ANGLE and LINE

A Quarterly Newsletter by COWAN ASSOCIATES, INC.
Engineers • Designers • Surveyors
Serving Business, Municipalities, and Industry since 1958

MATCHING THE TECHNOLOGY TO THE PROJECT

by Carl H. Wischner, Senior Project Manager

"There is more than one way to skin a cat." While engineered projects typically do not involve "skinning a cat," there are usually more than one solution, choice of design, methodology, and type of technology that can be utilized to obtain the desired results in developing the most cost effective and practical solution that will overcome any detrimental parameters or conditions that may affect a project.

In analyzing a project and developing an approach to a final design, several preliminary steps must be taken:

1. Determine the goal or end result to be achieved by the project.
2. Determine the parameters and governmental regulatory requirements that will govern the design.
3. Determine any special conditions which will need to be addressed.
4. Evaluate existing technologies, equipment, and methodologies available that will produce the desired end results.
5. Incorporate the selected technology, equipment and methodology into a final design.

Recently, Cowan Associates was presented with a project that, at first glance, appeared to have an easy solution. However, non-typical design conditions associated with the project curtailed the use of what could be considered a standard "cookie cutter" design where a previously engineered design with minor modifications could easily be adapted to the new project.

This project consisted of designing a sewerage system to serve an existing private recreational resort community named Christman Lake, located in north central Berks County close to the Borough of Hamburg. The community of approximately 100 units was built through the years around the periphery of a dam and a 40 acre lake that were constructed during the 1960's. Because of malfunctioning individual on-lot systems and the negative impact the sewage was having on the lake, a moratorium on further development of the community was imposed by the municipality, and the Pennsylvania Department of Environmental Protection mandated that the community be sewered.

The conventional approach is to construct a wastewater treatment facility (WWTF) at the low point, and install gravity sewers to convey the sewage to the WWTF where it is treated to meet requirements of a discharge permit and effluent discharged into a water body.

As stated earlier, several non-typical design conditions were encountered which created problems that were not conducive to the use of conventional gravity sewers and flow-through treatment. They included:

1. Highly fluctuating flows: This being a recreational community, only 40% of the residents lived there year round. On weekends, flows were estimated to be twice that of weekday flows and, on holiday weekends, flows were estimated to be one and one-half times the normal weekend flow.
2. Extremely undulating topography around the perimeter of the lake effectively eliminated the use of a gravity sewer system.
3. Low area below the community was determined to be wetlands and within a 100 year flood plain, eliminating the construction of a WWTF at the low point.
4. Shallow bedrock was common throughout the community and extended to the surface in many areas, limiting the use of long gravity sewers which tend to run deep.

In summary, the design had to:

1. Overcome extreme variability in flow and organic loading to the WWTF, and meet allowable discharge limits.
2. Convey sewage to a WWTF on an upland site at a higher elevation than portions of the community.
3. Convey sewage up and down hills for approximately three-quarters of a mile along each side of the lake, below the dam, and up to the WWTF.
4. Allow sewer pipes to be laid at the shallowest possible depth to minimize cost associated with excavating in rock.

There were numerous technologies available in the market place for conveyance and treatment of sewage. To handle the

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PRESIDENT'S CORNER

In a time of global economy and outsourcing of services, including engineering work, we need to retain our competitive edge for the future well-being of the country and ourselves by investing in our knowledge, skills and creativity. To accomplish this, greater cooperation and liaison between industry and education are required not only for the initial phase of engineering study, but also for the upkeep of our knowledge base through continuing education.

This entire issue of continuing education and how to accomplish it in a meaningful way was hotly debated at the Pennsylvania Society of Professional Engineers State Conference, held recently at the Pocono Chateau resort in Tannersville. Some of the participating engineers held that to protect the public and ourselves from the often disastrous consequences of stale engineering knowledge, continuing education should be mandated by legislation as practiced in many of the surrounding states.

Others expressed their frustration with the by-legislation mandated systems, which often result in the spawning of a seminar and expensive resource industry. I once attended such a "mandatory" seminar, where a portion of the participants were either reading newspapers or working their laptops, seemingly unrelated to the seminar presentations. Some states issue continuing education credits for watching videotapes which need to be purchased from a state-approved vendor and are rather pricey.

Cowan Associates, since the company's inception in 1958, has committed to continuing education by providing staff and management with a variety of growth and development opportunities that inspire both personal and professional advancement. Our goal is to ensure that all members of the Cowan team continue to be knowledgeable, creative, innovative and inspired to achieve.

Our resulting track record made Cowan Associates eligible for this year's Professional Development Award granted by Pennsylvania's Society of Professional Engineers in Private Practice. The award was accepted by our chairman William D. Kee during the Pennsylvania's State Conference Award's Luncheon. Inscription on the plaque states: "For outstanding contribution to the advancement of the engineering profession through its employment policies and practices."

Cowan Associates will continue "bearing the torch" for continuing education in the spirit of the great Statesman Mahatma Ghandi, who advised us to "live like tomorrow is our last day and to learn like we would live forever".

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wastewater treatment design considerations associated with this project, several treatment technologies were evaluated.

The Sequencing Batch Reactor (SBR) process was selected to best handle the treatment needs. The SBR process is an activated sludge process utilizing air, as are most treatment processes in use today. The SBR process bears no similarity to the standard flow-through extended aeration process which is commonly used. The SBR operates under a batch process, instead allowing sewage to continuously flow through a plant where the SBR process holds a quantity of sewage, treats it, and then discharges it. It provides for flow equalization during fluctuating peak conditions and flow blending to minimize peak loading impacts. It has five (5) basic cycles; fill, react (aerate), settle, decant (discharge), and idle. It is microprocessor controlled, which automatically regulates the operation and greatly reduces operator attention and skill requirements needed to operate the system. Operational simplicity is an essential component in a privately owned and operated system.

To handle the sewage conveyance design considerations associated with this project, several alternatives were evaluated. The Low Pressure Sewer alternative, utilizing individual grinder pumps, was selected to best handle the conveyance needs because of its ability to convey sewage over the undulating topography and the need for only a small diameter piping system that could be laid shallow and follow the contour of the land, thus minimizing installation cost in rock.

After determining the technology to be utilized, meeting with the Owner, and receiving approval to proceed, a concept plan was developed. With the low pressure sewer's ability to convey sewage to most any location selected, siting of the WWTF was able to be made at a location remote from the lake community in a secluded area buffered and hidden by the natural landscape, thus preserving the country atmosphere.

To select the actual treatment process and equipment to be utilized, several SBR process manufacturers and grinder pump manufacturers were contacted to provide proposals on the use of their technology and equipment. After reviewing the proposals and the Owner visiting operating systems, the treatment process and grinder pump manufacturers were selected for the final design.

The U.S. Filter, Jet Tech, Omniflow SBR was selected for the treatment process. In conjunction with the use of post tension concrete tanks, it met the design parameters. The process provided treatment and conformance with effluent discharge limits, simple operation, computer process controlled, low maintenance, ability to upgrade treatment should discharge limits become more stringent in the future, and adaptability to a compact site footprint.

The Environment One individual grinder pump system was selected to pump sewage through the low pressure sewer system. Benefits in utilizing this technology for this project were reduced pipe sizes because of its relatively low, constant pumping rate; ability to pump at relatively high heads; long reliable operational track record; and ease of maintenance.

Utilizing these technologies allowed Cowan Associates the opportunity to design a unique conveyance and treatment system. A system was designed to fully contain the waste from the house through the treatment process without being exposed to the atmosphere until it appears as treated effluent at the end of the treatment process.

Sewage enters the individual grinder pumps, is pumped through a service lateral into larger pressure sewers. The pres-

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sure sewers from both sides of the lake join at the WWTF and discharge the raw sewage directly into the reactor basins through an influent distribution manifold located along the bottom of the basin under water.

Size reduction to small particles (comminution) of the waste, which is typically done as a separate process before entering the WWTF, is not necessary since each grinder pump discharges a finely ground slurry into the low pressure sewer system. Therefore, there is no handling of residual waste required. Since all waste discharges from the individual house plumbing directly into the grinder pump tank, and the fact that the low pressure system is fully enclosed, infiltration/inflow and grit entry is not a problem.

The system was constructed in 2003 and is operating as designed. There have been no sewage odors emanating from within the system or from the WWTF. The system has blended unobtrusively into the environment, which is an excellent example of matching the technology to the project. With this accomplished, the Owner has been allowed to continue the buildout and development of his recreational resort community.

Following is an excerpt from a testimonial received from Dennis and Susan Christman, Owners of Christman Lake:

"The engineering firm, Cowan Associates, Inc. of Quakertown, PA, provided the planning, design and construction of this facility to treat approximately 80 thousand gallons per day of wastewater. Their cooperation and efforts to design and fit the system into the Christman Lake environment was excellent.

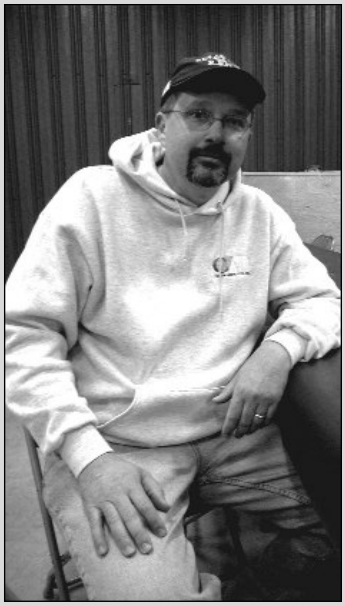
Since start-up and operation of our system in 2003, we have been personally operating the system. The system is performing well and is meeting the discharge requirements of our permit. We have found that the simplicity and ease of operation and maintenance of the low-pressure sewer and SBR wastewater treatment facility is overall superb, is very efficient, clean and sanitary, and virtually maintenance free. With its State-of-the-Art Control Systems, flow monitoring equipment and services, it provides an accurate, user-friendly means of recording, collecting and analyzing data. The grinder pumps and low-pressure sewer has been operating excellent. We have not had to perform any maintenance on any of the pumps. We would recommend the SBR wastewater treatment system and low-pressure sewer collection system to other municipalities and organizations."

Summer Anti-Drinking and Driving Message Campaign

WLVR radio, the student-run radio station at Lehigh University, is currently airing a public service announcement which Cowan Associates is proud to sponsor. Listen to WLVR 91.3 FM and hear the following message:

Cowan Associates, Inc. Engineering takes this opportunity to remind us that the summertime and fun are here, but drinking and driving never mix, no matter what time of year it is. So, to everyone who checks an ID, calls a cab, or tells a friend when to say when, Cowan Associates would like to say thank you; by doing things right, you have made a difference this summer. This important community reminder has been made possible by Cowan Associates, on the air because they care. That's Cowan Associates, Inc. Engineering, wishing everyone a safe summer 2005 by saying "Please don't drink and drive."

EMPLOYEE SPOTLIGHT



Cowan Associates, Inc. is proud to spotlight Todd R. Myers, P.L.S. Todd is a shareholder with Cowan Associates, Inc. (CAI) and holds the corporate position of Vice President. He is also Director of the Land Surveying Department where he is responsible for coordinating our two survey crews and providing quality control for data provided to our designers and CAD draftsmen. Todd also handles small subdivision projects from start to finish, including representing clients and presenting plans at municipal meetings.

Todd was born in Flemington, NJ and attended Hunterdon Central High School. He received a degree in Engineering Technology from Somerset County Community College. After graduation, he obtained a job surveying and has continued in that field to this day. He received his Land Surveyors license in 1992, and started work at CAI in 1993 as head surveyor. Four years later he became a shareholder and officer with the company.

Todd has been married for 24 years to his wife Catherine, who is also from Flemington, NJ. They have two children, a daughter Kerri who is attending Millersville University; and a son Michael who also works at CAI as a surveyor. Mike and his fiancée made Todd a grandfather with the birth of their daughter in 2003.

Todd and his wife live in Riegelsville, where they have resided for 18 years. Todd is in the fourth year of a second term as Mayor of Riegelsville. He is also Fire Chief of the Riegelsville Fire Company. Todd has been involved as a volunteer fireman for almost 30 years, and has been part of the Riegelsville Fire Company for 18 years.

Todd has many duties as Mayor, but one of his busiest lately has been as head of Emergency Management. The last flood of April 2005 hit the Borough of Riegelsville very hard, with damage to homes, businesses, and roadways. The Borough is trying to rebuild but needs funding, and federal funding has been difficult to obtain. If you are interested in helping, donations can be made to Riegelsville Fire Company, P.O. Box 185, Riegelsville, PA 18077.

So, with all that is going on in Todd's life, if you come into the office and occasionally see a sign posted on his door that says, "Beware, Todd is Grouchy Today," you will probably understand why. With all of his accomplishments, all of us at Cowan Associates, Inc. are very proud to have Todd R. Myers, P.L.S. as part of our team.

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Welcome Stephen Eisenhauer!!

On May 2, 2005, Stephen E. Eisenhauer joined Cowan Associates, Inc. to head the Business Development and Customer Relations Departments. He provided the following information to introduce himself to you.

I graduated from Bloomsburg University of Pennsylvania in May 2004 with a BSBA in Marketing. Immediately following graduation, I began working with a packaging engineering company. I have always had a deep interest in engineering, ever since my grandfather used to take me along to show me different projects in the area when he served as a Franconia Township supervisor.

When the opportunity to work with Cowan Associates, Inc. arose, I felt that it was a great opportunity for me and somewhere I could enjoy working. CAI has been very successful and I had heard many good things about the company, so I jumped at the opportunity to work for such a company and help them grow.

I have lived in this area my entire life, and I now reside in Perkasie, PA. I am a 2000 Honors graduate of Pennridge High School where I was Co-Captain of the basketball team and lettered on the baseball team. I currently play softball for St. Peter's Reformed Church in the Upper Bucks Church Softball League.

I am very excited by this position and I look forward to the challenges that it presents. I hope to be able to meet everyone and build a stronger relationship between Cowan Associates and our valued clients. Feel free to contact me at anytime at see@cowanassociates.com or 215-536-7075 ext. 138. Thank you very much and I look forward to meeting all of you.

CAI Chairman William D. Kee accepted the PEPP Professional Development Award during the PSPE awards luncheon at the Pennsylvania State Conference.

CAI

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