Environmental Services Walks the Walk
The City of Gresham Wastewater Treatment Plant Administrative Building

The Gresham Wastewater Treatment Plant is a laboratory for energy efficiency. Environmental Services engages in what could be called Modern Alchemy: turning wastewater back into clean water without external power. By capturing methane gas produced as a byproduct of the treatment process and converting it to electricity, the treatment plant produces all the power required for its own operations.

When faced with the question of what to do with the first building constructed at the plant—the administration and digester facility—re-use was the first thought. The original plant building was constructed in the early 1950s and remained in use until the 1970s, when it became functionally obsolete. In 2008, the City explored repurposing it, but wasn’t sure the building could meet the City’s need for additional office and education space.

BergerABAM worked with architect Fred Gast, FAIA, to determine the cost, benefit, and possibility of rehabilitating the building and digester tanks for new uses, and the City decided to transform the outdated, yet sound, process building into a multi-use administrative building that provides space for an environmental interpretive and personnel training center, administrative offices, and a City archives facility.

The building remodel was designed to achieve a LEED Platinum rating. The project incorporates a number of environmentally friendly practices, including reusing and repurposing an existing building, recycling 98 percent of the demolition materials, using natural daylighting, and heating and cooling by means of an under-floor air distribution system. In addition, all the power for the building will come from those nearby alchemical on-site generation facilities.

By looking beyond the easily visible, the City transformed this underutilized asset into a showcase for the contemporary ethos of sustainability.
Connecting Communities

For decades, Portland’s historic Lair Hill neighborhood had been cut off from the Willamette River and the emerging South Waterfront District by Interstate 5. The construction of an aerial tram over the neighborhood without any connection to the residential area underneath highlighted the problem and led to the City of Portland (COP) approving a plan for a pedestrian bridge.

The challenge was to design a structure to cross 14 lanes of interstate and ramps carrying over 120,000 vehicles per day and land on a small site constrained by multiple utilities and an aerial tram tower, while satisfying community stakeholders and the requirements of the COP Design Commission, all on a tight budget.

CH2M HILL delivered a striking, asymmetrical steel tub girder bridge that features a spectacular elevator tower and a 132-step stairway that connect the bridge to the South Waterfront street level 70 feet below. The project includes a complex, terraced system of retaining walls and bioswales on the steep hillside that capture and treat stormwater runoff. Engaging the community to build consensus through extensive Public Involvement activities was critical to the success of the project.

Project: US Congresswoman Darlene Hooley Pedestrian Bridge at Gibbs Street

Client: City of Portland, OR
Entering Firm: CH2M HILL, Portland, OR
Consulting Architect: Peterson Design
Landscape Architect: Mayes/Reed
Construction Contractor: Willamish Standard Paving Co.

American Council of Engineering Companies of Oregon
Managing Landslides in West Africa

Landslide Technology (a division of Cornforth Consultants, Inc.) performed emergency landslide mitigation at a natural gas plant expansion project on the remote island of Bioko, Equatorial Guinea, West Africa. Marathon Equatorial Guinea Production Limited’s (MEGPL) gas plant was undergoing a $250,000,000 expansion to quadruple its capacity to process natural gas when landslides were discovered on the coastal bluffs where proposed pipelines were to carry natural gas and its products.

With limited information and time, Landslide Technology assessed the subsurface landslide mechanisms and collaborated with MEGPL toward a multi-directional approach to mitigate the ground movement by unloading the top of the slides, buttressing the base, lowering the groundwater, and managing storm water runoff. Since successful remediation, Landslide Technology has employed an observational approach to remotely monitor stability of the slopes. The solutions met the Owner’s needs within four months of initiating the construction and the overall gas plant project was completed with negligible adjustment to the construction schedule.

American Council of Engineering Companies of Oregon
I-205 RAILROAD AVENUE (OR 99E DUNES DRIVE-10TH STREET)

Creating Community Connections

In Oregon City, the Willamette River, with its scenic Willamette Falls and End of the Oregon Trail significance, is an outstanding natural amenity. The waterfront and a historic boardwalk were once iconic features of the City and a gathering place for residents and visitors. The development of McLoughlin Boulevard as a state highway improved efficiencies for the traveling public, but isolated the downtown from the river, creating a barrier to the waterfront.

Over the past two decades many improvements have been made to McLoughlin Boulevard, from new streetlights and walkways to landscaping and public art. Waterfront recreational sites and features have been developed and improved, including Clackamette Park, Jon Storm Park, a marina, local and regional trails, and the Historic Oregon City West Linn Bridge. During the last decade the City led the public through a welcoming process for the downtown and waterfront areas. This process highlighted the community’s desire to revitalize the historic downtown area by reconnecting it to the waterfront and once again making the river a feature of Oregon City life.

The City, in partnership with the Oregon Department of Transportation and with prime consultant David Evans and Associates, Inc., successfully undertook this major transportation project to enhance McLoughlin Boulevard from 10th Street to Dunes Drive. The boulevard improvements created a welcoming environment that embracing Oregon City’s waterfront heritage. The project included improving connections and safety for all modes of transportation and developing engaging public spaces that included art, landscapes and architectural elements that reflect natural waterfront elements.
Because it's our home
Sellwood Pump Station Cleans Up the River

Pump Station increases sustainability.
The City of Portland, Bureau of Environmental Services, Outfall 27
Sellwood CSO Control.

In the mid 1800's when Portland was established, wastewater and stormwater wound up in the Willamette River. Since 1991, the City of Portland had been committed to achieve State Amended Stipulation and Final Order (ASFQ) compliance along the Willamette River including Outfall 27, which discharged combined sewage during storm events. To achieve the required level of control, several new facilities were constructed and the system is now operational with both storage and pumping to reduce discharges to the minimum level allowed by the ASFQ.

The new system is designed to receive combined wastewater that is diverted from a collection system interceptor during storm events. The new pump station pumps a portion of the diverted flow to a secondary drainage basin that has hydraulic capacity to accommodate this flow contribution. The remainder of the diverted flow is stored in an existing tunnel (Lents trunk sewer) that was converted from a conveyance facility to a storage facility.

To determine if it could be repurposed as part of the project, inspecting the Lents trunk sewer was going to be challenging. Because of its length and the distance between manholes, the 89-year old sewer had never been inspected. A visual inspection would require a team to descend into the nearly nine-foot-long pipe. Since normal communication with the team inside the concrete and brick tube was impossible, the team devised a make-shift communication plan. After 6 hours, the inspection team emerged from the tunnel, and the inspection revealed that the 89-year-old tunnel could be used as a storage conduit, saving money for the city's ratepayers by re-purposing the old sewage conveyance facility.

The next step was to site and design a new pump station and wet well that fit into this established riverfront community and met the needs of the project. The attractive buildings that are now in place blend into the fabric of the community. While the unknowns of re-using existing rather than new infrastructure added complexity to the design efforts, the reuse represented a significant cost and schedule savings, and both were needed to meet the regulatory deadline. When we have a typical rainy day in Portland, raw sewage no longer flows into the Willamette River.
SOUTH AUDITORIUM DISTRICT LIGHTING

**Firm:** DKS Associates  
**Client:** City of Portland, OR  
**Location:** Portland, OR

An integral component to Lawrence Halprin’s Open Space Sequence is its pedestrian and bicycle mall and roadway lighting system. DKS led the final design of over 540 new light fixtures for the South Auditorium District, replacing the lighting constructed over 40 years ago.

Based on input from the community and in collaboration with Lawrence Halprin and the Halprin Landscape Conservancy (HLC), DKS designed and provided construction support of a new lighting system that replicates the original design’s intent, maintains dark skies, and creates an aesthetically pleasing environment. The project resulted in a lighting system that operates more efficiently, has better light control and meets City standards and identified best practices.

*Photos courtesy of HLC*
The Port of Portland’s container wharf is an active facility and the Port’s primary source of revenue. Now more than 40 years old, the wharf did not conform to current code seismic standards. In 2000 the Port launched an initiative to upgrade the wharf, but by 2008 when the Port secured funds for the upgrade, further analysis using improved techniques revealed that significant additional ground improvement would be required to bring the wharf up to the code’s standard. The revised design nearly tripled the anticipated cost, putting the overall project at risk.

To address these challenges, GeoEngineers developed a multi-phased, incremental improvement plan based on innovative seismic and economic modeling. This approach enabled the Port to:

- Preserve its federal grant funding and complete the project using existing funds
- Prioritize projects by measuring actual return on investment of the various improvement plans developed, accounting for the economic impact to the Portland region
- Easily justify project expenditures to the Port Commission and local stakeholders
- Make targeted improvements to two of its three berths at the facility that reduce the seismic risk to the Port and the region
- Develop a future seismic upgrade plan to eventually enable the whole facility to meet City of Portland seismic codes

Credits

GeoEngineers, Inc. Portland, OR - Entering Firm
Port of Portland - Owner
WorleyParsons - Civil Design
MJ Hughes - Contractor
Malcolm Drilling - Drilling Contractor
The Rock Creek Trail Extension

The Rock Creek Trail is the major trail corridor spanning the City of Hillsboro, with a planned eight miles of shared use pathway extending from north of Highway 26 to the confluence of Rock Creek with the Tualatin River to the south. The Rock Creek Trail Extension was the natural continuation of the previous phase of the trail that connected Rock Creek Boulevard to Orchard Park along the scenic Rock Creek Greenway. David Evans and Associates, Inc. evaluated alignment alternatives and designed the trail extension that drifts south from Orchard Park to Wilkins Street and west to Cherry Lane for approximately two-thirds of a mile. The City’s goal was to create an elegant trail through an environmentally sensitive corridor that was inclusive for all users. The project features a winding, contoured trail fished through a lush vegetated corridor with a new boardwalk and bridge crossing the Rock Creek floodplain and floodway. The boardwalk creates a magical experience as users enter from either Cherry Lane or Wilkins Street and swoop along the boardwalk to enter a lush natural oasis within the heart of an active city. The pathway transitions from industrial areas and employment centers to neighborhoods, as well as providing a needed link at Wilkins to the Quatama LRT station and a community destination point in Orchard Park. The project is truly unique, creating a one-of-kind experience for all users whether they are traveling with a purpose or simply wanting to explore and lose themselves in the outdoors.

Client: City of Hillsboro
Location: Hillsboro, Oregon

American Council of Engineering Companies of Oregon
The Malheur National Wildlife Refuge near Narrows, Oregon provides sanctuary for almost 400 fish and wildlife species. Within the refuge, a series of diversion dams, operated by the U.S. Fish & Wildlife Service (USFWS), run along the length of the Donner und Blitz River and divert water into the refuge to irrigate aquatic wetland and support migratory wildlife.

Although no anadromous fish reside in the refuge, native Red Band trout were recently listed under the Endangered Species Act. In 2009, with funding from the American Recovery and Reinvestment Act (ARRA), the USFWS engaged GHD to complete civil, electrical, and mechanical engineering for fish screening and passage improvements at four diversions on the refuge’s three lower diversion dams (which, starting at the upstream end of the refuge, include the Grain Camp, Busse, and Soda House dams). Totaling seven projects, these improvements not only ensured protection of the Red Band trout within Malheur and managed invasive fish species, but:

- Provided fish screen facilities at the four remaining, unscreened diversions that meet Oregon Department of Fish & Wildlife (ODFW) criteria;
- Consolidated diversions to reduce the number of needed screens;
- Provided new passage structures meeting ODFW criteria around the remaining three dams with existing, deficient ladders to mitigate documented fish delay.

Regarding the 20 miles of GHD’s improvements, Deputy Project Leader Chad Kegges said, “This helps the refuge to advance its goal of improving conditions for native fish, reducing invasive fish species, and [protecting] refuge water rights. Water rights.”

**Owner**
U.S. Fish & Wildlife Service Region 1, Portland, OR

**Project Location**
Malheur NWR, Near Narrows, OR

**Submitting Firm**
GHD Inc., Portland, OR
The Wyeth property is a tightly constrained site in Hood River County. Mitigation for lost Tribal fishing access in this location required steep (12-13%) grades to quickly rise over the Union Pacific Railroad (UPRR) tracks and set down inside of the Columbia River shoreline. The sharply curved roadway profile over a 23'-6" vertical clearance envelope over UPRR right-of-way inspired a creative solution that truly has form following function. The "inverted fishbelly" steel plate girders provide the structural section needed at mid-span for bending, while the reduced web depth at the ends provides a three foot reduction to embankment fill, retaining wall heights, and allowed the approach grades to be reduced to 8% and 11.6%, saving money, time, and footprint while improving safety.
Once a streetcar line for the old Portland Traction Company, the Trolley Trail now connects neighborhoods, schools, parks and businesses along a six mile multi-use trail from Milwaukie to Gladstone. It also completes a crucial missing link in a 20-mile trail network linking communities surrounding the Portland Metro region.

The trail lies within a 30- to 40-foot wide right-of-way and over the years sections of the corridor had become overgrown and a haven for illicit activity. Leading the design effort, HHPR coordinated with 700 adjacent properties to design the trail. Critical to a successful, cost effective project, HHPR designed the project to minimize the use of retaining walls, and carefully routed the trail around several creeks and wetlands, and along PGE transmission poles, all while maintaining grades that meet ADA guidelines.

With 27 state, county, and local roadway crossings, and ADT volumes ranging from 40 to 54,000, crossing design treatment varied greatly. The crossing at Hwy 99E was routed to a signal where bike loop detectors were added and the standard crosswalk was changed to a Continental. At county collectors, improvement options included speed tables, raised intersections, striped crosswalks and curb extensions. Signage and striping was added prior to each crossing to warn users of the approaching intersection.

North Clackamas Parks and Recreation District purchased the corridor in 2001 and after completing master planning efforts in 2004 was able to pull together seven different federal, state, and local funding sources to design and construct the $4.5 million project.
ASHLAND GOES GREEN

Impending temperature limits on the Ashland wastewater treatment plant discharge permit required innovative thinking and new applications of basic principles. The selected temperature trading alternative is green for the environment and green for the City’s budget.

Innovative Analysis
Included temperature trading, a carbon footprint analysis, and a hydraulic model calibrated with spatially allocated meter data.

Collaborative Effort
Engaged regulatory agencies, stakeholders, City staff, elected officials, and public throughout the process leading to a solid plan with clear direction.

KELLER associate
780 COMMERCIAL ST., SE, #202
SALEM, OR 97301

City of Ashland
Comprehensive Sanitary Sewer Master Plan

ACEC

51 WINBURN WAY
ASHLAND, OR 97520

American Council of Engineering Companies of Oregon
Innovation From Well to Tap

Kennedy/Jenks began working with the City of Gearhart in 2003 to develop an independent water source and system to create a more economical water supply solution for Gearhart residents. The design also demanded creative thinking to tackle additional challenges posed by the site – a small 1.25-acre parcel located in a beach community and zoned for both municipal and community use. Using the City’s abundant groundwater supply as the water source and employing innovative treatment methodology, the new system has a smaller environmental footprint than anticipated and allows for preservation of valuable surface water natural resources. In addition, the project deliver the City an array of social, economic, and sustainability benefits, including a 30 to 40 percent reduction in water rates and a space for community gathering.

Tapping into the abundant Clatsop Plains aquifer, instead of using surface water, meets Gearhart’s needs and protects salmonid habitat by maintaining instream flow for the Lewis and Clark River system.

Gearhart’s 500,000-gallon clearwell was sited below the tennis courts to make best use of the compact 1.25 acre site.

The local groundwater supply contained elevated levels of arsenic that required a modern, automated water treatment process to provide high quality potable water.

The water treatment plant provides an effective blend of residential beach architecture along with two tennis courts, a basketball court, and public restrooms.

Gearhart citizens of today and future generations will benefit from a high-quality, affordable water system and enjoy excellent recreational amenities. Surrounding communities will also benefit from having access to a secondary, backup water supply and recreational spaces.

Kennedy/Jenks Consultants
Portland, Oregon

American Council of Engineering Companies of Oregon
I-84: Exit 64 – Bundle 224
Hood River, Oregon

In 2007, Hood River’s highest priority transportation issue – exit 64 – required an innovative solution to remain within ODOT’s construction budget. The existing Interstate 84 bridge could not safely accommodate overweight permit vehicles, and the interchange experienced nightly congestion that extended onto the freeway.

HNTB and OBDP collaborated with ODOT on a practical design approach to determine the minimum improvements needed to fix the congestion and to identify creative strategies to reduce both the temporary traffic control and final construction costs.

With these solutions, the bridge has been replaced with an aesthetic contemporary design, and the traffic congestion in the interchange has been eliminated. The final construction cost was $8.44 million – far below the original $11 million construction budget.

Solution 1: Innovative Traffic Control
OBDP envisioned that exit 63 and exit 64 could be combined into a temporary split-diamond interchange to minimize the detour cost by diverting local traffic through the interchange ramps instead of over the freeway bridge. This innovation allowed the bridge to be safely constructed one half at a time without an expensive detour.

Solution 2: Unique Bridge Type
HNTB’s haunched steel box girder alternative with a thinner structure was critical to maintaining the vertical clearance and minimizing the amount of freeway reconstruction. This contemporary bridge met the aesthetic guidelines for the Columbia River Gorge, minimized roadway improvements and reduced project cost.

ENTERING FIRMS:
HNTB CORPORATION AND OREGON BRIDGE DELIVERY PARTNERS (HDR/FLUOR)

CLIENT/OWNER:
OREGON DEPARTMENT OF TRANSPORTATION
OR 213/I-205 to Redland Road Crossing

The City of Oregon commissioned the OR 213/I-205 to Redland Road Crossing (Ughandle) project to construct highway and local street improvements including a roundabout; a new grade separation of Washington Street from OR 213; and widening OR 213 to better serve pedestrian, bicycle, transit, vehicular, and freight movement.

Kittelson & Associates, Inc. and OBEC Consulting Engineers worked with a team of subconsultants to provide innovative and cost-effective solutions for the planning, design, and construction of this $26 million project.

DECOMMISSIONED LANDFILL
- Structures to prevent settlement of gas migration
- 500 tons of trash and 20,000 gallons of contaminated water removed

PUBLIC INVOLVEMENT
- Open houses and stakeholder meetings
- Dynamic project website with live construction camera

OREGON CITY’S FIRST ROUNDABOUT
- Demonstrated to be an effective option for intersection design
- Roundabout safety and operational performance is often superior to other alternatives

ACCELERATED BRIDGE CONSTRUCTION
- Site constraints limited viable construction options
- Carefully planned 4-day closure of OR 213 with 65,000 ADT
- Successful incident action plan with multiple stakeholders and comprehensive public outreach

ENVIRONMENTAL AND FLOODPLAIN MITIGATION
- Old lumber mill converted to wetlands
- Removal of 50,000 cubic yards of sawdust and fill material
- Area populated with native species

American Council of Engineering Companies of Oregon
How to Demolish a Sewer Treatment Plant

The Challenge
From 1969 to 2000, the City of Troutdale operated a wastewater treatment facility, the former Sewer Treatment Plant (STP). Since the retirement of the STP, the facility has remained inactive and the City has maintained ownership of the site, which is an important asset of the City as it is prominently located on the Sandy River behind the popular East Columbia River Highway. The City was faced with the challenge of how to recover this important and valuable asset.

Innovative Solution
Kleinfelder was awarded engineering services to produce a Demolition Action Plan for the former STP. We innovatively produced the action plan using thorough site investigation and delving into 40-year-old, hand-drafted plans. In addition to detailing the disassembly and demolition of the plant components in the action plan, we addressed important regulatory and permitting requirements and focused on public perception during the demolition by describing key odor control and public awareness plan elements. Our cost estimates included an emphasis on local economic stimulus by using local labor costs, and we considered sustainable practices such as equipment and material reuse and recycling.

Excellence
Ultimately, we believe that we exceeded our client’s needs, but more importantly, we believe that we provided them with an essential asset recovery tool that will serve as a useful guide to City or a developer for the successful, safe, and responsible demolition and redevelopment of an important piece of City-owned property.

Owner:
City of Troutdale, OR

Engineer:
Kleinfelder (Beaverton, OR)

Project:
Sewer Treatment Plant Demolition Action Plan

American Council of Engineering Companies of Oregon
Chambers Covered Bridge
Rehabilitation & Interpretive Center – Cottage Grove, OR

ENTERING FIRM: OBEC Consulting Engineers - Eugene, OR

CLIENT & OWNER: City of Cottage Grove - Cottage Grove, OR

This iconic historical structure could easily have been lost.

The railroad bridge was originally built in 1925, and despite the rot and wear it had experienced over the years, the community saw the structure as an important local landmark.

While rehabilitation plans were being developed, a windstorm caused the structure to severely tilt to the side, raising concern that it could collapse. An emergency was declared and OBEC worked with the City of Cottage Grove to hasten removal efforts and dismantle the bridge. Within a three-week time frame permit and right-of-way authorization were obtained and the bridge was safely dismantled.

Thanks to the quick collaboration between OBEC and the City, this historical structure was preserved and rebuilt using almost all of the original iron and hardware, and 25 percent of the original timber.

The project was recently recognized with an Oregon Heritage Excellence Award and now stands as a remarkable centerpiece in the community, providing a gathering place, interpretive signs, a safe route to school, and a key stop along the popular Covered Bridges Scenic Bikeway.

American Council of Engineering Companies of Oregon
Battle Creek Property Redevelopment; Salem, Oregon

Post-construction.  The project provided for the construction of Battle Creek Elementary School, improves neighborhood connectivity, and creates an area for seasonal flood mitigation.

The former Battle Creek Golf Course, an 80-acre site in southeast Salem, consisted of abandoned fairways, a series of culverts along Battle Creek that contributed to upstream flooding, and an open space that was difficult to maintain and access. The property’s surrounding frontage streets lacked consistent bike lanes and included intermittent segments of sidewalks and storm sewers.

The City sought to create a safe public open space, improved multi-modal transportation systems, improved habitat, and an area for seasonal flood mitigation. The project also allowed for the construction of a new school.

This complex project involved designing for floodplain and stormwater management and maintaining an aggressive schedule. Our team simultaneously performed complex hydrologic and hydraulic modeling, prepared the site’s construction plans, secured all permits, and managed many moving parts in less than a year.

Because this area is prone to flooding, the project drew a lot of attention. The City kept the public informed via the internet and extensive public outreach.

The project represents a great value to the engineering profession both in its ingenuity and in its public perception. The City will continue to invest in this watershed, but this project was a great first step, and its significance is apparent with each passing school day at Battle Creek Elementary.
This project was a collaborative effort between the Chinook Water District, PACE Engineers and Hart Crowser to evaluate and repair a 25-foot-high dam (portions of which are over 100 years old) and dredge the impounded reservoir. The project was critical to the surrounding community because the reservoir is the sole potable water source, the reservoir capacity had been significantly reduced by sediment, and portions of the dam piping were collapsing and prone to catastrophic failure. PACE worked with the District to secure a $1 million grant and then worked with the project team to develop and implement a plan to evaluate and repair the dam and dredge the reservoir.

Factors complicating the project included: poor documentation of a failure (and subsequent repair) to the earthen dam in the early 1990s; the need to maintain uninterrupted water supply to the town; completion of the dredging within the in-water work window; the limited dry construction season at the coast; and difficult site access.

Design work included evaluating the stability and condition of the dam and associated components, developing a plan to replace the piping system and to divert the upstream flow, and safely disposing nearly 10,000 cubic yards of soft sediment in a steeply sloping area prone to landsliding.

Despite the challenges, the project team completed the design and construction for the project on time and within budget and returned full service to the town of Chinook.
I-5: Wilsonville Road Interchange; Wilsonville, Oregon

The Wilsonville Road Interchange on Interstate 5 was severely under capacity creating backups on both Wilsonville Road and the freeway ramps. Additionally, narrow sidewalks and inadequate bicycle facilities restricted access for cyclists and pedestrians. The Oregon Department of Transportation and the City of Wilsonville shared a strong desire to increase the capacity of the interchanges while also improving options for pedestrians and developing the interchange into a gateway to the City.

The City also commissioned a public artist to develop a theme for the improvements that would engage the community and capture the character of Wilsonville.

The solution to these challenges involved extensive widening and lengthening of the freeway ramps, in addition to widening Wilsonville Road. Significant and challenging retaining wall designs were developed to minimize impacts to the existing bridges and commercial businesses. Wall types include a significant soil nail wall, a short section of drilled shaft wall, two sections of soldier pile wall, and a unique dual stemmed wall which creates an attractive terrace around the interchange.

Widened sidewalks, bike lanes, decorative hand rails, colored concrete, and creative wall patterns combine to form an aesthetic, pedestrian-friendly gateway that promotes an active lifestyle and environmental stewardship.

This project represents a great value to the engineering profession both in its complexity, creativity, and public perception.

client:
Oregon Department of Transportation, Portland, Oregon
City of Wilsonville, Wilsonville, Oregon

American Council of Engineering Companies of Oregon
Otak and Hart Crowser designed this suspension bridge in the Olympic National Park to replace a failed culvert and embankment. The 136-foot-long bridge stretches over Crystal Creek and accommodates pedestrians, heavy snow loads, and mule trains used for trail maintenance.

The team encountered many uncommon constraints including steep terrain; no direct access to one abutment; weight restrictions for equipment and materials; unusual vibrational and bridge-to-trail skew considerations for mule trains; and geologic hazards. The resulting unique design is turning heads on the trail and actually taking advantage of some of the site constraints. Only one of the abutments has a tower to support the suspension cables, while at the opposite abutment, the cables are anchored directly to a rock cliff. This stroke of ingenuity reduced construction costs and provided more trail clearance between the rock cliff and adjacent unstable ravine slope.

The bridge was positioned to "thread the needle" between multiple rotational, debris-flow, and rockfall-type slope failures. Because only one side of the site was accessible by machine, the steel tower and equipment necessary on the other end had to be transferred across the creek using a system of cables and pulleys. This limited the size and weight of equipment and materials that could be used, and required special design considerations for constructability.

**Crystal Creek Suspension Bridge**

**Project Location:**
Olympic National Park, WA

**Client:**
National Park Service (Port Angeles, WA)
CHEMEKETA COMMUNITY COLLEGE: HEALTH SCIENCE COMPLEX

Portland, OR

Client: SRG Partnership
Owner: Chemeketa Community College
Engineer: PAE Consulting Engineers

A healthy, collaborative and flexible educational building, this state-of-the-art facility features user friendly systems that utilize natural resources to consume 60% less energy than a similar code building.

Teaming Up With Mother Nature
The passive cooling system uses local forecast data and the building’s rooftop weather station (seen on the left) to intelligently and accurately inform the night flush automation system.

Best of Both Worlds
Mixed-mode natural ventilation is used throughout the building to provide occupants with great indoor air quality while using as little energy as possible.

Energy from the Sun
An onsite rooftop photovoltaic array generates approximately 10% of the building’s energy needs.

100% Daylit
The exceptionally integrated lighting design virtually eliminates the need for electric lighting during daytime hours. It uses series of skylights and custom-suspended louvers to maximize natural daylight within the building.

Paving the Way
An Energy Trust of Oregon “Path To Net Zero” pilot program, the building’s metering will be used by for establishing incentive criteria for future high performance buildings.
Solving a critical shortage of clean water for coastal communities

PCJWSA was facing a critical shortage of clean water supply. Its existing wellfields, located along the Oregon Coast, were at capacity and susceptible to saltwater intrusion and tsunamis. PCJWSA had water rights on Horn Creek, a tidally influenced tributary of the Nestucca River. To access this source of water, PCJWSA constructed a surface water intake at Horn Creek, a 1,200 gpm treatment and disinfection plant, and a new transmission pipeline.

Project challenges included consolidating multiple water rights, wetland mitigation and enhancement, and designing an inlet and controlling withdrawals to protect endangered Coho salmon and other fish. The project also involved meeting multiple agency permit requirements, constructing improvements on property owned and used by an active dairy farm, safeguarding facilities from seasonal flooding, constructing structures on pilings to abate unstable soils, and ensuring there were no Native American resources that could be damaged by construction. Being 1.3 miles from sewer service also meant designing a custom on-site treatment and disposal system for wastewater generated by the microfilter. Through collaboration with stakeholders and regulators, the challenges were mitigated and the new system successfully delivers a dependable, high-quality drinking water source.
**BUD CLARK COMMONS**

*Portland, OR*

*Client: Holst Architecture*
*Owner: Home Forward*
*Engineer: PAE Consulting Engineers*

The Bud Clark Commons exemplifies how engineering ingenuity and a truly integrated design team can create a landmark of sustainable design that benefits the community. Its unique holistic services program provides not just housing, but services necessary to eliminating homelessness. The LEED Platinum building consumes 45% less energy and 50% less water than allowable under Oregon’s already aggressive codes.

**Hot Water from the Sun**
A 120 panel solar array on the roof of the building provides a majority of the hot water needs in the building.

**Substantial Savings**
The greywater reclamation system recovers water from showers and laundry machines and reuses it for flushing toilets. This system saves approximately 600,000 gallons of water and $30,000 annually.

**Solutions for the Cause**
The Day Center offers holistic services to aid people in obtaining and maintaining housing. The variation of these space types - from laundry to showers to offices - added to the complexity of the building design.

**A Place of Transition**
The Men’s Shelter’s HVAC system was specially designed to reduce the spread of airborne diseases and provide great indoor air quality for residents.

**Home Sweet Home**
The Center features 130 housing units. To waste as little energy as possible, each unit is provided with fresh air through a roof-top heat recovery system. The unit’s HVAC system is also specially designed to only operate when windows are closed.
Oregon 99W is the main highway through Newberg and Dundee. It experiences high levels of congestion as it connects to Portland, the Oregon Coast, and the growing Willamette Valley wine region. To relieve congestion and improve safety, this project will provide a 11-mile bypass highway with four interchanges as an alternate route for regional and freight traffic.

The environmental process has been unique. It is the first time a tiered NEPA process was completed in Oregon. In conjunction with the NEPA process, a land use goal exception was granted to locate the bypass on over 250 acres of high value farmland and the first construction phase of the project was incorporated into the Tier 2 FEIS. ODOT, FHWA, Parametrix, stakeholders, regulatory agencies, and the public worked together in a series of workshops called Context Sensitive and Sustainable Solutions (CSS) to develop the preferred alternative. The goal was to find a concept that best met the project’s purpose and need with a project design alternative that reflected local public input and ideas.

The Record of Decision for the Tier 2 FEIS was granted on June 5, 2012 and groundbreaking for Phase 1 occurred on August 29, 2012.

**Parametrix**

PORTLAND, OREGON
ENGINEERING • PLANNING • ENVIRONMENTAL SCIENCES

American Council of Engineering Companies of Oregon
Fourth Plain Transit Improvement Project

The C-TRAN Fourth Plain Transit Improvement Project lays the foundation for the first bus rapid transit (BRT) system for the greater Vancouver/Portland metropolitan area. Led by Parsons Brinckerhoff, the project included an alternatives analysis (AA) process to reach the community consensus on a locally preferred alternative along C-TRAN’s highest transit ridership corridor. Completed within a tight 13-month timeframe to meet a critical Federal Transit Administration funding deadline, the AA clearly demonstrated that implementing BRT with priority treatment would address existing issues and meet transit services goals on Fourth Plain Boulevard — improving current operations, attracting new transit riders, and setting the stage for future system development and corridor investment.

Improving transit reliability and service for the Fourth Plain Corridor. Higher bus frequency, priority treatment, and faster boarding will contribute to overall improved reliability and service, and attract new riders.

Encouraging economic development along the corridor. Visibility of existing businesses will be enhanced. Opportunities for redevelopment adjacent to stations may become more viable for land owners.

Enhancing corridor safety for transit users, drivers, bicyclists and pedestrians. New signalized pedestrian crossings, sidewalk improvements, and BRT station lighting will improve travel safety.

Supporting community connectivity and livability. Sustainable transit improvements will contribute to better overall mobility in the corridor, as well as improved air quality and reduced greenhouse gas emissions.

Owner
C-TRAN
Vancouver, WA

Consultant
Parsons Brinckerhoff
Portland, OR

Key Subconsultants
URS
DKS

American Council of Engineering Companies of Oregon
Roy Creek, a Lower Nehalem River tributary, has over 2.7 miles of high quality spawning and rearing habitat for salmon and steelhead that had been blocked by a number of culverts near the confluence of the Nehalem River and Roy Creek on Foss Road. The culverts had effectively created unnatural elevation changes to the stream, cutting off spawning and winter refuge habitat for important fish species. The Port of Tillamook Bay Railway and Foss Road pass above Roy Creek. In order to restore fish passage, four culverts were removed and replaced with a 36-foot-wide structure.

The project restored the gradient of the stream to historic conditions; reestablished stream width, both upstream and downstream; used native vegetation to restore the riparian area; and placed large wood debris in the stream to create habitat for fish.

Client:
Tillamook County, Oregon
In Partnership with:
Lower Nehalem Watershed Council
Oregon Department of Fish and Wildlife
United States Fish and Wildlife Service
JUNCTION CITY WETLAND MITIGATION
Melding Art and Science to Restore a Willamette Valley Wet Prairie

CHALLENGE: PBS designers and engineers were charged with designing the mitigation area to restore 90 acres of Willamette Valley wetland. Specific functions and values were required by the Oregon Department of State Lands to meet mitigation benchmarks. This was further complicated by stormwater and floodplain development requirements that must be accommodated on the same site. High levels of coordination were required among PBS staff, other design team members, the owner, and general contractor to deliver a quality, finished product within an abbreviated schedule.

SOLUTION: Employed a highly integrated design approach to balance multiple project objectives—simultaneously meeting wetland mitigation and floodplain development requirements, and simplifying constructability to meet short project timelines.

INNOVATION: Controlled invasive plant species through an aggressive soil management plan and diversion of upstream surface water sources—thereby reducing long-term maintenance costs and increasing the potential success of the project.

KEEPING INVASIVE PLANTS AT BAY:
A perimeter drainage swale handles a portion of upstream surface flow, and reduces introduction of invasive plant species.

REPLICATING THE WET PRAIRIE:
Micro-depressions were created with precise grading to mimic habitat representative of the Willamette Valley.

SOIL MANAGEMENT:
Detailed soil profile characterization was critical to the success of the wetland plantings. After stripping the soil layer, topsoil was stockpiled and later replaced to create a suitable planting media.

RACING AGAINST THE CLOCK:
Saturated clay soils required specific work methods and specialized equipment. With an 18-week work window, an expedited construction schedule was required.

MEETING MULTIPLE OBJECTIVES:
Surface flows originating upstream are routed to an engineered roadway and stormwater detention facility designed to meet FEMA and local agency requirements.

American Council of Engineering Companies of Oregon
OR 43: Willamette River Bridge Construction Scheduling

Location: Oregon City, Oregon
Client/Owner/Location: Oregon Department of Transportation (ODOT), Salem, OR
Team/Location: TY Lin International, Salem, OR; ODOT, Salem OR; Wildish Standard Paving Co., Eugene, OR

Time is of the Essence This complex bridge rehabilitation was experiencing numerous changes resulting from unforeseen field conditions. With eight months remaining before the opening to traffic date of October 15, 2012, TYLI was added to the project team as scheduling specialists.

CPM Scheduling Expertise TYLI enhanced and expanded upon WSTP’s detailed construction schedule to include upcoming changes to the scope of work and provide continuous assessment of progress. To complete these tasks, TYLI converted the project schedule from MS Project to Primavera P6 in order to utilize the software’s advanced capabilities. Further, TYLI and ODOT set up protocols to capture tasks’ start/finish dates, percent completes and other relevant data.

Facilitating Collaboration TYLI facilitated a collaborative effort with ODOT and WSTP to augment the existing project schedule in identifying the critical remaining activities impacting the bridge opening. The team approach was crucial as it relied heavily on WSTP’s expertise in planning and construction techniques. WSTP’s involvement allowed ODOT to provide critical feedback, thereby allowing TYLI to develop periodic schedule modifications. The collaborative effort allowed the combined management team to uncover enhanced timeframes, logic ties, and establish resources loading needed to meet the milestones. TYLI utilized live work sessions with Primavera P6 to make changes on the fly and review the results in real-time.

Achieving Milestones The bridge was available to traffic on October 12, 2012, three days ahead of schedule. Traffic was allowed on the bridge on October 15, 2012, meeting our commitment to the public.
I-5: Elkhead Road to OR 126: Knowles Creek Design Build Project (Bundle 508)

Location: Lane & Douglas Counties, OR, ODOT Regions 2 & 3
Client/Owner/Location: Oregon Department of Transportation, Salem, OR
Team/Location: TYLI International, Salem, OR & Slayden Construction Group, Stayton, OR

Fast, Efficient Delivery: Building on our hallmark service, delivering solutions in exceptionally short timeframes, the TYLI team designed 6 bridge replacements and 2 bridge repairs in less than 12 months.

Seven Diverse Sites: Project sites ranged from urbanized and rural sites on both interstate and state highways. Each required a unique solution that accommodated its distinctive constraints while achieving a constructible, economical solution. I-5 provided generous rights-of-way; however, the high-speed design standard required lengthy flat curves, presenting establishment of bypass detour alignments. OR126 allowed for bypass detour alignments; however, right-of-way was much more restricted. Interactions with nearby facilities and features—interchanges, county roadways, railroad grade separation, waterways—presented challenges at each site. The TYLI team was successful by developing unique, appropriate solutions for each location.

Multi-region, Multi-agency Coordination: Close collaboration with ODOT Regions 2 and 3, ODFW, NMFS, OBDP, Coos Bay Rail Link, and local communities resulted in successfully delivering project on time and budget.

Giving Back to the Community: A highly successful public involvement program included educational opportunities along the corridor. Students learned how tree removal due to construction activities could affect bird habitat, then built birdhouses designed to accommodate local species, which were placed near project sites.

Environmental Stewardship and Innovation: This was the first project completed under new stormwater treatment criteria G089-02(2), which expanded the standard from bioswales to include techniques such as amended soils, natural filtration, and considering addressing treatment supplied by overland flow. TYLI pioneered implementation of these standards on Oregon highways.
The Portland Streetcar Loop

Client: City of Portland Bureau of Transportation  
Location: Portland, Oregon  
Engineers: URS Corporation, Portland, Oregon

The 3.5-mile Portland Streetcar Loop Project is a critical economic catalyst for Portland’s burgeoning Central Eastside neighborhoods. Prior to beginning service in September 2012, the URS team overcame a number of technical and procedural challenges to deliver the environmental documentation and design within a very aggressive schedule. The result was the Loop being the first streetcar project in the country to receive Federal Transit Administration’s Small Starts funding.

Two bridges anchoring the route highlight the technical challenges. For the Broadway Bridge, 240,000 pounds of streetcar infrastructure was introduced to the lift spans while maintaining their original weight as stipulated by Multnomah County. This was accomplished by replacing existing with lightweight materials while respecting the bridge’s historic character. A new bridge connecting the terminus at OMSI navigated complex site constraints including crossing over Division Street, over the UPRR mainline, under two major transmission lines, by a railroad switching yard, over Water Avenue and tying into CDPF’s MLX Viaduct Replacement Project that was under construction. Touching down near OMSI, the design allowed for a future connection to the Portland to Milwaukie Light Rail project and the new Willamette River Bridge. To address all associated clearance issues, several innovations to the bridge design approach and track design resulted in an optimized bridge alignment that had only 4 inches of clearance to spare.

Delivered on time and within budget, the Loop reintroduces streetcar service to Portland’s Eastside and features the first modern streetcar vehicles manufactured in the United States; neither of which have been seen in nearly 60 years.
HABITAT PROJECT ADDRESSES BOTH FISH AND FLOODING
Walla Walla River Habitat Restoration
Milton-Freewater, Oregon

The Walla Walla River is central in the lives of the residents of Milton-Freewater, Oregon. While levees and other artificial constraints on the river’s natural boundaries help reduce flood risk near the town, they also limit fish-rearing habitat for endangered fish species such as bull trout, steelhead and spring Chinook. Removing levees was one way to create new habitat, but residents expressed concern that such an approach could expose the area to increased flood risk.

To address these concerns, GeoEngineers worked with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) to develop concepts for removing a portion of levee just upstream from Milton-Freewater and reconnecting the river with its traditional floodplain. The project’s goal was to dramatically increase fish habitat while simultaneously increasing the river’s natural ability to absorb flooding during peak flows.

This ambitious project met many objectives:
- Brought historically competing interests together and identified technical solutions that could address seemingly conflicting community needs
- Removed 2,500 linear feet of levees and produced ten acres of reconnected/restored floodplain
- Received a FEMA “no-rise” certification, demonstrating that removing the levee and reconnecting the floodplain reduced flood risk
- Yielded immediate and dramatic increases in endangered fish populations

Credits
GeoEngineers, Inc. - Spokane, WA - Entering Firm
Confederated Tribes of the Umatilla Indian Reservation - Client
Pankey Construction - Contractor