

# Summer

## The TJCAA Quarterly

2019  
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Message from the President

Novato Flagpole

TJCAA's Business Certifications

- Alameda County Small, Local Emerging Business
- Bay Area Green Business Program
- California DGS SBE
- City of Colton SBE
- City of Los Angeles SBE
- City of Oakland LBE
- Eastern Municipal Water District SBE
- Inland Empire Utilities Agency SBE
- Metropolitan Water District of Southern California SBE
- Sacramento Municipal Utilities District (SMUD) SEED Vendor
- San Diego County Water Authority SBE
- Port of Long Beach SBE
- Port of Oakland LIABE/SBE/VSBE
- PWC Registration—Dept of Industrial Relations (DIR)
- West Basin Municipal Water District SBE

Message from the President, Gianna Zappettini



Rick Cavanagh (right) with 2019 Pole Pedal Paddle Competitor, Scotty Goddard  
Photo - Gianna Zappettini

We took a weekend trip to Bend, Oregon to visit our niece and nephew, and to enjoy another beautiful area of the country. As part of our trip, we helped our nephew as he competed in the 2019 Pole Pedal Paddle race. He started with a downhill ski run, before moving on to the 8 km cross-country ski, 22-mile bike ride, 5-mile run, 1.5-mile paddle and 0.5-mile sprint to the finish. After consuming a signature Ocean Roll from Sparrow Bakery, I enthusiastically rooted him on from the sidelines—a tough job, but someone had to do it. Rick Cavanagh, TJCAA's CFO, provided more labor-intensive support as he helped carry our nephew's kayak to the water for the paddle portion of the race. Our nephew came in second in his age group and he appreciated our small contributions from the sidelines. TJCAA would like to provide you with the support your project needs so that you do not find yourself up a creek without a paddle. Please contact us to discuss how we can provide our engineering expertise in the Structural, Electrical, Instrumentation, and Control Systems Programming fields.

Featured Project—Novato Flagpole

With Independence Day fast approaching, we are happy to report that one place Old Glory will be flying high is atop an historic flagpole in Novato, California.



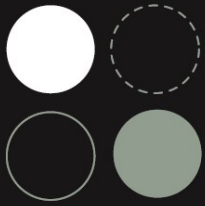
Historic Flagpole at the Marin Museum of Contemporary Art  
Photo - J. Darby Howard

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## Novato Flagpole

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TJCAA was retained by JDH Corrosion Consultants, Inc., a leading corrosion control and assessment firm, to conduct a structural assessment of the flagpole. J. Darby Howard, P.E., who lead the project for JDH, explains that the flagpole had evidence of localized corrosion and loss of metal at its base. The City of Novato wanted to be sure that it was still safe to fly a large (12 x 18-foot) flag on the 84-year-old pole at its prominent location in front of the Marin Museum of Contemporary Art.

MarinMOCA is at 500 Palm Drive, within the historic Hamilton Field in Novato. According to the National Park Service, Hamilton field was built as a bombardment base starting in 1932, and the base played a significant role during World War II. The 75-foot-tall flagpole, which appears in the Library of Congress Historic American Buildings Survey, "occupies an important position on the base and was designed to create a formal atmosphere at the entrance to the base headquarters." The Survey calls out the architectural detail at the base of the flagpole as being "reflective of the Spanish Eclectic theme found throughout the installation." (loc.gov).

Hamilton Field, which was decommissioned in 1975, is now a planned, mixed-use community with civic, residential, commercial, and open space uses, and has amenities such as a library and the museum. MarinMOCA features the work of local, national, and international artists and has new contemporary art exhibitions every six weeks (marinmoca.org).

Contemporary material for the flagpole means 1935 steel, which TJCAA considered when determining its structural properties. We determined the allowable design capacity of the

existing flagpole, accounting for the reduced section due to metal loss. TJCAA determined wind load by applying the methods defined in FP 1001-07, *Guide Specifications for Design of Metal Flagpoles*. An interesting tidbit is that wind loads created by the flag depend strongly upon the flag fabric. If you're flying a polyester flag, you can reduce the drag force by switching to a nylon or cotton flag of the same size.



Flagpole Base Before Corrosion Prevention Measures  
Photo - J. Darby Howard

TJCAA analysis, using wind parameters from ASCE 7, resulted in a conclusion that the stresses in the pole are below the allowable stresses. We are happy to say that with the implementation of JDH's recommendations for preventing further corrosion, this Novato historic flagpole can proudly fly Old Glory for years to come. If you have a structure you would like us to assess, give us a call.

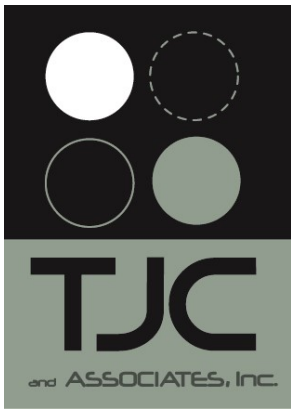


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### Equipment Obituaries

#### New Feature— Equipment Obituaries

We are pleased to introduce a new, recurring feature: Equipment Obituaries. Control system equipment is not immortal, even if it seems like that “trusty” old programmable logic controller can eke it out a bit longer. Control systems installed in the 1990s and early 2000s have become obsolete and need to be replaced. Equipment for which spare parts and support are no longer available is risky to keep in place, so periodically, we’re going to provide you a list of some units that should now be considered “the (barely) living dead.” Avoid a zombie equipment apocalypse, and call us if you have one of these ready-for-replacement units.



Genius Series I/O Installed in the 1990s  
Photo - Michael Eriwin

#### Upgrading your Control System Equipment the RIGHT Way

If your equipment is on the zombie list below, or maybe it’s simply time for something more reliable, you can avoid some common mistakes and make a smooth, successful control system equipment update for your agency.

**Control systems installed in the 1990s and early 2000s have become obsolete and need to be replaced.**

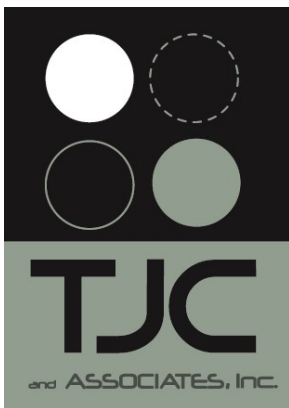
“Control system equipment obsolescence and improving technologies make periodic control system upgrades both necessary and beneficial,” says Michael Erwin, P.E., who leads TJCAA’s Control Systems Programming Group. “The legacy control software of the 1990s and early 2000s should be changed out for modern software implementations that are more reliable, easier to maintain and troubleshoot, and more efficient to implement.

Mike explains that PLC and SCADA software applications developed in past eras used logic, methods, data structures, and graphics that were designed to take advantage of the features and limitations of the technologies available at the time.

| Manufacturer       | Model or Series          | Obsolete Status  | Replacement                    |
|--------------------|--------------------------|------------------|--------------------------------|
| Hach               | 1720E Turbidimeter       | July 27, 2018    | TU5 Series                     |
| Schneider Electric | Modicon Quantum PLCs     | December 1, 2018 | M580                           |
| Schneider Electric | Modicon Quantum I/O      | December 1, 2021 | X80 Series                     |
| General Electric   | 90-30 Series PLCs        | December 1, 2017 | RX3i Series                    |
| General Electric   | Genius Series I/O        | June 1, 2017     | RSTi Series or VersaMax Series |
| Rockwell           | 1768 CompactLogix Series | June 30, 2020    | 1769 CompactLogix 5370 Series  |
| Microsoft          | Windows 7                | January 14, 2020 | Windows 10                     |

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### Equipment Obituaries

Advances in processing power, memory availability, communication bandwidth, and industry standards require development methods that are completely different than those used in the past. With current tools and industry-standard programming, control system software applications can be developed in roughly a quarter of the time it took to develop similar applications 10 to 15 years ago.

#### Use new software

Agencies providing critical public services need to take a considered and far-sighted approach to upgrading control systems to make sure they don't get trapped with difficult-to-maintain software systems and/or spend huge amounts of their limited budgets by using the wrong upgrade approach. Control system software applications that are developed using modern programming techniques are not only more efficient and reliable, but are also scalable and can likely be used in multiple generations of hardware revisions.

Nearly all of the major control system hardware and software manufacturers have provided tools that allow users to convert or translate old software into programs that can be installed and run on new hardware, but the converted programs, while relatively inexpensive to implement, don't have the ability to take advantage of modern programming techniques. Doing this type of conversion would be like trying to maintain Lotus 1-2-3 for DOS spreadsheets on a new Windows 10 computer!

#### Fun Fact

1-2-3 was a spreadsheet program by Lotus (later IBM). While it was the "essential application for the 1980s PC revolution," (zdnet.com) it was later eclipsed by Microsoft Excel. IBM stopped selling Lotus 123 in 2013 and stopped supporting it in 2014. (ibm.com)

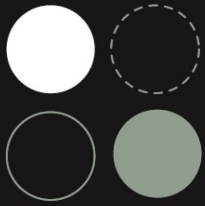
#### Don't do it piecemeal

Mike notes that many agencies treat their PLC upgrades and SCADA system upgrades as separate, distinct projects and have them done at different times. This is a mistake! Water utilities that update and maintain their systems on a component-by-component basis may be ensnaring themselves into long-term commitments to inefficient strategies and outdated methods that prevent them from getting the most out of their control systems.

We recognize that public agencies have limited budgets for control system upgrades and must operate their processes continuously. TJCAA engineers have developed a phased approach for upgrading control systems hardware and software that takes full advantage of modern programming techniques while minimizing downtime of existing processes. Call us and we'll help you upgrade your system.

#### A Seminar on this Topic

Mike will be teaching a seminar on this topic at the [CA-NV AWWA Water Education Seminars](#) at Santiago Canyon College in Orange, CA on August 21, 2019.



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What's uplift?

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### Did you know—What's uplift?



Art Installation on 9th Street in Oakland  
Photo - Eden Tekie

This art display near our Oakland office is a fun reminder of an important design consideration for structural engineers—uplift. Uplift is “any force that tends to raise an engineering structure and its foundation relative to its surroundings. It may be caused by pressure of subjacent ground, surface water, expansive soil under the base of the structure, or lateral forces such as wind.” (mindat.org)

TJCAA's Daisy Yu, S.E. notes that if light structures (such as canopies) are not properly designed, wind uplift can cause them to rip anchorages right out of the concrete or lift the slab to which they are attached. Many of our clients use metal buildings, which can have large uplift forces.

Structures buried at grade, such as concrete boxes or vaults, can be subject to uplift caused by water. Daisy explains that uplift forces due to water may be site-specific, such as in areas with a high groundwater table. High uplift forces due to wind would also be site-

specific near coastlines or on hilltops. In general, wind uplift forces could also be high regionally in areas where peak wind speeds are highest (e.g., in hurricane-prone areas or in Tornado Alley).

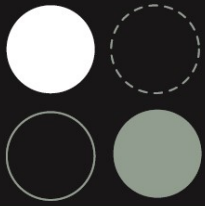
To picture the effects of uplift, Daisy says, think of roofs of houses and buildings flying off in hurricanes, or coffins in graveyards rising to the surface during flood waters. Daisy adds, “Anyone who has gone camping near the beach knows that you had better anchor your tent down, or your tent won't be there after the day's excursion, because of wind uplift.” We suspect that there is a story behind her warning.

When designing, we address the effects of potential uplift by having enough dead weight (e.g., self-weight of the structure) to counteract the uplift force. In the case of buried concrete boxes, we consider adding weight by thickening the concrete members (walls and/or slabs) in combination with footing extensions (extension of the bottom slab beyond the face of the exterior walls). These footing extensions engage the soil weight over them to counteract the uplift force. For wind uplift on canopies, we make sure there is enough weight in the footing to “hold” the canopy down and anchor the canopy to the footing properly. In the case of roofs, we make sure the roofs are adequately attached to the structure to prevent detachment of the roof during severe wind events.

Another option we use during design is helical anchors (rods or tubes with a screw on the tip; [here](#) are examples). For smaller loads, we might use soil screws (such as [these](#)), which have become a great option for many projects.

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What's uplift?

San Francisco  
Carnaval

If a structure needs a retrofit to deal with uplift issues, Daisy says, "we can add weight, for example with concrete to resist buoyancy effects. For wind uplift, we can add anchorage and make sure that we anchor it to something that can also resist the uplift force." In the camping tent example, structural engineers might bring along soil anchors to secure the edges of the tent. If you don't happen to have soil anchors in your garage, tent stakes might also work, as would storing a well-stocked cooler inside the tent.



Contractor retrofit for "engineered" structure  
Photo - Rick Cavanagh

The photo here shows an anti-Rube Goldberg retrofit for a canopy that might otherwise have had uplift problems. If you need a more elegant solution to your uplift issue, call us.

### Entertainment Review— San Francisco Carnaval

The 41st annual Carnaval San Francisco was held over Memorial Day weekend, and it was grand! At the 2019 Carnaval, TJCAA's McKenzie Campagna performed with the Ginga Brasil Passista Ala in the festival parade, held annually in the

Mission District. McKenzie tells us that the two-day festival brings artists from all over the world to perform their cultural folkloric dances and play their native musical styles. Her festival highlights include "interacting with the audience and witnessing participants who traveled from afar to share their culture and history through their performances."

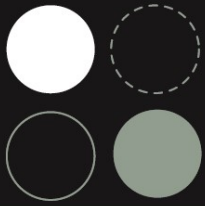
According to the event organizers, spectators will not want to miss each year's parade, including "beautifully adorned floats depicting rich multicultural themes and featuring performers who engage and entertain the crowds." The festival's theme this year was "La Cultura Cura" (Culture Heals), and visitors also enjoyed global cuisine, international music, dance, arts and crafts, and other activities and entertainment.  
(carnavalsanfrancisco.org)



TJCAA's McKenzie Campagna performing with Ginga Brasil Passista Ala in the 2019 San Francisco Carnaval Parade  
Photo - Gaurav Rele

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Dates to Note

Employment Opportunities

### Dates to Note

|                  |   |                  |  |
|------------------|---|------------------|--|
| Jun 21           | The Summer Solstice   | Aug 12-13        | Perseids Meteor Shower   |
| Jun 22-<br>Jul 7 | FIFA Women's World Cup<br>Knockout Phase, France  | Aug 15           | Full Moon<br>(The Sturgeon Moon)   |
| Jun 24           | Please Take <b>My</b> Children to<br>Work Day   | Aug 18           | Junius Courtney Band,<br>2-5 PM at Doyle Hollis Park<br>in Emeryville (Free Event) |
| Jun 25-28        | <a href="#">2<sup>nd</sup> International<br/>Conference on Energy,<br/>Electrical and Power<br/>Engineering (CEEPE 2019)</a> ,<br>UC Berkeley | Aug 19-31        | 12 <sup>th</sup> African Games,<br>Rabat, Morocco                                  |
| Jun 28           | Tau Day   | Aug 21           | <a href="#">CA-NV AWWA Water<br/>Education Seminars</a> ,<br>Orange, CA            |
| Jul 1-14         | Wimbledon Championships   | Aug 24           | Pluto Demoted Day  |
| Jul 6-28         | 106 <sup>th</sup> Tour de France  | Aug 26-<br>Sep 8 | US Open Tennis<br>Championship   |
| Jul 8            | Math 2.0 Day  | Sep 5            | 100 <sup>th</sup> NFL Season Opener<br>(Bears vs. Packers)                         |
| Jul 12-28        | California State Fair,<br>Sacramento  | Sep 20-<br>Nov 2 | 9 <sup>th</sup> Rugby World Cup,<br>Japan  |
| Jul 18-21        | 148 <sup>th</sup> Open Championship<br>at Royal Portrush  | Sep 21-22        | Maker Faire, New York  |
| Aug 2-24         | <a href="#">The Royal Edinburgh<br/>Military Tattoo</a> , Castlehill,<br>Edinburgh  |                  |  |



### Employment Opportunities

TJCAA is looking for qualified engineers to work on great projects with great people. To view and apply for open career positions, visit our website at [www.tjcaa.com](http://www.tjcaa.com).

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