

Studies in Success

Company: Nacht & Lewis Architects

Software on Board and Applied: In house, the company relies on AutoCAD®, Autodesk® Revit® Architecture, Autodesk® 3ds Max® Design and Autodesk® Navisworks® along with Google SketchUp and Google Earth. Their consulting partners used additional software including Autodesk® Revit® MEP, AutoCAD, CAD-Duct, CADPIPE, and Vectorworks®.

Company: Nacht & Lewis Architects

Nacht & Lewis is a leading architectural firm in Northern California and the Central Valley. From Tulare County to Sacramento to Siskiyou, the company has been dedicated to designing innovative solutions with integrity since 1922.

Summary

The California Department of General Services (DGS) Central Plant was in urgent need of renovation. Nacht & Lewis Architects (the company), collaborated with engineering and building firms to propose an entirely new facility built around the aging plant with subsequent demolition of the old. The new Central Plant requirements included an unprecedented level of energy savings, water conservation, environmental protection and safety. The company made a strategic decision to utilize familiar 2D software while simultaneously moving to a fully parametric model.

The Challenge

Part 1: Urgency

The California DGS Central Plant at 625 Q Street, Sacramento was built in 1968. Four decades later, the world had transformed while this important piece of infrastructure remained unchanged. Its operating capacity suited an earlier era, before state buildings in the capital area had increased by about 24 percent and employees served reached 20,000.

Additionally, the plant had used well water to extract heat from the buildings and discharged that warm water into the Sacramento River. In 2002, the Sacramento Valley Regional Water Quality Control Board issued a cease-and-desist order over its concerns for the detrimental environmental impact of that discharge to migrating salmon and steelhead. The Central Plant needed to enter the 21st Century or face costly daily penalties. Ultimately after environmental impact studies and legislative action, the DGS issued a Request for Proposal (RFP) with the Sacramento Central Plant project identified as a renovation project.

To complicate matters, the Central Plant's operations would have to continue without interruption 24-7, day in and day out year round during any renovation.

And, the project would take place in a location that had no increase in size to offer, in a tight urban setting that includes state and other office buildings and residential neighborhoods.

Because of the Central Plant location in a mixed use, highly urban environment, a primary need was to demonstrate that the new building would be an architectural fit in an established context. Utilizing the existing location meant numerous restrictions based on size, noise levels and other contextual factors. In the location, there is a state building, the architects' office and residences.

Part 2: The Scope

The Central Plant serves the efficient and reliable central heating and cooling needs of 23 state buildings in the capitol area (the campus) of downtown Sacramento. It needed to provide 19,000 tons of heating and cooling capacity with a capability of 21,000 tons to accommodate future needs.

One project mandate was to bring any water discharged into compliance with regulatory requirements. Others were to mitigate noise, to build to achieve the Leadership in Energy Efficiency and Environmental Design (LEED®) Silver certification from the U.S. Green Building Council, to build highly efficient heating and cooling capacity that can be increased to match existing loads and future loads and to minimize impact on downtown electrical infrastructure.

News Release

April 18, 2006 from California DGS Director Ron Joseph:

"This project is an important step forward in the state's use of new and more efficient smart energy technologies... And it demonstrates Governor Schwarzenegger's strong commitment to upgrading California's often overlooked and worn public infrastructure."

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—Michael Parrott, Vice President and Senior Project Manager, Nacht & Lewis Architects

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—Laura Wood, Virtual Design Coordinator, Nacht & Lewis

Part 3: The Strategic Initiative

The Nacht & Lewis Architects team viewed the RFP and the project as a new build rather than a renovation. Together with the multidisciplinary engineering firm WSP Flack + Kurtz and Skanska USA Building, Inc., they collaborated and submitted their comprehensive proposal. As Michael Parrott, Vice President and Senior Project Manager, Nacht & Lewis remembers, “We told them we can build the project all brand new. And we will save you money.

“We proposed the building of an entirely new plant around the old plant. Once the new plant was up and operational, we would demolish the old one.”

If they were awarded the project, Nacht & Lewis faced an additional challenge, the challenge of expanding and updating their own technology. They recognized both the value and limitations of the 2D solutions they knew thoroughly and used daily. They also wanted, for its design and visualization capabilities, to adopt building information modeling (BIM) full speed ahead.

In May 2007, Skanska was awarded the project and Nacht & Lewis was named architect of record. In October 2007, the company received a notice to proceed. As the economy lurched, the project continued based on the fact that the threat of daily fines loomed for continued discharge of water into the Sacramento River.

The Solution

The solution the Nacht & Lewis team envisioned, based on the complexity of the project and its urgency, was a combination of BIM adoption alongside use of their existing technologies. They would combine BIM adoption with collaboration between themselves, the client, all consultants and sub-contractors. To facilitate speed of BIM adoption and to anticipate implementation needs in advance of problems, they would work closely with Ideate, Inc.

Nacht & Lewis utilized the design and visualization capabilities of BIM software to get everyone, stakeholders and public, on board with the concept. According to Parrott, “Revit and 3d Max imaging really helped the client see what the new Central Plant would look like. The State could feel a whole lot better about the project, its cost, and its impact on the community.

“The project was our platform launch into Revit technology. We were concerned about the tight time frame. We continued with AutoCAD because to move into a Revit-only system would have left us somewhat on a limb.”

Laura Wood, Virtual Design Coordinator, Nacht & Lewis, expands on the employment of two systems by saying, “We didn’t find it to be redundant to rely on 2D and 3D processes.”

Documentation and Design

The project team’s parallel approach employed AutoCAD for documentation and used building information modeling (BIM) solutions including Revit Architecture, Navisworks and 3ds Max for design coordination, collaboration, clash detection and visualization.

As Eric Fadness, Principal, Nacht & Lewis explains, “Our design tools facilitated understanding among us, the client and the subcontractors. They helped us detect problems early and were invaluable when it came to getting client buy-in. We could do fly-bys and zoom in on the model to help the client share our vision. AutoCAD was our production and documentation tool.”

The biggest challenge for Nacht & Lewis was that the Central Plant had to remain in continuous operation during the build. Their design solution to an unusual challenge was to build around the existing plant and then demolish the building inside. They placed a 126 ft. tall, 4.5 million gallon thermal energy storage tank where the building used to stand. As Parrott says, “We essentially designed a central plant that doesn’t look like a central plant.”



The new Central Plant incorporates technological advances that will help reduce energy costs and greatly reduce the amount of water needed within the plant. The new facility has cooling towers for extracting heat from the buildings. This eliminates the need to use well water to extract the heat from the buildings and the need to discharge the same water into the Sacramento River. Thanks to the thermal energy storage tank, reserves of chilled water can be produced during off-peak energy demand times. As a result, the new Central Plant is expected to use a scant 10 percent of the water required by the antiquated plant.

As for energy efficiencies, “LEED is not really geared toward addressing central plant facilities that include office and plant,” explains Parrott. “But we are on track for LEED Gold.”

Collaboration

According to Parrott, “We were convinced that to bring this project to successful completion, we would need to keep everyone on the same page.”

As just one example of the 2D to 3D advantage, when the team members looked at 2D drawings with pipes and were not sure whether the layout was right, they then viewed the pipes in the Revit model. According to Wood, “The best arrangement of the pipes became clear instantly. The right decision was visible for everyone.”

Autodesk Navisworks enabled the team to test for interferences between elements. Trade partners used a variety of data formats, including AutoCAD, CAD-Duct, CADPIPE, and Vectorworks. To be able to bring data into Navisworks without regard to original format and then run clash detections kept the project on track. As Parrott says, “It helped in the workflow for construction.”

“Our coordination was impressive thanks to Revit and Navisworks,” says Parrott. “The amount of pipe alone on project like this boggles the mind. These are 24 inch and 30 inch pipes. They don’t move around easily, so knowing where they go saves time and money.”

Wood adds, “The simple fact of being able to see the pipes move around is a benefit. We were able to get a consensus so much faster.”

Full Software Utilization

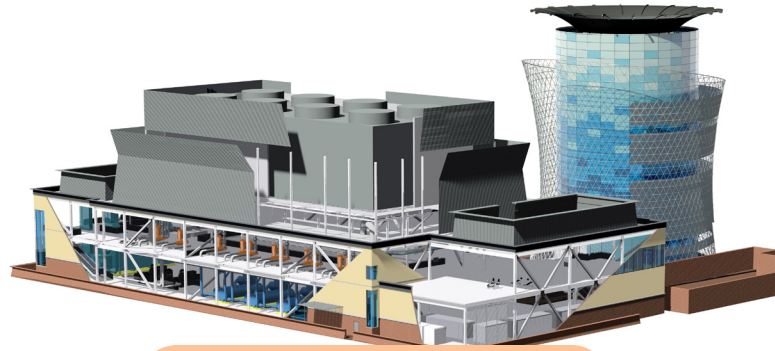
To get the most out of its BIM software, Nacht & Lewis turned to its long standing resource, Ideate, Inc., for training and support. The Ideate team provided customization for the company’s staff trainings. The BIM focused trainings included beginning and intermediate Revit training as well as training in 3ds Max. By having staff members trained, the result was an increase in the number of staff members available who could contribute to coordination of modeling. According to Wood, “Ideate is very accommodating. They responded immediately, providing training and trainers for this office.”

Having an Ideate support contract also assisted Nacht & Lewis in their BIM adoption process. As Fadness explains, “Ideate support is also timely. Ideate helps us when we encounter product bugs and issues. The tech support helps us work through problems and figure them out. An Ideate tech team member can always give us a fix to help us keep working.”

The Result For the Client

The State of California had initially requested a proposal for a renovated Central Plant. What they received was a highly efficient new plant, a rapid, effective transition to an environmentally friendly energy plant that will meet energy needs for many generations. The project came in within budget and most importantly within schedule to avoid financial penalties.

The project incorporates a 4.5-million gallon chilled water storage tank that can keep Sacramento’s state buildings comfortable even when the state’s electrical grid is strained. Water is chilled at night when electricity is more plentiful, stored and then circulated to state buildings the next day. Reclaimed water from the cooling tower finds re-use for irrigation and other gray water uses.



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The project remains on track to receive LEED Gold certification. The new Central Plant is slated to use one-tenth of the water of the existing plant and reduce energy consumption.

For the Community

As Parrott sees it, “The benefit we achieved for the greater community was to update outdated technology and replace it with much more effective equipment. The plant should reduce demand because of its efficiency. That provides more reliable electricity for everyone. The thermal energy storage tank is a great example of the aesthetics we could achieve through early visualizations. The tank is 126 feet high and has a diameter of 75 feet. Most people would try to hide something like that. We made it part of the composition and we are proud of it aesthetically.”

As for the Central Plant, Wood says, “It is a great piece of architecture in Sacramento and gives new personality to the city. An added benefit of the 3D modeling is that we had better feedback on how it would look than we could have had by any other means. The animations helped visualize all along the way.”

For the Company

“For our firm, the long term benefits of successfully completing a project like this have real impact,” says Fadness. “We have made strides in confidence, skills and in our expertise. We have gained forward momentum in our change to parametric modeling. Mostly now we document and design in Revit.”

“In spite of the fact that this was a complex project, we stayed on schedule,” Parrott continues. “Skanska built most of it within 12 months. It was the coordination between partners that made it happen. We respected each other’s roles. It turned out to be akin to an integrated project without any formal delivery agreement or contract.”

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Timeline

November 2007 Basis of Design
 April 2008 Construction Documents Completed
 May 2008 Construction Begins
 June 2009 Building Finished;
 Construction Completed
 August 2010 Phase 4 Site Work Completed

Project Partners

Nacht & Lewis Architects, Sacramento
 Skanska USA Building, Inc., Design/Builder
 WSP Flack + Kurtz, San Francisco
 Stantec, Sacramento Civil and Landscape
 CYS Structural Engineers, Sacramento
 Lawson Mechanical
 Redwood City Electric
 Capitol Engineering Consultants, Inc.
 Lionakis Beaumont Design Group
 Jacobs Engineering Group, Inc.

About Ideate, Inc.

Ideate, Inc., a leading Autodesk solutions provider, offers quality software, training, support and custom consulting services to companies in the building, infrastructure and multimedia industries. Established in 1992 and headquartered in San Francisco, California, Ideate is recognized as a Gold Partner for Architecture, Engineering and Construction, Autodesk’s highest level of authorization. Ideate, Inc. operates five Autodesk Authorized Training Centers (ATC): San Francisco; Sacramento, CA; San Jose, California; Portland, Oregon and Seattle. Ideate facilities are also Autodesk Authorized Certification Centers, providing globally recognized certification courses for professionals who sell, service and support Autodesk products and solutions. For more information about Ideate, Inc. visit www.ideateinc.com

With a specific focus on Building Information Modeling (BIM), Ideate is the developer of Ideate Explorer for Revit, the simple, powerful tool that helps Autodesk Revit users explore, quantify and manage the 10,000+ building elements in an Autodesk Revit building information model. For information on Ideate Explorer for Revit, visit www.ideateexplorer.com. Ideate Explorer is a division of Ideate, Inc.

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