise alternatives range from approximately \$1.45 to \$1.64 per square foot or \$852 to \$1,450 per month. Operating costs are approximately \$3,600 per unit per year, which includes an estimated \$73/Unit/Year cost savings (representing 20 percent of the cost savings generated by the RMA investment in energy efficient building systems). In this scenario the other 80 percent of the cost savings would be reinvested into RMA programs and initiatives. Overall, the Net Operating Income (NOI) for alternate 1 is approximately \$3.32 million per year before debt service. Alternate 2 generates an NOI of approximately \$2.7 million per year.

Retail rent is estimated to be a conservative \$17 per square foot per year on a net basis. Additional revenue is generated from renting parking stalls to residents at \$80 per space per month.

Financing

The financing for an income-producing property involves two loans—a construction loan and a permanent loan that takes out the construction loan once the project has stabilized and spreads the principal over a longer period (typically 30 years). The adjacent table illustrates the various assumptions associated with each of these loans.



financial performance - private component	mid rise on two 1/2 block sites	high rise alternate 1	high rise alternate 2
Net Present Value <u>with</u> RMA capital investment	\$298,000	(\$4,400,000)	(\$2,670,000)
Internal Rate of Return (IRR)	20.93%	16.60%	17.30%
Discount Rate	20.00%	20.00%	20.00%
catalyst total project costs	mid rise on two 1/2 block sites	high rise alternate 1	high rise alternate 2
private			
land cost / replacement parking reserve	\$ 3,659,000	\$ 2,800,000	\$ 1,750,000
residential and parking	\$ 24,928,000	\$ 63,933,000	\$ 51,184,000
retail costs	\$ 1,888,000	\$ 1,637,000	\$ 1,637,000
	\$ 30,475,000	\$ 68,370,000	\$ 54,571,000
public			
habitat / open space / land cost: public park	\$ 5,880,600	\$ 5,880,600	\$ 5,880,600
streetscape improvements	\$ 495,000	\$ 495,000	\$ 412,500
intersection / stormwater improvements	\$ 458,000	\$ 458,000	\$ 382,000
underground parking	\$ 2,000,000	\$ 2,400,000	\$ 2,000,000
parking reserve - residential permit or retail stimulus*	\$ -	\$ -	\$ -
	\$ 8,833,600	\$ 9,233,600	\$ 8,675,100
rma			
park building	\$ 910,000	\$ 910,000	\$ 910,000
living machine	\$ 4,604,600	\$ 4,604,600	\$ 4,604,600
thermal loop system	\$ 200,000	\$ 200,000	\$ 200,000
efficiency improvements - existing buildings	\$ 3,852,500	\$ 3,852,500	\$ 3,852,500
green upgrades - catalyst buildings	\$ 2,512,941	\$ 5,338,824	\$ 4,312,941
	\$ 12,080,041	\$ 14,905,924	\$ 13,880,041
total project costs (rounded to nearest million)	\$ 51,400,000	\$ 92,500,000	\$ 77,100,000

* need for public parking reserve should be substantiated in a more detailed parking analysis

Conclusions

The statistics in the adjacent table represent the overall performance of the alternative catalyst concepts as an investment. The Net Present Value (NPV) of an investment is the sum of the present value of all future cash flows less the initial investment. The net cash flow is discounted at the investor’s opportunity cost of capital, which for most real estate developers is approximately 20 percent. The NPV equals zero when the Internal Rate of Return (IRR) equals the discount rate.

At approximately 21 percent, the IRR that is evidenced by the mid-rise catalyst project is just above the discount rate (resulting in a slightly positive NPV). Under this set of investment assumptions, the mid-

rise catalyst is close to being a viable development project. Slight modification to some of the numerous assumptions used in the model could push the IRR further above 20 percent, indicating that it would meet the developer’s criteria and “pencil”.

At 16.6 and 17.3 percent (alternate 1 and 2 respectively), the IRR that is evidenced by the high-rise catalyst alternates is below the discount rate resulting in a negative NPV of \$4.4 million (alternate 1) and \$2.7 million (alternate 2).

Under this set of investment assumptions, both of the high-rise catalyst alternates need significant

cost reductions, subsidies or both to meet market expectations. Additional funds may come in the form of tax credits, urban renewal funds or a shared parking arrangement that reduces or eliminates the underground parking cost from the proforma. To be an attractive investment option, construction costs would need to be reduced by approximately 15 percent. Overall, the high-rise catalyst alternates are ambitious based on today’s Lloyd District market conditions. However, with the right combination of public and private participation, these projects could achieve reasonable financial returns as well as environmental and economic development goals.



Conclusions and Recommendations

The Sustainable Urban Design Plan establishes a vision for Portland's Lloyd Crossing as a vibrant, attractive urban neighborhood that reverses the predominant trend of increasing environmental impact through a coordinated set of strategies that can be implemented incrementally over the next 45 years. Over time, this produces a dense urban ecosystem whose performance characteristics mimic the historic pre-development conditions of the site in the key environmental areas of habitat, water, and energy. In this vision, the Lloyd Crossing neighborhood becomes synonymous with the concept of healthy urban living, incorporating a diverse mix of uses, a highly desirable identity, and convenient transportation connections to the rest of the metropolitan area.

The Plan demonstrates that this vision can be achieved by utilizing a combination of existing tax credits, incentives, and reinvestment of operational savings over the course of the study period. Implementation of the vision will require strong public/private partnerships, patient capital, and a long-term perspective. Applying certain assumptions regarding the amount of operational savings and tax offsets assumed to be reinvested, these revenues alone are adequate to repay upfront capital costs over the 45-yr study period; however, it will be important to identify additional public sources of capital to both make the required initial investments in infrastructure and to supplement the private capital sources identified here.





Key Recommendations

Habitat

- Introduce additional open space and habitat connectivity in the form of a public park, green streets, and bioswales in the public right-of way.
- Initiate off-site habitat mitigation in the adjacent Sullivan's Gulch area.

Water

- Achieve 60% overall water conservation through the use of highly efficient fixtures and water reuse via rainwater harvesting and blackwater treatment.
- Provide 100% of non-potable water supply through reclaimed water generated from the rainwater harvesting and blackwater treatment systems.
- Treat and infiltrate all stormwater in the public right-of way through bioswales at each street intersection.

Energy

- Implement efficiency upgrades to achieve an overall reduction in energy use of at least 23% for existing buildings.
- Increase energy performance by a factor of three over the current energy code for all new buildings constructed in the neighborhood from 2004 to 2015.
- Increase energy performance by a factor of six for all new buildings constructed in the neighborhood from 2015 to 2050.
- Through a combination of on site and off site strategies, create a study area that is carbon neutral.

Placemaking

- Use open space, stormwater and habitat recommendations as an opportunity to create an urban signature for the neighborhood, and to enhance the pedestrian experience throughout the study area.
- Preserve FAR capacity within the neighborhood through creation of an area-wide floor area transfer mechanism.
- Implement planning strategies to create a unique street character and hierarchy that reinforces recommended residential and commercial uses, and supports vibrant pedestrian connections within the study area.
- Consider the development of a public underground parking garage to offset parking spaces displaced by other strategies.
- Create a signature neighborhood park as a centerpiece to Lloyd Crossing, incorporating key sustainable strategies.

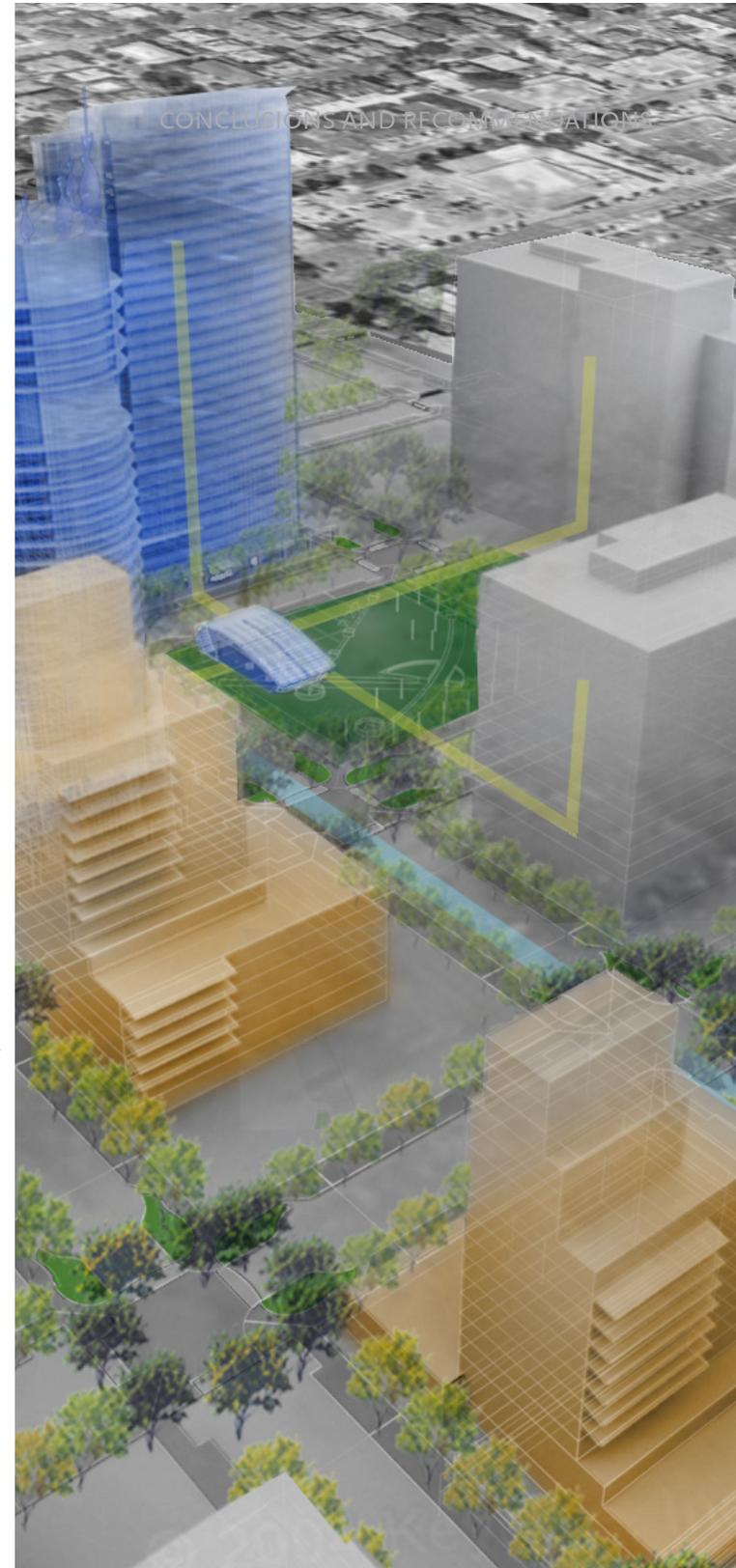
Implementation

- Consider formation of a Resource Management Association to facilitate the financing, construction, and maintenance of sustainable infrastructure and the implementation of sustainable development strategies and programs.

Next Steps

Many questions and issues were raised during the development of the Plan which will require further research and study. Some of these include:

- Further evaluate potential funding sources identified in the Plan to fund public and area-wide infrastructure improvements.
- Further evaluate potential modifications of design guidelines and zoning requirements to facilitate urban design goals established in the Plan for street-level character, transfer of floor area ratio between sites, and application of additional height limits and bonuses.
- Develop a study area computer model to evaluate form, height, location and orientation optimization on natural ventilation, solar access and solar performance.
- Research and evaluate detailed parking and transportation demand criteria that would impact the required level of investment in public infrastructure such as underground parking.
- Evaluate the Resource Management Association concept as to its membership, funding, and operating structure. Examine its potential role in development, operations, administration and marketing of the sustainable infrastructure.
- Further study a range of potential incentives to encourage private sector participation in the Plan.
- Further evaluate potential public sector funding sources to provide necessary up front capital.
- Establish strategies and partnerships to review local, state and federal tax policy opportunities.
- Expand on marketing and branding opportunities for the study area offered by the strategies.
- Develop a detailed first phase implementation strategy for recommended habitat, water, energy, and placemaking strategies in the Plan.
- Evaluate the economic benefit to affected agencies, departments, and jurisdictions of reduced resource demands and reduced environmental impact resulting from the Plan.
- Evaluate the benefits of establishing a Sustainable Advisory Board to provide input and evaluation during the next stages of the Plan's development and to oversee the initial stages of its implementation.
- Conduct a detailed study of current and projected parking demand in the study area to inform public and private development decisions.
- Further evaluate the interim retail concept to enhance street character.



List of Figures

2004 existing energy use conditions ©Mithun / SolArc	40	Active streetlife ©Mithun	80	Environmental impact reduction ©Mithun	7
2004 existing habitat conditions ©Mithun / GreenWorks	25	Building program cost revenue financing ©Mithun	85	Financial performance ©Mithun	104
2004 existing water use conditions ©Mithun / KPFF	32	Building Setback ©Lara Swimmer	62	Greater Portland area ©Mithun	16
2050 habitat conditions ©Mithun	27	Carbon balance ©Mithun / SolArc	45	Green Streets 8th Ave Streetscape Concepts ©GreenWorks / Mithun / KPFF	61
2050 per code energy use conditions ©Mithun / SolArc	44	Convention Center – Portland ©Mithun	103	Green Streets: Concept Plan ©GreenWorks / Mithun / KPFF	57
2050 per code water use conditions ©Mithun / KPFF	34	Corner cafe – Portland ©2004 Project for Public Space, Inc.	13	Green Streets Flow-through Conifer Planter ©GreenWorks / Mithun / KPFF	57
2050 per plan energy use conditions ©Mithun / SolArc	42	Corner of Johnson Street NW and NW 11th Street, Pearl District ©Eckert & Eckert	62	Green Streets Streetscape Concept ©GreenWorks / Mithun / KPFF	60
2050 per plan water use conditions ©Mithun / KPFF	35	Corner of NE Grand Ave and Weidler St, Lloyd District ©Roger Williams	63	Habitat / Open space – Cash flow analysis 2005– 2035 ©Mithun	28
3D rendering of catalyst project ©Mithun	12	Cost revenue financing ©Mithun	102	Habitat and tree cover ©Walsh Construction	23
3D rendering of catalyst project ©Mithun	82	Energy – cash flow analysis 2005–2050 ©Mithun	51	Habitat and tree cover ©Roger Williams	28
3D rendering of catalyst project ©Mithun	108	Energy mix transition ©Mithun / SolArc	50	High-rise alternate: design concept ©Mithun	11
7th Avenue Streetscape Concept ©GreenWorks / Mithun / KPFF	58	Energy Use ©Mithun	98	High-rise alternate: design concept ©Mithun	92
7th Street ©Mithun	46				

LIST OF FIGURES

High-rise alternate: design concept ©Mithun	93	Lloyd Center parking– Portland ©Mithun	67	MAX lightrail – Portland ©2004 Project for Public Space, Inc.	10
High-rise alternate: preliminary building form and massing studies ©Mithun	91	Lloyd Center tower – Portland ©Mithun	4	MAX Lightrail – Portland ©2004 Project for Public Spaces	21
High-rise alternate: site diagram ©Mithun	90	Lloyd Crossing living machine concept ©Mithun	84	MAX lightrail – Portland ©2004 Project for Public Spaces	53
High-rise alternate: site diagram ©Mithun	96	Lloyd Crossing streetscape improvements ©Mithun	84	MAX lightrail – Portland ©2004 Project for Public Spaces	107
High-rise alternate: sustainable strategies ©Mithun	101	Lloyd Crossing Study area development potential ©Mithun	19	Mid-rise alternate: design concept ©Mithun	87
High-rise alternate: view to north at 7th Avenue and Multnomah ©Mithun	94	Lloyd Crossing thermal system concept ©Mithun / SolArc	48	Mid-rise alternate: site diagram ©Mithun	86
High-rise alternate: view to northwest at 7th Av- enue and Multnomah ©Mithun	95	Lloyd Crossing thermal system concept ©Mithun / SolArc	84	Mid-rise alternate: site diagram ©Mithun	96
Interim Retail Concept section ©Mithun	68	Lloyd District ©Mithun	76	Mid-rise alternate: Sustainable Strategies ©Mithun	100
Interim Retail Concept section ©Mithun	97	Lloyd District high-rise ©Mithun	41	Mid-rise alternate: view north on 7th ©Mithun	88
Lloyd Center – Portland ©Mithun	83	Lloyd District high-rises ©Mithun	47	Mid-rise alternate: view west on Wasco ©Mithun	89
Lloyd Center – Portland ©Mithun	106	Lloyd District – Portland ©Mithun	5	Multnomah Streetscape Concept ©GreenWorks / Mithun / KPFF	59
		Materials ©Roger Williams	70	Native species – blue heron and beaver ©www.clipart.com	26
		MAX lightrail – Portland ©Mithun	8	Native species – robin ©www.clipart.com	27

Natural ventilation strategy ©Mithun 86	Portland District map..... ©UrbsWorks15	RMA Operating Model ©Mithun 78
NE 7th Avenue and Multnomah Street ©Mithun 17	Portland parks ©2004 Project for Public Spaces 65	Rose Center – Portland ©Roger Williams 71
Neighborhood park ©Greenworks..... 99	Rose Center – Portland ©GreenWorks 70	Solar massing ©Mithun 66
New York sidewalk ©Mithun 64	Portland skyline and Mount Hood ©www.clipart.com 16	Solar parking meter – Portland ©Mithun 67
NW 11th Street – Portland Pearl District ©Eckert and Eckert..... 81	Portland Streetcar ©2004Project for Public Spaces..... 8	Solar utilization ©Mithun / SolArc 45
Oregon Square ©Walsh Construction 24	Portland street vendor ©www.clipart.com 6	Streetlevel retail ©2004 Project for Public Spaces 85
Placemaking: Cash Flow Analysis 2005–2050 ©Mithun / Heartland 69	Portland street vendor ©www.clipart.com 75	Storefront ©Mithun 74
Placemaking: Land Use Plan, Street Level ©Mithun / Urbsworks 54	Pre-developement conditions ©Mithun 14	Stormwater strategy ©Mithun 36
Placemaking: Land Use Plan, Upper Level ©Mithun / Urbsworks53	Pre-development conditions ©Mithun 20	Storefront ©Mithun 74
Placemaking: Open Space and Connections ©Mithun / Urbsworks 64	Pre-development energy use conditions ©Mithun / SolArc 38	Streetscape improvements ©Mithun 84
Placemaking: Stormwater Intersection ©GreenWorks / Mithun / KPFF 56	Pre-development habitat conditions ©Mithun 22	Study area development potential mode ©UrbsWorks 18
Placemaking: Street hierarchy ©Mithun / Urbsworks 52	Pre-development water use conditions ©Mithun /KPFF 30	Study Area Plan ©UrbsWorks 17
Pocket parks and public spaces ©Mithun 52	RMA Investments ©Mithun 78	SUD financial performance Overall summary – cash flow analysis 2005–2050

LIST OF FIGURES

©Mithun	72
Sun / Wind / Views	
©Mithun	97
Trolley stop	
©Mithun	16
View looking north from Liberty Centre	
©GreenWorks	24
View Northeast from Liberty Centre	
©GreenWorks	79
View Northeast from Liberty Centre	
©GreenWorks	105
Water	
©www.clipart.com	31
Water – cash flow analysis 2005–2050	
©Mithun	37
Water metrics summary	
©Mithun / KPFF	35
Water use concept section	
©Mithun / KPFF	33
Wind turbines	
©www.clipart.com	39