

# the **HORNER & SHIFRIN** advantage

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## Wastewater Treatment, Nature's Way

**W**ith assistance from Horner & Shifrin's environmental staff, the City of Columbia, Illinois, now operates one of the most innovative wastewater treatment facilities in the state. Horner & Shifrin recently completed design and construction phase services for improvements to the City of Columbia's unique three-cell lagoon wastewater treatment facility, which uses an integrated process of complete aeration, Aquamats and native fish species to treat wastewater.

The treatment facility, which discharges to the Mississippi River, was required to meet effluent requirements of 37 mg/l suspended solids (SS) and 25 mg/l biological oxygen demand (BOD). In October 1998, the Illinois Environmental Protection Agency (IEPA) renewed the City's National Pollution Discharge Elimination System (NPDES) permit. Because the City's wastewater treatment facility was rated for a flow rate in excess of 1.0 million gallons, their effluent limitations by law became stricter. "After one million gallons a day, the IEPA considers you a 'major facility.' We had to find alternative ways to treat the effluent water more efficiently," said Morris Linnemann, Wastewater Superintendent for the facility. The IEPA gave the facility three years to come up with possible solutions. The new discharge requirements were lowered to 25 mg/l SS and 20 mg/l BOD.

Horner & Shifrin conducted an engineering study that determined a complete-mix aeration system and aerated rock filter would be the best alternative to meet the stricter effluent limitation. The report recommending this type of treatment was approved by IEPA.



*Morris Linnemann, Wastewater Superintendent, is pleased with the updated Columbia Wastewater Treatment facility.*



*View of cell number one.*

The new aeration system duplicates the natural treatment that occurs in a flowing stream, except that air is introduced from numerous lines of tubing laid in a parallel pattern across the bottom of the lagoon. Fine bubbles emitted from each aeration tube create a curtain of gently rising air that acts as a hydraulic barrier to hold wastewater behind it, turning it over and over before passing through the barrier to the next row of aeration tubing. Dissolved oxygen in the water aerobically reduces suspended solids to carbon dioxide and water. Settled solids are digested by bacteria. Overall aerobic conditions promote the growth of bottom crustacea which, in turn, provide food for higher life forms.

The result is the almost complete digestion of the sludge, much of it into useful protein. The new aeration system inherently provides primary settling, biological oxidation, final settling and odor control.

During the design phase of the project, the City asked H&S if there was an alternative to the IEPA-approved aerated rock filter. The City was concerned a new aerated rock filter would have plugging problems similar to what had been experienced with the existing anaerobic rock filter.

In response, Dennis Campbell, Associate Manager, Environmental Engineering, recommended the use of Aquamats, composite polymeric

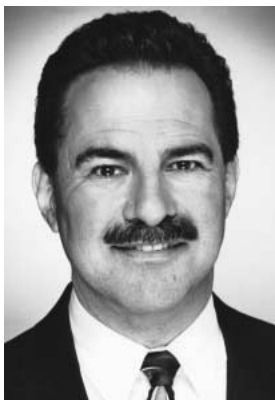
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## President's Perspective

Is your water system vulnerable to terrorist attack? As a result of security concerns following the September 11 attacks, the federal government is mandating that a nation-wide assessment of the vulnerability of drinking water systems be conducted.

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (H.R. 3448)

includes requirements to safeguard the nation's public drinking water systems against terrorism or other intentional acts. While the national media have focused on the bill's requirements for determining the vulnerability of large public water systems (i.e., those serving populations greater than 100,000), the bill also contains measures that will require similar vulnerability assessments for all water systems serving populations greater than 3,300 persons.



The vulnerability assessment shall include, but not be limited to, a review of pipes and constructed conveyances; physical barriers; water collection, pretreatment, treatment, storage, and distribution facilities; electronic, computer, or other automated systems which are utilized by the public water system; the use, storage, or handling of various

chemicals; and the operation and maintenance of such system.

Operators of community water systems will be required to develop emergency response plans no later than six months following the completion of their vulnerability assessments. While the legislation does not actually require most communities to submit their vulnerability assessments until June

2004, there is good reason to complete these water system assessments and emergency response plans much sooner than that.

As a 69-year-old consulting firm with a proud history of service to the drinking water industry in Missouri and Illinois, Horner & Shifrin, Inc. has on-staff six experienced water professionals who are well-prepared to assist communities in completing these critical tasks. Horner & Shifrin is well-attuned to the latest techniques for assessing water system security risks and mitigating those risks.

For further information regarding these new federal requirements, or to learn more about how Horner & Shifrin can assist you in protecting your community's water system, contact Leo Ebel at (314)-531-4321 or Glen Cherry (618)-397-1065.

Sincerely,  
Horner & Shifrin, Inc.

Leonard C. Kirberg, P.E.  
President

## Energy Solutions to Save Cost

Once available in abundance, energy is now an expensive resource and in some cases subject to foreign dominance. A great majority of energy is consumed within buildings and processes, which can be better designed and managed to conserve resources and reduce operating costs. By some estimates, one-third of the cost to operate a typical office building goes to utilities, mostly lighting and HVAC systems. Approximately 25% of the energy used is for lighting and 60% for HVAC with the remainder being used for domestic hot water heating and miscellaneous power. In industrial buildings or plants, a larger percentage of the energy consumed is for manufacturing.

Horner & Shifrin's use of computerized building load analysis and system-modeling programs evaluate the energy impact due to building setting, solar radiation and construction materials. The need for energy conservation focuses on energy-efficient designs for the construction of new facilities, upgrading M/E systems in existing facilities and the selection of process equipment such as pumps, filters and exhaust systems.

Rick Halteman, Horner & Shifrin's in-house Certified Engineer Manager (CEM) by the Association of Energy Engineers, in conjunction with our team of architects/engineers evaluates the building and make recommendations to implement the most cost-effective and most efficient use of materials and systems to conserve energy. This results in reduced operating and maintenance costs and the lowest life cycle cost for clients.

Like any good investment, energy conservation can generate savings to be used for other purposes or expenses. Standard energy conservation opportunities include building insulation,

insulating glass, low wattage lighting with electronic ballasts, energy management systems, exhaust heat reclaim, use of high efficiency equipment and many other energy solutions. Replacement of older, less efficient equipment will show immediate energy savings and generally require less air conditioning; therefore, the energy savings are even greater.

Additional measures include the following:

**Emergency response facilities** such as fire, police or EMS stations benefit from the use of infrared heaters to reduce heating energy input and tailpipe exhaust system to reduce exhaust quantities and heated makeup air plus reduce contaminants to the space.

**Educational facilities** where large amounts of outdoor ventilation air is required to meet current IAQ building codes often benefit from the use of variable volume air conditioning systems equipped with heat reclaim wheels to reduce initial equipment sizes and energy consumption.

**Water treatment and wastewater treatment plants** benefit from properly sized exhaust extraction hoods to reduce heating of makeup air and to minimize the size of bio-filters and horsepower of the associated exhaust fans and pumps.

**Industrial facilities** benefit from the use of destratification heating units, heat recovery ceiling fans, exhaust gas heat reclaim and modifications to compressed air systems.

**Advantage: Horner & Shifrin's expertise helps clients conserve energy while generating cost-effective solutions to meet their needs.**

## Wastewater Treatment, Nature's Way

*(Continued from page 1)*

sheet materials with a high surface area that are composed of thousands of fibers per square inch. "This groundbreaking technology is new in the field of wastewater treatment, but has been used for a number of years in aqua culture to help reduce suspended solids in shrimp farms," said Campbell. These slitted sheets of polymeric material are suspended in rows along the entire width of the lagoon from top to bottom.

Aquamats were added to the 5-acre cell three of the lagoon. The Aquamats provide a place for algae and photo-synthetic bacteria to cling to and grow on, thus reducing suspended solids and BOD. "Another advantage that has occurred with this biological growth is the fact that we don't have to chlorinate the water anymore to control fecal coliforms," said Linnemann. The Aquamats serve as a home to protozoa, motile bacteria, nematodes, rotifers and fungi, all competing for food, while also helping to reduce suspended solids and BOD. "Now, I can look in the final cell 10 feet off the bank and see the bottom of the pond. The Aquamats have made a big difference for us," said Linnemann.

The Aquamats create a sort of man-made wetlands environment to treat wastewater in a natural way.

Another innovative feature of this facility is the addition of sludge-reducing bacteria to cell one. The bacteria eats away at the sludge and helps to prevent it from collecting on the bottom of the lagoon. "The bacteria has helped us cut down on the cost of having to dredge out the sludge accumulated in the cells," said Linnemann. The bacteria is a solution that will help keep costs down at the facility for years to come.

To further polish the effluent, 450 pounds of fat-head minnows and 3000 blue gills were added to the final lagoon cell. These fish feed on snails, blood worms, beetles, crawfish and other aquatic life prevalent in a totally aerated and healthy habitat. Every pound of fish growth rate is a pound of waste removed. The fish are living on raw waste that is converted to smaller aquatic species and then larger species, i.e., the food chain.

The Columbia wastewater lagoon improvements were completed in May 2002. During the entire construction period the existing treatment facility

was kept in service. The improved wastewater treatment facility is the first use of Aquamats in the state of Illinois. The method of using the integrated processes of complete aeration, Aquamats and native fish species has for the first three months of operation produced a wastewater effluent well below the requirements of the NPDES permit. For the months of June through August 2002, the effluent SS has been on average less than 10 mg/l and BOD has been less than 5 mg/l and has shown continuing improvement each month. Columbia's NPDES permit requirements are 25 mg/l SS and 20 mg/l BOD.

The facility has the capacity to provide wastewater treatment to an equivalent of 15,000 people. Columbia, with a present population of nearly 8,000, should get many years of service out of the lagoon improvements. The \$940,000 construction cost of the project was much less than the cost of a high-maintenance mechanical plant that would achieve the same result.

***Advantage: Horner & Shifrin successfully provided the City of Columbia, Illinois, with a new, less costly approach to improving wastewater treatment.***

## Cub Scouts Receive Donations from Local Businesses

Horner & Shifrin teamed with two other St. Louis companies to brighten the day for a local Cub Scout pack whose camping equipment had been stolen. Pack 778 of Fenton, Missouri, had saved for nearly two years to purchase a new trailer, tents and cooking equipment, but it all was stolen just a few days before their first camping trip. After learning of the scouts' loss, Horner & Shifrin and Sanborn Map Company each donated \$1,000 toward replacement of the camping gear and trailer. The Sports Authority pitched in by donating new tents and allowing the rest of the new camping equipment to be purchased wholesale. President Len Kirberg (back row, left) presented Horner & Shifrin's check to the Cub Scouts.



## Notable Achievement – Allan Erdman Volunteers to Provide Loving Homes to Foster Children

**A**llan A. Erdman, P.E., Assistant Civil/Transportation Project Engineer, is doing his part to help today's youth and their future by serving as a volunteer Court Appointed Special Advocate Guardian ad Litem (CASA/GAL) for St. Louis City CASA organization.

St. Louis City CASA (Court Appointed Special Advocate) is an organization whose mission is to place foster children in loving homes and to speak on behalf of abused and neglected children in the City of St. Louis. As a CASA/GAL, Allan's job is to speak for the best interest of abused and neglected children in foster care. He will also closely monitor the progress of the child, reporting to the Judge what he thinks is best for the child and their future.

Currently there are over 3,000 children in foster care in the City of St. Louis, and the average length of time a child spends in foster care is 40 months. St. Louis City CASA believes that it is in the best interest of children to provide a permanent, nurturing home as quickly as possible. About 93% of the children represented by a City CASA guardian spend 24 months in foster care and 82% spend 18 months. Many children are returned to one or both of their parents; others may be placed with relatives and some are adopted by non-relatives. Since the program began 68% of children represented by CASA guardians have been placed with a natural parent or with relatives and 28% have been adopted by non-relatives.

As a resident of the City of St. Louis for several years, Allan is aware that many children are abused and neglected. "Last fall, a friend of mine was sworn in as a City CASA/GAL. She invited me to the ceremony where I had the opportunity to meet members of the City CASA staff and learn about the City CASA program. I was impressed with their approach," said Erdman.

In the weeks following, his friend convinced Allan that he should fill out an application for training to become a CASA/GAL. "At first I was hesitant to get involved. As an engineer I felt that I had no formal training in social services and I was concerned about my effectiveness as a CASA Guardian,"



*Allan A. Erdman, P.E.*

said Erdman. He decided to fill out an application to participate in the City CASA/GAL training program and was accepted. The training was extensive. It took place over a five-week period and required attending 30 hours of class, courtroom observations, reading, research and report writing. During the training it became apparent that the needs of children are unique and that with the resources available to him at City CASA he would have the ability to effectively serve as a CASA/GAL. Allan was appointed as a CASA/GAL in May 2002.

Each volunteer CASA guardian is initially assigned one case and is expected to eventually take two or three cases. Each volunteer has a staff attorney supervisor, who is assigned up to 30 volunteers. City CASA estimates that for the cost of one staff attorney, 125 children can be helped.

"I am now the CASA/GAL for two children in foster care. The CASA training and ongoing encouragement I receive from my supervisor have helped me make a significant difference in the lives of the children I represent," said Erdman. In the initial days and weeks of this case Allan met with the children on a regular basis to find out what their needs were and to make sure they were in the best place they could be. He performed an independent investigation of the family's history, which includes researching police, health, school and social service records.

Based on his research he appeared in court and read his recommendations to Judge Thomas Frawley at the St. Louis Family Court. With his recommendations the judge was able to make an informed ruling. It is now Allan's responsibility to help facilitate the court's ruling, monitor the progress and make reports to the court. As the children's CASA Guardian, he will be involved with these children until a safe, permanent, nurturing home for them is found.

The goal of St. Louis City CASA is to have all 3,000 children in foster care in the City of St. Louis represented by a CASA Guardian by 2006. City CASA is well on the road to reach that goal. Since January 2000 the number of children served by City CASA Guardians has doubled every 6 months. Currently City CASA has 140 volunteers. In order to represent all of the children, City CASA will need to recruit an additional 400 volunteers. To find out more about St. Louis City CASA and what volunteers are needed, contact the City CASA Volunteer Coordinator Shirley Bynum Smith at 314-552-2121 or [sbsmith@stlcitycasa.org](mailto:sbsmith@stlcitycasa.org).

## St. Louis Business Journal features Horner & Shifrin in latest *Structures* Edition

An article highlighting Horner & Shifrin's investigation of the latest innovative seismic bridge design guidelines was featured in the August 23 *Structures* issue of the *St. Louis Business Journal*.

Horner & Shifrin, working in partnership with the Illinois Department of Transportation (IDOT), has been working to evaluate new seismic design guidelines that are being considered for highway bridges. The proposed specifications directly address several methods in current use to reduce earthquake damage such as base isolation, lock-up devices, and passive damping. These guidelines, if adopted by the American Association of State Highway & Transportation Officials (AASHTO), will replace the current seismic design specifications.

The article featured interviews with Duane Siegfried, Associate Manager, structural engineering and Shyam Gupta, MODOT state bridge engineer.

**Advantage: Horner & Shifrin and the Illinois Department of Transportation have developed innovative seismic bridge designs that will benefit communities for years to come.**

## People in the News



Peter H. Green, AIA, AICP



William P. Clarke, P.E.



Carie E. Lewis



Dan R. Lang

**Peter H. Green, Vice President**, will serve on the CEC/MO Corps of Engineers-Kansas City District Liaison Committee for a term that will run from July 2002 to June 2005.

**William P. Clarke, P.E., Executive Vice President**, will serve on the CEC/MO Metropolitan St. Louis Sewer District Liaison Committee for a term that will run from July 2002 to June 2005.

**Carie E. Lewis** will serve on the Finance Commission for the City of Bridgeton, Missouri.

**Dan R. Lang, Senior Planner**, recently received the distinguished Leadership Award for Professional Planners from the Missouri Chapter of the American Planning Association.

*The following staff members have been promoted:*

**Jeffrey S. Stahlhuth, MCSE, MCDBA, MCP+I**, Associate Manager, Information Technologies

**Richard A. Brinson, R.A.**, Associate Manager, Architectural Services

**Bently C. Green, P.E.** and **James E. McCleish, P.E.**, Senior Environmental Project Manager

**Richard W. Halteman III, P.E., C.E.M.**, Mechanical Project Manager

**Steven R. Donahue, P.E.**, Transportation/Civil Project Manager

**Jamie L. McVicker, P.E.** and **Jarrett D. Jasper, P.E.**, Transportation/Civil Project Manager

**Kevin C. Kriete, P.E.**, Structural Project Manager

**Karen S. Frederich, P.E.**, Assistant Environmental Project Manager

**Michael A. Banashek, P.E.**, Assistant Structural Project Manager

**John D. Gilmore**, CADD Systems Administrator

## What's New

- Horner & Shifrin, Inc. has designed a series of security upgrades for the St. Louis Police Department Headquarters in the wake of the heightened security from 9-11. Security improvements include electric gates at all site and building entrances, electronic card readers, additional security cameras around the site perimeter and additional security fencing at all accessible areas around the site perimeter. Horner & Shifrin, Inc. provided architectural and electrical design for this project.
- Horner & Shifrin, in conjunction with its client, St. Charles County, received an Outstanding Planning Award for a Special Community Initiative for its Highway 94 Scenic Byway Corridor Study.



Jeffrey S. Stahlhuth, MCSE, MCDBA, MCP+I



Bently C. Green, P.E.



James E. McCleish, P.E.



Jarrett D. Jasper, P.E.



Michael A. Banashek, P.E.



John D. Gilmore

Horner & Shifrin publishes *The Advantage* periodically. Our continuing commitment is to improve the world around us, as well as to give you or your organization an Advantage.

For more information regarding ways we can assist you or your organization, please contact:

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