Multnomah County had an ambitious goal for the Sellwood Bridge project:
develop a project to meet the transportation need while achieving broad-based community support

When it came time to fix or replace this 85-year-old bridge over the Willamette River, there was a wide range of opinion over what should be done. A politically charged environment and competing interests could well have stalled plans to rejuvenate this, the busiest 2-lane bridge in Oregon.

To build consensus around an implementable solution required an innovative approach—one involving a community task force and policy group, a 6-point decision-making process, and an innovative, “Build-A-Bridge” website tool to gather public input on 120+ alternatives. The preliminary engineering team worked with stakeholders—within a tight budget and constrained urban setting—to hone the design to functional and aesthetic goals.

After 4 years of study and numerous challenges, a recommended alternative was unanimously approved by agencies and endorsed by the public, the record of decision for the environmental impact statement approved, preliminary design completed, and the path to a 2016 ribbon cutting firmly in place.

The preferred alternative is a new structure on the existing alignment, with enhanced facilities for car, truck, transit (bus and streetcar), bicycles, and pedestrians.
KAI reviewed crash data and determined that 70% of all crashes occur in ice/snow conditions, 50% of crashes occur on Saturday or Sunday, and January has more crashes than the months of May through September, even though the highest traffic volumes occur in the Summer months.

Mt. Hood Highway Road Safety Audit

ODOT has already commenced installation of the near-term projects totaling $150,000. Design projects have commenced for many of the medium to long-term safety improvements, and construction is set for 2013 for a total of $9 million.

ODOT approached Kittelson & Associates, Inc. (KAI) to assist with the completion of the RSA for one of the most popular—and most dangerous—stretches of Mt. Hood Highway: a 7-mile section on the western slope between Portland and the Mt. Hood recreational ski areas.

The beauty of this RSA is that there is very little complexity to it. The suggestions generated from the team’s research and analyses are straightforward, easily implementable, and cost efficient. These suggestions: regular maintenance improvements, geometric improvements with limited impact to surroundings, intersection improvements addressing unacceptable intersection configurations/locations, a variable speed limit, and the public outreach campaign targeting younger drivers could all greatly improve safety in this corridor.
Lake Oswego Interceptor Sewer (LOIS) Prototype Testing

The City of Lake Oswego (Oregon) currently utilizes an undersized interceptor sewer line in Oswego Lake that is inadequate and vulnerable to an earthquake. The LOIS system was designed to replace that system to ensure environmental protection and provide service for residents.

The challenge: Testing full-size prototype components to loads that simulate and exceed actual conditions.

The solution: Mindful planning, diligent execution, and hard work.

The design of test fixtures started as pencil sketches which were later refined into working 3D simulations using SolidWorks software.

Custom built test fixtures, load cells, hydraulic cylinders, and over 200 strain gages were used to test various prototype components of the LOIS system, specified by the client.

Client: Advanced American Construction, Inc.
Location: Portland, Oregon
Testing provided by Professional Service Industries, Inc.
A Vision for High-Capacity Transit in Clark County

Growth in Clark County has outpaced investment in transportation infrastructure, resulting in traffic congestion and delays in travel times. By 2030 the county is expecting an additional 250,000 residents, increasing the need for high-capacity transit (HCT) options to maintain mobility.

But what will HCT in Clark County look like in 20 years?

To answer this question the Southwest Washington Regional Transportation Council and its partners selected URS to complete the Clark County HCT Study. This study marks the first comprehensive look at all travel corridors within Clark County for their ability to function as HCT corridors and thus improve mobility within the County. At the beginning of the study, nine modes were evaluated for their applicability to Clark County: bus rapid transit (BRT-lite mixed traffic), BRT-full (exclusive guideway), streetcar, light rail, commuter rail, heavy rail, monorail, personal rapid transit and water transit.

One of the key challenges of the study was the preference of some stakeholders for one mode over another. URS successfully met this challenge by starting with a clean slate and presenting information on the various modes in a fair and unbiased way. This mode-neutral approach provided the decision-makers with the best available technical information with no hidden agendas. As a result, consensus was achieved to focus on BRT in four high-capacity corridors.

Project title and location:
Clark County High-Capacity Transit Study,
Clark County, WA

Owner’s name and location:
Southwest Washington Regional Transportation Council, Vancouver, WA

Entering firm:
URS Portland

American Council of Engineering Companies of Oregon
John E. Jaqua Academic Center for Student Athletes
EUGENE, OREGON
ZGF Architects, Portland, Oregon / Interface Engineering, Portland, Oregon

Designed by ZGF Architects, the 48,000 square-foot, glass-enclosed center was built to encourage academic achievement and athletic performance. It provides athletes with a state-of-the-art, peaceful learning environment while commemorating Oregon athletic achievements throughout. It is also a showpiece of spectacular design, fully integrating architecture and engineering; athleticism and study; open plan and privacy; and transparency and connection. Named after a former football player, lawyer, founding board member of Nike and friend of University of Oregon, the center is becoming a University icon that will help athletes succeed both on and off the field. As the MEP, building technologies, fire/life safety, energy, and lighting design engineer, Interface played a critical role in creatively incorporating energy efficient systems that maintained the integrity of the building’s stunning design, while addressing strict State Energy Efficiency Design (SEED) program requirements.

BUILDING SYSTEMS HIGHLIGHTS:
» Atrium Smoke Control System
» Ducted Outdoor Air System (DOAS) with Heat Recovery
» Dual Skin Facade
» LED Lighting & Controls
» Water-Cooled Variable Refrigerant Volume (VRV) Heat Pump System
LOTT Administration / Education Center and Laboratory - Olympia, WA

Client: Miller Hull Partnership
Owner: LOTT Clean Water Alliance
Engineer: PAE Consulting Engineers - Portland, OR

This four story, 33,000 square foot building features an administrative office tower, a renovated water quality laboratory, a 200-seat board room, and an interpretive center and classroom to actively educate the public about the importance of water conservation.

The unique design of the building provides heating and cooling without a boiler, cooling tower, or geothermal field. Instead, a new cogeneration plant burns methane captured from the adjacent sewage treatment plant and transfers the heat to a low temperature water loop. This low temperature water is used to provide comfortable, efficient heating to each of the LOTT buildings and to the adjacent Hands On Children’s Museum.

The new cogeneration plant and low temperature loop eliminates the flaring of methane into the atmosphere and reduces CO2 emissions by 35-percent. Heat is rejected from this loop into clean effluent water that is discharged into the East Bay. LOTT treats the wastewater effluent, converting it into Class A reclaim water that is used on-site and by the Children’s Museum for non-potable uses including water features, irrigation and flushing.

With 80-percent water savings and 42-percent energy savings beyond a typical code building, LOTT is on track to achieve LEED Platinum. Contributing to community-wide water savings and actively engaging the public about the importance of water conservation, the new center is a key part of Olympia’s development plan for the East Bay area.
PORTLAND WATER BUREAU

Meter Shop Relocation

SMALL METER TEST BENCH: Multiple 1/2” through 2” meters are simultaneously tested by flowing water through meters to load cell supported tanks. Water flow is timed and weighed to determine meter accuracy. Recycled water to the test benches is chlorinated to provide clean, potable water for testing. Water lost during meter changes is dechlorinated before going to the municipal waste stream.

LARGE METER TEST BENCH: Multiple Controls effect meters accurately measure flow from 0.25 to 5000 GPM for testing water meters sized 2-1/2” through 12”. A reconditioned hydraulic ram permits simultaneous testing of up to four meters. Recycled water from a new underground storage tank is supplied to test benches for flows from 0.25 to 1200 GPM.

LEED GOLD BUILDING: The City of Portland’s first building to achieve LEED-NC Gold Certification. Incorporating efficient HVAC and lighting systems, efficient control strategies, on-site renewable solar energy systems and creative use of recycled water in the meter testing process.

SOLAR ENERGY: Solar energy is used to heat water and generate electrical energy. Panel arrays are capable of producing 150,000 BTU for heating of domestic hot water and 12 kW of electrical energy. Electrical energy that is generated but not used is delivered to the local electrical utility through a net metering system.

ENERGY EFFICIENT LIGHTING AND HVAC: Energy efficient lighting is controlled by both occupancy sensors and daylight dimming controls. High efficiency heating systems are locked out when large loading doors are open.

AUTOMATED TESTING AND DATA COLLECTION: The R&W designed PLC system with custom logic controls the meter testing recycled water system, meter test bench water flows, and logs all data for each individual meter. Touch screen panels allow for easy operator interface for operation and data collection.
PORT OF PORTLAND HEADQUARTERS (HQP2) - Portland, OR

Client: Zimmer Gunsul Frasca
Owner: Port of Portland
Engineer: PVE Consulting Engineers - Portland, OR

The Port of Portland’s new headquarters combines the Port’s aviation, marine, and real estate development enterprises under a single roof. On track to receive LEED Platinum, this 1,200,000 sf building is located at the entrance to Portland International Airport. With more than 16 million passengers passing by each year, HQP2 creates an iconic first impression for visitors, and a reminder to residents of our region’s commitment to sustainability.

Fresh Air, Healthy Spaces
HQP2 is equipped with a Dedicated Outside Air System (DOAS) which maintains excellent indoor air quality while minimizing the impact on energy use and operating cost. A system of carbon dioxide sensors continually monitors the level of CO2 and responds by adjusting the amount of fresh air delivered.

Dynamic Skin
Dynamic building facades are integral to sustainable building design. A massive 300 ft by 20 ft external solar shade is automatically positioned based on sun sensors and the time-of-year to capture daylight and reduce heat gain and glare. Internal shades bounce daylight directly onto the ceiling to provide natural light to occupants far within the building.

The Living Machine
On the frontier of aggressive sustainable design is the requirement that an environmentally responsible building treat its own wastewater. In response, the design team installed a Living Machine to naturally sanitize wastewater, filtering it through plants and microorganisms, for reuse in flushing of toilets, landscape irrigation (pending DEQ approval), or for use in the HVAC system.

Harvesting Renewable Energy
The ground below us contains an incredible amount of energy in the form of heat. The HQP2 design team was able to mine this natural resource with use of a ground source heat pump system. A grid of 200 geo-exchange wells, each 340 ft deep, provides most of the heat required by the building, reducing the need for fossil fuel-based utilities and greatly enhancing energy efficiency.

Radiant Ceiling Panels
Radiant Ceiling Panels are used to heat and cool all occupied spaces. These panels use hot or chilled water as necessary to maintain comfort conditions in each space, while using a fraction of the energy required by a forced air HVAC system.
The Shriners Hospitals for Children™, a national network of 22 hospitals, specializes in the care of children with orthopedic conditions, burns, spinal cord injuries, and cleft lip and palate. Unique to Shriners, a child is admitted based solely on their medical needs, not on their ability to pay for services. In Portland, the Shriners Hospital was faced with increased patient needs and an aging facility located on OHSU’s Marquam Hill campus. The team took on the challenge of expanding the existing hospital on a constrained site: the result is a five-story, 73,000-square-foot hospital addition that spans 90 feet over an existing four-story parking structure, designed to accommodate a future three-story addition.

Requiring close coordination among all team members, the innovative concept of having the addition span over the existing parking structure saved the owner over $20 million in project costs. The structure incorporates Buckling Restrained Braced Frames for seismic resistance, an innovative system that saved the owner over 10% in structural costs during construction. The preliminary steel weight that was provided at the conceptual design phase came within 2% of the actual steel that was bid helping the owner maintain their desired programming needs on a fixed budget. The project reduces carbon emissions equal to the yearly emissions of 460 automobiles. From concept to completion, the success of the Shriners Hospital for Children™ in Portland continues the mission of healing children throughout the Northwest today and for years to come.
Portland State University (PSU) faced the demands of dramatic enrollment increases, information technology advances, and updated code requirements. PSU identified Science Building Two (SB2), built in 1970, for a major transformation into a Science Technology Research Center that would attract world-class faculty, provide best-in-class undergraduate laboratories, and place Oregon at the forefront of the new technology economy.

To minimize disruption to students and symbolize the building’s modernization, Degenkolb designed a seismic strengthening scheme using advance analysis techniques. This innovative scheme extended the floor slab out to the exterior tower walls using steel trusses. Light, exposed steel trusses do not impact the dynamic loads of the building and the highly recycled content makes the university’s goal for LEED certification more achievable. Degenkolb’s performance based engineering approach not only achieved the university’s building performance goals, but also enhanced the architectural appeal of the building and saved significant construction cost dollars.

SB2 has become a hallmark of innovation, collaboration, and discovery, demonstrating Oregon’s commitment to educating the next generation of scientists. The building is also expected to strengthen interdisciplinary connections and align leading programs in environmental science, pharmaceuticals, and nanotechnology.
university of michigan museum of art

Client: Allied Works Architecture, Portland, OR
Owner: The University of Michigan, Ann Arbor, MI
Engineer: KPFF Consulting Engineers, Portland, OR

ANN ARBOR, Michigan — The University of Michigan Museum of Art's collection comprises more than 18,000 works of art amassed over 150 years. To fulfill a new vision of the museum as a town square for the 21st century, the University renovated its 49,500 sq. ft. historic museum and doubled its space with a $39,000 sq. ft. addition that promotes student interaction.

The last available site on campus was situated at the University's core, near the main cross-campus pedestrian pathway. The design maintains these circulation and outdoor areas by opening the ground floor levels beneath three cantilevered building arms. The cantilevers are enormous - up to 60 ft in length and supporting the weight from two floors of gallery space and a roof above.

To achieve this feat, the engineers leveraged the 28 ft vertical height needed for gallery space and created cantilevers out of 20 in thick concrete walls - each three points of support per building arm. If not carefully considered, the supporting gallery floors would create unacceptable deflections once occupied. The engineers carefully calculated these deflections and designed the structure to compensate, which resulted in a level structure after all loads were in place. Columns of thin steel tubes provide elegant structural supports for the glass curtain walls and skylit galleries, enhancing transparency and allowing daylight into the spaces.

Creative and ambitious engineering allowed the inspirational design to forge a new gathering place for arts, students, and community.
Building on the City of Eugene’s vision for an interconnected and environmentally responsible transportation system, the newly constructed Delta Ponds Pedestrian Bridge provides a vital safe crossing of the busy Delta Highway.

The bridge is also the latest move in Eugene’s long-term investment in the restoration of the 150-acre Delta Ponds wetland area, which is valuable open space and critical habitat for numerous native species.

OBEC, in conjunction with Czech engineer Dr. Jiri Strasky, designed a unique pedestrian bridge to serve as a sweeping architectural landmark complementing nearby public amenities and recreational areas.

The signature 760-foot-long cable-stayed bridge serves as an important link in Eugene’s popular trail system. Site constraints required a structure with a slender form from finished grade to soffit and a small footprint.

The proximity of the four-lane-wide divided highway and crossing geometry greatly limited the base area available for the central cable-stay support pylon, which was solved by using an innovative delta, or “V” shape, to minimize its footprint. The convenient and cost-effective precast segmental concrete deck panel system allowed the design team to meet Delta Highway traffic clearances by completing main span construction without falsework or daytime lane closures.
Washington State University - Vancouver
Utility Mapping
VANCOUVER, WASHINGTON
HARPER HOUF PETERSON RIGHELLIS INC.

Washington State University - Vancouver presented the task of creating easily accessible and accurate as-builds of the underground utilities for the 351-acre campus. The as-builds were intended to be a working document that allows the WSUV maintenance staff, as well as future consultants, the ability to update after each completed project. The deliverables for the project included 11x17 hard copies for each utility (similar to a Thomas guide), 11x17 data tables, 30x42 campus drawings, as well as digital files. The digital files were in AutoCAD, for familiarity with the WSUV maintenance staff, as well as ARCGIS, to allow compatibility with WSU-Pullman.

The project was split into two phases: Phase 1 consisted of gathering and compiling existing record information, surface verifying utilities, and creating the deliverables. Phase 2 will consist of surveying the campus for the areas that were not distinguishable from the as-builds, and updating the hard and digital files.

HHP created a geographical information system (GIS) within AutoCAD with a linked-external Microsoft Access database. The AutoCAD GIS file gives WSUV the ability to view, modify, and print the digital maps in the environment that they are accustomed to. Microsoft Access allowed the data tables to be viewed, modified, and printed all from one file. The database also has the ability to be exported to a more familiar program, Microsoft Excel. The AutoCAD GIS setup is fully compatible with importing and exporting to ARCGIS.

At this time, Phase 1 of the project has been completed. Phase 2 is scheduled to start in 2011.

LOCATION: Vancouver, Washington
CLIENT: Washington State University - Vancouver

American Council of Engineering Companies of Oregon
Gateway to La Center

As the gateway to the City of La Center, this wastewater facility has been expanded as an attractive, cost-effective addition to the La Center landscape for the benefit of the community and the environment alike.

The City of La Center, Washington needed to significantly expand its wastewater treatment capacity to meet the needs of its growing community and improve performance and effluent quality—all on a highly visible 0.75 acre site. To assist the City, Kennedy/Jenks provided facility planning, design, and construction services to increase peak wastewater treatment capacity from 1- to 3-mgd (easily expandable to 6-mgd in the future).

Our approach of maximizing facility reuse, innovative design, and unconventional maximization of gravity flow in an MBR facility has provided an aesthetically pleasing Class A effluent and Class A biosolids facility on a postage stamp parcel at the main entrance to the La Center community.
INNOVATIVE SOLUTION TO WASTEWATER COLLECTION

Unique Vacuum Sewage Collection System Solves Environmental Contamination and Public Health Hazards in Coastal Community

The Miles Crossing Sanitary Sewer District is located across Youngs Bay, south of the City of Astoria, Oregon. Historically, domestic sewage has been disposed of in the area by the use of individual on-site septic tank and drainfield systems. These on-site systems have frequently failed over time and allowed underdrained, untreated sewage to contaminate groundwater, surrounding surface areas and local drainageways, thus creating a public health hazard and adverse environmental impacts.

The project demonstrates an application of a unique technology and innovative solutions. The new vacuum sewer system consists of three major components: vacuum valve pit, vacuum force main, and vacuum station. A new secondary overflow tank was added to allow for suspension of pumping during high sewer flow events.

- 2,000 feet of vacuum sewer was constructed.
- The new vacuum sewer system serves a population of about 900 people in approximately 375 households and businesses. This is the largest vacuum sewer system in Oregon.

COMMUNITY BENEFITS

- Local discharge of untreated, underdrained sewage ended.
- Environmental degradation to waterways, groundwater and surface areas ceased.
- Public health risks are eliminated and economic activity in the community is revived.
- Wastewater treatment is provided by the City of Astoria through intergovernmental agreement.
- 2,000 feet of horizontal directional drilled (HDD) pipeline beneath Youngs Bay conveys raw sewage to the Astoria sewer system.
- Pipeline installation at shallow depths eliminated the need for wide, deep trenches, reducing installation costs and environmental impacts.
- Vacuum sewer system is relatively simple to operate and maintain.
- Only one source of power, at the central vacuum station, is required for the system.
- Affordable collection, transmission, treatment and disposal costs.

American Council of Engineering Companies of Oregon
Perseverance Significantly Reduces Flood Zone

For the last century, the City of Stanfield has battled destructive flood events caused by the Stage Gulch Ditch, which flows through the center of the City. Nearly two-thirds of the City’s homes and businesses were located in the 100-year floodplain, requiring home and business owners to carry expensive flood insurance. Beginning in 1964, the City worked with federal agencies to improve the floodway channel and revise the floodplain maps but were met with one bureaucratic roadblock after another.

Since 1988, Anderson-Perry & Associates, Inc. (AP) has helped the City mitigate flood impacts by designing improvements to the Stage Gulch Ditch to carry floodwater through town without causing flood damage. Work included replacing/modifying six bridge structures to allow floodwater to pass, removal of 27 homes to allow for floodway development, and constructing floodway channel improvements to keep flood flows within the new floodway.

AP also helped the City navigate through the complex and ever-changing regulatory requirements, which made this project particularly challenging. When the aftermath of Hurricane Katrina prompted a U.S. Army Corps of Engineers policy change that prevented the Corps from certifying the City’s levees, AP became the first consulting engineering firm in the nation to provide levee certification accepted by the Federal Emergency Management Agency (FEMA).

On August 17, 2009, FEMA informed the City that the floodplain maps had been revised, removing homes and businesses from the 100-year floodplain. After decades of hard work, undaunted determination, and overcoming setbacks and frustrations, the City of Stanfield’s long-running flood improvement efforts had finally come to fruition.
Medford Water Commission
Rogue River Intake Improvements
Medford, Oregon

ENTERING FIRM: Black & Veatch
OWNER/CLIENT: Medford Water Commission

PROBLEM:
The Medford Water Commission (MWC) Robert A. Duff Water Treatment Plant is supplied from the beautiful and protected Rogue River. The existing Rogue River Intake was constructed in 1968. The recent removal of Savage Rapids Dam and Gold Ray Dam downstream located the intake in habitat accessible to anadromous fish species. MWC desired improvements to the intake to meet NMFS and ODFW requirements for the protection of ESA-listed salmonid species and to protect MWC water rights on the Rogue River supply. Specific challenges of the project included:

- Assessment of site fluvial geomorphology to determine channel stability
- In-water work period limited to June 15 through August 31 corresponding to a period of high system water demand
- Application of fish screen technology and hydraulic design to supply 65 MGD through the existing intake structure

SOLUTION:
MWC hired a team led by Black & Veatch to design new fish screens. The design solution included two tee screens, each 5 feet in diameter and 15 feet in length. A steel debris deflector was attached to the intake to minimize impacts to the river bottom.

A new air burst screen cleaning system was located in a new building and included two 20-hp compressors, a 1500-gallon air receiver tank and associated equipment. A hydraulic study performed by Black & Veatch led to the installation of wet well baffles designed to straighten flow into the intake pumps to enable the 65 MGD design capacity in the existing intake geometry.
If You Build It – They Will Come

Pelton Round Butte Selective Water Withdrawal

A one-of-a-kind structure, the Selective Water Withdrawal facility revitalizes downstream migrating fish patterns disrupted over 40 years ago, prevents fish from entering powerhouse intakes, and at the same time restores Deschutes River basin river currents and water temperatures to historic conditions.

The structure is anchored 270 feet below the water's surface and measures just 30 feet short of the Statue of Liberty. Stood in a steep canyon area, the entire facility had to be built on the water using a precisely choreographed combination of floating barges and marine engineering.

The facility works by drawing intake water from different levels in the reservoir and mixing colder bottom water with warmer surface water. The ability to control these temperature gradients restores natural water currents needed to attract and guide migrating fish. In the first year, more than 100,000 juvenile salmon and steelhead successfully migrated past the dam, easily surpassing fisheries agency's expectations and the hopes of the owners.

The project, jointly owned by Portland General Electric and the Confederated Tribes of Warm Springs, required careful planning and collaboration between some of the Northwest’s best engineers, hydrologists, marine specialists, and construction contractors.

“The company’s outstanding commitment to improving the salmon’s habitat resonates not only with local communities, but with the power industry, which is paying close attention to this great sustainability achievement . . . .”

Tom Kahn, President, Edison Electric Institute

American Council of Engineering Companies of Oregon
Port of Longview Berth 9 Grain Export Terminal

Erecting Marine Leg Tower for Barge Unloading

Approach Trestle Guard Rail

Installation of Pilecaps on Approach Trestle at S2 Shiploader Platform

Erecting Stringers on Approach Trestle at S2 Shiploader Platform

Aerial of Port of Longview Berth 9 Grain Export Terminal

American Council of Engineering Companies of Oregon
City of Damascus 2050

Q: “What do we want Damascus to look like in 50 years?”

A: A sustainable model of livability that retains its distinct rural character

To make that vision real, the City undertook a “green street” demonstration project that transformed a 630-foot section of roadway into a model for future development. This street of sustainable dreams, right outside Damascus City Hall, minimizes stormwater runoff and carbon footprint while enhancing pedestrian/bicyclist safety and natural beauty.

Natural Filtering
Rain gardens and swales catch and filter rainwater. Instead of flowing into storm drains, water percolates through vegetation and rock, which filter out pollutants. This protects watershed health, reduces demand on the sewer system, and recharges ground and surface waters.

Smart Technology
As a demonstration project, the City is working with PGE and Clackamas County Lighting District to use energy-efficient LED streetlights and remote photo controls to monitor, track, and modify electricity use on a street-by-street basis. This minimizes energy use and maintenance costs. It also helps control light pollution by allowing operators to fine tune light intensity to situational need.

Permeable Surfaces
Porous materials on street and sidewalk surfaces allow rainwater to infiltrate, reducing runoff. This alleviates pollution and flooding downstream, expands potential land uses, reduces the need for curbing and storm sewers, and provides better traction in icy conditions.
As the Urban Growth Boundary was expanded in North Clackamas County within the City of Happy Valley, the old rural roadway system along SE 172nd Avenue required improvements to the existing two-lane roadway.

Harper Houf Peterson Righellis Inc. completed the project management, civil engineering, landscape architecture, land use planning, surveying, public involvement and structural design for this exciting project.

This brand new uniquely designed arterial roadway facility works to preserve the neighborhood identity, serves the transportation needs of the corridor, and uses a unique water quality system for over a mile of roadway.

Several notable features include:

- Construction of a new connection to Highway 212 to eliminate the dangerous Armstrong Circle
- Construction of a mile long “Greenstreet” treatment for stormwater management along the corridor, and the first “Greenstreet” constructed by Clackamas County
- Construction of bio-engineered hill slopes (living wall)
- Construction of a two-lane concrete roundabout which included close coordination with the Clackamas County Art Alliance to provide artwork that provides a sense of place and community

**LOCATION:** Happy Valley, Oregon  
**CLIENT:** Clackamas County Department of Transportation & Development
I-5: VICTORY BLVD. TO LOMBARD ST.

Success through Partnership and Planning

Interstate 5 (I-5) between the Victory Blvd. and Lombard St. interchanges is a key 1.3 mile section of the highway corridor that carries over 120,000 vehicles daily. Improving mobility and safety within this section was a critical first step within a larger bi-state plan to upgrade the transportation system that supports the regional economy.

The project had four major objectives, to: (1) widen I-5 southbound between the Victory Blvd. and Lombard St. interchanges from two lanes to three with minimal loss of mobility during construction, (2) bring the highway section up to current ODOT standards; (3) help prepare the corridor on the Oregon side for the Columbia River Crossing, a major Oregon-Washington bridge and infrastructure project; and (4) support future local improvements.

The scope of the $65 million project included the extensive highway and local infrastructure improvements, including multiple bridges over environmentally sensitive waterways, within the tight constraints of three construction seasons.

The success of this project was the direct result of collaboration, experience and planning. A strong partnership formed early in the project between the ODOT, prime consultant David Evans and Associates, Inc., and contractor Hamilton Construction Company. This partnership was based upon respect for each other and the project purpose, and the drive to deliver a quality result for the community with minimal disruption. The outcome was a project that was completed early with negligible construction impacts to the public and nearly $5 million under budget.

A new steel bridge was constructed over an existing railroad bridge over Columbia Blvd, resulting in a rare third level structure.

Capping and landscaping landfill material within the Lombard loop mitigated on-site environmental hazards and provided aesthetic enhancements.

Work on multiple bridges over environmentally sensitive waterways was performed within the constraints of strict in-water work periods.

An historic bottleneck was alleviated by widening southbound lanes from two lanes to three.

Owner: Oregon Department of Transportation
Location: Portland, Oregon

American Council of Engineering Companies of Oregon
1st Street and Main Avenue Sidewalks and Bike Facilities

Irrigon, Oregon

The project concept was to construct sidewalk and bicycle facilities on a primary school route for children accessing the elementary and junior/senior high schools. Project enhancements included street lighting and trees, as well as stormwater planters. All roadway runoff is collected in stormwater planters that are treated and subsequently infiltrated into the ground eliminating the need for stormwater systems.

The 1st Street and Main Avenue Sidewalks and Bike Facilities project was one of the first projects in Oregon that was funded by the American Recovery and Reinvestment Act. Collaborating with ODOT and the City of Irrigon, Otak worked diligently to meet the aggressive design schedule that was required. Final plans, specifications, and cost estimates were completed within four weeks of Notice to Proceed. Additionally, as a federally-funded project, it was required to provide the appropriate environmental closeout documentation, right-of-way certification, and utility coordination. ODOT and City staff were crucial in ensuring that review and approvals were completed on schedule. Otak provided engineering services and construction management. The project was substantially completed in June of 2010.

client: City of Irrigon

Otak
Lake Oswego, Oregon

AECE
American Council of Engineering Companies of Oregon
Over the years East Burnside, a critical east-west arterial for the city of Portland, had become a barrier to vehicle circulation for location business and to pedestrian travel. Left turns were prohibited, parking was limited in pro-time lanes, and with few traffic signals, accessing local businesses in the area was challenging. In addition, the intersection of NE 12th Avenue, Burnside and Sandy was confusing for vehicle traffic and a barrier to pedestrians with its limited crossing options.

The East Burnside/Couch Couplet Project transformed East Burnside into a one-way serving east bound traffic, and NE Couch Street into a one-way serving west bound traffic between NE 14th Avenue and the Burnside Bridge. The project added traffic signals at every intersection to improve vehicle and pedestrian flow and circulation to businesses. With the reduction in the number of travel lanes on Burnside, parking was able to be provided without time restrictions on both sides of the street. Curb extensions were added on most corners and stormwater treatment planters and street trees were added throughout the project area. A bike lane was added on much of East Burnside and a portion of Couch Street.

HMPR's multi-disciplinary team provided project management, design, construction engineering, and construction administration and inspection services on this federally funded project. The design process included development of green street concept alternatives as well as alternatives analysis of various structural and non-structural options for the new roadway connection from Couch Street onto the Burnside Bridge.

LOCATION: Portland, Oregon
CLIENT: City of Portland

American Council of Engineering Companies of Oregon
The Oneonta Gorge Tunnel Rehabilitation

The Oneonta Gorge is a narrow, steep canyon featuring rare botanical wonders, waterfalls, and impressive views that is located a few miles to the west of the Bonneville Dam. To serve this popular recreational destination, the Oneonta Tunnel was built in 1914 to connect visitors to both the Gorge and nearby Horsetail Falls, two of the natural beauty spots along the scenic corridor of the Columbia River Highway. Because of significant safety concerns and poor function, the tunnel was closed in 1948, was filled with debris, and eventually was overgrown by native vegetation.

The Oneonta Tunnel now has been given new life as part of the Historic Columbia River Highway Trail. Faced with increasing demand for visitor parking and safety concerns regarding rockfall from the bluff, the Oregon Department of Transportation (ODOT) partnered with the Western Federal Lands Highway Division of the Federal Highway Administration and identified the tunnel as an opportunity to create a public space that was both functional and responsive to the site’s historic context.

The project team worked in partnership with ODOT to uncover and restore the historic appearance of the tunnel and reopen it as a safe and accessible connection for pedestrians and bicyclists. A new parking area was created to shield visitors from rockfall, and the adjacent Oneonta Creek Bridge was repaired. More importantly, the reopening of the tunnel restored an important link to the vibrant chronicles of the Historic Columbia River Highway and created an amenity that will become one of Oregon’s iconic destinations.

Owner
Oregon Department of Transportation
Location
Columbia River Gorge, Oregon
Consultant Team
David Evans and Associates, Inc.
GRL Geotechnical and Environmental Engineering
JAL Construction, Inc.

Images courtesy of ODOT

American Council of Engineering Companies of Oregon
INNOVATIVE SHAFT DESIGN IN URBAN TUNNELING

This landmark use of cutter soil mixing (CSM) allowed construction of five deep shafts in difficult ground with fast-tracked delivery. Adaptation of CSM for shaft excavation not only proved more cost-effective than traditional approaches, it promoted sustainable construction practices by reducing material disposal requirements.

The CSM method mixed in situ soil with cement and water to form rectangular solidate panels. Individual panels were interlocked to construct watertight shoring walls in several different configurations, tailored to handle ground conditions at each site. Shafts were excavated through landfill debris, very soft silt, and open graded gravel with cobbles and boulders.

The shafts are part of the Balch Consolidation Conduit project, a final element in the City of Portland’s 20-year effort to eliminate pollution in the Willamette River.

Balch Consolidated Conduit Shafts & Pipelines
Portland, Oregon

LANDMARKS
- First use of CSM in Oregon
- First known use of CSM panels as ground improvement to support TBM and pipeline in soft soil in U.S.

INNOVATIONS
- Adapting CSM to a variety of shaft configurations
- Incorporating embedded steel elements for structural support and base slab uplift resistance
- Integrating CSM with traditional shoring methods
- Reducing truck traffic and extra equipment by using in situ materials meant a reduced carbon footprint
Fashioning a Diamond in The Pearl
The Development of Block 19 (Encore Building) in The Pearl District, Portland, OR

Hoyt Street Properties, in association with the City of Portland, the Oregon DEQ, and the Portland Development Commission, is the development company responsible for transforming a 34-acre brownfields site in a Portland industrial zone into the thriving mixed-use Pearl District community.

Over a century of industrial use had left the soil and groundwater impacted by diesel, polynuclear aromatic hydrocarbons, and lead from railroad operations, including fueling, battery service, and general maintenance activities.

Geotechnical design and monitoring successfully ensured the protection of a functioning 90-year-old composite concrete arch and brick-lined storm sewer line from vibration, settlement, and excess pore pressure associated with deep foundation construction.

Kleinfelder innovatively used stone columns to replace and reinforce soil and reduce liquefaction potential. A stone column buttress was also constructed under the perimeter of the building to further reinforce the site and to resist buckling of the steel pipe foundation due to potential lateral spreading. The mitigation improved the seismic site class from F to D, reducing structural requirements.

Kleinfelder managed hundreds of thousands of cubic yards of petroleum contaminated soil through an integrated remediation and redevelopment plan. Kleinfelder also proposed an alternative disposal option which saved the client $3.6 million as well as extended the life of a local landfill.

Owner:
Hoyt Street Properties

Geotechnical and Environmental Engineer:
Kleinfelder

In Association With:
KPFF
BOORA Architects
HHPR
Anderson Construction Company

Now a prime example of successful urban renewal, the area integrates homes, businesses, retail shops, restaurants, galleries, and parks into a vibrant and efficient multifaceted neighborhood.
Portland’s new living room: 5 shades of green
A 160-year-long dream to connect the North and South Park Blocks takes one more step toward sustainable realization.

1. Curbs less ‘shared’ streets allow the plaza to extend from building front to building front for events.
2. Stormwater planters treat runoff from the glass canopy.
3. Stormwater from the curbs less streets drains into terraced stormwater planters, where it is filtered (see detail at right).
4. High-density foam and lightweight fill under the plaza reduced weight on the garage roof.
5. Interactive fountain treats and reuses water.

Simon and Helen Director Park

Director Park represents the newest link in a decades-long effort to connect Portland’s North and South Park Blocks. Developer Tom Meyer donated Park Block 5 to the City of Portland while retaining rights to build a six-story underground parking garage on the site. The key challenge: siting a parking garage and an attractive, user-friendly and sustainability-designed urban plaza on the same one-block property.

The numerous stormwater management strategies KPF applied to the site include an eco-roof, on-site flow through stormwater planters and below-grade filters. Park and Ninth Avenues were rebuilt as green streets with integrated stormwater management and a curbs less, festival environment. The involvement of KPF civil engineers in the parking structure site development provided continuity through park design.

Client: Zimmer Gunsul Frasca Architects
Owner: Portland Parks & Recreation

THE PROJECT TEAM
The Olin Studio
Mayer/Reed
SoiArc
Interface Engineering
Brant Construction

American Council of Engineering Companies of Oregon
What does a 62 foot tall lighthouse on the Columbia River have to do with shoreline restoration?

It's a figurative and literal beacon that will draw attention to the long neglected Clover Island, and increase community focus on this Island in the Columbia River.

Over the past 100 years Clover Island was a neglected community asset that had undergone several land modifications over the years. Its shoreline consisted of embayed wet concrete and concrete that had been jetisoned from off site construction. The site did have a tremendous view to the west of an arch-truss Highway bridge and Rattlesnake Mountains. Combined with the Columbia River in the foreground the view was something that should be shared with the community. What would help draw people out to what otherwise was an uninviting site?

The Island’s owner, the Port of Kennewick, identified a need to bring more people to the Island, and create a unique destination experience to drive private business reinvestment on the Island, allowing the Port to realize one of its goals to revitalize the shoreline.

The intent of the revitalization was to capitalize on the cultural, historic and recreational values of this special place by creating a heightened and memorable "Shoreline Experience" for tourists, the surrounding community, and the business and recreational users that visit the Island by vehicles, cycling, walking or boat. The Island today is the result of the "vision" of the Port, the consultants and the community.

**Welcome to Clover Island!**
Sandy River Crossing Conduit Relocation Tunnel

Sandy, Oregon

Conventionally Tunneled River Undercrossing Protects Portland’s Water Supply

Owner

American Council of Engineering Companies of Oregon

CHALLENGES
The feasibility of conventional tunneling hinged on verifying consistent geology, i.e. “no surprises.” Shannon & Wilson’s approach assured the City and their design-build teammates that this project would succeed. Tunneling was completed efficiently – no water inflows, measureable settlement, or significant rockfall occurred. The finished tunnel surpassed these challenges, providing a dry, stable work environment.

INNOVATION
Sometimes innovation can be as simple as remembering your roots.
In a time when similar projects are often accomplished by microtunneling, the Portland Water Bureau chose a traditional tunneling approach, which provided the following benefits:
- Allowed welding inspection both inside and outside the pipes, providing exceptional quality control.
- Thick concrete encasement to sustain the City’s water supply for potentially hundreds of years.
- A smaller construction footprint, reduced spoils, less risk of river contamination, and minimal impact to the adjacent park.

RESULTS
Tunneling was the easy part of a complex pipeline project.
- Horizontal core boring/in-situ testing confirmed ideal tunneling conditions.
- Roadheader excavation, shotcrete, and lattice girder support simplified construction as compared to microtunnel systems.
- Settlement sensor above tunnel confirmed no deformation for good tunnel performance throughout pipeline assembly.
- Provided Portland Water Bureau’s first successful design-build project application.
The Meridian is a mixed-use commercial development, completed in 2009, that consists of 89 condominiums, along with office and retail space on six floors, situated over a footprint of a little more than three acres. The site was originally developed in the early 1960s as a hotel and has a long history of creep, subsidence, and sliding due to a high groundwater table combined with unstable geological conditions.

Innovation:
- The use of four 6" diameter dewatering wells provides an effective and consistent collection and lowering of the local groundwater level on a relatively small site;
- The specialized pumps and control systems are specifically designed for combined use as a dewatering system and automatically work in unison to maintain a lowered groundwater table;

Exceeding Client's Expectations:
- To date, there is no indication of further settling and/or creeping of the site;

Complexity:
- Use of coordinated installation of the dewatering wells during site preparation allowed for the precise positioning of each well;
- The simplicity of the design and operation is an actual advantage over more complex designs;

Economic and Sustainable Design:
- At a total system cost of less than $100,000, this system provided a significant savings in capital costs to the owner over alternate methods of dewatering;
- Provides a higher overall efficiency and lower operating costs than other methods;
- Minor impact on the site aesthetics;
- Adjustable operating flexibility and range of the groundwater level.

The success of the Meridian dewatering system is an example that proper advance planning, combined with a simple and basic design concept, can create an effective and low cost aid for site stabilization.

American Council of Engineering Companies of Oregon
Portland Parks and Recreations Circle Avenue Pedestrian Bridge

- Debris Collecting at In-Water Bents
- Lifting Replacement Span into Place
- Aerial of Completed Circle Avenue Pedestrian Bridge with Vegetated Timber Crib Wall
- Completed Pedestrian Bridge Looking West
- Completed Pedestrian Bridge

American Council of Engineering Companies of Oregon
Pringle Creek Community is a mixed-use development consisting of space for up to 70 residential building sites along with commercial and public use areas in Salem, Oregon. The site was originally part of the former Fairview Training Center that closed in the mid-1990s. This geothermal/irrigation system provides the following benefits:

**Innovation:**
- Extensive computer modeling was used to develop a dual network of a water supply loop for the heat pumps as well as a return loop for the irrigation well and irrigation system for all commercial use conditions.
- Use of an existing water supply well, combined with a new injection well, provides a geothermal water supply and return system for up to 30 heat pump connections.

**Exceeding Client’s Expectations:**
- The system has now worked over two seasons to provide a consistent water supply for the currently connected ground water heat pumps and water supply for the irrigation system.

**Complexity:**
- The entire system utilizes two submersible well pumps, one with a variable speed drive, and is fully automated and includes monitoring of the critical operating and performance parameters to verify the proper operation of the full system.

**Economic and Sustainable Design:**
- The total system cost of approximately $250,000, the combined water systems offer a viable economic alternative to other methods of heating and air conditioning as well as an efficient use of the return water for use in an irrigation system or back to the existing injection well.
- Adjustable controls provide the Owner with variable speed operation.
Flat Water Wind Project
The first utility-scale wind energy project developed for the Omaha Public Power District in the state of Nebraska.

- Owner: Gestamp Wind
- Project Developers: juwi Wind, Gallop Power
- Engineer: Kleinfelder
  www.kleinfelder.com

- Project includes 40 General Electric (GE) 1.5 megawatt (MW) turbines with an annual energy yield of approximately 200 million kilowatt hours; sufficient energy demand for approximately 20,000 US households. This project will reduce CO₂ emissions by approximately 30,000 tons annually.
- Unique challenge included an extremely compressed schedule, being completed with transfer of project ownership three times during the course of development, design, and construction.
- With each change of ownership, Kleinfelder had to continue to prove its value. This was not limited to our engineering and regulatory capabilities but also to our ability to assist each new owner in the evaluation of plausible financial strategies available through both the United States Treasury Department and the U.S. Department of Energy.
- Our work included environmental permitting and geotechnical engineering in support of wind turbine foundation and roadway design, civil design services for heavy haul routes and construction access, crane and platform, civil foundation plans, electrical substation, and underground electrical collection systems.
- Assisting a developer of a renewable energy project from “conception to completion” requires a dedicated team of professionals including support motor experts in the areas of regulatory compliance, environmental permitting, geotechnical engineering, civil design, structural engineering, project management, and financial strategy.

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