

Art & Science

THE COMMUNITY TECTONICS QUARTERLY

A White Paper on Architectural Technology 3D Animated Rendering: Visualize This

Have you ever looked at a drawing of a building and wondered what, exactly, it would look like in reality? It's an architect's job to interpret a client's needs into plans for actual physical space. It's also an architect's job to communicate and ensure that everyone understands those plans.

History Repeats Itself

Community Tectonics is taking the lead - once again - by offering 3D videos and interactive CD-ROM's to depict a building's design. In the 1980's, this firm was among the first to employ AutoCAD (computer-aided drawing) on a major project, Mary Blount Elementary School in Blount County. Technology has evolved from those early two-dimensional drawings to 3D drawings and now to 3D animated rendering.

"In less than 30 years, we've come quite a long way from computer programming cards and drawings

created with pencil and ink and straight edges," says Bill Vinson, Community Tectonics vice president.

"Just like any business, we've been impacted by the explosion in technology. In addition, we have the added responsibility to work with our clients to understand how technology impacts their building needs," Vinson continues.

Future Predictions

Based on recent rapid changes in technology, Vinson predicts astounding advances in the near future. "By the time I retire, I envision architects wearing computers as a lapel pin. We'll virtually walk clients through their future building and make immediate changes for their review as they make comments."

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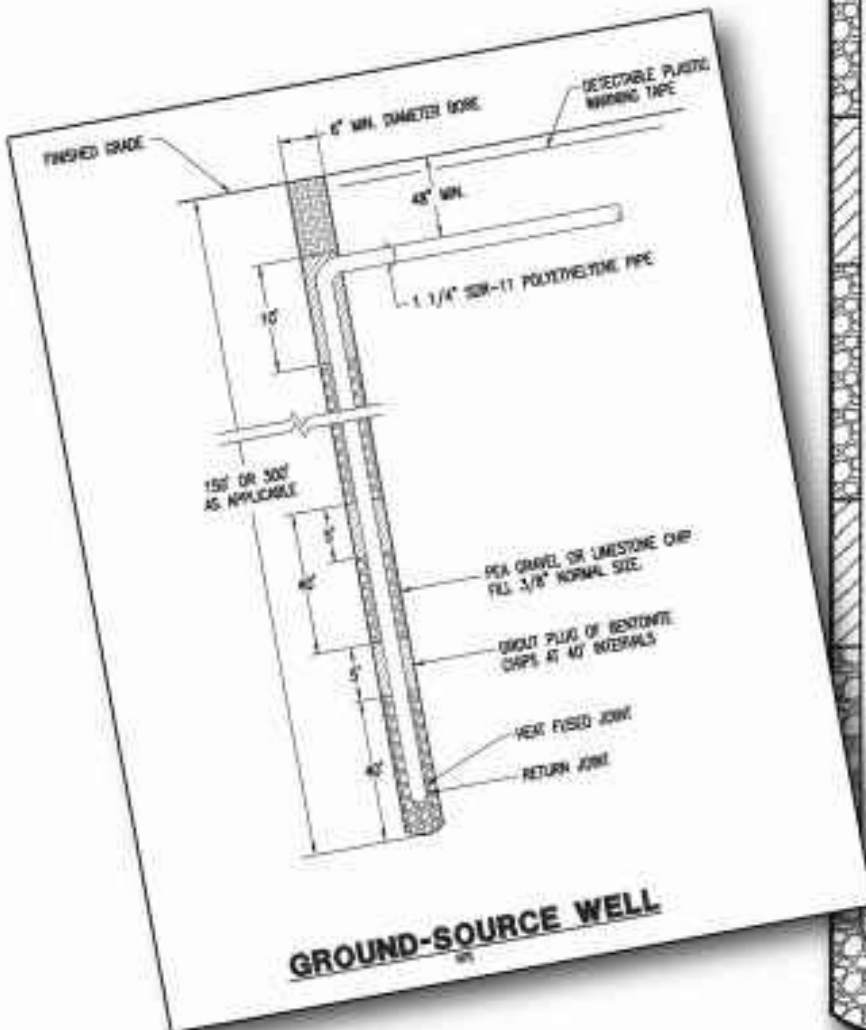
Tectonics: The Art and Science of Creating Structures

Cutting-Edge Geothermal Systems Make Use Of Earth's Ancient Energy

By tapping the latest technology, Community Tectonics' clients are using the natural temperatures of the earth to heat and cool their buildings. Geothermal technology offers an attractive, environmentally friendly, cost-efficient system to transfer the earth's heat into buildings during cold months and to take heat out of buildings during warm months.

"Geothermal technology can slash energy costs up to 50 percent," says Don Shell, president of Community Tectonics. His company has recently designed several projects that incorporate geothermal heating and cooling systems. These include a primary school in Sevier County and a dormitory at Johnson Bible College.

"Geothermal delivers many functional advantages for our clients," Shell reports. "In addition, architectural aesthetics benefit when the boiler and chiller equipment is eliminated."



Geothermal Benefits

Shell lists several benefits to geothermal technology:

1. Cost savings: While up-front costs may be higher, geothermal systems are renowned for quickly paying back this difference in lower utility bills.
2. Environmental benefits: Other systems use non-renewable fossil fuels. The warmth of the earth is an inexhaustible source of energy.
3. Easy maintenance: This system has far fewer mechanical parts than a boiler or chiller unit, which often need regular upkeep.
4. Long life span: Since the system is underground, no equipment is exposed to harsh weather. Most systems have an estimated life of 50 years, and many carry long-term guarantees.
5. Aesthetics: No cooling towers or rooftop units are required.
6. Safety: No outside equipment or fire hazard threatens building occupants.
7. Size: Geothermal pump systems are 50 to 80 percent smaller than conventional boiler-type furnaces.

Geothermal Defined

A geothermal system pumps water through underground pipes into the building. Under the frost line, the ground stays at a constant temperature: 57 degrees Fahrenheit. During cold weather, the water absorbs warmth from the ground and heat pumps transfer it to the building. During hot weather, the reverse happens. Water is cooled underground and pumped back into the building, where the heat pump transfers heat from the building into the water, which is pumped back down to be cooled again.

This closed-loop system incorporates a field of pipe that reaches 300' into the ground and a central pump system taking water into and out of the building. Rooms within the building have their own in-room water loop heat pump and thermostat, allowing individual room temperature control.

which are both Functional and Visually Pleasing.

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A Case Study: Johnson Bible College

At Johnson Bible College, several heating and cooling systems were compared before the geothermal system was chosen for two new 190-occupant dormitories.

"We were looking for a system to provide heating and cooling year-round, to provide the easiest long-term maintenance, and to provide the highest energy conservation," explains John Linsenbiger, director of plant services for the college.

"Geothermal technology allows us to use what the good Lord has given us and to use it wisely," Linsenbiger continues. He notes that the "East Tennessee rocks provide a good field for the system, one with excellent conductivity."

"Utilizing the geothermal system at Johnson Bible College enabled us to design a better and more efficient system," explains Henry Welch, president of West, Welch, Reed Engineers, who also worked on the project.

In addition, Linsenbiger says that geothermal systems last twice as long as traditional boiler systems. His new geothermal system carries a 30-year warranty, while he just had to replace a standard mechanical system after only ten years.

Linsenbiger says he worked with Community Tectonics' architects to select a specific geothermal system. Community Tectonics offered several options, such as a deep-well system, for his consideration.

"We've been a long-standing client of Community Tectonics for about 20 years," Linsenbiger notes. "They've helped us expand on the geothermal project, they've provided options, and they continue to be responsive to our needs."

Geothermal Popularity Continues to Grow

Dr. Levonn Hubbard, Community Tectonics' assistant to the president, sums it up like this: "We have an obligation to our clients to apply our expertise and to analyze heating and cooling requirements. We are becoming more proactive as we help clients determine if geothermal technology will work for them. The many benefits of geothermal deserve exploration for increasing numbers of Community Tectonics' clients."

In the meantime, the most advanced visualization technique available for architecture is 3D animated rendering. Community Tectonics is working with Todd Peterson, owner of MTP Graphics, to produce a five-minute video of the proposed design for Cleveland Middle School.

The Virtual Tour

Before the ground is ever broken, school administrators can join with parents and governmental leaders to actually get a sense of what a building will be like, from all areas and in realistic



settings. The Cleveland Middle School video begins with an aerial flight around the site, then the building arises from the ground on-screen right before your eyes.

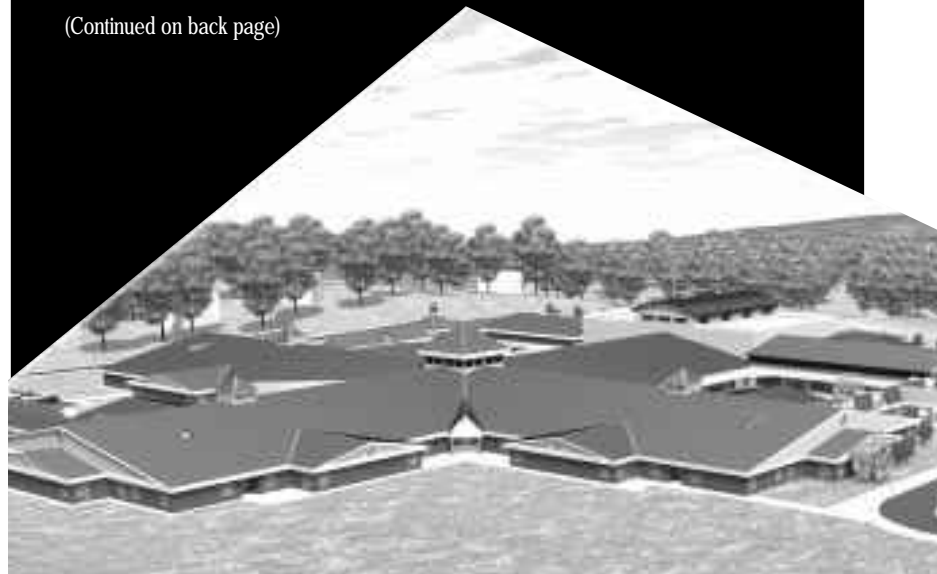
The viewer virtually flies around the building, seeing all elevations, and then enters the building for a virtual tour of common areas like the gym, theater, and library as well as a typical wing of classrooms.

Peterson begins his work with the 2D AutoCAD drawings, the footprint plan and elevations, and the site plan. These documents are imported into 3D software for manipulating shadows and other details and animating people and vehicles.

Perfect Timing

Don Shell, president of Community Tectonics, says that it is the perfect time for Community Tectonics to utilize this technology for the Cleveland Middle School design. "The owner has a particular interest in exterior finishes and colors, and the interactive CD will allow them to view different building elevations before they make their final selection," Shell says.

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"The Cleveland City School Board is a particularly good client. We're pleased to offer them the additional value that this technology delivers," Shell continues, noting that they've worked together for more than 20 years. "They're interested in high quality design, plus they expressed an interest in utilizing this technology to help them visualize their facility."

Ultimately, the greatest benefit is creating a new structure with functional design criteria that match client expectations. A major benefit of this new technology is the

ability to make changes quickly and accurately. In addition, it enhances the ability to effectively communicate the design to large numbers of people - always an integral part of any school construction project.

"Our goal at Community Tectonics is to be the most valued educational consultant in the State of Tennessee by 2001. We're already recognized that way by many clients," Shell concludes, as he predicts continued growth in technological applications. "It's our intent to stay on the cutting edge of technology to meet and exceed our clients' needs."



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