ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Inland Empire Section

Outstanding Civil Engineering Achievement Award

ENTRY FORM

Part of the Outstanding Projects and Leaders Program

Outstanding Civil Engineering Achievement Award

ENTRY FORM

The Inland Empire Section of the American Society of Civil Engineers recognizes exemplary civil engineering projects as the Outstanding Civil Engineering Achievement (OCEA). Established on the National level in 1960, this distinguished award honors the project that best illustrates superior civil engineering skills and represents a significant contribution to civil engineering progress and society. Honoring an overall project rather than an individual, the award recognizes the contributions of many engineers.

Entries for the Inland Empire Section OCEA Award require submittal of an Outstanding Civil Engineering Achievement entry form with attachments as specified in the following pages.

Present most technical information in lay terms. The Section Board and Awards Committee members have diverse backgrounds in civil engineering. The engineers and design professionals on the Board and committee may have expertise in structures, for example, but not in environmental engineering. Entries will also be read by general media reporters who cover such civil engineering issues as transportation or the environment but who may not have engineering backgrounds.

Please use one form for each entry. Submit one unbound, single-sided original hard copy or PDF file of the complete nomination package to the Post Office Box or Email address below.

DEADLINE FOR ALL ENTRIES IS APRIL, 16.

John (Hank) Swift, P.E.
Section President & Awards Committee Chair
P.O. Box 1095
Rathdrum, Idaho 83858
hkswift@roadrunner.com

PROJECT INFORMATION

Project name (exactly as it should appear on the trophy):

Presented by the Inland Empire Section of the
American Society of Civil Engineers to

City of Spokane, Wastewater Management Department
(name of owner)

Egg-shaped Digester, Riverside Park Water Reclamation Facility
(name of project)

Outstanding Civil Engineering Achievement Award

Example: Potomac Crossing Consultants
Woodrow Wilson Bridge Project

Project Location (city, state) Spokane, Washington

Completion Date April 28, 2009

NOMINATED IN:

(check the category that most closely matches your project):

- ☐ Bridge, tunnel, waterway, railway, road (other than toll)
- ☐ Water supply, flood control dam
- ☐ Fuel power plant
- ☐ Airport and other similar large development
- ☐ Port, coastal, ocean and wetlands project and offshore structure
- ☐ Military project (such as base, launching unit, and harbor facility)
- ☐ Toll or similar regional road
- ☐ Power dam
- ☐ Building and structure
- ■ Water supply, water treatment, and waste disposal

ABOUT THE PROJECT:

Scheduled completion date: March 14, 2008

Actual completion date: April 28, 2009

Total project budget: $45,060,000

Actual cost: $44,475,000

NOMINATOR'S INFORMATION

Describe the nominator's role:

☐ Nominator only ■ Active in the Project

If active in the project, describe activity Program Manager, City of Spokane

Submitted by Lars Hendron

Title Program Manager, City of Spokane

Address 909 E. Sprague

City, State, Zip Spokane, WA 99202

Country United States of America

Phone (509) 625-7900 Fax

Email lhendron@spokanecity.org

Signature Date

PROJECT OWNER INFORMATION

Project Owner's name City of Spokane

Firm CEO Mary Verner, Mayor

Firm Representative Dale Arnold, Wastewater Director

Address 909 E. Sprague

City, State, Zip Spokane, WA 99202

Country United States of America

Phone (509) 625-7900 Fax

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Signature Date

TEAM LEADER INFORMATION

Contractual Team Leader's name Rick Smith, Program Director, CH2M HILL

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City, State, Zip Spokane, WA 99201

Country United States of America

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Signature Date

Engineer of Record's name Dave Green, Project Manager, CH2M HILL

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Program Manager Kelly Irving, Engineer, CH2M HILL

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Construction Manager Brian Gomolski, CH2M HILL

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Signature Date

General Contractor's name Hollis Barnett, Garco Construction

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Phone (509) 535-4688 Fax

Email hollis@garco.com

Signature Date

CONTRACTOR/SUBCONTRACTOR INFORMATION

Please provide contact information for all contractors and subcontractors who contributed to this project. If more space is needed, please photocopy this page.

Contact person's name Wayne Kienbaum, Advanced Fireproof and Insulation, Inc.

Address P.O. Box 789

City, State, Zip Greenacres, WA 99016

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Phone (509) 924-6709 Fax (509) 924-9045

Email

Signature Date

Contact person's name Bruce Buck, Central Pre-Mix Concrete Co.

Address P.O. Box 3366

City, State, Zip Spokane, WA 99220

Country United States of America

Phone (509) 533-0208 Fax

Email

Signature Date

Contact person's name Nils Brandt, Cobra Roofing

Address P.O. Box 19068

City, State, Zip Spokane, WA 99219

Country United States of America

Phone (509) 455-4043 Fax (509) 455-4594

Email

Signature Date

Contact person's name Karin Rinaldi, Eller Corporation

Address 8102 N. Starr Rd.

City, State, Zip Newman Lake, WA 99025

Country United States of America

Phone (509) 226-0333 Fax (509) 226-1332

Email karin@ellercorporation.com

Signature Date

Contact person's name Richard Carlson, Inland Waterproofing Service, LLC

Address P.O. Box 2847

City, State, Zip Hayden, ID 83835

Country United States of America

Phone (208) 665-0440 Fax (208) 665-0550

Email

Signature Date

Contact person's name Don Williams, McClintock & Turk, Inc.

Address 516 N Sycamore

City, State, Zip Spokane, WA 99202-4625

Country United States of America

Phone (509) 535-7641 Fax (509) 535-8812

Email

Signature Date

Contact person's name Tom Vandergaag, Modern Drywall, Inc.

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Contact person's name Bruce Fabert, Chicago Bridge and Iron

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Contact person's name Gary Sanders, Nelson Landscaping

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Signature Date

Contact person's name Tony Rinaldi, Power City Electric

Address P.O. Box 2507

City, State, Zip Spokane, WA 99220

Country United States of America

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Email trinaldi@sesco.com

Signature _____ Date _____

Contact person's name Gary Mann, Pro Heating & Air Conditioning

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Country United States of America

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Email gmann@proheating-spokane.com

Signature _____ Date _____

Contact person's name Lewis Ray, Ray's Demolition

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Signature _____ Date _____

Contact person's name Mark Schultz, S&S Coatings, Inc.

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City, State, Zip Spokane, WA 99203-0438

Country United States of America

Phone (509) 924-6120 Fax (509) 924-6121

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Signature _____ Date _____

Contact person's name Matt Spilke, Spilker Masonry Co., Inc.

Address 3917 E Columbia

City, State, Zip Spokane, WA 99217-1111

Country United States of America

Phone (509) 489-7311 Fax (509) 489-9450

Email _____

Signature _____ Date _____

Contact person's name Mitch Kemple, ThyssenKrupp Elevator Corp.

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Phone (509) 533-2701 Fax (509) 533-1811

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Signature Date

Contact person's name Jack Ilestine, Tri States Rebar, Inc.

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City, State, Zip Spokane, WA 99212-1287

Country United States of America

Phone (509) 922-5901 Fax

Email rebarjack@air-pipe.com

Signature Date

Contact person's name

Address

City, State, Zip

Country

Phone Fax

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Signature Date

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Signature Date

Contact person's name

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Signature Date

Contact person's name Roger W. Flint, CH2M HILL

Address 717 West Sprague Avenue, Suite 800

City, State, Zip Spokane, WA 99201

Country United States of America

Phone 509-747-2000 Fax (509) 623-1622

Email roger.flint@ch2m.com

Signature _____ Date April 8, 2010

I hereby authorize submission of this project into the Inland Empire Section of the American Society of Civil Engineers' Outstanding Civil Engineering Achievement (OCEA) Award competition.

Senior Executive/Principal Roger W. Flint

Title Vice President/Area Manager, CH2M HILL

Signature _____ Date April 8, 2010

Address 717 West Sprague Avenue, Suite 800

City, State, Zip Spokane, WA 99201

Country United States of America

Phone 509-747-2000 Fax (509) 623-1622

Email roger.flint@ch2m.com

Signature _____ Date April 8, 2010

I believe the work of the engineer meets the intended uses and expectations for the project and hereby grant permission to enter this project in the ASCE Inland Empire Section OCEA competition, and authorize publication of its outstanding features, unique aspects or innovations.

Client/Owner Representative Dale Arnold

Title Director, City of Spokane Wastewater Management

Signature _____ Date 4/9/10

Address 909 E. Sprague

City, State, Zip Spokane, WA 99202

Country United States of America

Phone (509) 625-7900 Fax (509) 625-7940

Email darnold@spokanecity.org

Signature _____ Date 4/9/10

APPLICATION CHECKLIST

Entries for the ASCE Inland Empire Section Outstanding Civil Engineering Achievement (OCEA) Award should be presented in the following order:

- ■ Completed, signed, entry form
- ■ Addendum:
  - **Originality and Innovation** – Must demonstrate New or Innovative Application of Technology, Design, Materials, Process/Methods.
  - **Collaborative Approach** – Must show collaboration between Design and Construction.
  - Must enumerate the ways in which the team showed **Resourcefulness in Planning** and **Solving Design Challenges**.
  - Must describe the **Value to Engineering Profession and Public Perception**.
  - Must articulate how the project used a **Systemic, Integrated Approach**.
  - Must address comments about **Quality**, specifically Client Satisfaction and Proven Performance.
  - Must detail the **Complexity of the Problem** or **Situation Addressed**.
  - Must describe what **Social, Economic, and Sustainability Design Considerations** the team addressed, specifically how the project shows Significant Improvement to Public Health, Safety, and/or Welfare.
  - **Exhibits** – Minimum of six color photographs (more photos/slides are encouraged. ASCE may use photos for publicity purposes). Local newspaper articles or trade journals, if available. Include only data and charts essential to understanding the project's technical aspects or innovations. Videos will not be accepted as part of the nomination process. Items may be submitted on CD, provided photos are JPG/300 dpi.

DEADLINE FOR ALL ENTRIES IS APRIL 16.

addendum

originality and innovation

The City of Spokane, Washington, and CH2M HILL, in the midst of a 10-year plant upgrade, suddenly faced the need to replace a collapsed digester. CH2M HILL was selected in 1998 by the City of Spokane to serve in the overall role of Program Manager and project management office (PMO) functions for the Riverside Park Water Reclamation Facility upgrades. CH2M HILL provided design and construction services for upgrades at the plant, including on the egg-shaped digesters. Garco Construction was the successful bidder and was assisted by subcontractor CBI Services, a division of Chicago Bridge and Iron Company, and by numerous other subcontractors.

The steel egg shaped digesters measure 109 feet tall by 89 feet in diameter at the equator. What makes these digesters unique is that they have a conical shaped bottom that transitions upward into a spherical shaped top. This unique shape provides better recirculation of biosolids and requires much less maintenance and cleaning, compared to conventional cylindrical (flat bottom) shaped digesters.

CBI Services has a patent on the design of steel egg-shaped digesters, and at the time the project was awarded, they were the company best qualified to design and fabricate these digesters. Garco Construction subcontracted with CBI Services to design, fabricate, and construct the steel egg-shaped digesters under the oversight of CH2M HILL's PMO. This matchup built on an already excellent working relationship, as CBI and Garco have been working over the past 10 years on various military contracts involving steel tank construction.

Fabrication of the steel shells and plates was very specialized because it required the shell plates to be double-curved and pressed to create the desired egg-shaped digester.

Aerial view of site.

Vertical welding process on side of digester.

Horizontal welding process on side of digester.

Unique services included the implementation of an automatic curved-track welder that welded 25-foot-long vertical seams that varied in position from a negative slope to a positive slope. The automatic welding machine was made specifically for this project. An automatic girth welder for the continuous horizontal seams also was designed, built, and implemented.

Because of the double-curved concave shape, the shell plates were very difficult and challenging to temporarily support during the weld-up process, which included the services to design special strong-back trusses to position and align the steel sheets and hold them in place until they were securely welded. The temporary strong-back trusses were designed and fabricated specifically for this project. The shells were lifted in place with all required safety scaffolding and safety tie-offs preinstalled. Thus, all safety and fall-protection requirements were already in place prior to erection.

Due to the proximity of the digesters to the river, the final design also includes a spill containment berm constructed around the digesters. If a release occurred, the material would be contained and would not reach the river.

The project also included the development of specialized internal suspended scaffolding that followed the internal slope of the walls and roof to allow access for welding and inspection. The innovation, technology, and processes required to execute such a task successfully resulted in a one-of-a-kind project in the Pacific Northwest.

Setting tank section with scaffold.

Welding tank panels on ground between digesters and river.

collaborative approach between design and construction

The collaborative approach between design and construction is illustrated by the effort required on the steam lances, on the welding inspection, and on the training and startup coordination.

Steam Lances

Steam lances were added for augmentation to the solids heating system during project construction. The original heating method was having problems in a similar application in the raw feed system. New penetrations added to the digester shell also required additional engineering effort. Change was broken into portions to minimize impact on the project schedule; for example, tank penetrations were released first since the first digester vessel was already under construction. Early and frequent coordination with all involved to incorporate the work yielded excellence created in an open manner with the goal of success for the entire team. This change was nearly $1M in construction cost and resulted in a extending the project's critical path.

Inspection and Construction Phase Services

Tank construction code requirements required contractor quality control, as well as owner quality assurance, including visual, dye penetrant, and radiographic testing. The CH2M HILL design team was primarily based in Corvallis, Oregon, and was coordinated and managed from the PMO, onsite. CH2M HILL's onsite Construction Management team included a construction manager, assistant construction manager, administrative assistant, resident inspector, structural inspector, and welding inspector. The team held a series of workshops between the City and CH2M HILL, including site visits, to choose egg-shaped and design parameters, industrial safety, and operational consideration. Special site

Top of Digester 4, looking north, with steam lance nozzle.

The project included the development of specialized internal suspended scaffolding that followed the internal slope of the walls and roof to allow access for welding and inspection. The innovation, technology, and processes required to execute such a task successfully yielded a high-quality end product.

inspection visits also were coordinated with design staff for structural, electrical, architectural, process mechanical, steam, heating, ventilation, and landscape architecture elements at various appropriate stages of the project. The onsite team coordinated submittal reviews, requests for information and change items with design staff throughout the project. These efforts were closely monitored using Primavera Contract Manager software and daily communications so that the design team could assist the construction effort without delay. Coordination calls and visits also were used as needed for direct discussion between design staff and contractor/subcontractor/supplier when necessary on more difficult issues.

Training, Startup and Commissioning Coordination

Training, start-up, and commissioning portions of the project required extensive coordination between all involved. Three levels of collaboration were established: Collaboration between the inspector and the superintendent (daily meetings); collaboration between the Construction Manager and the Contractor's PM (weekly meetings); and collaboration between the president of Garco, the City Wastewater Director, and the CH2M HILL Program Director was conducted on an as-needed basis.

Extensive coordination also occurred between the City, the Engineer, and the Contractor. Several months in advance of these activities, special weekly meetings were held to review requirements, expectations, and issues needing resolution with City, Contactor, and Engineering staff.

The City and PMO worked together during the project to develop and implement a Design, Construction, and Operability (DCO) protocol for this and other projects delivered through the program.

Particularly challenging was coordination involving City personnel training, as there are several different shift crews and each individual operations personnel was required to be trained

New power building upper left (with green roof), old boiler building to south, Digester 3 demolition (upper center.)

Demolition of old boiler building.

Sheetpile driving.

Sheetpiling and foundation set in hill above river.

because the digesters are a critical use facility and the plant is a 24-hour-a-day, 7-days-a-week operation. This required multiple training sessions on the same topics. Owner crews were training by manufacturer's representatives in equipment operation and maintenance and by Engineer personnel in process system operations. Sessions also had to be coordinated with the obligations of normal day-to-day plant operation.

resourcefulness in planning and solving design challenges

The City had lost the use of one digester, which necessitated the need for design work to bring the new egg-shaped digesters online quickly, since the City had no redundant digesters. Primary challenges included were the minimal available site space, the desire to set the digesters as deep as possible to reduce visual impact on the surrounding neighborhood, and the existing boiler facility's interference with the construction site. The boiler facility also was found to be an inadequate size for future facility growth, so replacement of this facility also was incorporated into the project. Early in design, the boiler facility's design was broken out separately from digester design and fast-tracked so that it could be constructed and placed in operation in time to start shoring and deep excavation for the digester foundation. In addition to replacing the functionality of housing the steam heating boilers, the new facility was designed to allow addition of future cogeneration equipment. This facility was under construction in October 2005 and was placed in partial operation May 2006 to take on plant steam loads. The old boiler facility was then demolished so that the digester excavation could proceed without delay.

As previously mentioned, operational difficulties were discovered with the original steam heating system design while the digester facility was under construction. The design team was mobilized

Sheetpiling and excavation adjacent to Digester 3 and existing digester building.


Concrete placement at electrical room.


North area of pump gallery.

Digester mix piping.

to address the concerns and come up with an alternative heating system that could be added to the project by change order. The design was adjusted to provide direct injection to the digesters by redundant steam lances through the top of each digester shell. The design was completed and fast-tracked through construction to provide the necessary robust heating system required for the operation of the system.

The project was constructed on a steeply sloped site that was confined by the Spokane River to the south, a high pressure liquid gasoline line to the west, and the existing wastewater treatment plant facility to the north and east sides. The project required extensive excavation, shoring, and difficult concrete construction on a very confined site.

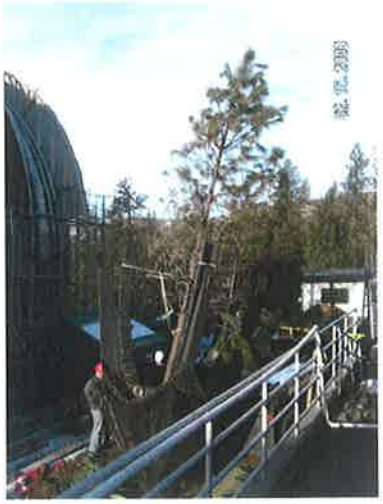
The engineering and installation of a temporary sheet pile retaining wall system with tiebacks was necessary to retain the existing hillside, plant facilities, and the liquid gasoline line. The temporary sheet pile retaining wall system allowed Garco's earthwork subcontractor Eller Corporation to perform a 50-foot-deep excavation for the foundation and basement gallery of the new egg-shaped digester facility. The excavation and removal of 30,000 cubic yards of soil was required for the foundation of the new digester facility. Access to the site was limited to only the east side via a one-lane, steeply graded gravel road. There was also very little lay-down area for staging of materials. All construction materials had to be trucked to the site on a just-in-time basis, which required continuous coordination of all material deliveries with the excavation and hauling-off of soil from the existing hillside.

Additional design challenges included cast-in-place concrete work, structural steel erection, and tower crane operation for hoisting and setting of all materials and equipment. The challenge also included the coordinated efforts of 21 subcontractors working together on a very confined site, in a very tight timeframe, with limited work hours to reduce the noise impact to the residents of the adjacent neighborhood.

Ventilation equipment at southeast end of Digester 5.

View from foundation level, looking up hill.

View of project from neighborhood above facility.



Planting of mature landscaping to provide visual screening.

value to engineering profession and public perception

This project provided much needed replacement of the existing 30-year-old digesters, provided more efficient and better treatment of biosolid processing, and gave the City the ability to replace the remaining aging digesters whose determined life would have expired in 2015 This project replaced one existing 2.1 million gallon digester with two new 2.8 million gallon digesters. The new digesters also offer better safety features, better environmental features, and reduced operational cost.

This project drew a lot of interest from local neighbors and interested parties. An open door policy was maintained and interested persons were invited to watch the construction effort within the construction boundary in safe pre-determined locations and also offered routine site tours to interested parties. The City and PMO included a series of open houses with neighbors and interested parties; held progress updates and then passed information to the city design review committee; ultimately leading to a plantwide Aesthetic Master Plan for the site. The final site tour was attended by Spokane's Mayor, Mary Verner, and the City Council President, Joe Shogan, along with members of the local newspaper—the Spokesman Review—and the City of Spokane Wastewater Department.

Eastside shoring and excavation with foundation progressing from west.

Tower crane assembly.

Stair tower construction.

use of a systemic, integrated approach

The overall project goal was to construct the new facility and place it in operation without undue impact on day-to-day plant operations. The team was successful in this regard. The project was also completed under budget.

Coordination of construction with existing plant operations was coordinated in detail using Construction Impact on Plant Operations forms. These worked by the contractor drafting a plan for their impact activity then submitting to the Engineer for initial review and then reviewed with the plant's supervisory team for approval. On the scheduled activity date, the Engineer, Contractor, Construction Management team, and City work teams met before work started to review the plan and work roles. As a result, all tie-in and other impact activities were completed without negative or unanticipated impact on plant operations.

Engineering staff also programmed the supervisory control and data acquisition (SCADA) system and coordinated closely with Contractor-supplied equipment and City staff on a frequent basis to ensure that Contractor scope was met and Owner expectations achieved.

The project was also was coordinated with other small and large construction projects at the facility so that contractors did not affect the work of other contracts. This was achieved through planning during the design phase to minimize work area overlap and day-to-day coordination by the construction management staff, contractors and Owner. An emergency project also occurred during the project in which a failed digester gas pipe needed to be replaced on the main access road in front of the digester construction site. Again, all project team members worked together to ensure that the necessary work was completed without undo impacts on any work.

Selting digester bridge.


Pumping equipment.


Transfer tank.


Healing and ventilation equipment.

The key partnering concepts revolved around a "team" approach for resolution of all problems, with the underlying goal to provide the best possible project that met all of the needs of the end users. This could have been a difficult challenge, as the steel-egg shaped digesters are relatively new technology and are the first of their kind to be constructed in the Pacific Northwest.

The team approach adopted in our partnering meeting was quickly put to test with the discovery of differing underground site conditions, associated schedule delays, and some major design revisions and additions. All three parties worked extremely well together through open discussions that were primarily oriented around finding solutions versus placing blame. The result was very successful as the City of Spokane, CH2M HILL, and Garco were all very pleased with the final outcome of the project.

The City and the PMO worked together during the project to develop and implement a Design, Construction, and Operability (DCO) protocol for this and other projects delivered through the program. The DCO protocol involves close collaboration between the Owner's staff, the Engineer and the Construction Manager to assure that the facility meets the design objectives, is constructed properly, and is ultimately operable.

The key partnering concepts revolved around a "team" approach for resolution of all problems, with the underlying goal to provide the best possible project that met all of the needs of the end users.

Egg-shaped digester, Riverside Park Water Reclamation Facility.

quality, client satisfaction, and proven performance

The DCO Protocol helped to assure that the Owner's staff satisfaction was achieved. This was especially evident during walk-throughs performed during construction for the placement of valves. The project featured hundreds of valves throughout the facility. Special care was taken to guide the plant supervisors through the facility to seek input on whether valves had the proper placement and orientation, or whether they should be reoriented or relocated. The goal was to enhance the ultimate operability of the facility to enhance operational efficiency.

The client also was pleased with the process of startup and commissioning that was put in place at the facility. A great deal of preplanning and coordination was used—especially with third-party suppliers through Garco—with City staff, CH2M HILL, and with sales representatives as well. Preplanning was the most important factor in the commissioning, planning, and startup process: making sure all the appropriate key people were involved when they needed to be. For example, consultation on the treatment process used by the digesters during startup was very successful. The project's treatment process expert was onsite during startup to provide input.

"Serving as the Engineer, CH2M HILL deftly orchestrated the multitude of professionals needed to plan, design and execute this project successfully. Communication was key and CH2M's constant ability to quickly bring expert talent to bear on any given issue was critical to developing the design, resolving problems and staying on schedule while remaining responsive to the City's needs.

"Garco, as prime contractor, routinely demonstrated its competence for constructing large, complex projects involving a very broad range of trades. The work progressed quickly and serious issues were remarkably few and far between for a project of this magnitude. The site and time constraints were simply handled, and the problem resolution process developed in Partnering proved very effective."

Lars Hendron,
Program Manager,
City of Spokane

complexity of the problem

The complexity of the problem can be illustrated by in the building of this wastewater treatment facility project in extremely tight quarters; in the proper involvement of key players in a fast-tracked project; and in the incorporation of this massive facility into the local landscape in a manner that would provide an acceptable aesthetic along the scenic river for those living in the neighborhood, using the state park, and using the Spokane River.

The project's very narrow footprint and proximity to the river made construction a complex issue. Groundwater had to be protected, so construction was allowed only during the low flow season, which meant working hard and fast when the river was low.

Coordination with two key groups was necessary in the complex situation. In addition to working with neighbors in public involvement meetings, the City's Design Review Committee was consulted to help work with neighbors to give them a sense of what options were available and what outcomes might look like. It was also necessary to work closely with the Spokane Tribe of Indians to make sure digging was not done in sensitive areas that qualify as burial grounds. Tribe members monitored excavation in the case that artifacts or remains were encountered.

Lastly, incorporating the facility into the local scenic and neighborhood landscape was a complex issue. In addition to the coordination of extensive mature landscaping, a Chevron liquid gasoline line at a pressure of 1,000 pounds per square inch runs through the site. Careful work was done to address Chevron's requirements, to work with them on what they did and did not want near the pipe, and to not damage it. While they initially were reluctant to allow landscaping near the pipe, they were extremely pleased with the outcome.

Heating and ventilation equipment

Aesthetic Improvements to Environment Surrounding Digesters

- Digesters were built deeper, as close to the hill as possible
- Round top was created
- Profile of fins was lowered
- Substantial landscaping was added, including a variety of mature trees
- Internal mixing was used to avoid mechanical equipment exposed on top of digesters

social, economic, and sustainability design considerations including significant improvement to public health, safety, and welfare

The work was constructed immediately adjacent to the Spokane River, which required special attention to storm water pollution prevention and installation of protective silt fencing, drainage, and site grading. The project was also immediately adjacent to an osprey's nest that initially drew the concern of the Washington State Fish and Game Department. The department was assured that every reasonable precaution would be taken to not disturb the nesting osprey. In fact, when it was feasible, during two summers of nesting, the tower crane operator would specifically position the rigging block in a location to block the sun and provide shade to the nesting osprey and its chicks.

Additionally, prior to the contract being awarded, the surrounding neighbors near the project voiced concern to the City about the visual impact and noise that would be created by the project. CH2M HILL and the City held neighborhood meetings and developed aesthetically pleasing landscaping features and color selections for the project that would blend well with the environment along the river. Limited construction work hours were also agreed to, which would reduce the construction sound impact to the surrounding neighborhood. Digester mitigation became the basis for a plant-wide Aesthetics Master Plan addressing architecture, landscaping, odor, noise, and lighting.

Osprey nest.

Outside view of final exterior of finished digester at landscaped site.

exhibits

Exhibit A: New boiler building at upper left (green roof), old boiler building to south, and Digester 3 demolition (center).

Exhibit B: View from fountation level looking uphill.

Exhibit C: Shoring east area of site, looking southeast.

Exhibit D: Aerial view of site.

Exhibit E: View of inside of digester from crane.

Exhibit F: Setting tank wall section (note scaffolding in place).

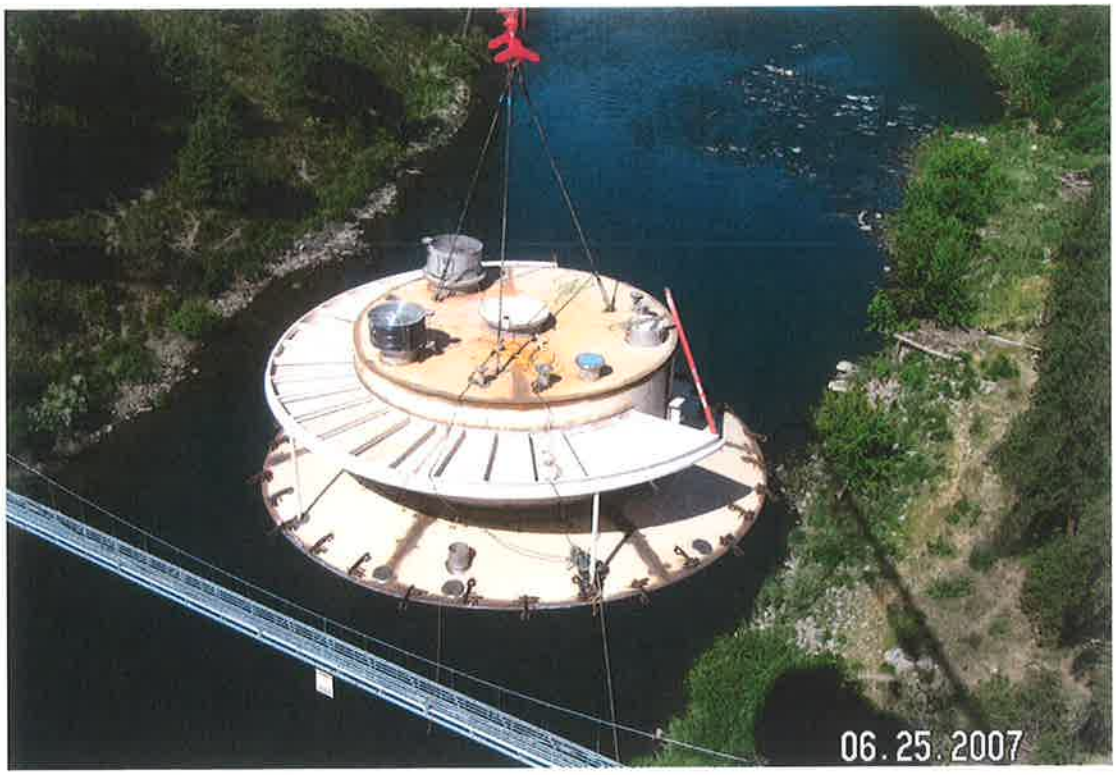


Exhibit G: "Flying" digester dome lifted in place over Spokane River.

Exhibit H: View of project from neighborhood.

Exhibit I: Looking south to digesters, winter of 2007.

Exhibit J: Riverside Park Water Reclamation Facility, digester project site, center of picture.

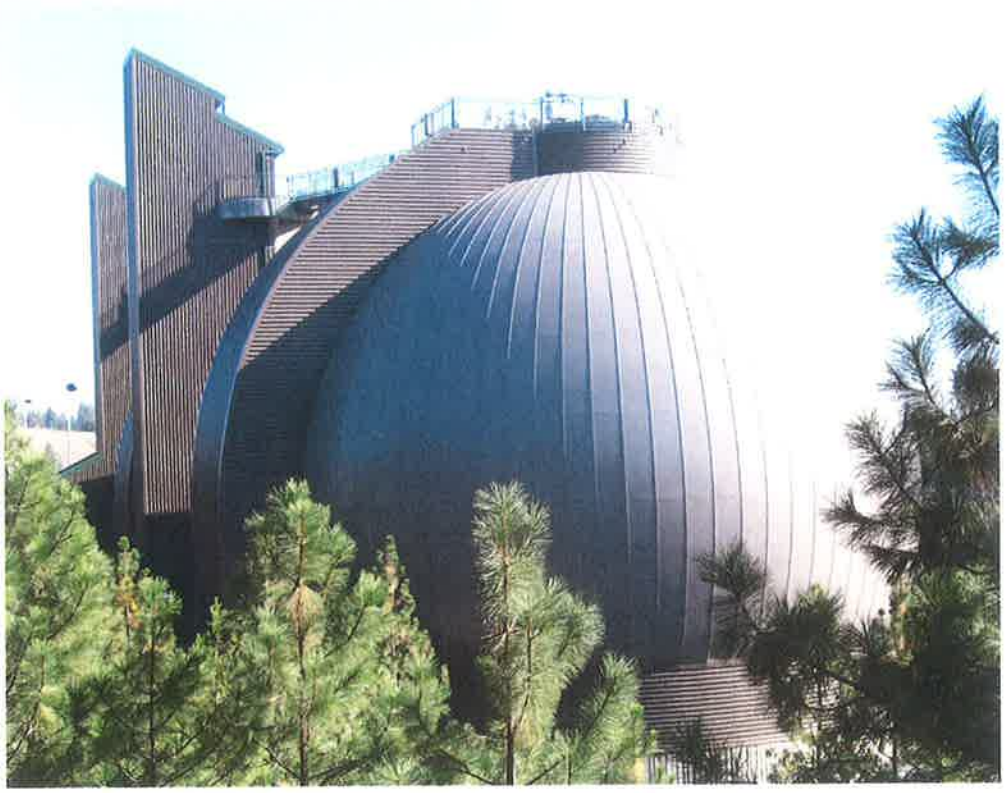


Exhibit K: Outside view of final exterior of finished digester at landscaped site.

Exhibit L: Digester and boiler building.

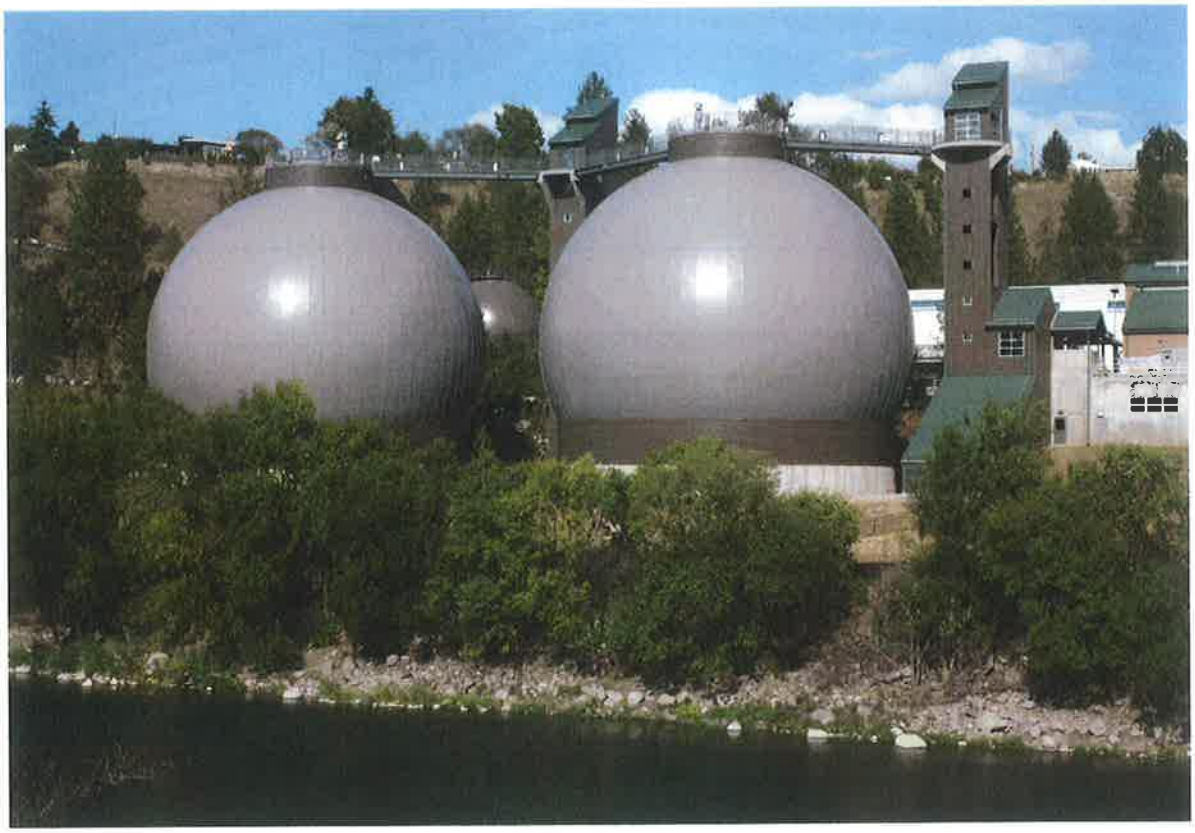


Exhibit M: Egg-shaped digester, Riverside Park Water Reclamation Facility, looking north across Spokane River