

TJC
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The TJCAA Quarterly

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Message from the President

Cogen and PV and Fuel Cells—DSRSD Works Toward a Carbon Toeprint

TJCAA's Business Certifications

- Alameda County Small, Local Emerging Business
- City of Oakland Local Business Enterprise
- California DGS Micro Business (SB (micro))
- Port of Long Beach SBE
- San Diego County Water Authority SBE
- SoCal Network SBE
- CA PUC WBE
- City of Sacramento SBE
- Sacramento Municipal Utilities District (SMUD) SEED Vendor

Message from the President, Gianna Zappettini



There seems to be an “app” for everything these days, and I do not always know if they are good or bad. But I do know that if you choose TJCAA for

your next engineering project, you are “apt” to get just what you need—a really qualified team. Let us know how we can help you.

Cogen and PV and Fuel Cells—DSRSD Works Toward a Carbon Toeprint

The Dublin San Ramon Services District recently expanded and improved the electrical distribution and cogeneration systems at its main wastewater treatment plant. TJCAA, teaming with Whitley Burchett and Associates, Inc., performed preliminary design, final design, and construction services for the WWTP improvements, which were completed in 2012. Along with photovoltaic and fuel cell projects (by others) implemented previously, this project is helping the District to take advantage of alternative energy sources and reduce impacts associated with greenhouse gases.

Cogeneration involves taking advantage of a power source for dual uses. Anaerobic digester gas, a treatment byproduct, contains methane. Plants can burn the digester gas to produce thermal energy, heating the process tanks to provide a favorable environment for the process

“bugs” to do their work. Cogeneration systems produce power as well as heat. In the District’s cogeneration facility, gas-driven engines (fueled by digester gas blended with purchased natural gas) turn generators that produce electrical power for the plant and the engines’ exhaust provides heat for the process.

The District saw a good opportunity to expand its cogeneration electrical output, which offsets costly utility electricity. The improvements allow the District to save on energy costs and reduce the production of greenhouse gases and other air pollutants that might otherwise be associated with power from a utility or gas “flaring” to atmosphere at the WWTP.



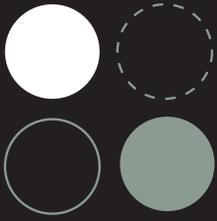
This project included incorporating a third cogeneration unit previously purchased by the District to the facility’s internal grid, to achieve a total internal generation capacity in excess of 2 megawatts

(cogeneration, PV, and fuel cells). The plant must continue to provide its critical services even if external power sources fail; the expanded system provides additional power reliability for the WWTP by increasing its internal power sources.

TJCAA’s design included relocation of the plant’s 21-kilovolt overhead main service with underground feeders, which also increased reliability and improved the visual aesthetics at a nearby city park.

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The cogeneration system was configured to give the District the opportunity to sell power back to the grid when it generates more power than the plant needs. Coordinating changes to a plant's main service for relocation, or to export power to a utility (in this case, PG&E) can be complicated. TJCAA coordinated with PG&E to identify and design the electrical distribution improvements and protection necessary to accommodate the upgrades and allow the District's meter to "run backwards" while meeting the utility's numerous technical requirements.

The District's Cogeneration Electrical Improvements and Service Relocation Project required design of many features:

- New, networked engine-generator controls
- Upgrades and replacement of several 480-Volt and 21-kilovolt switchgear lineups, including suitable cogeneration protective relaying conforming to PG&E requirements
- Directional boring of new PG&E primary feeders to maintain park access (during soccer season) and avoid an open trench through a storm channel maintained by a sister agency
- Establishing electrical system modeling requirements (using SKM software) for meeting stringent PG&E protective relaying criteria and for determining arc flash hazard levels for safety labeling on electrical equipment
- Extensive use of cable tray and stand-alone conduit support structures, with structural criteria established by TJCAA

TJCAA's design featured a new condition assessment system for temperature and vibration monitoring of the cogeneration equipment. Paul Giorsetto of TJCAA explains that like any large piece of machinery, the large, gas-driven engines are most effective when they are operating within

tolerances. The condition assessment system will help the District to ensure reliable operation and anticipate maintenance needs.

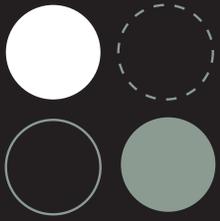
The design also included an expanded power-monitoring system, networked to provide District engineering and maintenance staff with operational data associated with the new internal power sources.

Working closely with Steve Delight and Maurice Atendido, the District's Project Manager and Senior Electrical Engineer, respectively, and Tom Hendrey of WBA, TJCAA's project design team addressed the fundamental requirement of maintaining the plant in operation throughout the construction sequence. In addition to electrical system reliability, requirements included coordinating the construction schedule to minimize power costs during summer peak periods and provide necessary process heat during winter periods.

The EPA's [market analysis](#) found combined heat and power systems such as the District's to be "a strong technical fit" for many WWTPs, and that "it can be a compelling investment at WWTPs, depending on local electricity prices." The EPA also noted that while many plants have adopted cogeneration systems already, "substantial opportunities remain." Cogeneration can be especially effective with newly available engines that can operate on varying blends of digester and natural gas. When combined with other local energy sources like PV and fuel cells, cogeneration can help public agencies be recognized as key proponents of energy sustainability practices. TJCAA's Instrumentation, Controls, and Electrical Group can provide expert assistance for cogeneration system designs. Please call us if you would like to discuss your system and equipment needs.

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Featured
Employee –
Bee Vue

Featured Employee – Bee Vue



Our featured employee this edition is Bee Vue, who joined TJCAA in 2008 as a CADD professional. Bee started drafting in high school,

and when his school received funding that made workstations and AutoCAD Version 14 available, he caught the computer-aided drafting bug. By his senior year, he was helping his school win state competitions in the field. Autodesk has updated its software with about a dozen releases since then, while Bee has continued to increase his CADD expertise.

Beginning in 2010, Bee has also been learning and applying SketchUp, a 3D modeling and drawing software. He enjoys its simple, yet powerful interface, which he says allows the user to do “more things than you can even imagine.” Renderings in 3D can add life to proposals, he explains, and can turn a proposal concept into a working plan. With SketchUp, Bee can also provide dimensions and highly illustrative cross sections.

TJCAA also has Bee’s help in the Lab for its sister company, Terrapin Testing. The Lab performs destructive testing on building materials such as laminated sandwich panels, photovoltaic support systems, windows and doors, and adhesives—

work that Bee describes as “eye-opening.” His duties in the Lab include a wide range of setup, takedown, and monitoring activities. Three years of warehouse experience come in handy for his work in the lab, where he expertly pilots the forklift to move a variety of large and oddly shaped objects.



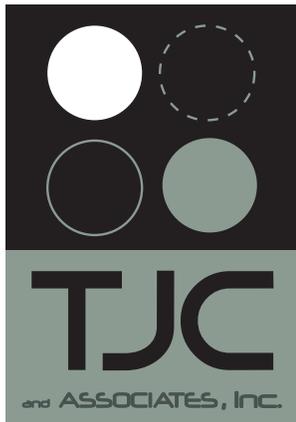
A SketchUp Rendering by Bee Vue

Bee keeps a challenging schedule: in addition to his job at TJCAA, he is working toward a Real Estate degree at American River College (he already holds an associate degree in Engineering Design Technology). After the spring semester, he says, he would like to pursue a civil engineering degree. Design work appeals to him, and he notes that putting ideas into construction documents is satisfying.

TJCAA family members know Bee as a dependable source of up-to-date insights on NFL football. The San Francisco 49ers are his team, and he has enjoyed Niner games and events such as the recent Fanfest. We count ourselves among Bee’s fans here at TJCAA; not only for his professional efforts, but also for the way he graciously offers spot-on analysis of upcoming games. Thanks, Bee!

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Equipment and Instrumentation Tag Naming

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Recently, TJCAA's Michael Erwin was testing programmable logic controller monitoring and control of filter valves at a water treatment plant, and he reported back on his experience with the WTP's equipment tag naming system.

I was about to run the test when the radio crackled to life: "Let's start with valve V-106. Go ahead and give us the open command."

V-106? I didn't see any reference to V-106. I scanned the input/output and schematic drawings, but there was nothing labeled V-106. I scrolled through the nicely annotated PLC program listing, but still nothing with a reference to V-106. There were only 8 valves associated with Filter 1, but none of them were called V-106 on the instrumentation and control drawings.

With a brief investigation in the pipe gallery we discovered that the tag names used for the mechanical equipment had absolutely no relationship to the tag names used for the control system. To add to the confusion, the electrical conduits were numbered using a third system that had no relation to the mechanical or control system labels. V-106 was controlled by loop 301-11 and was fed by conduits labeled P318 and C318. The next several hours were spent creating a cross-reference table instead of doing the functional testing that had been scheduled.

A well-designed tagging scheme, in contrast, requires the following:

- A consistent format for all types of equipment
- A well-defined structure of abbreviations and code numbers that can be used to immediately identify the process area and function of each component
- A system that can be applied to all mechanical, electrical, process, instrumentation, and control components
- A numbering system following the process train such that lower numbers indicate devices upstream in the process and higher numbers indicate devices downstream
- A numbering system allowing similar devices in separate process trains to be easily identified and associated
- Abbreviations that follow industry standards (such as ISA S5.1)
- Abbreviations that are distinguishable and that clearly identify process areas and equipment functions
- Consistent use and application across disciplines
- A system that is easy to read

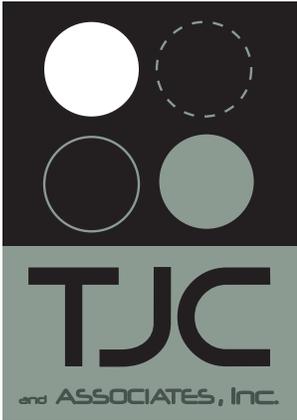
Please give us a call if your equipment numbering system could use improvement, or if your upcoming project might present an opportunity to incorporate a well-designed tagging scheme.

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Did you know?

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Dates to
Note



Our TJCAA logo was selected to evoke infrastructure features that our engineering team designs: four circles to represent a plan view of tanks or cross-sections of conduit. Likewise, we selected the font as a representation of rebar and conduit. For those of you not solely in the engineering world, the four circles look like a

Marshall stack, without mesh front, and the font is the wiring to get that bad boy sounding "just exactly perfect!"

Dates to Note

- September 21 SOL at Angelicas in Redwood City, featuring Paul Giorsetto on trumpet
- September 22 Autumn Equinox ([see tinyurl.com/TJCAA-Autumn2013](http://tinyurl.com/TJCAA-Autumn2013))
- October 5-9 Water Environment Federation Technical Exhibition and Conference WEFTEC 2013, Chicago
- October 9-12 ASCE Annual Civil Engineering Conference, Charlotte, NC
- October 12-17 ICC-ES Evaluation Committee, Birmingham AL
- October 23 MLB World Series begins
- November 3 Daylight Saving Time Ends
- November 3-7 AWWA Water Quality Tech Conference, Long Beach, CA
- November 23 116th Big Game: Stanford vs. Cal

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