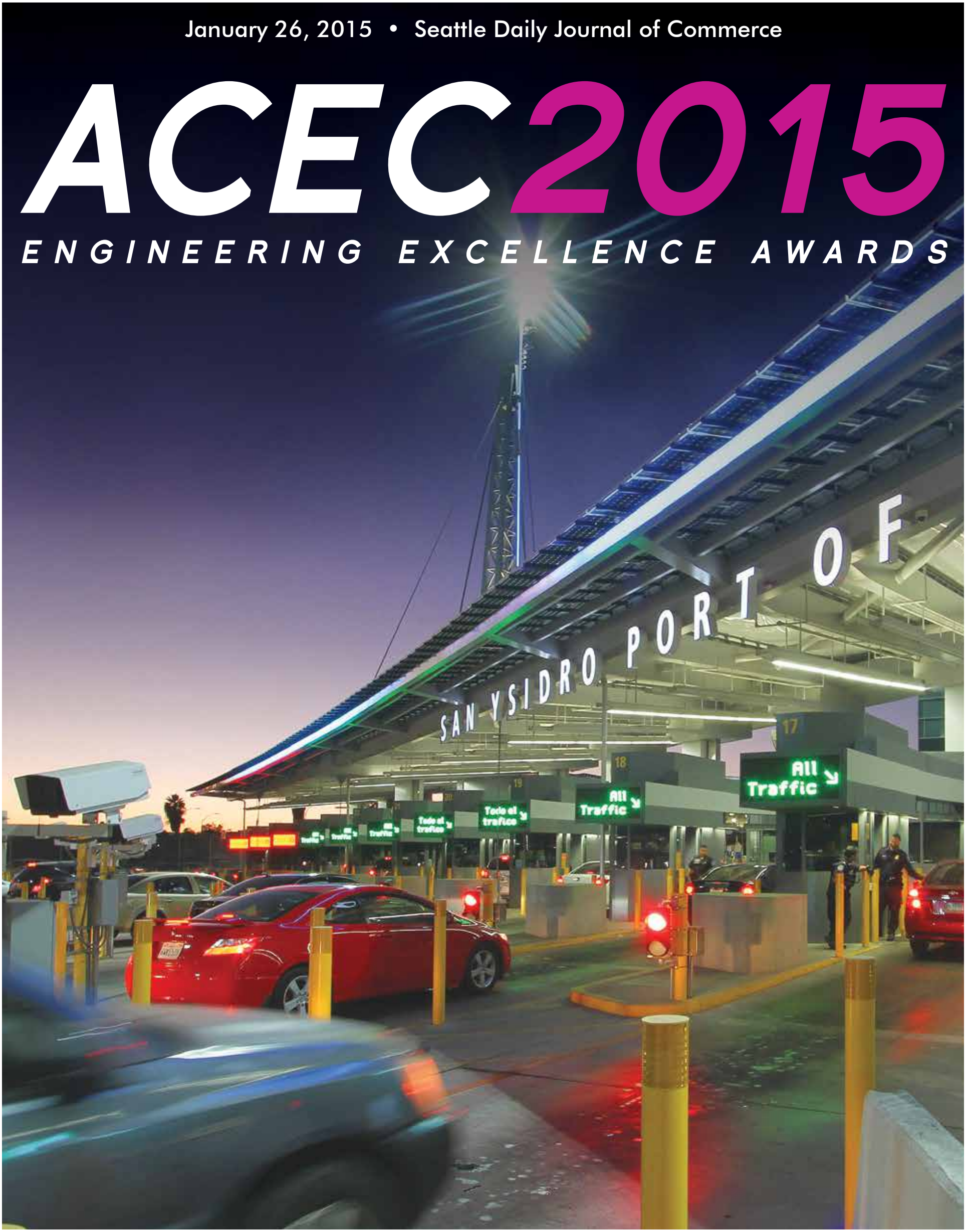
January 26, 2015 • Seattle Daily Journal of Commerce

ACEC2015

ENGINEERING EXCELLENCE AWARDS



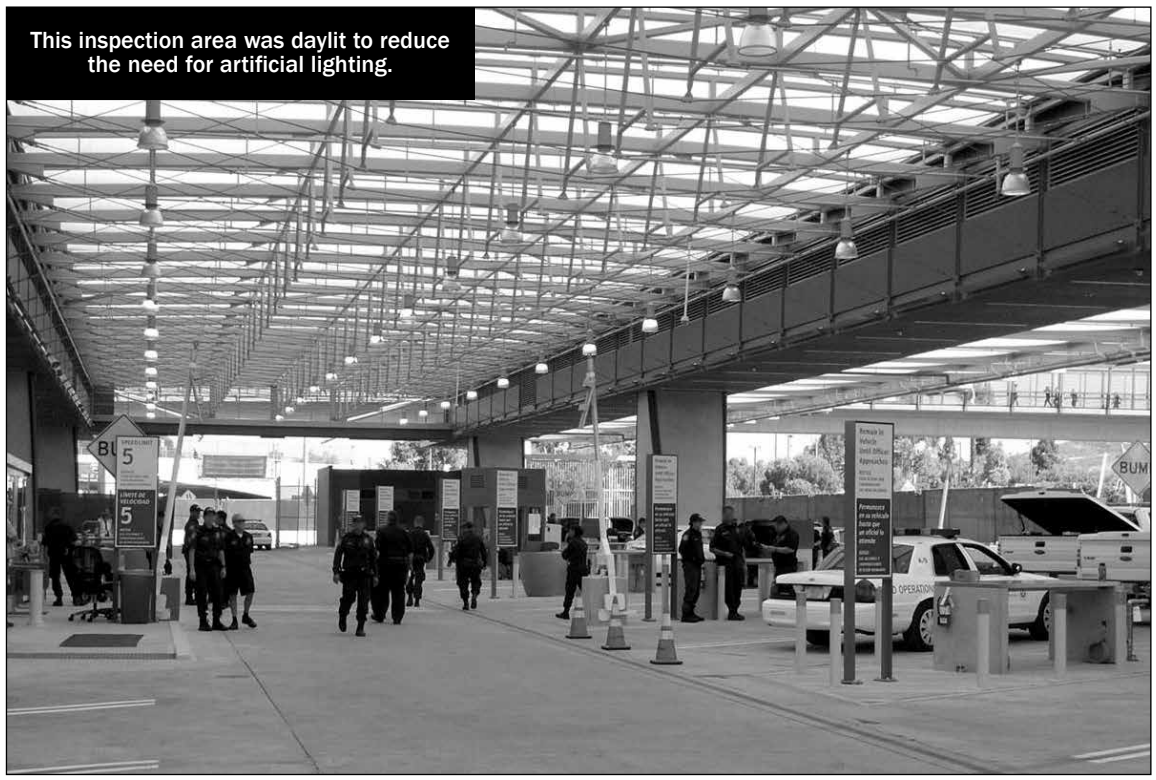
MKA used a cable-stay system to support the long-span roof over the inspection booths at the San Ysidro Land Port of Entry.

PHOTO COURTESY OF MAGNUSSON KLEMENCIC ASSOCIATES

National finalist: Platinum award

Magnusson Klemencic Associates

Project: San Ysidro Land Port of Entry modernization
Client: U.S. General Services Administration



This inspection area was daylit to reduce the need for artificial lighting.

PHOTO COURTESY OF GSA

Modernization of the San Ysidro Land Port of Entry, the Western Hemisphere's busiest land port, is a project unlike anything attempted anywhere in the world.

It's a massive, $434 million puzzle with tightly interlocking functional components. A constrained construction zone requiring ship-in-a-bottle-like phasing that averages 50,000 vehicles and 25,000 pedestrians passing through daily. A critical facility with complex and extremely stringent security requirements. An arid location short on water and fighting pollution from runoff, and requiring segmental construction to meet budget and minimize operational constraints.

These components had to fit together, all while meeting the owner's requirement to create a model port that sets new standards of efficiency, security, aesthetics and sustainability.

These unprecedented challenges were met with the creation of two first-ever systems, each with multiple innovative components:

- Net-zero nonpotable water system: Five separate strategies combine to eliminate the need for "outside" water for nonpotable purposes, saving the U.S. General Services Administration 20 million gallons per year. The system includes an on-site membrane bioreactor to transform water from "black" to clean, and can provide the port of entry with total water self-sufficiency in the event of an emergency or terrorist event.
- "Floating" inspection canopy: New levels of visibility and security are achieved by replacing the 70 columns normally needed to support 770 feet of double-stacked (two per lane) vehicle inspection booths with just four high-performance pylons. The invention of a cable "quad-stay" support system brings elegance and allows the very-long-span roof to be just 2 feet deep.

The port of entry's edge-to-edge 39-acre modernization is designed for phased construction. The first phase, which opened in September, includes a 30,000-square-foot primary inspection canopy, a 62,000-square-foot secondary inspection canopy, other buildings totaling 225,000 square feet, advanced security features and 26 vehicle-processing lanes with double-stacked officer booths.

It's the first-ever 24/7/365 facility to achieve LEED platinum, net-zero energy, and net-zero nonpotable water, with border crossing wait times from Tijuana, Mexico, to San Diego dropping from over three hours to less than 20 minutes.

Protected by the most advanced security approach in the entire U.S. system, the port's signature mix of structure and architecture creates a welcoming first impression for visitors to the U.S. The modernization project also brings the potential to inject billions into the economies of U.S. and Mexico.

Delivered on time and budget, the San Ysidro Land Port of Entry is a model for not only future ports, but projects of all kinds.

MKA TAKES TOP PRIZE FOR BORDER CROSSING

Magnusson Klemencic Associates captured the top honor at the American Council of Engineering Companies of Washington's 2015 Engineering Excellence Awards ceremony on Jan. 23.

The ceremony honored 35 engineering projects, excelling in a wide range of engineering skill and ingenuity.

Magnusson Klemencic Associates was presented with the platinum award for its part in the $434 million San Ysidro Land Port of Entry modernization project.

The six national winners (1 platinum and 5 gold) will go on to compete in the ACEC national competition in Washington, D.C., in April.

Members of the six-judge panel were Nadine Post, ENR; Steve Johnston, engineer emeritus; Mike Slater, president of AIA of Washington; Bob Adams, AGC; Brian Ziegler, public works director for Pierce County; and Matt Rosauer, Pine Street Group.

The American Council of Engineering Companies of Washington is a professional trade association representing consulting engineering, land surveying, and affiliated scientific and planning firms statewide.

ON THE COVER

The San Ysidro Land Port of Entry in San Diego is the busiest land border crossing in the Western Hemisphere. Magnusson Klemencic Associates won ACEC Washington's platinum award for its work on a modernization project there.

PHOTO COURTESY OF MAGNUSSON KLEMENCIC ASSOCIATES

DJC TEAM

SECTION EDITOR: JON SILVER • SECTION DESIGN: JEFFREY MILLER
WEB DESIGN: LISA LANNIGAN • ADVERTISING: MATT BROWN

NATIONAL FINALISTS

PLATINUM AWARD

MAGNUSSON KLEMENCIC ASSOCIATES
Project: San Ysidro Land Port of Entry modernization
Client: U.S. General Services Administration

GOLD AWARDS

STRUCTURAL SYSTEMS

HART CROWSER
Project: King Street Station restoration
Client: ZGF Architects

BUCKLAND & TAYLOR
Project: Milton-Madison Bridge replacement project
Client: Indiana Department of Transportation

HNTB CORP.
Project: South Park Bascule Bridge replacement
Client: King County Department of Transportation

CKC STRUCTURAL ENGINEERS
Project: Viktoria
Client: Weber Thompson

TRANSPORTATION

JACOBS/GEOENGINEERS
Project: SR 530 emergency roadway reconstruction
Client: Washington State Department of Transportation

BEST IN STATE

GOLD AWARDS

ORIGINALITY/INNOVATION

TETRA TECH
Project: Ballard Siphon replacement project
Client: King County Department of Natural Resources Wastewater Treatment Division

FUTURE VALUE TO ENGINEERING PROFESSION

DAVID EVANS AND ASSOCIATES
Project: Bear Creek rehabilitation
Client: City of Redmond

HERRERA ENVIRONMENTAL
Project: Port of Olympia Stormwater Treatment System feasibility and design
Client: Port of Olympia

SOCIAL/ECONOMIC SUSTAINABILITY

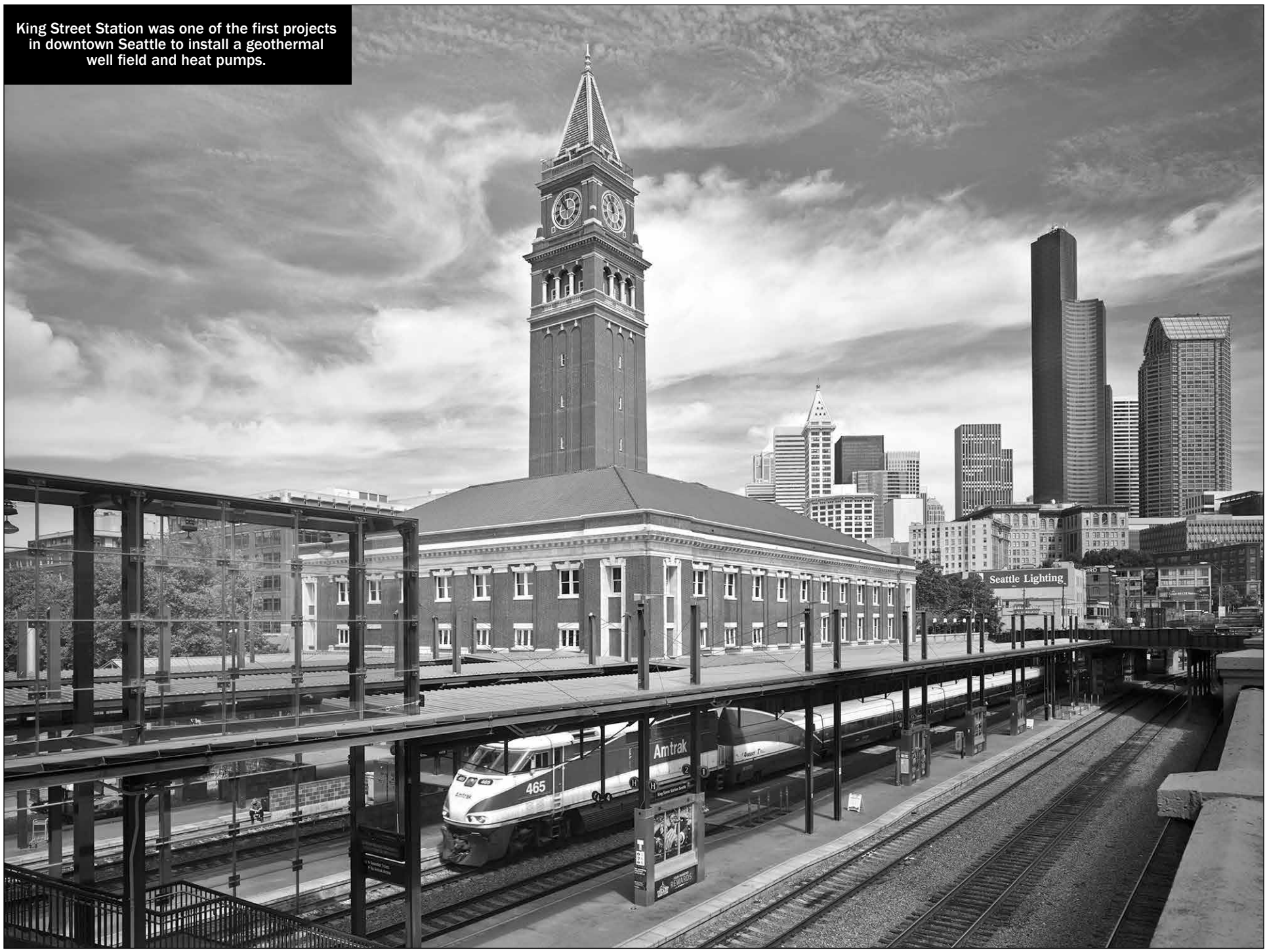
HART CROWSER
Project: Custom Plywood Mill site cleanup
Client: Washington State Department of Ecology

COMPLEXITY

PARAMETRIX
Project: Interbay Pump Station
Client: King County Department of Natural Resources and Parks Wastewater Treatment Division

EXCEEDS OWNER/CLIENT NEEDS

HART CROWSER
Project: Seattle Children's Hospital Building Hope
Client: Seneca Group



King Street Station was one of the first projects in downtown Seattle to install a geothermal well field and heat pumps.

PHOTO COURTESY OF HART CROWSER

Structural systems

National finalist: Gold award

Hart Crowser

Project: King Street Station Restoration
Client: ZGF Architects

King Street Station is an iconic building, designed by the same firm that designed New York's Grand Central Station. Originally built in 1906, King Street Station is one of the most recognizable buildings in Seattle.

But there was a problem. Its landmark 245-foot-tall clock tower had already been damaged by an earthquake and would not survive another major shakeup. The seismic design loads and poor condition of the structure required adding 1,345 tons of steel within the existing structure.

Hart Crowser used state-of-the-art seismic design and also took helical pile technology to another level in engineering practice, making the project feasible at this constrained site.

Much has changed since 1906, such as the need for sustainability. The requirement of a LEED silver certificate was surpassed by the design, and the building achieved LEED platinum certification.

Hart Crowser recommended the use of geothermal heating and cooling. This was one of the first projects in downtown Seattle to install a geothermal well field and heat pumps to reduce the building's energy consumption.

Hart Crowser also performed geophysical testing to "see" through the ground and identify the toe of the existing timber piles supporting King Street Station. This eliminated the need for expensive and disruptive ground improvement that was recommended by a previous geotechnical consultant. This alone saved the city of Seattle half a million dollars.

Using state-of-the-art-seismic modeling, innovative geotechnical engineering design and geophysical investigation in a unique combination, Hart Crowser helped the Seattle Department of Transportation make this iconic building safe in a sustainable manner, while saving over $750,000 in public money.

Structural systems

National finalist: Gold award

Buckland & Taylor

Project: Milton-Madison Bridge replacement project
Client: Indiana Department of Transportation

The old Milton-Madison Bridge, built across the Ohio River in 1929, was narrow, deteriorating and functionally obsolete, but it was a vital link to the nearby communities.

The joint owners of the bridge, the Kentucky Transportation Cabinet and the Indiana Department of Transportation, decided to replace the bridge.

The challenge for the bid design team was finding an innovative solution that eliminated the need for a year-long bridge closure and also reduced construction risk associated with the schedule.

The team developed a solution so the existing bridge remained open to traffic during the pier rehabilitation, while the new bridge superstructure was constructed alongside on temporary piers. Traffic was then diverted onto the new structure, and the old superstructure and pier tops were demolished. Temporary access ramps allowed the new approaches to be completely built in their final position.

In early 2014, the bridge was closed for a few days and the entire new superstructure slid into final position. The Milton-Madison Bridge is currently the longest truss slide in North American history.

The replacement was built on temporary piers alongside the old bridge, then slid into place after the old superstructure was demolished.

PHOTO COURTESY OF BUCKLAND & TAYLOR

The new South Park Bridge was built to withstand a major earthquake.

PHOTO COURTESY OF HNTB CORP.

Structural systems

National finalist: Gold award

HNTB Corp.

Project: South Park Bascule Bridge replacement
Client: King County Department of Transportation

The original South Park Bridge, built in 1931, was a double-leaf bascule bridge listed on the National Historic Register and designated a King County landmark. The 1,045-foot-long bridge connected Seattle neighborhoods across the Duwamish Waterway, a navigable channel used for commercial, industrial and recreational purposes.

The original bridge was deemed seismically vulnerable due to the original foundation piles not penetrating through a deep layer of liquefiable soil, as well as the concrete structure being weakened by cumulative damage from several previous earthquakes. The tilting and cracking of the main piers meant the bridge was susceptible to reactive movement as the bascule spans opened and closed.

In the last years of operation the bridge required extensive maintenance and operations to maintain alignment of the movable spans and machinery. The bridge was ultimately classified structurally deficient and functionally obsolete and received a sufficiency rating of 4 out of 100 prior to closure to roadway traffic in 2010.

King County Department of Transportation selected HNTB as the final design consultant for the South Park Bridge replacement. The primary objective of design was a bascule bridge that would sustain minimal damage and remain operational in the aftermath of a minor seismic event and that would experience only moderate, repairable damage to make the bridge functional within days following a major earthquake.

Achieving this objective within the context of a movable span with strict alignment requirements for reliable operation adds several degrees of difficulty for design and construction. Seismic performance requirements were satisfied by implementing several innovative design features, including sunken caisson foundations, isolated trunnion frames and a collapsible center joint on the lift spans.

The new South Park Bridge is more than a bridge. It reconnects communities and businesses on both sides of the river, improves freight mobility and provides better regional access to downtown Seattle and the adjacent industrial area.

The bridge has restored a reliable link to the South Park community. The community can take pride in a landmark drawbridge that is safe, preserves the art and historical features of the old bridge and improves the marine and land-based environment of the surrounding areas.

Seattle's Viktoria apartments were built with a unique shear wall core designed to eliminate interior columns.

PHOTO COURTESY OF CKC STRUCTURAL ENGINEERS

Structural systems

National finalist: Gold award

CKC Structural Engineers

Project: Viktoria
Client: Weber Thompson

Located in the heart of downtown Seattle near Pike Place Market, Viktoria has 249 apartments ranging from studio to two-bedroom units, six levels of parking above grade and 3,700 square feet of street-level retail.

The 25th floor has panoramic views and is devoted to socially focused amenities. An evergreen tree pierces through an oculus opening, and a dramatic butterfly roof cantilevers more than 20 feet from the sky lounge, adding unique charm to the modern high-rise building.

Viktoria's structural system consists of cast-in-place concrete with post-tensioned floor slabs and a shear wall core for seismic and wind resistance. The column sizes and total concrete volume were effectively decreased by optimized concrete strength in the lower level core walls.

CKC proposed a unique shear wall core design which provided a highly advantageous way to eliminate interior columns, increase architectural design flexibility, and improve structural efficiency. The structure has no internal columns from the core to the exterior glass line, providing completely open interior space with enhanced views from each unit while increasing architectural design flexibility.

By thickening the slab from 8.5 inches to 16 inches for a distance of 6 feet around the core perimeter and creating a unique "drophead," all internal columns became unnecessary. Slab spans of nearly 40 feet from the central core to the exterior glass line were made possible, providing completely open living units and parking layout without structural obstructions.

This approach eliminated the need for transfer beams that would otherwise have been required to shift interior column locations at levels where occupancies change.

Another benefit of this structural system was reduction in reinforcing steel requirements. With fewer interior columns, the majority of the building's dead load was transferred to the core, minimizing net tension in the walls under overturning from wind and seismic forces. Additional costs for thickening the slab were therefore canceled by savings in core wall reinforcing.

The increased thickness around the core also created a more uniform and consistent deflection distribution, which would remain stable with time. Thus, the slab is less susceptible to serviceability problems.

Through careful coordination among the design and construction teams, CKC's unique solution to the design challenge resulted in a clean economical structural layout without compromising other design features of the building.

WSDOT used a design-build delivery process to quickly reopen state Route 530 after the Oso landslide buried a mile of roadway.

PHOTO COURTESY OF JACOBS/GEOENGINEERS

Transportation

National finalist: Gold award

Jacobs/GeoEngineers

Project: SR 530 emergency roadway reconstruction

Client: Washington State Department of Transportation

On March 22, 2014, a catastrophic landslide near Oso flowed thousands of feet across the Stillaguamish River Valley, obliterating dozens of homes and spreading 10 million cubic yards of mud, trees and debris over a half-mile area. The slide buried approximately one mile of state Route 530 — a critical highway that connects a string of rural communities — with up to 20 feet of debris, closing it for four months.

It was against this backdrop that Jacobs, GeoEngineers and SDA — the design firms on Atkinson Construction's SR 530 emergency roadway reconstruction design-build team — began working with the Washington State Department of Transportation and local stakeholders to rebuild the roadway and deliver much-needed resources and hope to the area.

The team helped WSDOT:

- Reopen the roadway extremely quickly, reconstructing an approximately one-mile stretch of highway exactly six months after the landslide — one of the fastest design-build deliveries in WSDOT history.
- Open a temporary two-way corridor within days, enabling goods and people to travel between areas that had been isolated for months.
- Save $5.4 million over WSDOT's projected cost, due in part to the design-build team's creative habitat mitigation plan, fish-friendly designs that were less costly to install, innovative roadway designs and use of existing stormwater mitigation best management practices.
- Take a different approach to the traditional permitting process and trust that the design-build team could mitigate impacts and finalize permits after construction.
- Incorporate project elements that helped the community heal after the devastating landslide.
- Demonstrate that emergency design-build projects can be built extremely quickly, with a high degree of cooperation and without compromising project quality or the environment.

The team's efforts to address these pressing needs and help the affected communities rebuild is engineering at its best. As a result of the SR 530 project's remarkable success, the state now has the confidence that it can use a design-build model under emergency conditions. Perhaps more importantly, the project also demonstrated that engineering firms can effectively adapt under very difficult circumstances and lead stakeholders to effective solutions, despite overwhelming challenges. And in doing so, engineers showed they can do more than design infrastructure: They can help heal communities.

Originality/innovation

Best in State: Gold award

Tetra Tech

Project: Ballard Siphon replacement project

Client: King County Department of Natural Resources Wastewater Treatment Division

What do you do with the last two segments of historic wood stave pipeline in the King County wastewater collection system? That was the question when Tetra Tech began working with King County on the Ballard Siphon replacement project.

The original wood siphons were put into service in 1935 beneath the Lake Washington Ship Canal. They carry up to 60 million gallons per day of sewage from North Seattle to the West Point Treatment Plant, so the siphon pipes were a critically important piece of King County's infrastructure.

Sonar profiling of the pipes had shown signs of deformation but further testing, using graduated sized mandrel pigs, found the existing wood pipes were in sufficient condition to reuse by lining each siphon with new HDPE pipe, butt fusion welded to make them waterproof.

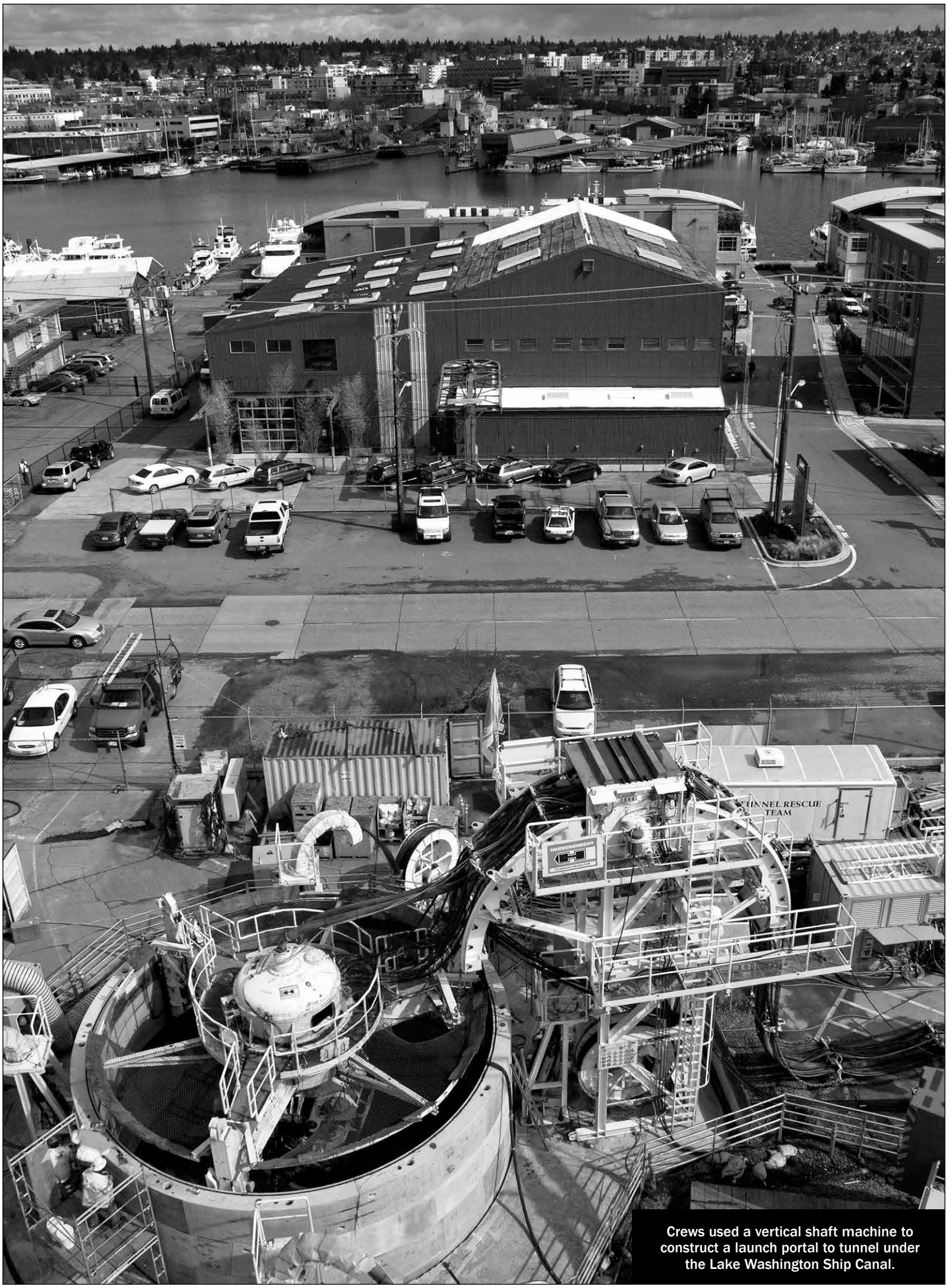
A new parallel 84-inch siphon provides additional capacity (bringing the total to 83 million gallons per day). This will reduce combined sewer overflows into the Lake Washington Ship Canal and eliminate the potential single point failure mode if one of the siphons were out of service.

Tetra Tech was the lead consulting engineer on the project from the initial alternatives analysis through final design. Subconsultants included Staheli Trenchless Consultants and Landau Associates.

The project involved the first use in North America of the Herrenknecht AG vertical shaft machine, a robotically controlled tunneling machine that operates within a small construction footprint, without the need for dewatering, in mixed and difficult soil conditions. General contractor J.W. Fowler used the vertical shaft machine to construct the 157-foot-deep launch portal for the earth pressure balance machine used to mine the nearly 2,000 linear foot tunnel 60 feet beneath the Lake Washington Ship Canal.

The tunnel shaft sites are both located in built-out areas in the Ballard and Interbay marine industrial zones along major arterials. The initial site offered for the launch portal was withdrawn by the property owner, necessitating a change in approach.

Throughout the design phase, the project team remained flexible and quickly adapted its design as needed to respond to the concerns of the neighbors, the traveling public, and various stakeholders.



Crews used a vertical shaft machine to construct a launch portal to tunnel under the Lake Washington Ship Canal.

PHOTO COURTESY OF TETRA TECH

On the Ballard side of the Ship Canal, the new tunnel and re-lined wood siphons were reconnected to a 12-foot diameter vintage brick sewer. The top of the brick arch was removed and supporting concrete walls were built outside the pipe to take the structural load and avoid damaging the vintage sewage tunnel. After making the connection precast top beams shaped to match the brick arch were placed. Fill above the top beams included foam blocks to reduce structural loading and support of the arterial roadway above.

The new Ballard Siphon tunnel provides more capacity and operational redundancy and prevented combined sewer overflows during heavy rainfalls in October 2014.

Future value to engineering profession

Best in State: Gold award

David Evans and Associates

Project: Bear Creek rehabilitation
Client: City of Redmond

Bear Creek, a tributary to the Sammamish River, was straightened and hardened with riprap by the U.S. Army Corps of Engineers in 1965 as part of the Sammamish River flood control project.

Nearly a mile of the lower reach of Bear Creek in Redmond was identified as a high-priority restoration because it is a critical migration route for some of the last wild salmon stocks in the Lake Washington system. In 2008, the Washington State Department of Transportation provided funding for the Phase 2 restoration as mitigation for state Route 520, and the final permitting and design was led by David Evans and Associates.

This complex urban stream restoration project with multiple objectives was further complicated by the discovery of the oldest known archaeological site in Western Washington, requiring innovative engineering solutions to mitigate impacts to cultural resources.

As part of the 404 permitting evaluation for cultural resources on the site, artifacts were found dating up to 12,000 years ago. This delayed the design, permitting and construction until the site could be evaluated.

The site is significant because it is one of the first archaeologically excavated sites in Western Washington that dates to the end of the Ice Age. At that time, the environment was undergoing tremendous change and early Native American communities migrated along coastal and inland routes south of large continental glaciers. This archaeological discovery posed larger questions about social values where salmon habitat restoration conflicted with the preservation of cultural resources.

Stream restoration included "channel meandering" to increase the overall length of the channel — providing a more natural, sinuous stream, critical for pool formation and reducing velocities for improved fish passage.

Wetlands were designed as part of the project and were hydraulically connected with Bear Creek. Portions of remnant channel were repurposed as "backwater channels" for refuge habitat critical to juvenile salmonids. This increased the in-stream habitat by 1,335 feet.

Fifteen hundred pieces of large, woody debris were installed for pool formation and bank protection. Over 3,000 feet of trail was realigned.

The outcome provides lessons that can be applied to engineering for future projects. DEA worked with the city of Redmond, WSDOT, Native American tribes and the USACE to avoid and minimize impacts to the cultural resources by realigning the stream and designing bank protection to protect the resource area. The cultural resource was preserved by maintaining the floodplain above the geological stratum with the most artifacts.

The work was phased over three separate construction packages to accommodate field investigation and artifact recovery while design moved forward to meet requirements for completion by 2014.

Crews found an Ice Age-era archaeological site while restoring Bear Creek in Redmond.

PHOTO COURTESY OF DAVID EVANS AND ASSOCIATES

Future value to engineering profession

Best in State: Gold award

Herrera Environmental

Project: Port of Olympia Stormwater Treatment System feasibility and design
Client: Port of Olympia

Herrera designed a 3.25-acre stormwater treatment facility to handle runoff from a log yard.

PHOTO COURTESY OF HERRERA ENVIRONMENTAL

Nearly 130 million board feet of logs move through the Port of Olympia's marine terminal every year. The majority of this 65-acre site is devoted to 25-foot-high stacks of logs, log debarkers and immense log-loading machines.

Every log that moves through the port leaves behind bark and other organic material. This material accumulates and is washed into south Puget Sound, where it is consumed by bacteria and in the process depletes the oxygen supply in the water.

Low oxygen leads to stress and mortality of aquatic life. Due to this, Washington state's industrial stormwater permit has set benchmarks for stormwater containing oxygen-depleting material, and the Port of Olympia, along with many other log yards, are required to treat their log yard runoff to meet these benchmarks. For the Port of Olympia, this required treatment of 64 million gallons of stormwater each year.

When Herrera began working with the Port of Olympia, the port had a clear goal: Design a system to treat their stormwater and make sure the system is flexible enough to meet changing demands.

At the time of design there were no existing successful log yard treatments for the pollutants found at this site. Herrera designed a 3.25-acre stormwater treatment facility that will meet the state's benchmark values.

The modular and adaptable design provides the port with flexibility for reducing operating costs should their treatment needs change. The treatment facility design incorporated wastewater treatment technologies to treat highly variable stormwater and used relatively inexpensive pilot testing to guide the design. Gallon for gallon, the system will be less expensive than other technologies, including a passive treatment system originally envisioned, yet without the concerns of long-term reliability or consistency.

The port is now acknowledged by regulators, the community and by other ports as being innovative, progressive and leading the way in protecting Puget Sound.

As Gov. Jay Inslee said at the project's ribbon cutting, "I'm here on behalf of my three grandchildren because they're going to have a shot at a clean Puget Sound because of the leadership of the people associated with the port."

Social/economic sustainability

Best in State: Gold award

Hart Crowser

Project: Custom Plywood Mill site cleanup
Client: Washington State Department of Ecology

The Custom Plywood Mill site cleanup transformed a blighted industrial property into healthy natural habitat.

PHOTO COURTESY OF HART CROWSER

The Custom Plywood Mill site cleanup serves as a shining example of how public agencies, local governments and the consulting community can optimize scarce public funds to achieve the transformation of a once-blighted and severely degraded industrial property back to a productive and thriving economic and ecological community.

The Custom Plywood project is unique because of its large size, high visibility, public interest, stakeholder involvement and overall scope of the project.

From the outset this has been more than a cleanup project. It is a restoration of a beautiful stretch of public shoreline involving a multidisciplinary team of environmental, geotechnical and civil engineers, wetland and fisheries biologists, coastal geomorphologists and cultural resource/archaeological professionals.

The mill site, located in Anacortes, is the largest ever cleanup funded by Washington state.

Industrial operations at the site began in 1892 and included a succession of mills: sawed lumber and trim, shingles, box parts, wooden water pipes and plywood. Over 100 years, mill operations contributed to the deposition of approximately eight acres of wood waste and fills, thousands of creosote-treated piles and industrial debris — including remnants of two substantial fires, the last of which leveled the facility in 1992.

The mill operations had left a legacy of contamination, including toxic hydrocarbons, dioxins and metals. While the decay of wood waste is a natural process, the huge quantities of waste decreased the amount of available dissolved oxygen in the water and released hydrogen sulfide and ammonia, all of which are toxic to sea life.

The solution involved separate interim remedial actions to address the upland and in-water impacts.

The upland remedy involved demolishing all upland structures, excavating and disposing of 30,000 tons of contaminated soil and waste, removing more than 1,000 piles, and constructing an estuarine wetland complex.

The in-water remedy included removing 1,400 creosote piles, demolishing remaining in-water structures, removing 52,000 tons of contaminated sediment, and placing 140,000 tons of new habitat substrate.

The myriad of habitat enhancements — including upland plantings, forage fish habitat restoration, construction of a new estuarine wetland complex, and an aquatic spit and protective jetty extension to protect the wetland and shoreline enhancements from winter storms — ensure long-term ecological and economic productivity.

All of this work ultimately resulted in a complete transformation of the site.

An upgrade to the Interbay Pump Station was completed more than seven months ahead of schedule.

PHOTO COURTESY OF PARAMETRIX

Complexity

Best in State: Gold award

Parametrix

Project: Interbay Pump Station
Client: King County Department of Natural Resources and Parks Wastewater Treatment Division

The Interbay Pump Station, originally constructed in 1967, conveys wastewater flows from the Elliott Bay Interceptor system to King County's regional West Point Wastewater Treatment Plant.

It is the county's highest-flow conveyance system pump station and handles most of the combined sewage/stormwater collected from within Seattle city limits, including all of downtown. It is a critical part of the wastewater system.

Prior to this upgrade, much of the equipment was nearing 50 years old and its electric lead pump lacked standby power, presenting significant operation risks.

Improvements were carefully planned and sequenced. Work involved installing a new generator and electrical system, replacing the oldest pump (which was part of the original 1960s construction), then replacing the other two pumps and performing other upgrades. The pump station had to remain fully operational at all times during the project.

The station was converted to three premium-efficiency, 800-horsepower medium-voltage motors on variable frequency drives. Noise and odor control systems were also added, along with replacement of most support equipment.

The work was planned in close partnership with King County operations staff, as they needed to understand exactly how the project would occur so that they could continue their necessary activities throughout construction. The project also added system flow-control and flow-limiting software that allows operators to minimize combined sewer overflow (CSO) events.

The upgrade was completed 230 days ahead of schedule, 20 percent under budget, and at the lowest cost per gallon of capacity of any recent major station upgrade.

The pump station now operates with an increased firm capacity of 133 million gallons per day, has EPA Class 1 Reliability, operates 35 percent more efficiently, and has eliminated the majority of its greenhouse gas emissions. The station also enables the county to better control flow and storage in its conveyance system to reach its continued goal of reducing CSO events.

Hart Crowser saved $850,000 by compacting soil on the site.

PHOTO COURTESY OF HART CROWSER

Exceeds owner/client needs

Best in State: Gold award

Hart Crowser

Project: Seattle Children's Hospital Building Hope
Client: Seneca Group

Seattle Children's Hospital had reached its capacity. It needed a new emergency department and new critical care and cancer units. Building Hope fulfilled this urgent need for new and better space.

Yet there were challenges: Seismically unstable soil conditions. Construction adjacent to an operational hospital. Sustainability goals. What's more, Seattle Children's Hospital wanted the design and construction team to do more with less money so that more resources could go directly to healing children.

Hart Crowser reconsidered one of the oldest geotechnical engineering practices — soil compaction — and applied it in a new way that reduced project cost by $850,000. They kept 5,600 truckloads of soil from being trucked offsite and another 5,600 truckloads from being brought back on. This had the added benefit of saving an enormous amount of time so the project easily finished on schedule.

Hart Crowser also helped create rain gardens to keep stormwater runoff on the site instead of sending it to an overtaxed sewer system. To do this, they created specially designed tests for stormwater filtration evaluation and established new criteria for infiltration characteristics.

The result: facilities that are as harmonious with the environment as they are safe for children to come for treatment. These vital new facilities would not have been possible without careful management of approved funding and a strong emphasis on efficiency.

BEST IN STATE

SILVER AWARDS

ORIGINALITY/INNOVATION

EXELTECH
Project: Anderson/LaVenture road extension
Client: Skagit County

ORIGINALITY/INNOVATION

EXELTECH
Project: Lauridsen Boulevard Bridge replacement
Client: City of Port Angeles

ORIGINALITY/INNOVATION

TRANSPO GROUP
Project: Next Generation ITS implementation
Client: Seattle Department of Transportation

FUTURE VALUE TO ENGINEERING PROFESSION

TETRA TECH
Project: Kirkland Pump Station upgrade
Client: King County Department of Natural Resources Wastewater Treatment Division

SOCIAL/ECONOMIC SUSTAINABILITY

RH2 ENGINEERING
Project: Cashmere Wastewater Treatment Facility
Client: City of Cashmere

SOCIAL/ECONOMIC SUSTAINABILITY

OTAK
Project: Northeast Redevelopment Area regional infiltration facilities and Miller Creek enhancements
Client: City of Burien

SOCIAL/ECONOMIC SUSTAINABILITY

REID MIDDLETON
Project: Pioneer Highway and Fir Island roundabout
Client: Skagit County

COMPLEXITY

LANDAU ASSOCIATES
Project: Bay Vista Redevelopment Landfill Gas Mitigation Feasibility Study
Client: Bremerton Housing Authority

EXCEEDS OWNER/CLIENT NEEDS

WOOD HARBINGER
Project: Health and Science Building
Client: Leavengood/Rovelstad Architects

EXCEEDS OWNER/CLIENT NEEDS

FSI
Project: Northwest Wine Academy at South Sound College
Client: Boxwood

JUDGE'S AWARD

FUTURE VALUE TO ENGINEERING PROFESSION

NOTKIN MECHANICAL ENGINEERS

Project: Norton Sound Regional Hospital
Client: Kumin Associates/Norton Sound Hospital Corporation

BEST IN STATE

BRONZE AWARDS

DAVID EVANS AND ASSOCIATES

Project: 56th Street Northwest/Point Fosdick Drive Northwest
Client: City of Gig Harbor

PARSONS BRINCKERHOFF

Project: Ballard to Downtown Seattle Transit Expansion Study
Client: Sound Transit/Seattle Department of Transportation

BERGER ABAM

Project: Commercial dock replacement
Client: Makah Tribe/Port of Neah Bay

WOOD HARBINGER

Project: North Seattle College Allied Health and Technology Building Renewal
Client: Schacht Aslani Architects

OSBORN CONSULTING

Project: Northshore Summit Park Design and Construction
Client: City of Kenmore

PARAMETRIX

Project: Pacific Avenue improvements
Client: City of Bremerton

BERGER ABAM

Project: Pendleton Avenue widening and multiway boulevard
Client: U.S. Army Corps of Engineers

BERGER ABAM

Project: Port of Tacoma's Pier 3 upgrade
Client: Port of Tacoma

REID MIDDLETON

Project: Renton Taxiway B rehabilitation
Client: City of Renton

DAVID EVANS AND ASSOCIATES

Project: SR 20/Cook Road realignment and extension
Client: City of Sedro-Woolley

HDR

Project: Swamp Creek Bridge No. 546 replacement
Client: Snohomish County

PARSONS BRINCKERHOFF

Project: Washington State Ferries 2013 Origin-Destination Travel Survey
Client: Washington State Department of Transportation, Ferries Division