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Construction, Design & Engineering

Radiant heating and cooling added to Denver County Jail

Built in the late 1950s, the original Denver County Jail campus needed new housing spaces to serve its current needs. MKK was brought on board to design an energy-efficient system for the east housing building. Approximately 100,000 square feet, the east housing building is a precast concrete structure and skin with very few windows. This results in a massive building with a low solar load. The required addition of topping slabs to the precast tees for level floors made radiant heating and cooling a natural fit.

To provide the heating for the radiant floor system, the building utilizes the existing low-pressure steam central plant for the heating water system. To utilize this existing plant, MKK specified a steam-to-water converter in the building's mechanical room (adjacent to the site's utility tunnel). Cooling for the radiant floor system is provided by chilled water, which is obtained from a new chilled water plant installed as part of this project. The chilled water is first routed through the dedicated outside-air handling units to cool and dry the air sent into the building. In the process of cooling the air, the chilled water is warmed. The now-warmer chilled water flows to the radiant floor, where it cools the space. The warmer chilled water is used in the floor so that the floor temperature is maintained above the dew point temperature. Dew point is the temperature at which the moisture in the air condenses. Control of this temperature is



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critical; if not controlled, the floor could become wet and dangerous to the occupants, as well as a source of mold growth. Radiant heat transfer occurs when there is a difference between a heated or cooled surface and objects within the space. Keeping the floor warm in the winter and cool in the summer allows the occupants within the space to be comfortable with the heat set at a lower temperature, and the air conditioning set at a higher temperature. Lower and higher set points, respectively, reduce the amount of energy required to condition the space.

The radiant heating/cooling system is achieved by running heated or cooled water through cross-linked polyethylene plastic pipes located in the slab of each floor. Plastic pipe proves desirable because the expansion and contraction of the pipe due to temperature changes is less than that of metal. The concrete the pipes are installed in possesses yet a different expansion rate; using the plastic pipe allows for a stable floor. Additionally, the length of the plastic pipes allows routing of continuous pieces of pipe through the floor to both the supply and return manifolds, thus eliminat-

ing any joints in the concrete, which in turn reduces the opportunities for leaks. Thermal zones within the building are achieved through the use of manifolds located in secure access areas.


Radiant heating and cooling is innately more energy efficient than many alternative systems because it is water-based as opposed to air-based. At sea level, water is 784 times denser than air. As such, water is that much more capable of transferring heat than air is. When air is moved by a fan or water is moved by a pump, energy is expended by that fan or pump. Since water achieves more energy transfer on a cubic foot basis, less must be moved to achieve the desired heat transfer. All of these factors contribute to a very efficient system that meets building occupant requirements for ventilation and comfort.

ASHRAE 62.1 and the International Mechanical Code both have minimum ventilation requirements that must be maintained while a building is occupied. Since this building is occupied 24 hours a day, 365 days per year, the ventilation load is virtually constant. Normally utilized control strategies allowing a reduction in ventilation air due to varying occupancies – common in office buildings and schools – were not feasible for this project. The HVAC system MKK designed separates the ventilation air delivery from the heating and cooling of the building. This design not only meets the energy and atmosphere credits required by U.S.

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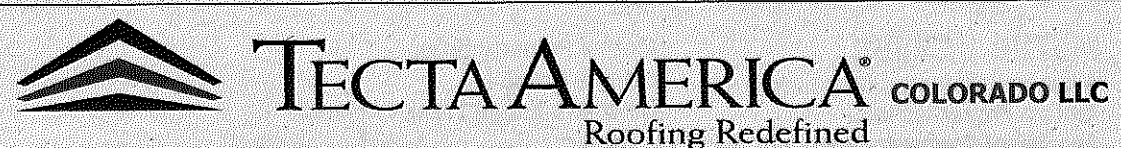

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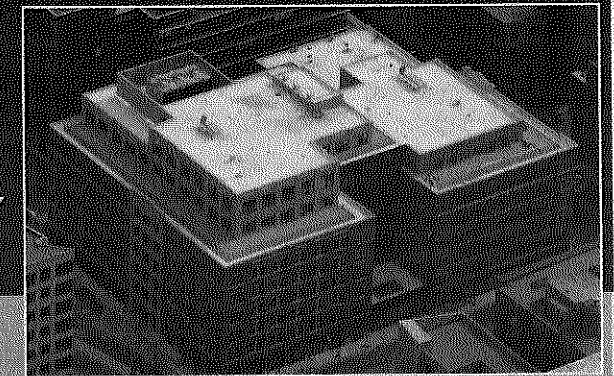

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Construction, Design & Engineering

Getting the best construction warranty from a contractor

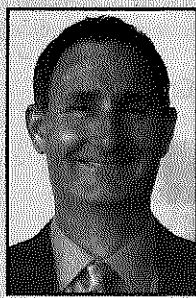
When looking for a contractor, what kinds of things do you usually take into account before making a selection? For most, the top three are price, schedule and the experience of a potential contractor. But what about the warranty program? Often overlooked, but equally as (if not more) important, is how a contractor plans to back up its work. A warranty program can tell you a lot about a contractor, the work it does and what you can expect from the company.

So how do you determine whether a contractor has a good warranty program? Don't wait until after you've sealed the deal to work out the details of the warranty – ask questions up front and make those answers a factor in your decision-making.

Here are a few questions for your potential contractor that can help you determine whether it has a good warranty program:

■ **Does your warranty program provide the same customer service after construction that I will have during construction?** Do you have personnel on hand to specifically address warranty requests? Many contractors don't have dedicated staff for filling requests; when calls come in, usually they are handled by whatever project team completed the work, as an add-on to whatever current assignment the team has, and rarely are these requests made a priority. Seek out those contractors who have at least one fully dedicated staff member assigned to resolving post construction issues.

■ **How long is your work guar-**



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anteed? What specifically is covered in the warranty? Typically contractors warrant against faults and defects in workmanship, materials, appliances, fixtures and equipment due to noncompliance with the construction standards for a period of one year. Some warranties, such as roofing and sheet metal, may exceed five years, although there is no guarantee the original staff will be present if and when the need arises. It is important for companies to be sure the contractor they're

using recognizes its responsibility to address any needs well beyond project turnover. The contractors that do tend to have the programs that go above and beyond.

■ **How quickly is a typical issue resolved?** Each contractor will have a different resolution period. However, you should be able to schedule a site visit with your contractor within five days of the initial notification. If possible, your contractor should try to resolve the issue at the time. If that is not possible, have them indicate to you how long it will take to resolve the issue. No issue should take more than 10 to 15 days to resolve. These short turnaround times are critical to keep a problem from causing greater damage.

■ **Does your company pro-**

actively track warranty expiration dates? A common best practice among contractors with good warranty programs is to contact clients 30 days prior to warranty expiration and request a facility re-walkthrough. This ensures that any warranty-related issue can be resolved within the allotted time frame without additional expenses to the customer.

In today's world of construction, modern buildings are every bit as technologically advanced as cars – yet few people are capable of maintaining them. When investigating general contractors, it is important to ask questions related to follow-up efforts and make sure you are getting more than just a "standard" program. This way, you can make sure your contractor won't leave you in the dust, after the dust settles.▲

Improve poor ethics in construction: set consequences

Ethical behavior in the construction industry is a subject rarely discussed openly, probably because for most people in construction it's the epitome of throwing stones in a glass house. A 2004 study by FMI Corp. and the Construction Management Association of America indicated more than 80 percent of almost 300 construction industry professionals (including architects, engineers and contractors) had personally witnessed unethical behavior in the previous year. In my experience, that statistic does not shock me, but it may shock an owner or financing professional writing construction loans. Ethical violations in construction are never on the front page of the newspaper or on the evening news, but they happen every day. And, in many cases, they cause real-world problems for owners as well as many good companies that refuse to participate in the types of unethical preconstruction procurement activities of their potential clients and gen-

eral contractors.

Examples of typical unethical scenarios occurring in competitive design-bid-build construction are bid shopping (pre- and post-bid time); underbidding a less than adequate set of project documents to be the low bidder; knowing the plan is to flood the contract with change orders during construction to make the money back; and specialty contractors slandering their competition when they have their client's ear. Obviously there are many more examples, but this article does have to fit on one page.

Why is this the case in our industry? Is this the case in every industry? Would 80 percent of 300 lawyers admit witnessing unethical behavior in the past year? It's doubtful and there are reasons why.

I believe there are two reasons the construction industry has fallen into the unethical abyss: 1) There are no licensing consequences for unethical behavior in construction; and 2) Most owners don't specifically



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demand ethical practices from their contractors in competitive bidding situations.

The first reason for an unethical environment given above has to do solely with the business consequences of unethical behavior. Our profession is one that bridges the gap between services and products. Building a commercial office building is manufacturing a custom product that requires consultant, professional, managerial and labor services. Many of these services are performed by construction professionals, not licensed consultants. For industries that solely provide professional services (i.e., lawyers, therapists, etc.), ethics plays a part in licensing and continuing education. There are consequences for

unethical behavior in the form of being fined, being fired or losing a license and having to change careers. This is not the case in general or specialty contracting. If there were one state agency that licensed all construction contractors, that would be a great place to start this movement. But, there isn't one licensing authority; there are many cities and other state or county agencies that require individual contractor licensing. In a brief research effort, neither city of Denver nor city of Boulder requirements for a general contractor license information documents mention the word "ethics," let alone highlight any licensing consequences for unethical business practices.

In the construction/development hierarchy, the owner and his financing team have ultimate authority over the requirements of the project. Obviously, the requirements include the building's size and specific materials and methods (i.e., roofing, structural, electrical, etc.), but also they can include required methods of procuring subcontractors

and vendors that require ethical practices and transparency. Surely there are some owners requiring methods of preconstruction procurement that do encourage ethical behaviors, but even in these cases we have to ask the question: Would they fire their selected general contractor during the construction process if they learned that the GC achieved budget/cost savings by shopping the subcontractors' bids to someone willing to drop his price in order to pick up a 2 percent savings on the specific scope of work?

In order to compete and win work in the tough construction market we are in today, people will do what they need to do to survive, let alone thrive. Since we are in an environment where there are very little consequences for unethical behavior, it is exactly what we can expect. Psychology and sociology both teach us that consequences affect behavior and in the construction industry the consequences for unethical behavior are few and far between.▲

Jail

Continued from Page 26

Green Building Council's LEED program, but it also allows the ventilation system to provide only the required amount of air for ventilation, not the additional air required for building comfort. The ventilation air is provided by three dedicated outside air units that recover

the available energy from the air being removed from the building as the ventilation air replaces it. The units utilize two energy wheels, one to recover heat from the exhaust air and another to remove moisture from the air. Additional features provided are a solar wall and solar ducts. Made of perforated black metal, the solar wall or

solar duct heats the air as it is drawn through both. When the temperature of the air outside is lower than the desired ventilation air temperature, air is routed through these transpired solar collectors where it is heated. Due to available space on the roof, two units use duct collectors and the third unit uses a wall collector.

An added benefit to this system is that it is easily adaptable to alternate energy sources. In the future, heating could be provided by solar thermal, geo-exchange, or even condensing boilers as the Smith Road Jail campus evolves. On the cooling side, geo-exchange heat pumps are an alternative to the mechanical cooling presently

provided.

Though still under construction, the energy savings captured by this project is anticipated to be 27 percent above the ASHRAE 90.1-2004 baseline system design, affording Denver County energy savings for the life of the building. The building is on target to achieve LEED Silver certification.▲

Northern

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positive signal as smaller properties begin to trade. Owner-users are the typical buyers of these properties, attracted by lower pricing and available capital.

Investors are seeking core properties, with stabilized yields. Strong properties are gobbled up quickly, offering capitalization rates of around 8 percent. On the other end of the spectrum, cash-

rich investors also seek value-add offerings. Some properties have traded 50 cents on the dollar to speculative investors with turnaround plans. Lender owned real estate (OREO) is finding its way to the trading table and now is about 15 percent of the overall market.

Larger multifamily properties continue to be in high demand, evidenced by the \$33.5 million June sale of the Boulders Apart-

ments. Demand is high, but owners aren't always willing to sell, especially when rents are rising and vacancies are very low in the area. Holding and operating multifamily real estate is a winning strategy now.

Land offerings are severely imbalanced. Supply far exceeds the minuscule demand. Well-located infill properties have taken what little demand is present. Buyers typically are owner-

users who do not want to develop subdivisions, but rather seek developed lots at bargain pricing.

In the tri-county Northern Colorado market, the trend lines are improving for owners. Landlords and sellers will slowly regain bargaining power as demand picks up with general economic conditions. East of Interstate 25, a fast-growing oil and gas industry drives the growth. West of I-25, the research-and-development

connection from Boulder to Fort Collins, driven by research-driven universities, is emerging. Significant commercial real estate impact will begin coming from the Boulder area ConocoPhillips new research center and Larimer County's upcoming ACE/NASA development. Times are looking better for those of us in the tri-county area.

For more detail, see: www.svn-colo.com/market-trends.▲