

# Spring

## The TJCAA Quarterly

2021  
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### Message from the President

### TJCAA Welcomes Newell T. Pangulayan, P.E.

#### 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

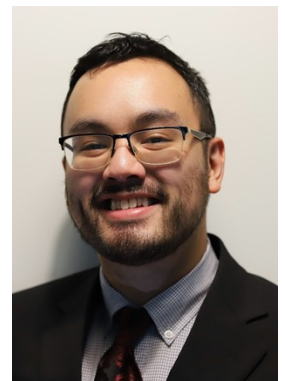


Hope springs eternal. This has been very evident as I walk around our neighborhood observing the abundance of flora. Even in my own backyard, the plants are coming back despite my lack of a green thumb. One year after the pandemic was declared, hope also takes on a new significance as we move towards reopening and reestablishing work venues, travel opportunities, and multiple-person gatherings. Throughout the past year, TJCAA remained available and committed to providing excellent services to our clients. We will continue to do so, and we hope that you will choose TJCAA to be a part of your engineering team for any structural, electrical, or control systems programming projects.



### TJCAA Welcomes Newell T. Pangulayan, P.E.

TJCAA is pleased to announce that Newell Pangulayan, P.E. has joined TJCAA. Newell has been in the civil engineering field since 2012, and he will be working in our Walnut Creek Office. His experience includes analysis, design, and detailing for various concrete and steel structures.



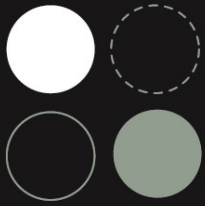
Newell will be supporting projects in our Structural Group by performing field investigations and structural design and by providing engineering services during construction. He brings to us his experience and insights from the oil and gas industry. Before joining TJCAA, Newell was working at the Anvil Corporation in Concord, California where he was designing oil refinery facilities. His recent work was on facilities near us in Martinez; however, he also worked in the oil industry while based in Alaska.

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TJCAA Welcomes  
Newell T.  
Pangulayan, P.E.

Two New P.E.  
Certifications

Cybersecurity  
Concerns for  
Public Utilities



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A native of Walnut Creek, Newell moved with his family to Alaska when he was 6 years old. He earned his Civil Engineering degree at the University of Alaska Anchorage, and says he has many fond memories of growing up and living in the Land of the Midnight Sun. The small-town atmosphere had its charms, he explains, and he enjoys his return visits to Alaska, but the opportunities and energy in his new home, Oakland, are also a big draw.

We are happy that Newell was also drawn to TJCAA. Welcome!!

## Two New P.E. Certifications



Raphael Okubo, P.E. McKenzie Campagna, P.E.

We are also proud to announce that two more members of our Instrumentation, Controls, and Electrical Group successfully passed the Professional Engineer's exam in February, earning their Professional Engineering Licenses in the State of California. Raphael Okubo and McKenzie Campagna, who joined us in 2016 and 2017, respectively, both earned a P.E. in Electrical Engineering. Please join us in congratulating them for this accomplishment!

## Cybersecurity Concerns for Public Utilities



istockphoto/Traitov

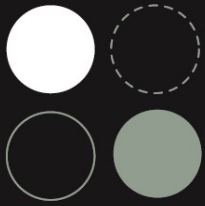
Our clients have facilities that are critical for public health, and these facilities should never be left vulnerable to hackers. Recent news reports about a hacking incident at an Oldsmar, Florida utility have highlighted the need for strict cybersecurity to protect facilities such as water treatment plants.

According to a [Joint Cybersecurity Advisory](#) issued by the FBI, the EPA, the Cybersecurity and Infrastructure Security Agency, and the Multi-State Information Sharing and Analysis Center,

*"On February 5, 2021, unidentified cyber actors obtained unauthorized access to the SCADA system at a U.S. drinking water treatment facility. The unidentified actors used the SCADA system's software to increase the amount of sodium hydroxide, also known as lye, a caustic chemical, as part of the water treatment process. Water treatment plant personnel immediately noticed the change in dosing amounts and corrected the issue before the SCADA*

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Cybersecurity  
Concerns for  
Public Utilities

What's that on my  
drawing?

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*system's software detected the manipulation and alarmed due to the unauthorized change. As a result, the water treatment process remained unaffected and continued to operate as normal. The cyber actors likely accessed the system by exploiting cybersecurity weaknesses, including poor password security, and an outdated operating system."*

The Advisory notes that authorities have observed other instances of hackers targeting and exploiting desktop sharing software and "networks running operating systems with end-of-life status" to illegally access systems.

Please see the [Joint Cybersecurity Advisory](#) for general recommendations for preventing unauthorized access through desktop sharing software and outdated OSs, and specific recommendations for security in water and wastewater facilities.

In 2019, we began publishing our Equipment Obituaries, a list of obsolete equipment and software that is due—or past due—for replacement. Operating with systems and equipment that is no longer supported, and which may be vulnerable to intrusion, is beyond risky. Watch this space in our next edition for our updated list.

With the transition to remote working and staffing limitations imposed by COVID-19, an increasing number of owners are seeking to bridge the traditional airgap between SCADA systems and the Internet. As this Florida incident and others show, this step should not be taken lightly. If you have concerns about the security of your control system software or equipment, please contact us about our cybersecurity evaluations and related services.

## What's that on my drawing?

In our last edition ([Winter 2020](#)), we provided the first installment of a crash course on reading engineering drawings. Our engineers prepare numerous drawings during the course of design. These drawings depict a wide variety of information about a project, including structural, electrical, instrumentation, and controls schematics, plans, and details.

Last time we focused on the lines that appear on P&IDs (piping and instrumentation diagrams). This time, we are going to take a look at some frequently used symbols that appear on P&IDs, which are schematic representations of pipes, electrical connections, equipment, controls, and instrumentation in a facility such as a treatment plant or pump station.

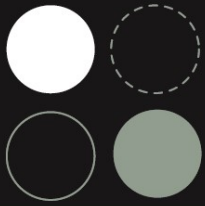
P&IDs are diagrammatic representations. TJCAA's Jacqui Arama, P.E. explains that the symbols are placed on lines representing flow streams, to show where they are in a process. While P&IDs are not plans showing the exact physical locations of objects, the diagrams do depict the physical interconnection of equipment and instrumentation, and are not merely schematic positions. When symbols are shown touching, for example, it may indicate that one piece of equipment is integral to another, such as a temperature switch on a motor.

Agencies typically have their own set of standard symbols, Jacqui notes, as do most consulting firms. Symbols used by different entities in the water and wastewater field are often similar, however, and the P&IDs are always accompanied by a legend sheet for reference.

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What's that on my drawing?

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TJCAA engineers work on many pump station design projects, so our P&IDs often feature pump symbols. Shown here are two of the pump symbols we use.



CENTRIFUGAL PUMP



SUBMERSIBLE CENTRIFUGAL PUMP

Pumps are driven by motors, and a symbol for each pump will show what kind of motor it has. Below are symbols showing a constant-speed motor and a variable-speed motor.



MOTOR (CONSTANT SPEED)



MOTOR (VARIABLE SPEED)

A wide variety of flow-measuring instruments appear in water and wastewater facilities, and may include pitot tubes, flumes, orifice plates, venturi tubes, weirs, and meters that measure physically, ultrasonically, or magnetically. Below are example symbols associated with flow-measuring.



MAGNETIC FLOW METER



ORIFICE PLATE



PITOT TUBE

### What's a P&ID?

P&IDs are one of the main deliverables of engineering done at the front end of an instrumentation, control, and electrical (ICE) design. The P&IDs are drawn in close collaboration with the project mechanical/process engineer. The process engineer prepares a process flow diagram that schematically depicts the flow of fluids through the facility. This process flow diagram shows the pipes sizes and the configuration of equipment (such as pumps, valves, and flow meters) in the system. Our ICE engineers complete the P&ID by adding information about electrical connections from the piping system to the controls.

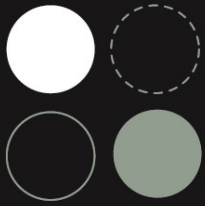
Designers, control system programmers, contractors, and operators use the P&IDs in many ways. They can help when designing the physical ICE layout of a facility, to be sure, but also can provide important information for many other aspects of a project:

- cost estimating
- planning for construction phasing
- programming control systems

In addition, the P&IDs can provide a common frame of reference when discussing operations. A wealth of information is shown on a P&ID, such as the parameter measured and type for every instrument, all valves and their IDs, control inputs and outputs, and all mechanical equipment with descriptions and tags. We draw our P&IDs according to American National Standards Institute/International Society of Automation standards.

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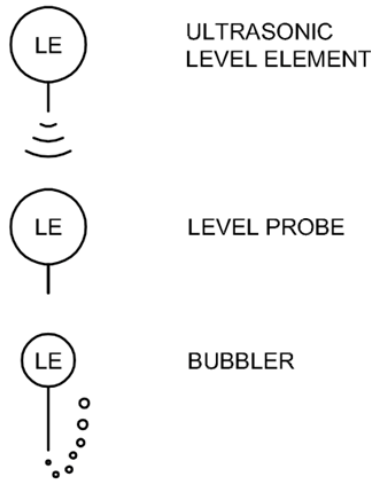
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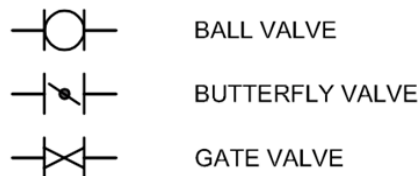
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What's that on my drawing?

Water levels are key indicators of tank and wet well operation, and we depict several types of level instruments on our drawings. The symbols shown below are particularly illustrative, in that they show how the level meter works: ultrasonically, with a probe, or with a bubbler.



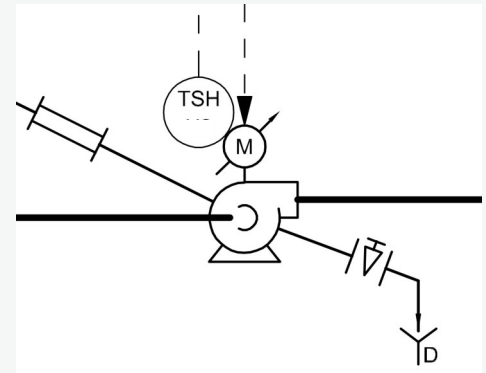
The variety of valves that facilities use to control flow in pipelines is extensive. Valves are depicted as relatively small symbols that interrupt the process flow lines. Below are symbols for some common valves.



We design facilities with a wide range of complexity, from simple flow-metering vaults to large treatment plants, and this is only a small fraction of the symbols that appear on our P&IDs. Users can always refer to the legend to identify an unfamiliar symbol.

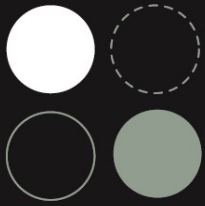
### Quiz

This P&ID shows which of the following?



- A centrifugal pump with a tagged pressure switch above, a cleanout at left, and an air release valve and diaphragm valve at lower right.
- A centrifugal pump, with its variable speed motor and high temperature switch, a sight glass at left, and a needle valve and drain at lower right.
- A centrifugal pump, with its magnetic flow meter and high temperature switch, insulated piping at left, and an air release valve and diaphragm valve at lower right.
- A schoolyard supervisor whistle, with temporary spit holder, minder mechanism, and decibel meter.

Answer on page 6.



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An Unusual Catch  
Basin Catch

P&ID Quiz Answer

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### Did you know?— An Unusual Catch Basin Catch

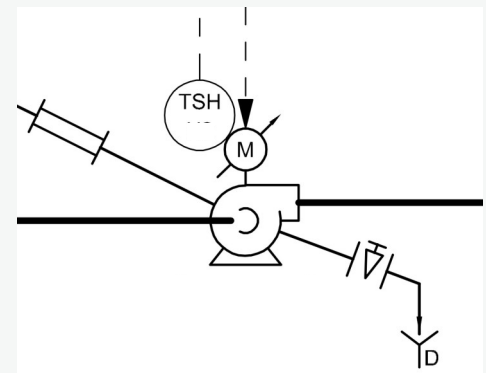
As long ago as 4,000–2,500 BCE, cities in the Mesopotamian Empire had in-street stormwater drain systems consisting of sunbaked bricks or cut stone. Some of the homes in these cities even had simple indoor toilets with “sewer” connections to the drainage system.

While the sophistication of stormwater drainage systems has changed enormously since then, at least one major similarity remains—their catch basins need periodic cleaning. A catch basin is an in-ground cistern that receives flow from the surface. Municipal catch basins are typically topped with a grate at street level. The catch basin helps to maintain proper drainage and catch debris that might clog pipes downstream.

In January 2018, the New Orleans Department of Public works reported on its extensive catch basin flushing program. Along with the usual leaves, mud, sludge, and trash that crews typically find in the catch basins, there was an unusual load in part of the city. Along a five-block stretch of St. Charles Avenue downtown, the crews had pumped out *46 tons* of festive Mardi Gras beads. (nola.com) That’s a load of festivity!

### P&ID Quiz Answer

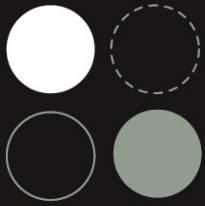
This P&ID shows which of the following?



This shows a centrifugal pump, with its variable speed motor and high temperature switch, a sight glass at left, and a needle valve and drain at lower right.

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## Dates to Note

## Employment Opportunities

**Dates to Note** (Subject to change—  
dates shown are as of publication day)

Mar 20	The Vernal Equinox	May 11	Stanley Cup Playoffs
Mar 26	Prince Kuhio Day	May 15	146th Running of the Preakness Stakes
Mar 27	<a href="#">Earth Hour at 8:30 PM</a>	May 17	2020 Taxes Due
Mar 28	F1, Bahrain Grand Prix	May 17– Jun 6	French Open
Mar 28– Apr 1	<a href="#">ACI Virtual Concrete Convention</a>	May 20–23	79th F1 Grand Prix De Monaco
Apr 1	Major League Baseball Opening Day	May 20–23	PGA Championship, Kiawah Island Golf Resort, SC
Apr 1	Opening Day for the Oakland A's	May 22	NBA Playoffs Begin
Apr 4	Inaugural Extreme E (off-road electric vehicle racing), Saudi Arabia	May 26	The biggest "Supermoon" of 2021
Apr 9	Opening Day for the San Francisco Giants	May 30	105th Running of the Indy 500
Apr 10	Formula E (electric "formula" cars), Rome, Italy	Jun 2–4	<a href="#">SEI/ASCE Structures Virtual 2021</a>
Apr 5–11	The Masters at Augusta National	Jun 4–6	Belmont Stakes
Apr 22	<a href="#">Earth Day</a>	Jun 11	King Kamehameha Day
Apr 25	Opening Day on the Bay	Jun 11– Jul 11	UEFA EURO 2020
Apr 30– May 1	Kentucky Derby	Jun 17–20	US Open

## 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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