GEO OUTLOOK

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George C. Marshall International Center Renovates with Geothermal

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Directors' Forum

Notes from GHPC

By Wael El-Sharif
Executive Director,
Geothermal Heat Pump Consortium

After years of waiting, President Bush signed the bipartisan Energy Policy Act of 2005 in Albuquerque on Monday, August 8, at a signing ceremony held at Sandia National Laboratories. This new multi billion-dollar National Energy Plan is the first signed into law in more than a decade, and comes to us at a time when new energy-related policy is more critical than ever. Among the many features of this 1,724-page law, Congress has provided new incentives for geoexchange.

One of the highlights of the new bill addresses homeowners, who are granted up to $300 in tax credits for the cost of new geoexchange systems. To be eligible, the standards that must be met are 14.1 EER & 3.3 COP for closed loop, 16.2 EER and 3.6 COP for open loop and 15 EER and 3.5 COP for DX. However, the system must include a desuperheater or integrated water heating to meet the credit's criteria.

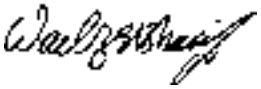
It is also important to note that the section covering renewable energy security offers a 25 percent rebate, up to $3,000, for renewable energy systems that "(i) when installed in connection with a dwelling, transmits or uses- (I) solar energy, energy derived from the geothermal deposits, energy derived from biomass, or any other form of renewable energy which the Secretary specifies by regulations, for the purpose of heating or cooling such dwelling or providing hot water or electricity for use within such dwelling..." The Consortium is now working to ensure geoexchange is not excluded from this definition, which could bring an even greater interest to our technology.

Furthermore, this bill extends energy savings performance contracts from 2006 to 2016. Provisions also offer credit for construction of new energy efficient homes, up to $2,000, for homes that cut energy use for heating and cooling only (no hot water) by 50 percent compared to the national model code - the 2004 International Energy Conservation Code Supplement (assuming an SEER-13 air conditioner). Producers of manufactured homes can also qualify for a tax credit of $1,000 for homes that save 30 percent.

Another highlight of the new Energy Policy Act addresses commercial facilities by awarding energy efficient commercial buildings deductions of up to $1.80 per square foot for buildings that achieve a 50% reduction in annual energy cost to the user, with partial credits offered at $0.60 psf. This reduction amount is compared to a base building defined by the industry standard ASHRAE/IESNA 90.1-2001.

There are many other provisions of interest in this important federal law, including new state energy programs and R&D program funds offered through DOE. We will continue to encourage our industry's involvement in every applicable area possible.

The Geothermal Heat Pump Consortium works hard to represent our industry, making sure our voices are heard and that we are included in policies that direct the future of our country's energy market. We applaud both Congress and the Bush administration for passing a comprehensive energy plan that encourages conservation and energy efficiency, and that specifically addresses our industry's future when we need it most.



Directors' Forum

Notes from IGSHPA

By Jim Bose
Executive Director,
International Ground Source Heat Pump Association

The squeaky wheel always gets the attention. This colloquialism can be applied to any industry, including GSHPs. Thousands of systems have been installed around the world. However, more often than not, the general public does not hear about them. Newspapers rush to print stories about the one job that has gone sour for one reason or another. It is usually not the heat pump system that failed, but it gets the blame just the same.

High profile jobs require extra attention. While GSHPs are known for their low maintenance, they are not maintenance free. People assigned to maintain them must be properly trained and newly hired service personnel start the cycle over again. Without continual vigilance on prestigious jobs, others wishing to promote their technology over GSHPs are given an opportunity to lay blame. At the first sign of dissatisfaction, no matter how small, an adequate response must be made. Also when a new manager comes on board, the good will established from years of interaction is lost and must be rekindled.

Take for example the GSHP system installed in the Oklahoma State Capitol. It was a front page story in *The Daily Oklahoman*. A recently hired manager was not aware of the GSHP system and the benefits. Therefore, he was unable to explain its benefits and its importance to the State of Oklahoma. Charges were made that the GSHP was leaking water all over the building and causing untold damage. The reported inefficiency of the system and its alleged failure were fodder for much discussion in the Oklahoma State Senate and House of Representatives. The industry responded with strong support and discussions are being made as to the necessity of spending 27 million dollars for a traditional HVAC system. Sometimes the old adage, "bad publicity is better than no publicity" can be suspect. But if the response is factual and comes from industry leaders, damage can be minimized.

The GSHP industry continues to experience growing pains. It is small enough that word-of-mouth can kill a company's reputation. It is still small enough that one success benefits everyone. As members of this growing community, everyone needs to be aware of their impact on the GSHP industry's growth.

Due to the general lack of knowledge about these systems, GSHP representatives and installers need to go that extra mile in customer service. Did you do everything possible to make sure the system was designed and installed correctly? Did you follow-up with the customer or general contractor to make sure that the system was functioning as designed? In our industry is it important to never think that "the job is done." Just as you can never walk away from your reputation, you do not really walk away from any job. Since these systems last longer than a traditional system, so do the installers' and designers' tie to them.

In this issue of the *Geo Outlook*, you will see examples of inspired GSHP designs. The stories cover projects that are in the public eye day-in and day-out. They are excellent examples of creativity and customer service.

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Nell Withers Thomas

Member Services Director
Plumas Sierra REC

Nell Withers Thomas is the member services director of Plumas Sierra REC and division manager of Plumas Sierra Telecommunications. She also serves as statewide editor for Golden State Power Cooperative.

Thomas began her career with the rural electrics in 1988 and has since gained expertise in the electric utility, marketing, advertising and communications industry. Most recently she has headed up PSREC's very successful loop lease program, which installed over 450 geoexchange systems since 1997. The cooperative is a member of IGSHPA and Geothermal Heat Pump Consortium.

Thomas is the immediate past chairman of the Council of Rural Electric Communicators, serves on the Board of Directors of the Geothermal Heat Pump Consortium and serves on the National Rural Electric Cooperatives standing committee on telecommunications. She has received numerous awards for communications excellence over the past fifteen years. In addition, as a member of Kiwanis she served as a leadership and officer trainer for Kiwanis International and obtained the level of Distinguished President and Distinguished Lt. Governor. A native Kentuckian, Thomas has a Bachelor of Arts degree from Western Kentucky University.

Morris Lovett

Senior Engineer
OGE Energy Corporation

Morris Lovett is a registered Professional Engineer and has been with OGE Energy Corporation for 12 years. He is currently the Senior Engineer for HVAC/R Commercial/Industrial Marketing. He is responsible for working with the architectural and engineering community, design education and studies for energy conservation and demand management. He has previous experience in Design/Operations Mechanical Engineering. Lovett serves on the International Ground Source Heat Pump Association's Advisory Council.

Courtesy of Kathleen Finnegan, George C. Marshall International Center.

General George C. Marshall's Impact: Yesterday and Today

By Trisha Swindle

Geothermal energy exemplifies subtly–it's the behind the scenes hero of the HVAC world, steadily working without fanfare. General George C. Marshall led his public life with the same quiet strength. He designed the Marshall Plan in such a way as to strongly encourage post WWII Europe to repair itself while the United States quietly helped bear some of the financial burden. Marshall did not want any public credit for his numerous accomplishments, regardless of how much they impacted the world. Some of his accomplishments from 1941-1959 included serving as the Chief of Staff of the U.S. Army, Secretary of State, emissary to China, Secretary of Defense, President of the American Red Cross and United States representative to the coronation of Queen Elizabeth. Marshall saw his career serving this country as his honorable duty; a duty he chose to perform without constant recognition. The geothermal HVAC system installed in the historic renovation of his former home, the Dodona Manor, performs its duties in a similar fashion, with a quiet determination creating efficient, sustainable energy.

Concerned citizens, led by the late B. Powell Harrison of Leesburg, Va., founded the George C. Marshall International Center in the early 1990s with the goal of restoring the Dodona Manor and creating a place where Marshall's legacy could be continued. They raised the necessary funds for the many phases of this extensive project from a variety of sources. The exterior restoration funding was donated by grants from the Commonwealth of Virginia, the Federal Republic of Germany and private donations. This phase of the restoration was successfully completed in late 2000. The Dodona Manor is a registered National Historic Landmark and a Virginia landmark. The interior restoration was funded by the Commonwealth of Virginia, the National Park Services and a Congressional appropriation dispensed by the U.S. Department of Housing and Urban Development.

The interior restoration plans included an updated HVAC system, but one was needed that

General George C. Marshall was a strong yet humble force working to rebuild Europe after World War II.

Courtesy of Harvey Hottel Inc.

could meet the many challenging requirements set to keep the contents of this museum safe. Hank Handler of the Oak Grove Restoration Company served as the general contractor. Handler approached Harvey Hottel Inc. to assess how to fulfill the HVAC needs of this particular site. After their assessment, Marc Hottel and Richard Hottel felt a GSHP would best serve this project's' needs. They both were IGSHPA certified installers and were asked by Handler to design and install the unit. Hank Almond from WaterFurnace International assisted the Hottels with the design.

Courtesy of Kathleen Finnegan, George C. Marshall International Center.

With a ground source heat pump system, the restored Dodona Manor maintains not only its historic beauty, but also comfortable indoor temperatures without the distractions of outdoor units.

This brick home is approximately 5,000 square feet, with four floors, and a carriage house. According to Richard Hottel, this project posed many challenges. In order to preserve the museums' wood floors, wallpaper windows, furniture, books and miscellaneous memorabilia, the Center's criteria for their HVAC system were numerous. According to the 2004 Annual Contracting Business Design/Build Quality Comfort Awards submission by Harvey Hottel Inc. the following standards had to be met:

1. HVAC system had to be compatible for ASHRAE Museum Standards, Class B-humidity controlled within plus or minus 10%.
2. No visible outside equipment and minimal noise.
3. Environmentally friendly.
4. Able to accommodate an unusually high winter heating load due to the energy inefficient nature of the building.
5. The owner desired to use as much of the existing ductwork as possible.

A ground source heat pump (GSHP) meets these requirements perfectly. The GSHP is the invisible HVAC system–the compressors are tucked away in the basement.

Five vertical ground loops were dug and high-density polyethylene pipe was used in these 400-foot deep wells. Environmentally safe propylene glycol was used as an antifreeze agent. Most of the heat pumps were installed in the basement of the building. According to Richard Hottel, the system's design called for two four-ton WaterFurnace, two speed scroll compressors and two Bryant "Perfect Heat Perfect Humidity" systems with variable speed fan and Thermidistat™ control and high efficiency natural gas furnace. Due to the cold Virginia winters, a natural gas furnace was only needed in this particular house due to its lack of insulation. One nominal two-ton WaterFurnace geothermal system was installed in the attic to maintain the third floor's temperature. The total cost of this design and installation was $120,000.

Courtesy of Harvey Hottel Inc.

The ground heat exchanger is installed by drilling boreholes which protect the interior and exterior of the home.

Maintaining appropriate humidity and temperature levels in a museum is incredibly important to the welfare of its contents. According to Richard Rohrer of the Center, they have been very impressed with the level of control this system has allowed. Bryant's "Zone Perfect Plus" zoning thermostats were installed along with the Bryant's Thermidstat™ in order to control the temperature and humidity. Rohrer expressed the museum's pleasure in being able to control the temperature and humidity so precisely in each part of the museum since some parts of the home can be warmer and damper than others. They are also pleased with the system's ability to be adjusted for periods of time when staff and visitors are not using the facility.

The main restoration of the house is completed and open for viewing. The interior of the home is lacking only the finishing touches. The walls were painted with colors appropriate to the time period and custom wallpaper was ordered to match the original patterns. The late Mrs. Marshall's estate donated some of the homes original furnishings. Other furniture is being custom made to fit the time period.

The land surrounding the Manor has been purchased by the Center in order to maintain the integrity of the area. This has allowed the Center to proceed with the renovation of the grounds as they appeared during Marshall's residence. The services of the landscape architect for the Garden Club of Virginia were donated to the project to develop working drawings for the extensive garden restoration. Half a million dollars has been donated for use on the landscape project. Landscaping will include the planting of an orchard, vegetable garden and a rose garden. With these beautiful additions, visitors and dignitaries will find a peaceful atmosphere to absorb the integrity and scope of George Marshall's vision.

The Saturday after Veteran's Day, November 2005, the George C. Marshall International Center is proud to be officially opening the doors of the Dodona Manor. According to Rohrer, public dignitaries such as Colin Powell and Condoleezza Rice will be in attendance for the weekend long ceremony. Up to one thousand people

Award Winning Design

Harvey Hottel Inc. won second place in the 2004 Annual Contracting Business Design Build Quality Comfort Awards for their work on the Dodona Manor. Richard Hottel submitted this project and put together the extensive judging materials. They had to meet the following nine elements of judging.

1. Comfort/Control
2. Design and Installation Quality
3. Economic Impact
4. Indoor Air Quality Improvement
5. Aesthestics
6. Environmental Impact
7. Unique Problems Resolved
8. Unique Designs
9. Commissioning

The Dodona Manor, a testament of Marshall's legacy, was restored through grants and donations from numerous organizations.

are anticipated to attend the weekend's festivities.

Along with the Manor, an Education and Orientation Center is scheduled to open. This center will play host to conferences such as teacher's workshops. Teachers can come to Dodona Manor to immerse themselves in the life and leadership of George Marshall and then take what they have learned about this great man home to their students. Other educational resources about Marshall have also been developed by the center, such as secondary educational materials for social studies programs. They were launched in 2003 at the National Center Council for Social Studies annual conference in Chicago. They will soon be available on ERIC, a national information system funded by the U.S. Department of Education.

The township of Leesburg shares in the excitement of the opening of this grand facility, as they will also benefit. The local business owners look forward to the increase of revenue caused by the numerous visitors to the museum.

Perhaps most exciting is the planning and opening of the Center for National Redevelopment. Rohrer stated that this center is being designed with the intention of putting Marshall's legacy to work in today's world. World leaders will have a neutral place to come and discuss their hopes and needs for their country and what part they would like the United States to play in it. The Marshall Plan has yet to be surpassed in its vision and success in regard to the United States involvement in the rebuilding of a war torn country. This center hopes to

provide today's war ravaged countries the same opportunity–to be able to recreate their own free country with the help of the United States. Marshall saw this aid as being provided with grace and diplomacy, not force. He did not want the United States to rebuild countries. His hope was to provide the necessary tools and motivation so they could do it themselves. George Marshall won the Noble Peace Prize in 1953 for his Marshall Plan. His quiet leadership and wisdom gave this country gifts that it still hasn't fully realized. His aid in protecting the world from future dictators through his Marshall Plan should be continued as our country currently strives to aid those in need. The restoration of the Dodona Manor is a beautiful tribute to a truly great man. The use of a GSHP will help protect the integrity of the contents of this home it now shares with the legacy of George C. Marshall.

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Courtesy of Kathleen Finnegan, George C. Marshall International Center.

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A Unique Solution for a Louisiana Plantation

By Jennifer Hale

Alex Demyan image, courtesy of Louisiana State Parks.

The subtle architecture of Jimmy Dodds adds to the unique and historic Oakley Plantation in Louisiana, the home of John James Audubon and his art.

Alex Demyan image, courtesy of Louisiana State Parks.

Courtesy of its quiet and invisible ground source heat pump system, the Oakley House and surrounding 100-acre forest still attract tourists for the same reasons Audubon was attracted to the area in 1821.

When choosing a heating and cooling system for the Oakley House on the Audubon State Historic Site, park employees wanted to find a system that could be tucked away and hidden. They wanted nothing to distract from the uniqueness of the historic plantation home. When faced with the question of how to install a heating and cooling unit without making distracting noise or polluting the visible beauty of a historic home, GSHP technology seemed to be the answer, said John House, Project Manager for the Audubon State Commemorative Area. Complimented by a GSHP system, the natural and peaceful beauty of the Oakley Plantation, set in the lush 100-acre forest of Audubon State Historic Site between St. Francisville and Jackson Louisiana, is still able to attract tens of thousands of visitors every day for the same reasons it attracted artist John James Audubon in 1821.

"GSHP technology was the perfect solution for the Oakley House," said House. "The units can be totally tucked out of the way and don't impact the original appearance of the house. We give tens of thousands of tours of the house every day and the GSHP system has neither left a permanent scar on the appearance of the house nor disturbed the peaceful walk visitors enjoy when approaching it."

A Unique Beauty

"The rich magnolias covered with fragrant blossoms, the holly, the beech, the tall yellow poplar, the hilly ground and even the red clay, all excited my admiration. Such an entire change in the fall of nature in so short a time seems almost supernatural, and surrounded one more by numberless warblers and thrushes, I enjoyed the scene," wrote John James Audubon in his journal when he arrived at the Oakley Plantation in 1821.

According to the Audubon State Historic Site Web page, Audubon was hired by Mr. and Mrs. James Pirrie, owners of the Oakley Plantation, to give drawing lessons to their daughter Eliza. He was blessed with the ability to capture reality with his artistic hand. Half of his time at Oakley was devoted to teaching Eliza to draw and the other half was spent roaming the woods observing bird specimens for his own paintings.

Audubon returned home to New Orleans only four months after his arrival due to tension between him and Mrs. Pirrie. However, during his short stay, Audubon brought to life or began 32 beautiful paintings of birds from the surrounding forest. Many of these are displayed within the house today for tourists to admire.

The Oakley House, where Audubon stayed, was placed in the National Register of Historic Places in 1973 and is the main attraction of the Audubon State Historic Site in Louisiana. It was constructed around 1806, before most classic Southern plantation homes, and gains uniqueness because its architectural style predates most plantations left standing today. The graceful three-story home contains simple, yet eloquent, decorative building architecture.

Although the home was built in the early 1800s,

the rooms inside have been restored to reflect the late Federal Period of the 1820s when Audubon stayed there. A large detachable kitchen, restored around the original kitchen house chimney, and a plantation barn filled with historic vehicles and carriages, sit close to the house. Two slave cabins and two restored gardens, a formal garden and a kitchen garden, help recreate the reality of a still admirable and once functioning plantation home.

After viewing the acres of magnificent magnolia and poplar trees on a nearby nature trail, it is easy for tourists to appreciate and understand the same beauty Audubon wrote about 184 years ago. A nearby sheltered picnic area is also available to host fellowship gatherings or take lunch breaks in this art inspiring forest.

A Unique Solution

In the early 1980s, Audubon State Commemorative Area staff faced the dilemma of finding a heating/cooling system that would function efficiently while still preserving the art inside the building. Audubon's paintings, as well as fabrics and clothes inside the house, were being damaged by accumulating moisture due to a lack of ventilation and air circulation. Louisiana's humid environment also enhanced the moisture damage. To preserve the natural setting of the site, there was a need to avoid the visibility of a large outdoor unit and noise that could pollute the natural sounds of the forest.

In answer to the Audubon staff dilemma, Jimmy Dodds, lead architect for Dodds and Associates, and his team faced a challenge in 1983 when they began the Oakley Plantation project. To meet the challenge of placing the Oakley system out of view, Dodds chose to place the two, 5-ton, closed loop units in the attic of the three-story house and run the duct work through the chimneys. The system contains a 1 1/2" polybutylene, Phillips 66 pipe, fused with a U-bend. The two GSHP units are Carrier manufactured.

"This job is very unique and took a long time to design," said Dodds. "There is no exposed ductwork and the system does not impact the historic, internal fabric of the building. Air is supplied through chimneys into each room and returned through west chimneys."

To begin the project, the chimneys were tapped into and ductwork was run through them. Their tops were sealed off on the roof of the house and air is now supplied through them. Two chimneys on each floor push air into bedrooms and air is then returned through chimneys on the west side of the house. There is no chimney return on the first floor, however, air is returned via an internal set of stairs.

Since the units are placed in the attic of the house, the next challenge was to find a way to bring the chilled water lines in wells outside the back of the house to the attic. Four wells, each 400 feet deep, were dug for each of the two units, making eight wells total. The unique solution was found in a rain gutter that went into a rain barrel in the back of the house. Piping controls were covered by a Cyprus ramp, resembling a wheelchair ramp. The chilled water lines were run into the rain barrel and through the down spout. The return and supply pipe for the chilled water was then run up the rain gutter and into the attic. About ten years after the installation, the rain barrel was removed due to its awkward placement by

John James Audubon, world renowned artist, has many of his famous paintings preserved at the Oakley House.

(continued on page 18)

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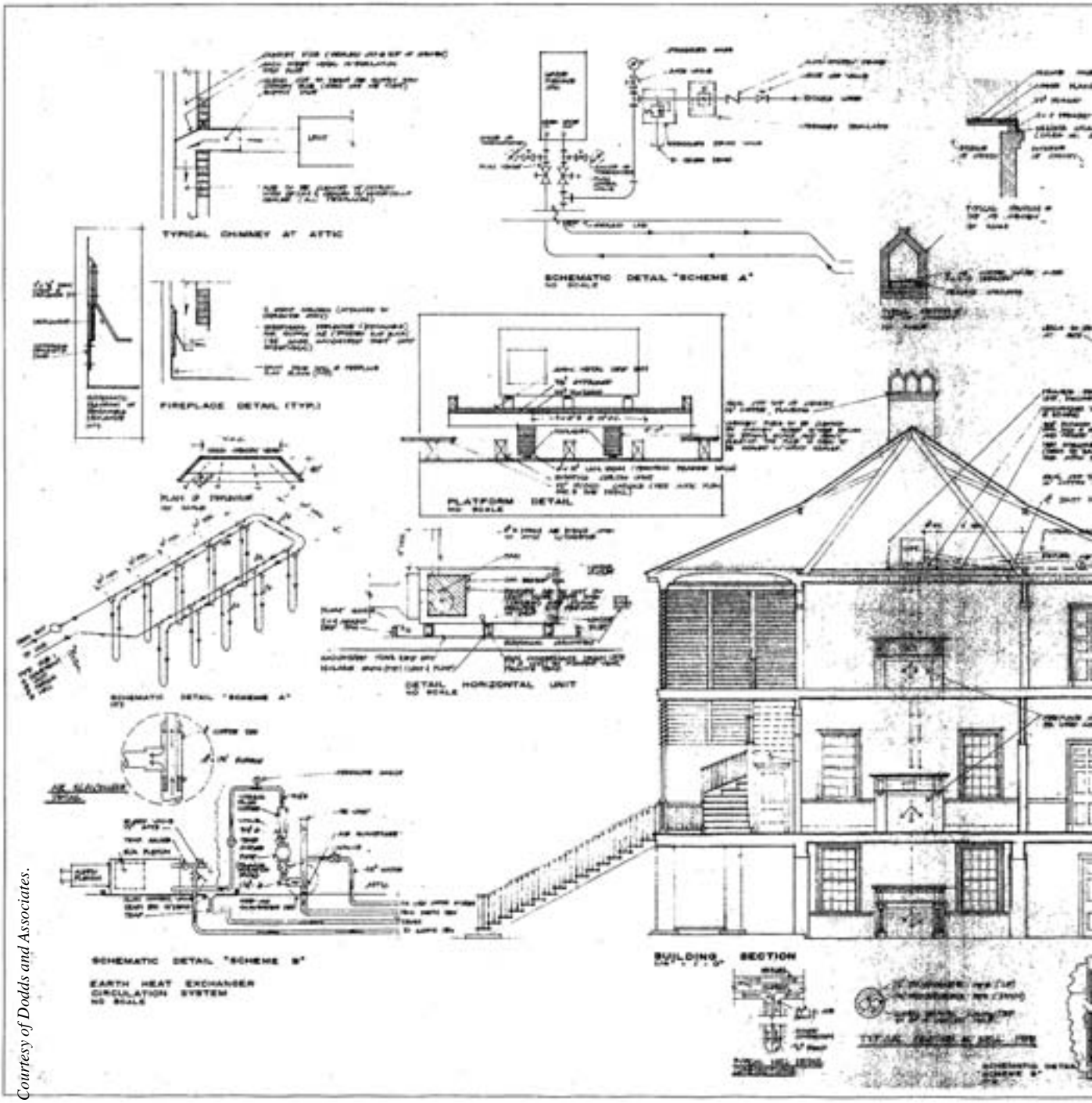
the stairs in the back of the house. The rain gutter now runs directly into the brick on the ground.

"We did not penetrate the outside fabric of the building either," said Dodds. "Historically, we had a super way to do it without destroying anything on the building. Controls for piping are even hidden outside the house under a Cyprus box."

Dodds received his accredited installer's license from IGSHPA at Oklahoma State University in the 1970s. His personal home has been heated/cooled by a GSHP for over 25 years without any problems or replacements. He is particularly proud of the unique

Dodd's unique architectural plan for the Oakley House's ground source heat pump system is as much a work of art as those displayed inside by John James Audubon.



Courtesy of Dodds and Associates.

architectural design displayed at the Oakley Plantation at Audubon State Historic Site. After its successful completion in March 2003, Dodds was also asked by Audubon staff to be the architect for their visitor's center, which is designed with a cotton-barn theme to tie in with its historical surroundings.

"Although the Oakley House was our first historic project, since then we have done numerous historical jobs because of this one," said Dodds. "It got us in the loop of doing historical renovations and projects."

GSHP units are much quieter than a traditional system and the unique architectural placement of the system in the Oakley House also makes it invisible. One of its two units was replaced about a year ago after many years of performance without any serious maintenance needed.

"Twenty years of faithful service without problems is much more than you can expect from a traditional commercial system," said House. "The durability and low maintenance of the units is a huge advantage of the systems and a reason that more people should use them."

Apprehension about water pipes bursting because of the use of groundwater in the closed loop system is a common misconception felt by many. However, the past 20 plus years have proven this apprehension to be false. The systems performance has built trust in the GSHP system at Audubon State Historic Site. Audubon staff members encourage others to take note of this proven technology and the perfect solution it has been for them.

"The GSHP system has solved all of our problems and no one even knows it is there. It has remained fully functional, proved dependable, protected the historic site and allowed it to remain naturally beautiful," said House. "The Oakley House is a very important historic structure and this system has protected it for over 20 years and demonstrated its dependability. I would recommend this system to other people and highly consider using it for my future projects."

The unique beauty of the Oakley House is the perfect place to display Audubon's recreation of birds by his artistic hand. The GSHP system amazingly has the ability to preserve the natural sounds of the forest, historic beauty of the plantation home and artistic ability of Audubon while modernizing the historic site to include the convenient comfort of a heating/cooling system. Dodds' architectural challenge has made a unique solution for a unique beauty a reality.

Chickasaw Nation Invests in Geothermal

By Kelly Green

Living a life of public service makes a person aware of the effects of their decisions and actions. As the top elected official of the Chickasaw Nation, Gov. Bill Anoatubby carries a deep passion to serve not only the Chickasaw tribe but also people around the world. He cares for the land and people of today and seeks to provide a safe environment for the land and people tomorrow.

"His motivating factor is making conditions and quality of life better for all people," said Kennedy Brown, special assistant to Anoatubby since 1992. "He is always there to help and has been an inspiration to other tribes throughout the state."

When his tribe began looking for an environmentally-friendly, energy-efficient heating and cooling system for its new Microtel Hotel and Bread Basket Restaurant in Davis, Okla., it was no coincidence that the Chickasaw Nation chose to install a geothermal system.

"Environmental stewardship is a core cultural belief of the Chickasaw Nation, and as such, we always try to minimize our impact," said Brian Campbell, CEO of Chickasaw Enterprises.

A Public Servant

Anoatubby began his work with the Chickasaw Nation in 1975. During his 30-year tenure, Anoatubby has served as tribal health director, tribal finance director, lieutenant governor and is currently serving his fifth term as governor. When he arrived in 1975, the tribe was struggling financially and was almost completely reliant on U.S. government funding.

It was while working as tribal finance director that Anoatubby saw the need for commercial ventures that would increase tribal revenue and decrease the tribe's dependence on U.S. government funding. Today, the Chickasaw Nation operates several businesses, including the Microtel Hotel and Bread Basket Restaurant, which help fund the tribal government and allow the government to provide a wide range of programs and services to the Chickasaw people.

The Chickasaw Nation Health System accommodates 350,000 patients each year and operates several Chickasaw-specific healthcare programs. The Division of Housing and Tribal Development ensures Chickasaw citizens receive low-rate home mortgages. Through grants and scholarships, tribal education funding assists

Courtesy of the Chickasaw Nation.

Governor Bill Anoatubby has worked for 30 years to provide health and prosperity to the people of the Chickasaw Nation.

Courtesy of IGSHPA staff.

The Chickasaw Nation's property, at the Microtel and Bread Basket facilities, are all heated and cooled by ground source heat pumps.

Chickasaw students whether they choose to attend college or learn a vocational trade.

The Microtel facility is just one of many examples of Anoatubby's ideas at work. The facility contains a hotel with 60 guest rooms, a pool, spa and restaurant, which serves breakfast, lunch and dinner daily. The guest rooms, pool, spa and restaurant are all heated and cooled by GSHPs. It was the reliability and efficiency of GSHPs that convinced the Chickasaw Nation to install a geothermal system.

"The geothermal system pays for itself quickly and is more efficient than a conventional system," said Campbell. "This system should last 25 years and a conventional system will only last 12 years."

Environmentally Friendly Technology

The Microtel facility contains a vertical ground loop heat exchange system designed by Ron Willis of Environmental Loop Services utilizing pumps manufactured by Trane. The whole system is about 171 tons, said Greg Dudley of Earth Energy Technology and Supply, Inc. The project began in August 2003 and required 106 boreholes drilled to 265 feet on three well-fields. The facility opened in October 2004. Even before the hotel was open, the GSHPs were in full working order.

"The other trade contractors were surprised at how quickly the system could cool the unfinished building-even in August," Dudley said.

For the Microtel facility, Dudley

believes that the benefits of GSHPs outweigh the benefits of other heating and cooling options. GSHPs offer equal equipment costs with lower operating and maintenance costs, Dudley said. The Chickasaw Nation agrees.

"We were interested in minimizing electrical usage as much as possible," Campbell said. "It was easy for us to see how using this system would dramatically reduce dependence on electrical and mechanical means to manipulate temperatures."

The Chickasaw Nation appreciates the reliability of a geothermal system just as it appreciates the reliability of its leader. As another service to the public and as further evidence of the tribe's strong conviction to protect the environment, the Chickasaw Nation partnered with East Central University in Ada, Okla., Anoatubby's alma mater, to sponsor an environmental protection workshop for high school students. "It's Your Environment" took place July 25-29, 2005, on the campus of ECU. The workshop was part of a larger project known as the National Environmental Science Partnership Program, which is sponsored by the Environmental Protection Agency.

The workshop allowed students the opportunity to travel to sites where environmental conditions were questionable. With the help of environmental health professionals, students participated in the measurement and data collection process. Students also learned about the duties and responsibilities of those working in environmental health and protection careers.

Unconquerable Spirit

Anoatubby continually works to provide enriching opportunities to the Chickasaw citizens. He also holds a long list of honorable affiliations and achievements. He served on the Oklahoma State Board for Easter Seals and Crippled Children, Leadership Oklahoma and the Oklahoma Academy of State Goals. He is a member of Fannie Mae's National Advisory Council and Chairman of the Native American Cultural and Educational Authority Board of Directors. In 1995, he was appointed by President Clinton to serve on the board of trustees for the Morris K. Udall Scholarship and Excellence in National Environmental Policy. In recognition of his work throughout the country, Anoatubby was also recently inducted into the Oklahoma Hall of Fame.

Anoatubby said he feels privileged to be associated with such noble organizations and was honored to have been selected for the state Hall of Fame.

"The accomplishment I am especially proud of is having the honor of being selected to serve the Chickasaw citizens," Anoatubby said.

Under Anoatubby's leadership, the tribe is flourishing. Previously employing only 200 people with an annual budget of $11 million, the Chickasaw Nation today employs more than 7,000 people and has an annual budget exceeding $300 million.

"Our first priority is to determine if something is

Courtesy of Earth Energy Technology & Supply.

Crews worked quickly and efficiently to install the ground heat exchanger that began cooling the still unfinished building through the summer heat.

good for the Chickasaw people," Anoatubby said. "Once that is determined we proceed accordingly."

Geothermal technology has given the Chickasaw Nation the opportunity to balance its need for energy with its desire to serve not only its own citizens but also people throughout the state. Anoatubby looks forward to the opening of a new American Indian Cultural Center that will showcase American Indian culture to visitors from around the world.

The project, located in Oklahoma on 300 acres of city land between Interstates 35 and 40, will break ground on Nov. 1, 2005. Civic and political leaders have been working since as early as 1994 to secure the $135 million needed to begin construction. According to its Web site, the center will feature educational programs, performances and exhibits to display the heritage of the American Indian. Anoatubby and other members of the Native American Cultural and Educational Authority plan to unveil the center in November 2007 as a part of Oklahoma's centennial celebration.

"The center is intended to provide a place to experience the many Indian cultures of this state and create opportunities to learn about the history, traditions and contributions of Oklahoma's native people," Anoatubby said.

Anoatubby has coined an unofficial motto for the Chickasaw Nation that concludes many of his public speeches: Unconquered and Unconquerable. History records the Chickasaws as a tribe that was never defeated in battle. They were a people who throughout the turbulence of the expansion across the United States, continued to believe in themselves and their way of life.

Today, the Chickasaw Nation maintains that same strength and unity. The Chickasaws of the past relied on the earth to provide their provision. The tribe's decision to use geothermal energy links this past heritage with a technology of the future. The Chickasaws of today rely again on the earth to meet their energy needs. Anoatubby and his tribe cherish the long, rich Chickasaw history and through their decision to use geothermal technology have helped to ensure a safe and bright future. The Chickasaws of today still live with an unconquerable spirit that is evident in their elected leader, Gov. Bill Anoatubby. ◆

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In the News

NASA Ground Source Heat Pump Feasibility Study

In July this year, the U.S. House of Representatives referred H.R. 3070 of the National Aeronautics and Space Administration Authorization Act of 2005 to the Senate. In Section 109 of this Act, the NASA Administrator is directed to conduct a feasibility study on the use of GSHP technology in new NASA facilities and for use in renovated facilities. The study will look at life-cycle costs, barriers to installation and other issues. If approved, the study must be completed no later than one year after the enactment of the Act (for a complete copy of H.R. 3070 visit www.house.gov).

Heat Pump Tax Credit

U. S. Representatives Bart Gordon and Jim Cooper of Tennessee are working to get a bill passed that will help encourage people to use GSHPs in the future. Currently a tax credit of up to 10 percent of the investment or purchase and installation costs of "qualifying energy property" is given to any commercial business. This does not include GSHPs. They are seeking to add GSHPs into this bill. If you want to help see this bill passed please call: Julie Eubank for Rep. Gordon at 202-225-4231 or Anne Smart for Rep. Cooper at 615-736-5295.

Potential Ground Source

Tennessee Governor's Residence Gets Historic Renovation

By Trisha Swindle

The undertaking involved with renovating a historic home is daunting. Renovating a historic, public home has responsibilities that the latter doesn't. The renovators have to bear in mind the legacy they are leaving behind in their decisions to alter the house or simply bring it back to its former glory. Tennessee Gov. Phil Bredesen and First Lady Andrea Conte are in the process of having the Executive Residence

Courtesy of Nashville Electric Service.

Renovation of the Governor's mansion was a high priority of First Lady Andrea Conte. The elegant integrity of the beautiful residence was maintained by the installation of a ground source heat pump system.

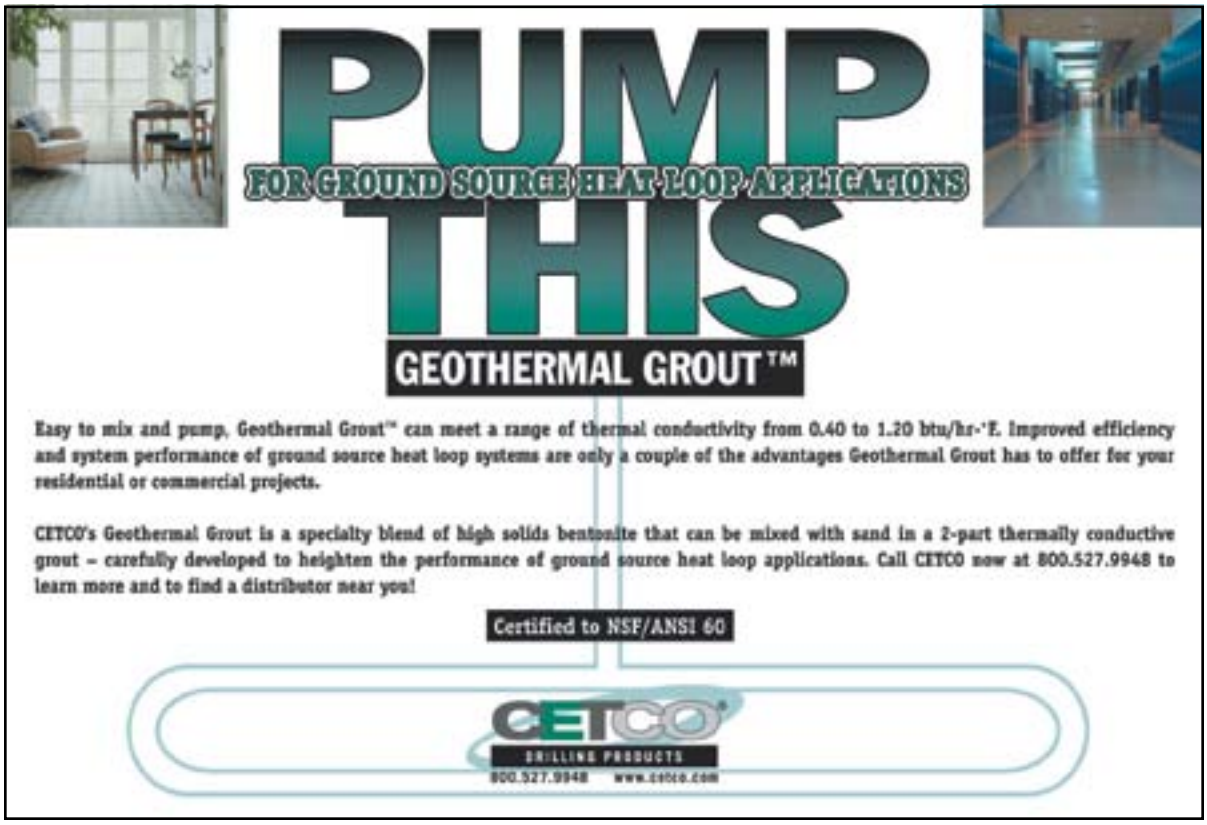
renovated. Conte has made this renovation one of her many important projects as the First Lady of Tennessee. Conte has decided to bring the house up to current standards of comfort and accessibility while maintaining the elegant integrity of the original home.

Conte stated, "In looking at the options for restoring the outdated heating and cooling system in the Tennessee Residence, we found geothermal to be one option that was both cost-effective and environmentally friendly. Geothermal uses the earth's own heat to provide energy instead of using electricity, so in the long run we're saving money and protecting the environment."

Courtesy of Nashville Electric Service.

The First Lady of Tennessee ordered that renovation of the governor's mansion be cost-effective and environmentally friendly.

The mansion was built in 1929 and purchased by the state in 1949 for the purpose of becoming the Governor's Executive Residence. This Georgian colonial home was originally built for the William Ridley Wills family. Wills was the founder of the National Life and Accident Insurance Company. Seventy years of living has caused the home to need extensive repairs. The antiquated heating and air conditioning units have



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poorly maintained the humidity levels in the home causing the interior walls painted, with lead-based paint, to peel. This has also left the home's historic collections at risk.

The major renovation is still in the bidding process and is set to begin as soon as possible. The renovation is planned in four phases. The first phase includes replacing the roof, water damage and paint repairs, and replacement of the outdated electrical and mechanical systems. Most of phase one has been completed–the roof and HVAC systems have been replaced. It will also include making the building ADA compliant. Phase two includes building a conservatory for large public functions. Phase three centers around the carriage house, which will also need to have its roof replaced, and other repairs. The final phase will have a consolidated maintenance building constructed. The conservatory and carriage house will also be using ground source heat pumps.

The main building is 15,500 square feet. Approximately 10-15 people live in this residence, but it can host up to 100 during state affairs. The original architectural firm who designed the existing building, Hart Freeland Roberts, is also the one performing the renovation. The drilling was done by Mid-State Drilling. The mechanical engineer was Tracy Worley with I.C. Thomasson.

According to Tony Viglietti, senior energy services specialist for Nashville Electric Service, there were 78 boreholes drilled at 300 feet deep. Geothermal high-density polyethylene pipe was used for pipe material. The pipe loops were one inch in diameter, the circuits used one to three inches and the supply and return used four to six inches. No antifreeze solution was needed due to the mild climate of the area so water was used to fill the pipes. The total tonnage of the system is 110 tons. The 29 units weigh 3/4 to 2 tons a piece. The anticipated annual energy usage is 25 kWh with operating costs at $1.78 per square foot. The payback period is expected to be in three to seven years. A 30 to 70 percent reduction in total heating and cooling costs are expected.

It was important to the First Lady and the Governor that the majority of the money used for this renovation

came from donations. They have used the left over funds from their 2003 gubernorial campaign and all other funds to date have been through donations. For example, the Tennessee Federation of Garden Clubs has put together a statewide initiative called "Flowers for the Executive Residence". This initiative will provide the First Lady with the necessary funds to have fresh flowers displayed in the public areas of the Residence. She will also have guest floral designers at her disposal for holidays and special events.

By choosing to use a GSHP for the three buildings of this renovation, Conte has given the people of Tennessee a gift. Not only will their beloved Executive Residence be restored above and beyond its original grandeur, it will also be supplied with warmth during the winter and cooling during the summer using renewable energy.

Courtesy of Nashville Electric Service.

The noisy and visible traditional units, shown here, are being replaced with the quiet and invisible technology of ground source heat pumps.

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Earth Insights

If you have a question about geothermal installation, design or troubleshooting, send it to Phil Rawlings in care of *Geo Outlook*, Oklahoma State University, 374 Cordell South, Stillwater, OK 74078 or via e-mail to insight@igshpa.okstate.edu.

The "Little Things"

Regardless of the time and effort put into a geothermal project's proposal, sale, design, and installation, the simplest things can turn the new owner of a first class system into a dissatisfied customer with nothing good to say about the contractor and/or geothermal heat pump systems. The reason is simple–the "little things" need just as much detailed attention as the system installation.

Over the years, I have heard too many complaints from owners/operators about the "little things." For example, homeowners often need equipment or thermostat operating manuals replaced because the originals were lost or thrown away during construction. Too often, the owner hears "We left it in one of the kitchen drawers." Another simple mistake is putting a unit in the attic but not using filter grills, so the owner has to get to the unit in the attic to change the filter. And worst of all, "The ground loop is on the east side of the house, toward the back." What happens when they decide to add on "close to where I think the ground loop is?"

On commercial systems, the problems are often the same, just on a larger scale. For example, there was a large commercial facility where the operations and maintenance manual was "left on the table in the corner of the mechanical room" and now can't be found–and it was the only one. Another time, the mechanical contractor had a problem because he had no as-built drawings–"The electrician borrowed mine and I never got them back." And finally, the commercial facility that was planning to expand and all the information they had on the loop field was "It's under most of the south side parking lot."

Our customer base made an educated decision to use geothermal for their space conditioning needs, but that doesn't mean they know how to use a geothermal system. Regardless of residential or commercial application, we as contractors should never fail too to:

- Educate the owner on the operation and maintenance of their system
- Provide the owner an operation and maintenance manual(s)
- Provide an accurate dimensional layout of the loop field
- Keep records of each system installed on file in our office
- NEVER give away your original copy of the operation and maintenance materials or as built drawings on any project–regardless of size or age. If someone wants to "borrow it to make a copy," make it for them!
- Finally, address the "little things" before they become big problems.

Proper attention to detail and all the other "little things" to complete and deliver the project positively and professionally can make a customer a geothermal customer for life.

Mr. Rawlings has over twenty-five years experience in the geothermal industry. He is a Certified Geoexchange Designer (CGD) and an IGSHPA Accredited Installer and Trainer.

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