

# ECODISTRICTS

BUILDING ACROSS SCALES

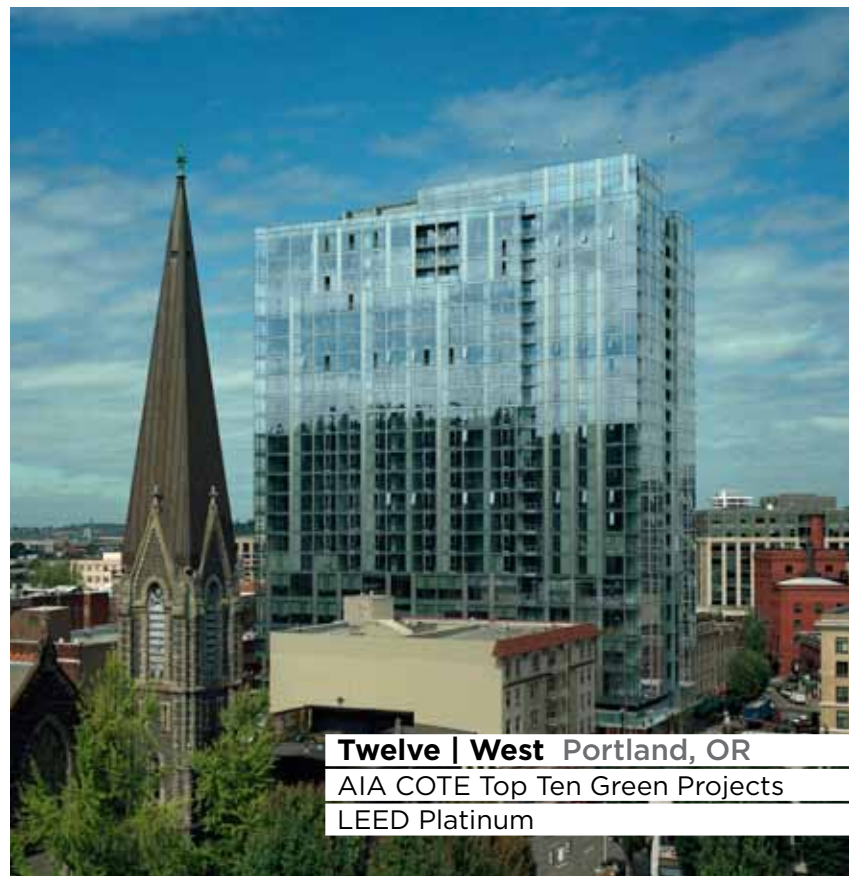


ZGF  
ZIMMER GUNSUL FRASCA ARCHITECTS LLP



# ZGF ARCHITECTS

ZGF Architects LLP is a 450-person architectural, planning, and interior design firm with offices in Portland, Los Angeles, Seattle, New York and Washington, D.C. Our work represents a diverse mix of projects, ranging from institutional and corporate campuses to civic and cultural facilities, and regional transportation systems that uses community and natural resources efficiently. Our approach is to look at the unique qualities of each place and to create buildings that respect the existing environment and strengthen or even heal the fabric of which they become a part. ZGF has learned to transfer this capability to other locales and circumstances throughout the world, adopting it as a very basic principle in its work. Currently ZGF is ranked 4th in the U.S. by Architect Magazine.



**Twelve | West** Portland, OR  
AIA COTE Top Ten Green Projects  
LEED Platinum



**U.S. GSA, Federal Center South Building 1202 Seattle, WA**  
National Institute of Building Sciences,  
Sustainable Buildings Industry Council, Honor Award



For nearly six decades, ZGF has master planned, designed, and built a diverse portfolio of projects internationally and across the United States, in settings ranging from college and corporate campuses to urban centers and rural communities. We have been instrumental in the development of design guidelines and land use policies, programs, and master plans that have provided the framework for hundreds of millions of dollars in public and private investment. Many of these projects have been coordinated and funded through unique partnerships including private developers, property owners, city, county, and state agencies. Our experience in master planning for large mixed-use projects includes multiple projects in distinct districts where we have led the development of plans, guidelines, strategies and implementation. Included in this is the design of the infrastructure, institutions, and private projects that are implemented in the district, as well as the design and development of individual mixed-use projects within the core of a city.



**Simon and Helen Director Park** Portland, OR  
Merit Award, AIA Northwest and Pacific Region



**St. Anthony Hospital** Gig Harbor, WA  
Design & Health International Academy,  
Academy Award for Sustainable Design



**Dana-Farber Cancer Institute, Yawkey Center** Boston, MA  
Modern Healthcare Magazine, Citation Award

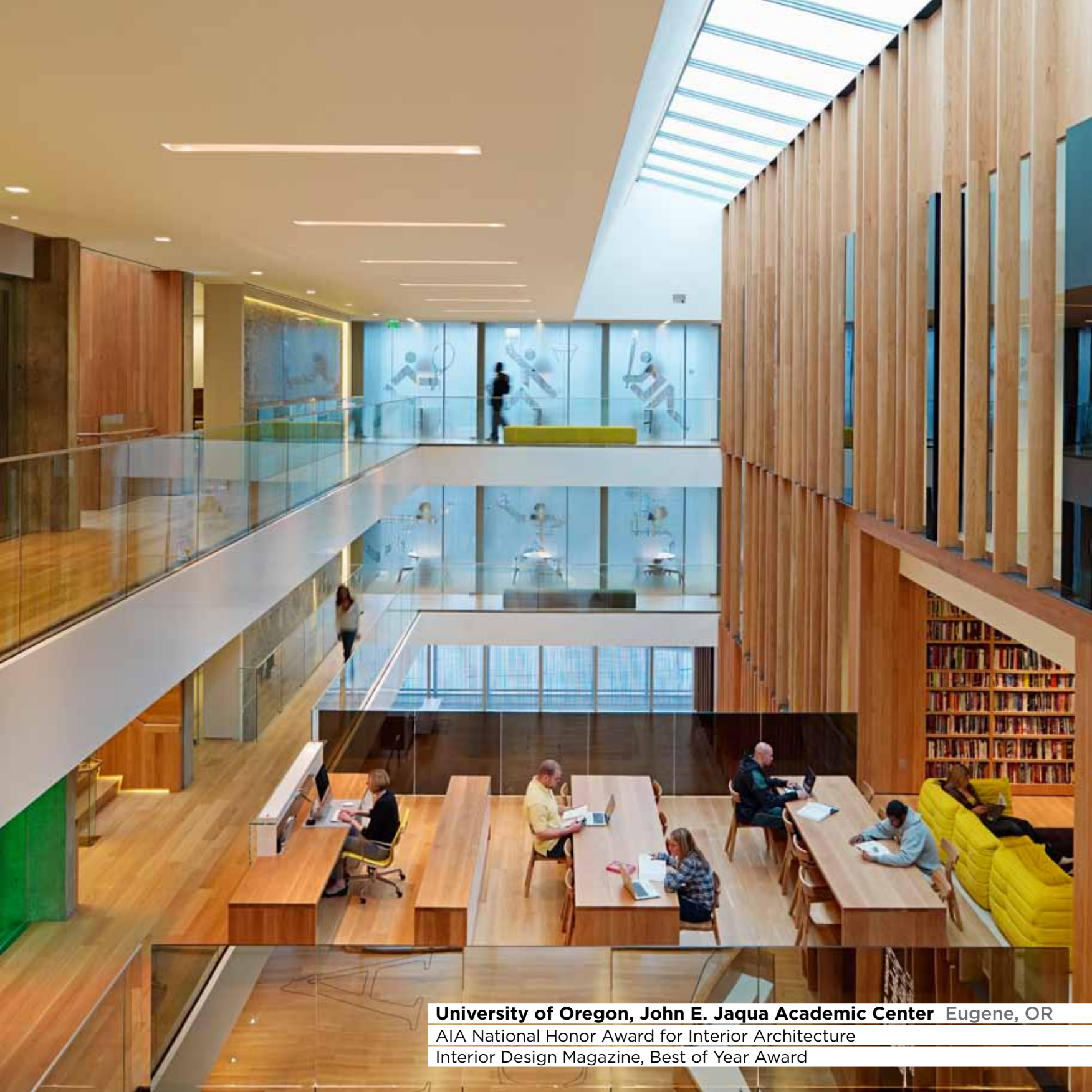


**Portland Mall Revitalization** Portland, OR  
AIA, National Honor Award for Regional and Urban Design

ZGF has been an industry leader in the progressive practice of sustainability for decades. The firm has more than 150 LEED Accredited Professionals on staff, and the firm has designed more than 60 projects that have been or are registered to be LEED Platinum, Gold or Silver certified. ZGF has received more than 550 national, regional, and local design awards, including the 1991 American Institute of Architects (AIA) Architecture Firm Award and the Presidential Design Award. In addition, the firm has been an industry leader in evolving the progressive practice of sustainability for decades. ZGF has more than 150 LEED Accredited Professionals on staff, and the firm has designed more than 60 projects that have been or are registered to be LEED Platinum, Gold or Silver certified.







**University of Oregon, John E. Jaqua Academic Center** Eugene, OR  
AIA National Honor Award for Interior Architecture  
Interior Design Magazine, Best of Year Award

# THE PEARL DISTRICT

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FORD'S



## Planning Portland's Pearl District

ZGF conceptualized and guided the development of the Pearl District in Portland, Oregon. It is considered the "gold standard" of a live, work and play neighborhood and has contributed to significant urban renewal since the 1990s. Today it is known for art galleries, upscale businesses and high-rise condominiums and lofts. It began with a consortium of developers and property owners that worked together to create a community that acted collectively in their own self-interest. ZGF helped to crystalize their ideas through urban design vision that brought unlikely partners together and ultimately attracted public interest and investment in the Pearl District, formerly occupied by warehouse, industry and railroad yards. Together they formed a development agreement that paved the way for individual projects to move forward through public and private investment. It was a compelling idea that connected the remote rail yards to the Willamette River waterfront and built the first modern North American streetcar – opening the door for redevelopment. Each individual involved contributed to the idea that the district would be a highly livable neighborhood and all project, no matter how small, complemented and supplemented this vision.

All of this was achieved through cultivation of sometimes improbable partnerships between parties who shared an interest in some part of district implementation. Funds from one source were used to leverage more from another. Ideas forged during the vision process have strengthened and consolidated during implementation. Today, Pearl District has more than 5,000 new housing units, more than 18,000 jobs (of which 2,400 are new) with supportive streets, parks, community oriented services, new centers for higher education, and a streetcar system linking the district to downtown (now in its tenth year of operation and currently being extended).

Its success is measured by the experience. The Pearl District's true value was its contribution to the benefits of vertical, mixed-use development built with easy access to streetcar, bike routes and pedestrian activities. As a result, there is less vehicle traffic and therefore the streets became a desirable feature of the district. They are places for community activities that support employment and residential uses and services. A true live, work, play environment is created.



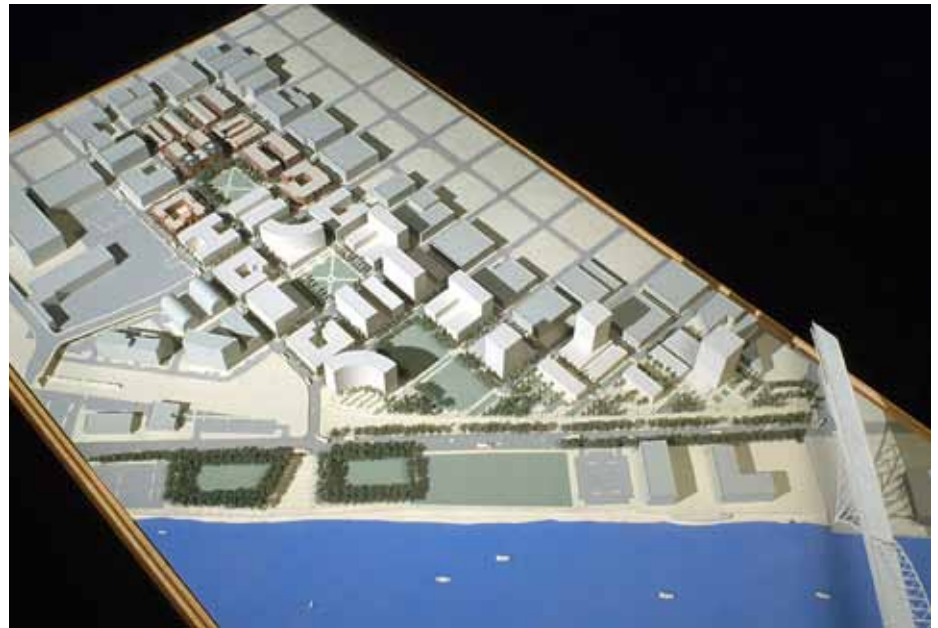




ZGF was commissioned to create a vision for the evolving Pearl District and a pathway for redevelopment. The plan was to recognize and leverage projects that were already planned, proceeding or recently completed and helped stakeholders work together to create a meaningful and desirable place. The plan also defined the magnitude of public and private investments, as well as resulting environmental improvements in the area.

ZGF Projects include:

- Right of Way Standards
- Hoyt Street Yards Master plan
- The Yards at Union Station
- Union Station Pedestrian Bridge
- Central City Streetcar
- Transit Mall Extension
- Centennial Mill Conversion
- Lovejoy Viaduct Removal





**BEFORE**



**AFTER**







The Pearl District is the antecedent to the EcoDistrict or Eco City approach to urban design. It is based on the simple idea that a long-term vision can coordinate shared community interests, aspirations and lifestyles. It became a place redefined by a strong community that administrates a mixture of jobs and housing; vertical, mixed-use buildings that are both old and new; with active retail storefronts.

Since the advent and awareness of climate change and recognition of the precious resources of the planet, the Pearl District is the foundation for livability that leads to significant reductions in water, waste, and energy use. The EcoDistrict builds on community stewardship to promote a resilient and regenerative urban environment. The facilities needed are made by incremental investments and support collective action. The Pearl has ushered in a new vision for urban renewal. Based on its example, we advance EcoDistricts as a new idea for urbanism that offers vitality through efficient use of resources and community participation.





# ECODISTRICT

SYSTEM DESIGN APPROACH





## **The district scale provides opportunities to optimize financial and natural resources in an enduring community.**

Buildings today are often judged by their performance in saving energy and water and reducing waste. But there is a limit to what a building can achieve by itself. For example, resource efficiency in providing heat, light and water is typically addressed at the building level—making it difficult or even impossible to meet net-zero consumption goals in urban settings.

EcoDistrict are a group of buildings and their surrounding open spaces that share the costs and the benefits of district systems. In the right circumstances, the waste of a neighbor is an asset to another. At the district scale, the waste water and thermal energy can be collected and reused more cost effectively than if done building by building or site by site. This can result in a fountain or other landscape that processes water and reduces energy and adds an amenity to the urban environment.

Simply put, a larger community can support improvements that save resources at a shared and potentially incremental cost. And system-wide planning like this allows for improved placemaking. Buildings enliven a community with street level pedestrian activity, providing access to services, and a lower housing to jobs ratio that forms a desirable community for business and healthy lifestyle for its inhabitants.

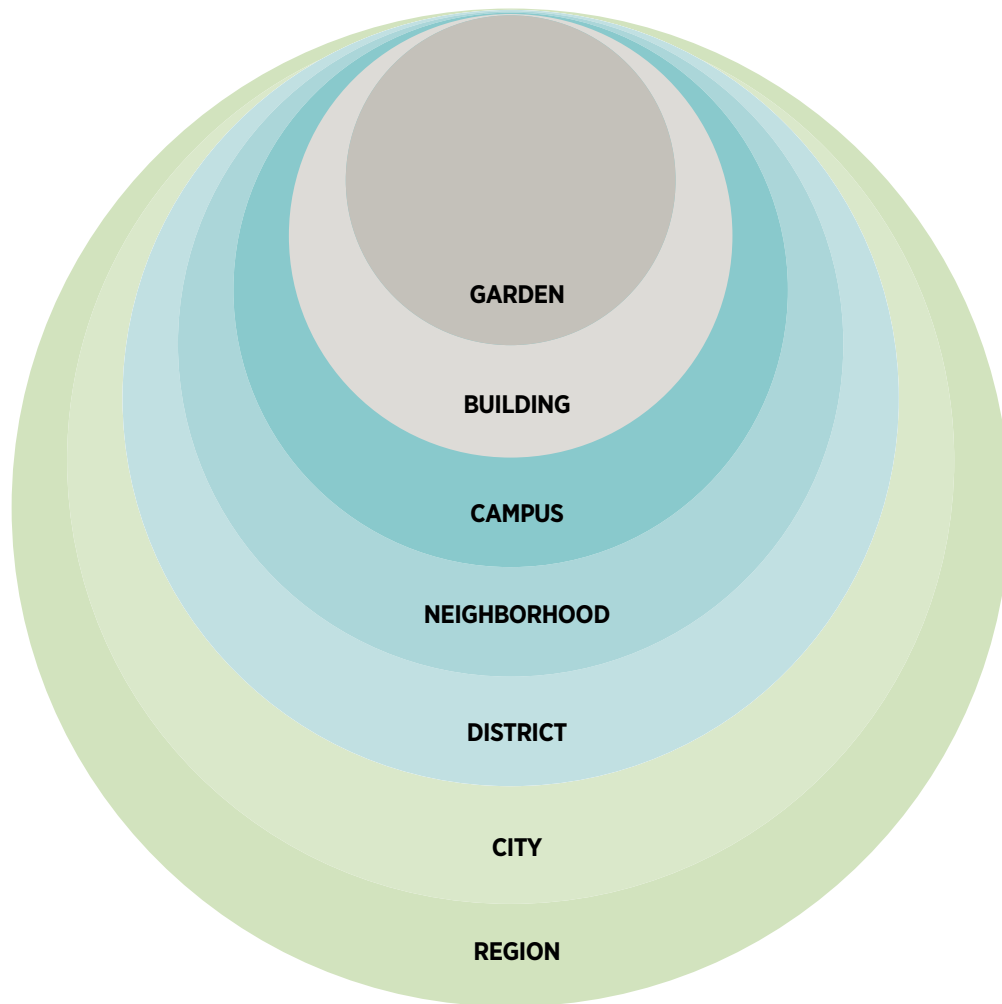
An EcoDistrict, is a place that relies on a strong design idea supported with enduring community stewardship at multiple scales. It requires the concerted action of government and grassroots efforts to encompass the full potential of community shared interests, resources, and resolve. Opportunities are found where action can be taken and supported across the community through collective pursuit of individual self-interest.

Whether Architect, Urban Designer, Landscape Architect, Engineer or Stakeholder, many design decisions—from the smallest scale of material such as a brick or a plant to the larger scale of the room, garden, building and surrounding open spaces—combine to yield the desired effect. The aggregate of public infrastructure, open space, transit, pedestrian and bike systems can be formed most effectively at

the district level to achieve improvements in energy and water efficiency, waste reduction and mobility. Resource efficiency in providing mobility is a long-standing principle that has proven to work on the scale of the district or city, for example in the form of light rail lines and pedestrian-oriented environments. District-, city-, and even regional-scale systems for water and energy can facilitate resource sharing and develop synergies in use patterns, leading to greater efficiency overall.

One of the great strengths of ZGF as a firm is the breadth of experience in designing at many scales in the city. Working side-by-side with the community in collaboration with other partners imbues designers with concern for context and attention to impact far beyond a property line. This broad mode of thinking about the larger context as we consider the smaller scale enables us to weigh the value of good ideas that contribute to a richer public realm and stronger communities. As district systems are connected in new ways in redeveloping urban areas there are tremendous opportunities to achieve new levels of environmental performance in the built environment. The district projects on the following pages make a contribution to any measure of sustainable development, at all scales of a City.





# SYSTEM

## ENERGY

Energy spans all scales and touches all systems. District energy can leverage efficiencies of scale in production and distribution, replacing resources pulled across long distances. By combining complementary uses, district and neighborhood systems can balance resources and help change human behaviors to lighten energy needs.

## WATER

Precipitation and ground water levels define a community's water use and neighborhoods can share water across wetter and drier parts of the city. Design of buildings and open spaces can minimize impervious surfaces and create areas of increased infiltration. Potable water can be reused multiple times, treated naturally and eventually released into the watershed or used to recharge local aquifers.

## MOBILITY

Efficient connections within a district or across a city or region and reduce the necessity of motor vehicle travel for access to jobs, education and amenities. Choices such as transit, biking and walking enhance the urban lifestyle and mitigate the impact of energy costs and increasing commuter burdens.

## MATERIALS MANAGEMENT

Material use should endorse products and processes that are safe for all species through time. Material demand should focus on reuse in a closed loop of salvage and recycling. A material's production, use and disposal should be free of toxic byproducts, creating clean industries and jobs for local residents.

## AIR

Air is integrally tied to the other systems. For example, decreased energy consumption reduces negative environmental and public health impacts from air pollution, which historically has a disproportionate impact on low-income and minority communities.

## NATURAL AND URBAN ECOSYSTEMS

Buildings and public open spaces should provide urban habitat and agriculture for the district and city. When coupled with other systems such as water, they can support plants, animals and microorganisms that enhance overall ecosystem health and livability.

## COMMUNITY

Livable communities are an outcome of integrated urban development and land use planning that address quality of life, economic development and social equity issues. District planning creates economies of scale for intrinsically related resources, improving air quality and urban ecosystems while yielding livable and culturally vibrant communities.



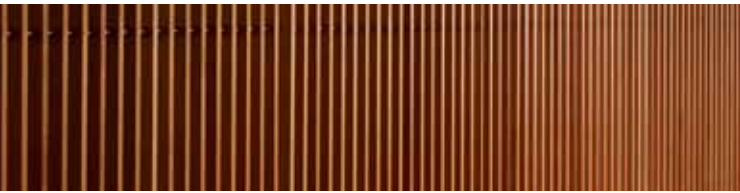
ENERGY



WATER



MOBILITY



MATERIALS MANAGEMENT



AIR



NATURAL AND URBAN ECOSYSTEMS



COMMUNITY

# SOUTHWEST ECODISTRICT

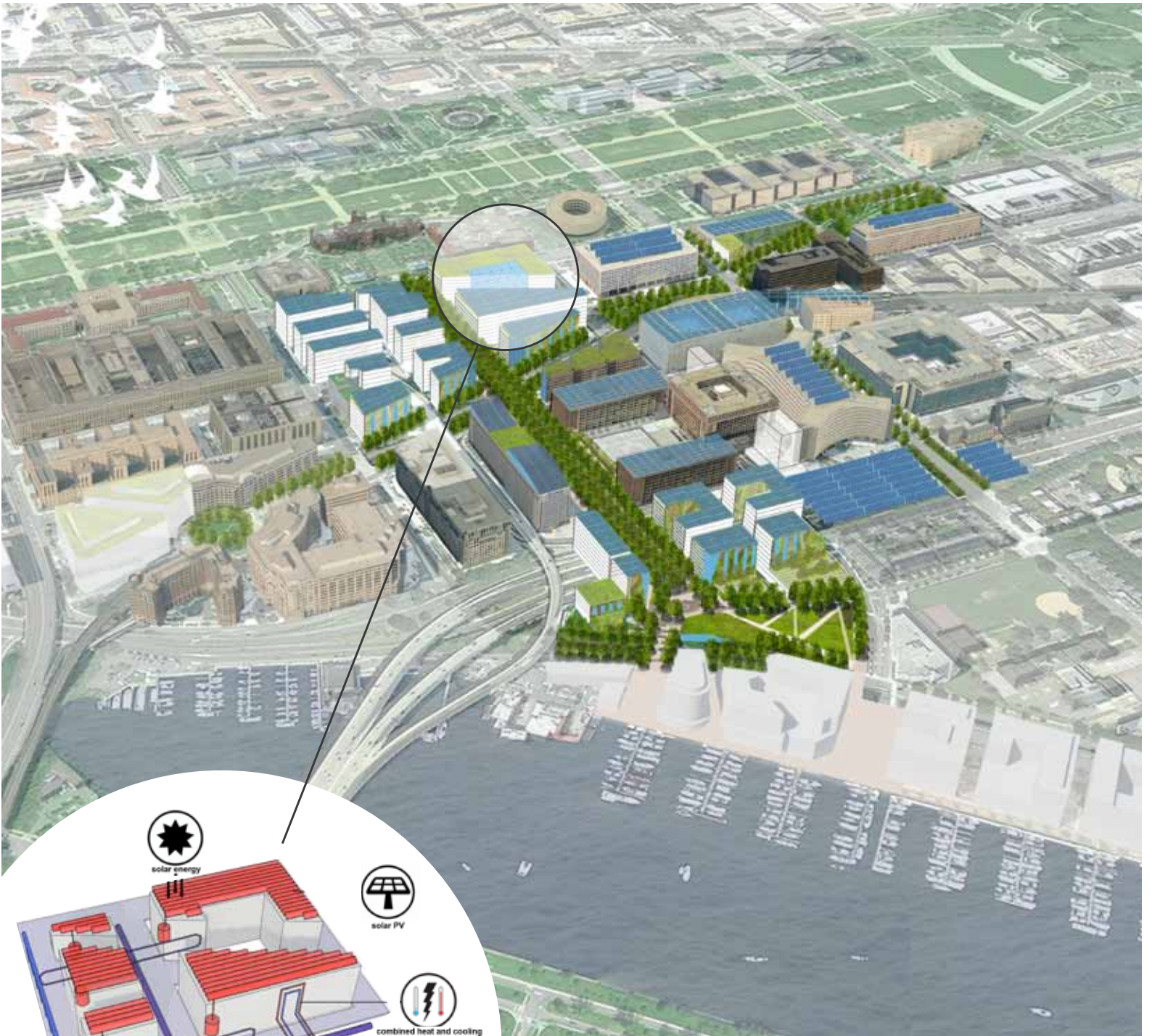
WASHINGTON D.C.

ZGF is developing urban design and sustainability strategies for the SW EcoDistrict, an effort led by the national Capital Planning Commission (NCPC) and the General Services Administration (GSA) in coordination with the DC Office of Planning, as well as 17 other local and federal agencies.

Project goals include advancing recommendations in the Monumental Core Framework Plan, Comprehensive Plan, and the Center City Action Agenda; assisting the federal government to meet the goals of Executive Order 13514—Federal Leadership in Environmental, Energy, and Economic Performance through the reduction of greenhouse gas emissions; and transforming the federal employment center into a model 21st century sustainable community through the implementation of high-performance buildings, infrastructure, landscapes, and streetscapes.

The SW EcoDistrict will be an active, multimodal, mixed-use neighborhood with significant cultural attractions and public spaces, offices, residences, and amenities. This mix will help the district share resources, allowing the waste from one building to supply resources for another building. Water, gas, electricity, and heating and cooling will all be shared among the buildings to create a 24-hour synergy.





Energy Production Diagram

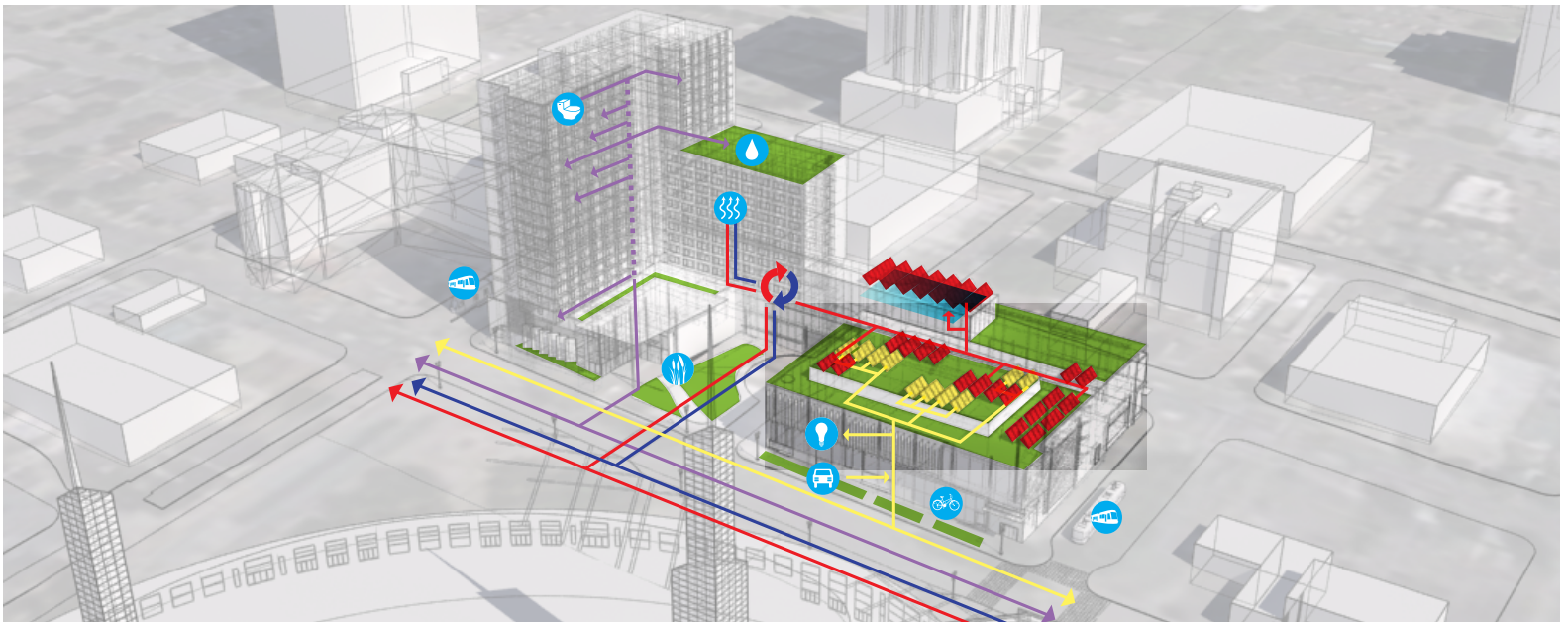
# LLOYD DISTRICT ECODISTRICT

PORTLAND, OR

Using the development of a new hotel as the catalyst, ZGF planned an EcoDistrict in the Lloyd District surrounding the Portland convention center. The mixed-use neighborhood features a variety of businesses, multi-family housing, two sports stadiums, greenways, and a number of public transportation facilities.

With ZGF's guidance, a variety of stakeholders—including developers such as Ashforth Pacific and City entities such as the Portland Sustainability Institute—explored various strategies for sharing resources and waste among the various buildings in the area. Using ZGF's proposed design for the Oregon Convention Center Headquarters Hotel as an example, the district's buildings would take advantage of, and contribute to, district-wide systems, including stormwater management,

sewage treatment, and energy harvesting. Other high-performance strategies include an anaerobic digestion facility to convert food waste from restaurants, hotels, the convention center, and the Rose Garden Area into electricity. Combined with distributed rooftop and building-integrated solar photovoltaic panels, these systems can provide grid-tied renewable energy that exceeds what can be achieved by individual buildings, while wastewater management systems can take advantage of the larger surface area to reuse rainwater for irrigation and other non-potable needs.





On-Site Energy Generation



On-Site Wastewater Treatment



Surface Runoff



Vegetated Roofs and Walls



Transportation



Community

# BEAVERTON ECODISTRICT CONCEPTS STRATEGY AND SITE DEVELOPMENT FEASIBILITY STUDY

BEAVERTON, OREGON

In a parallel effort to the Beaverton Strategic Civic Plan, ZGF and Gerding Edlen studied the cost benefit and development feasibility of identified catalyst sites and EcoDistrict systems for water and energy. The EcoDistrict Concept Strategy and Site Development Feasibility evaluated various public investment scenarios that would expand an existing energy system and Transform heavily-impacted creeks flowing through the area.

Through comparison of development concepts, the team evaluated catalyst projects that would leverage district energy systems and give the City a competitive advantage for attracting

new businesses and residents. ZGF also developed a high-performance open space concept that achieves three of Beaverton's objectives: provide stormwater system improvements to reduce flooding and improve water quality; support the district energy concept through heat exchange with collected stormwater to limit summer heat loads in Beaverton Creek; and create inviting open space corridors to attract new development.







# WENJIANG SOUTH INDUSTRIAL ECODISTRICT

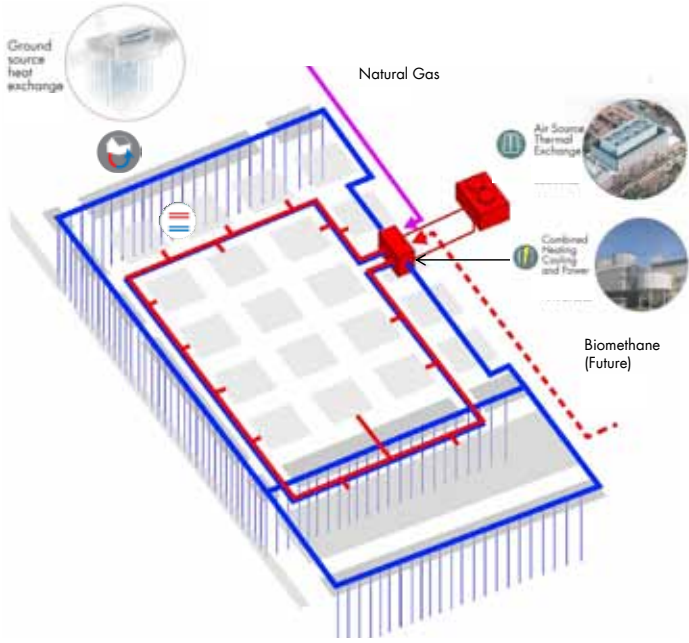
CHENGDU, CHINA

WenJiang's new EcoDistrict is designed to integrate residential, commercial, recreational, and educational uses to support a community lifestyle for a new high-tech and creative community located between the government and university areas of town. ZGF's Framework establishes district-wide goals, policies, and strategies for environmental responsibility; defines urban design guidelines; and creates design standards for open spaces and buildings.

It provides a framework that is "net-zero" ready for water, waste, and energy. Through stewardship of business and residential amenities, unique places are envisioned that are particularly attractive in

the international creative class market. Sustainable strategies make use of natural elements—rain, wind, sunlight, and ground source energy—to offset the energy and resource needs and wastes of a typical urban area. Among other sustainable strategies, high-performance buildings, streets, and open spaces use shared water and energy to minimize waste and pollution while a central utility plant, in combination with a waste recovery system, provides additional efficiencies.





# LIVING CITY

DESIGN COMPETITION  
PEOPLE'S CHOICE AWARD





The Living City Design competition, sponsored by the International Living Future Institute and National Trust for Historic Preservation in 2011, called for teams worldwide to create powerful visualizations of how existing cities might be transformed to achieve and transcend the Living Building Challenge 2.0, the built environment's most rigorous performance standard. Rather than constructing new cities from scratch, submissions focused on the premise that a "living" future will rely on retrofitting the existing built environment and regenerating the evolutionary capacity of life. More than 80 teams submitted entries, addressing 69 different cities spanning 21 countries. Submissions were evaluated based on redefining our urban ecosystems and how they work in tandem with their natural environment.

# CITY TO REGION

## **APPLYING THE LIVING BUILDING CHALLENGE**

As the building blocks of cities, districts are the right scale to accelerate sustainability—small enough to innovate quickly and big enough to have meaningful impact. Yet in a city the whole is greater than the sum of its parts, and neighborhoods balance assets like water and energy between each other to meet city-wide needs.

The Gateway EcoDistrict competition team included: ZGF, Portland Sustainability Institute, CH2M Hill, David Evans and Associates, Greenworks PC, Newlands and Company Inc., Portland State University, Institute for Sustainable Solutions and Sparling.

## **Green Infrastructure**

A new green city infrastructure emerges for habitat, food, water and waste. Green streets and a new greenway over the I-205 freeway grow native habitat and food while treating and conveying water. Organic wastes are captured in the neighborhood, cleanly converted to fuels while creating industry for residents

## **Rich Street Life**

Automobiles lose their dominance by shifting rights of way to pedestrians and bikes, allowing Gateway residents and visitors to move easily between homes, services and the regional transit center. This fuels a rich street life for pedestrians, businesses and efficient transport, creating spaces ripe for communication and connection.

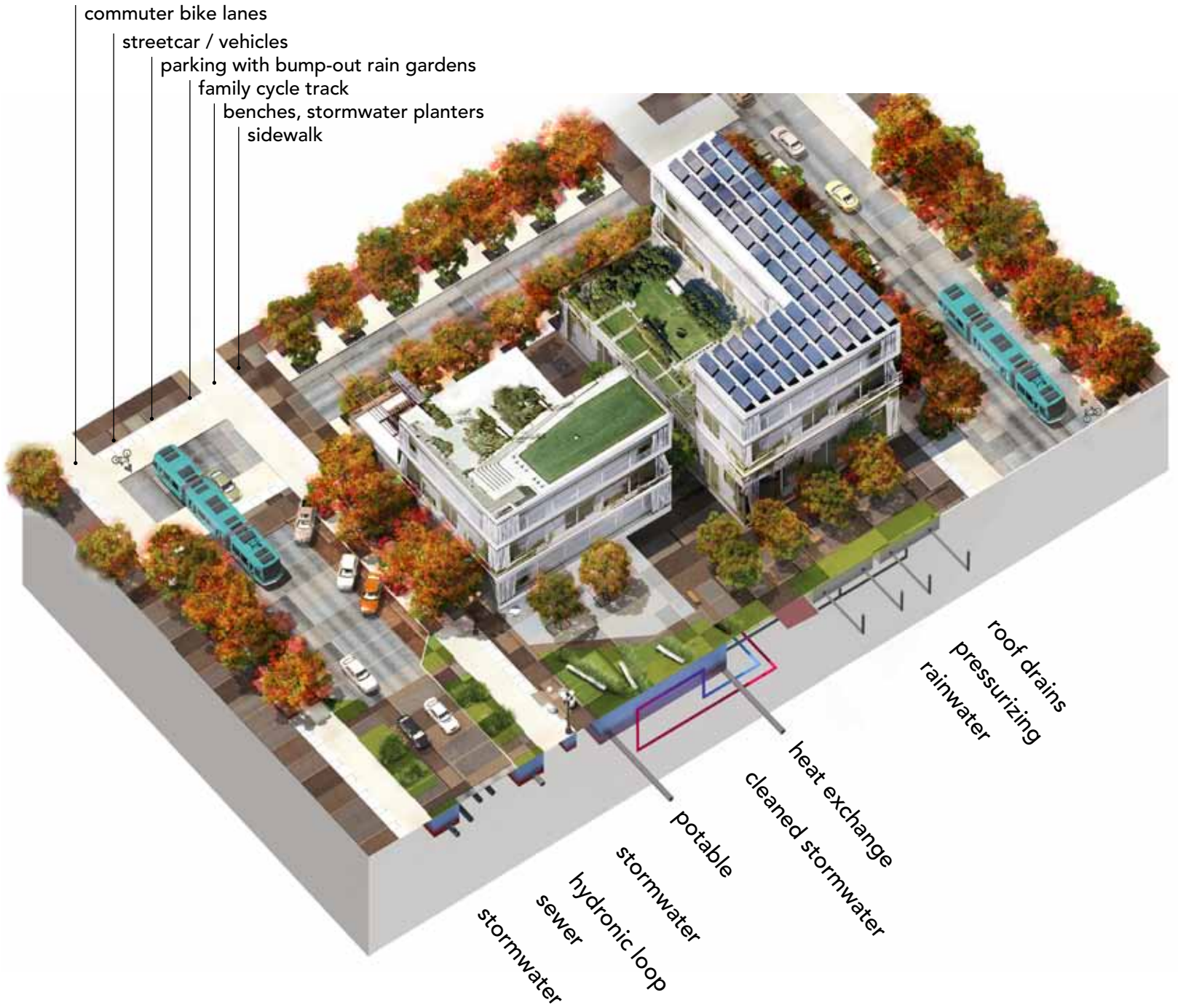
## **Net-Zero Energy and Water**

Net-zero energy and water become easy targets with infrastructure that is scaled to the neighborhood. Thermal pipes bring geothermal heat to buildings, looping between them to capture efficiencies across the district. Sewer mining and organic waste provide additional firepower. Living machines throughout the district clean water, with distribution to every building through accessible networks laid under streets.

## **Urban Agriculture**

People grow food on every surface—organic fruits and vegetables are cultivated on the greenway, green spaces, rooftops, terraces and green walls. Small livestock inhabit the city alongside residents, further helping to generate one of Gateway's most needed fuels—food—right where it is needed.

# ABOVE AND BELOW-GROUND IMPROVEMENTS WORKING TOGETHER





## RE -ENVISIONING MAIN STREET

Imagine going from an environment full of asphalt and fast moving traffic to a place for bees, bikes, babies and birds. What would that place be like? It would be an ecologically supportive environment teeming with the most vulnerable residents of our planet. It is filled with pedestrians, bicyclists and public transport replacing autos. Copenhagen reminds us that bicyclists are not part of transport, they are part of public life. We have accommodations for commuter bicyclists and eight-year-olds out with their grandparents. One could imagine that every drop of water that falls on Main Street stays on main street or leaves cleaner than when it fell. In that sense, it defines an incremental watershed in anticipation of its role in developing a fully functioning EcoDistrict over a period of time. It is, simply, a place you would rather be that is good for you.



Existing Conditions



Renewable energy production (solar and wind) integrates into the urban fabric

Residential buildings use excess heat captured from supermarket refrigeration systems

Geothermal conditioning loops extend across the neighborhood below ground connecting to heat pumps in buildings

Organic wastes are anaerobically digested to produce energy

People, bikes, trains and buses dance in a multi-modal system on streets where cars are prohibited



Existing Conditions

## LIVING INFRASTRUCTURE

Bold infrastructure interventions build towards a city living in balance. The redevelopment of a main street at the site of a regional transit station provides a rich street life based on pedestrians, bicycles and public transport. Urban greenways created from abandoned freeways and green streets provide a new green city infrastructure for habitat, food, water and waste. In a net-zero energy and water community, local fuels power nodes of district energy that couple efficient mixed-use structures, and neighborhood water utilities capture, clean and reuse water arriving from the sky. The urban greenways, roof gardens, living walls and use of the in-between green spaces allow agriculture to be embedded into the community.



## TRANSFORMING HIGHWAYS TO GREEN SPACES & AGRICULTURAL PRODUCTION

How would you eat up an eight lane freeway? Six lanes of asphalt are digested into a greenway for biking, walking and urban agriculture. Stormwater flows into tunnels next to the remaining two lanes to be collected, treated and reused as freshwater in the neighborhood. Less pollution from less traffic makes the new natural corridor ideal for a set of plots for growing fruit and vegetables or producing dairy. Vendors serve food sourced from 100 feet away. Have you ever tasted a quarter mile carrot? With regional transit and improved bikeways, all Portland residents can access this greenway sans freeway.



Existing Conditions



Existing Conditions

## REPURPOSING THE BIG BOX

A regional transit station with light rail, and streetcar deserves more than surface lots serving big boxes. Such large expanses of asphalt are ideal for new housing that brings people closer to transit and accommodates new models for small business. Imagine transforming a super block leftover from a Home Depot by transecting it with walkable green streets that serve bikes, people, urban agriculture and treat stormwater while repurposing the building for a school, community center or marketplace. The rooftops alone of this repurposed big box location can produce up to 4,400,000 kWh per year with solar power that would meet the electrical energy needs of 790 households (assuming an average daily use of 15 kWh).

# CONCLUSION

Working at the smallest scale in the city makes an equal contribution to the larger scale of the city, when considered with district-scaled systems. The district scale makes the most impact at the overlap of the following principles.

Principles for district systems and complementary projects

- Build projects where they will be wanted.
- Build projects that will pay for their presence and enrich the welfare of others.
- Build projects that will attract partners and leverage other projects.
- Build projects where community stewardship will be cultivated.
- Build projects that will capture good ideas.

The EcoDistrict concept enables collective development investments to achieve greater performance than an isolated improvement. District systems such as streetcar, open space, waste, water and energy can be transformative.

The EcoDistrict concept enables collective development investments to achieve greater performance than an isolated improvement. District systems such as streetcar, open space, waste, water and energy can be transformative. Improvements at the scale of the streetscape can help achieve desired performance for a district with regard to mobility. At a larger scale symbiotic energy, water and mobility systems add to the vitality and efficiency of an entire region. These effects offer competitive advantage for cities which take steps to coordinate their public investments with the aspirations of their community. The opportunity is to leverage greater efficiency through urban redevelopment to make beautiful urban places that add value to living in cities with less resource use.

Some district systems may not be more than a new utility. Other systems may be an improvement to the experience of a place formed by new public open space or building. How one supplements, complements or leverages places and infrastructure defines an approach that has been successful for ZGF Architects over its 50-year history of planning and building. This approach seeks an investigation of ideas based on the inclination of the community to meet their aspirations for their places in the city.



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