

THE CAREER PATHWAY FOR ELECTRONIC MAINTENANCE TECHNICIANS/INSTRUMENT TECHNICIANS IN THE WATER AND WASTEWATER INDUSTRY

A BAYWORK White Paper

8/18/2016

This White Paper on the career pathway of Electronic Maintenance Technicians/Instrument Technicians identifies the strengths and weaknesses of the pathway from high school to journey-level status as an Electronic Maintenance Technician/Instrument Technician and provides recommendations for future actions to make this pathway more accessible and complete.

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THE CAREER PATHWAY FOR ELECTRONIC MAINTENANCE TECHNICIANS/INSTRUMENT TECHNICIANS IN THE WATER AND WASTEWATER INDUSTRY

Introduction

Within the San Francisco Bay Area, 7.5 million residents rely on over 50 water/wastewater utilities to provide safe drinking water and protect the environment. These utilities collect, treat, and distribute drinking water and collect, treat, and properly discharge or reuse treated wastewater. BAYWORK, a consortium of 29 water/wastewater utilities and stakeholders, recognizes that operational reliability depends on access to qualified candidates for mission-critical job categories. These mission critical job categories are: water and wastewater treatment operators, water distribution operators, electricians, electronic maintenance technicians/instrument technicians, mechanic/machinists, and wastewater collections operators.

This white paper on the career pathway of Electronic Maintenance Technicians/Instrument Technicians (EMT/Instrument Tech) has three purposes:

- To provide information to students, parents, teachers, and counselors interested in helping job-seekers find challenging and well-paying careers in the field of Electronic Maintenance and Instrument Technician in the Bay Area.
- To identify the strengths and weaknesses of the pathway from high school to journey-level status as an EMT/Instrument Tech
- To make recommendations for future actions to make this pathway more accessible and complete

Electronic Maintenance Technicians/Instrument Technicians in the Water and Wastewater Industry

Electronic equipment is used throughout water, wastewater, and power systems to monitor and control factors such as flow and water quality. Because of the dependence of modern water and wastewater systems on accurate collection and transmission of data, the work of an EMT/Instrument Tech is crucial to operational reliability.

Electronic Maintenance Technicians (EMT) and Instrument Technicians install, maintain, and repair electronic monitoring and communication equipment, such as pressure and level sensors and recorders, programmable logic controllers, relays, or computers. In the Bay Area, journey-level EMT/Instrument Techs at water and wastewater utilities earn approximately \$80,000 to \$96,000 annually.¹

The EMT/Instrument Tech Career Pathway

In the Bay Area, interested students can start on the career pathway to becoming an EMT/Instrument Tech in high school. By taking courses in math and science, as well as hands-on courses such as woodworking, shop, and metal-working, students can prepare for Career Technical Education (CTE).² After graduating from high school, CTE is available at community colleges, or through union and utility apprenticeship programs. CTE in an electronics program is a pre-requisite to careers in Electronic Maintenance and Instrument Technician in the Water and Wastewater Industry. The graphic below shows the requirements to become Journey-Level EMT/Instrument Tech.³

Useful Terms

Career Technical Education:

A term applied to schools, institutions, and educational programs that specialize in the skilled trades, applied sciences, modern technologies, and career preparation. Career Technical Education can be abbreviated to CTE, and is sometimes called Vocational Training.

Apprenticeship:

A combination of on-the-job training and related classroom instruction under the supervision of a journey-level craft person or trade professional in which workers learn the practical and theoretical aspects of a highly skilled occupation.

Journey-Level Person:

A person who has completed an apprenticeship program or is an experienced worker, not a trainee, and is fully qualified and able to perform a specific trade without supervision.

¹BAYWORK 2014 Salary Survey

²For a full listing of courses and experiences suggested by industry experts, see Appendix A.

³These pre-requisites are based on the San Francisco Public Utilities Commission requirements for the Electronic Maintenance Technician (#7318) job classification. We are conducting additional research on the job requirements of other utilities to supplement this information in FY 16-17.

Sources for Terms: www.cslb.ca.gov/Contractors/Journeymen/Journeymen_FAQS.aspx, edglossary.org/career-and-technical-education/, <http://lni.wa.gov/TradesLicensing/Apprenticeship/About/WhatIs/default.asp>

Career Requirements for an EMT/Instrument Technician

Education and Training	}	<ul style="list-style-type: none"> •High School Degree or GED •Completion of a two year or equivalent program in electronics from a recognized academic, trade or technical institution; or completion of a military training program in electronics
Certifications	}	<ul style="list-style-type: none"> •California State Driver's license
Exams	}	<ul style="list-style-type: none"> •N/A
Work Experience	}	<ul style="list-style-type: none"> •Three years of journey-level industrial or institutional electronic experience performing installation, instrumentation calibration, maintenance, troubleshooting, repair and modification of electronic systems
2014 Bay Area Salary	}	<ul style="list-style-type: none"> •\$80,000 to \$96,000 annually

Career Technical Education training programs generally requires both a high school degree and an entrance exam.⁴ Training programs within utilities usually offer on-the-job experience and training at the same time to satisfy the work experience and education requirements to becoming a Journey Level EMT/Instrument Tech. Community Colleges provide training and are sometimes able to provide students assistance in gaining on the job experience.⁵ Graduates from community college training programs need to find on-the-job experience to qualify for Journey-Level positions as an EMT/Instrument Tech. Students who attend Community College training programs can take advantage of financial aid and scholarships directed specifically to Community College and students interested in technical careers.⁶

The section below details different models for providing training opportunities to interested job-seekers in the EMT/Instrument Technician field. Baywork has identified two successful community college

⁴ Sample questions reflecting the types of questions students need to answer to enter vocation training are listed in Appendix B. Tutoring for students interested in entering vocational training or apprenticeship programs is detailed in Appendix C.

⁵ See Appendix F for a map of training locations throughout the Bay Area for EMT/Instrument Technicians

⁶ For a complete list of financial services available to students seeking training in EMT/Instrument Technician, see Appendix E

training programs, a successful utility run apprenticeship program, and a successful training program in a related industry. Each are considered successful because they provide on-the-job experience, classroom training, or both, and connect graduates to opportunities for advancement and employment.

Community College training programs:

Los Medanos College: Electrical and Instrumentation Technology

Los Medanos offers a 2 year associate degree program (60 unites) to students in Electrical Instrumentation and Technology (EETEC), a Certificate of Achievement in EETEC with Electrical Specialization (42 units) and a Certificate of Achievement in EETEC with Instrumentation

Specialization (45 units). EETEC is a successful program because it graduates students who have the skills necessary to complete work in the water and wastewater industry. EETEC graduates often go into the East Bay Municipal Utility District apprenticeship program to obtain required on the job experience to advance to journey-level positions at EBMUD.



Figure 1: East Bay Municipal Utility District intern gaining hands-on experience with a journey-level Instrument Technician.

College of San Mateo: Electrical Power Systems

The College of San Mateo offers a 19-credit Electrical Power Systems Certificate. The curriculum was developed with input from PG&E, as well as other utilities and public works organizations, and is aligned as a PowerPathway Affinity program (see section below for more info). As a result of this collaboration, graduates have access to pre-employment testing sessions, receive special job alert notifications, are provided with guest speakers from PG&E staff (Electric Operations and Recruiting), and the certificate program is listed as a desired qualification for some jobs (i.e. Apprentice Electrical Technician). It is successful because it prepares students with foundational skills and knowledge to enter PG&E and excel in the internal apprentice training that PG&E offers. BAYWORK is investigating how to link this training program to similar entry level roles in the water and wastewater industry.

Apprenticeship programs:⁷

East Bay Municipal Utility District

The EBMUD Apprenticeship program coordinates with the Los Medanos EETEC program to bring graduates into apprenticeship positions as apprentice Instrument Technicians. These apprentices receive on the job training and are connected to journey-level job opportunities after successful completion of the apprenticeship. This is a successful program because apprentices receive the necessary training to be qualified for journey-level positions. EBMUD is the only water/wastewater

⁷ A complete list of Bay Area training programs for EMT/Instrument Tech is in Appendix D.

utility in the Bay Area offering this type of in-house training to their staff in Electronic Maintenance or Instrumentation.

Training Program in Related Industry

PG&E's PowerPathway

Launched in 2008, Pacific Gas & Electric's PowerPathway™ program is a nationally-recognized workforce development model that aligns with the company's skilled craft hiring needs to create a local, diverse, qualified, and sustainable pipeline of candidates for PG&E and the utility industry through public-private collaborations. PG&E partners with colleges, community based organizations and workforce development boards to provide training programs leveraging grant and workforce development funds. Students receive approximately 240 hours of industry-informed curriculum to ensure the academic, job specific, employability skills and physical training necessary to effectively compete for entry-level employment.

PowerPathway has two levels of programs to meet workforce needs:

1. **Signature:** Customized training programs that are developed by PG&E to prepare students for entry- and apprentice-level careers at PG&E and other utilities. Applicants undergo rigorous pre-screening, program enrollment is limited, and eligibility requirements apply. Programs have a duration of 6-8 weeks (and include pre-employment tests), are free to participants, and lead to certificates of completion and college credit. An example is the Cypress Mandela Entry to Gas Operations program in Oakland.
2. **Affinity:** Coursework developed in partnership with PG&E that focuses on skills specific to PG&E and other utilities' hiring needs. Participants are enrolled through the college and subject to their eligibility (and payment) requirements. PG&E staff has a supplemental/advisory role. Courses may lead to certificates of completion, college credit and AA degrees. An example is the College of San Mateo's Electrical Power Systems certificate program.

Research Findings

Methods

To develop the EMT/Instrument Tech career pathway, BAYWORK staff collected data in eight distinct areas and answered the following questions:

- What do EMT/Instrument Techs like about their jobs?
- What training, experience, and credentials are required to reach journey-level status as an EMT/Instrument Tech?
- What earnings are associated with EMT/Instrument Tech positions?
- What courses/experiences do students need to be prepared for vocational training in EMT/Instrument Tech?
- What problems (e.g. math) do they need to be prepared to solve to be successful in vocational training?
- Where is vocational training provided?

- Where can tutor assistance be obtained?
- Where can financial support and other support services be obtained?

Staff also conducted interviews with representatives from PG&E, College of San Mateo, and Los Medanos.

Strengths and Challenges

Through research into the programs that are successful, staff found that the strength of this pathway is found in the connections that some community college training programs have to utilities with entry-level job opportunities. One of the strengths of this pathway is the examples found in Los Medanos College and College of San Mateo. Los Medanos College has a training program that connects with the EBMUD Apprenticeship Program. This is the most complete pathway, as an interested student could feasibly enter the Los Medanos training program, then receive the necessary on-the-job experience as an EBMUD apprentice to qualify for a journey-level after the apprenticeship. The East Bay Municipal Utility District program is also successful because apprentices are closely connected to work experience and have a clear pathway from training into job opportunities.

Staff found that effective training for EMT/Instrument Techs requires a substantial investment in in-house training such as the East Bay Municipal Utility District apprenticeship. East Bay Municipal Utility District works closely with Los Medanos to ensure that the classroom learning in the Electrical and Instrumentation Technology program, combined with the on-the-job training provided by the EBMUD apprenticeship, prepares staff to become journey-level Instrument Technicians.

However, altogether the EMT/Instrument Tech career pathway from high school to Journey-Level positions presents many challenges. The challenges of navigating the pathway from high school to a journey-level position as an EMT/Instrument Tech are found at each step of the pathway. In high school, there is a lack of hands-on learning such as woodworking, metal working, or repair that is necessary to prepare students for community college and on-the-job training. In addition, high school math skills are often not sufficient to prepare students for training. Overall, there are not many experiences or resources available on the high school level for students to prepare for to successfully enter training programs at the community college level.

In the existing community college programs, there is a lack of communication and coordination between curriculum and necessary skills for utility jobs. In the Bay Area, it is unclear whether programs that contain electronic maintenance and instrumentation curriculum teach the necessary skills for utility jobs in that field. This makes the pathway from training into utility jobs unclear, as training may not provide the necessary skills and experiences to qualify job-seekers for utility positions.

Within utilities, there is a lack of entry level positions in EMT/Instrument Technician. This limits the opportunity for utilities to train up their own employees. This presents the challenge for utilities to ensure that Journey-Level EMT/Instrument Techs have the necessary skills for the specifics of the job site. This also presents a challenge for job-seekers. The minimum qualifications to enter as a journey-level EMT/Instrument Tech are much higher than an entry-level job within the utility. Entry-level work is competitive, but attainable for a job-seeker with some community college level training. Without entry-level opportunities, it is difficult for job-seekers to start on this career path.

To address some of the challenges in the EMT/Instrument Tech pathway, BAYWORK has completed work on a number of projects. These are outlined in Appendix G. These projects center on increasing awareness of the industry, the salary, benefits, and advantages of the EMT/Instrument Tech career path, and skills required to become an EMT/Instrument Tech. Appendix G also shows the areas where BAYWORK has not completed projects. BAYWORK's initiative in fiscal year 2016-2017 is to address these barriers where BAYWORK has not previously led projects.

Recommendations for Future Action

To improve this pathway, BAYWORK recommends the following:

1. Increase in-house training for EMT/Instrument Techs within agencies
 - a. Add entry-level and apprentice classifications to utilities in electronic maintenance and instrumentation
 - b. Provide on-the-job training for entry-level and apprentice workers to advance those interested into journey-level positions
 - c. Coordinate with community college programs to develop the necessary curriculum to prepare graduates for entry-level and apprenticeship work
2. Partner with unions to develop new apprenticeship programs in BAYWORK utilities
 - a. Unions can provide testing and classroom training, as well as crucial administrative support, to move interested candidates into apprenticeship positions in utilities
3. Expand existing training programs at the community college level
 - a. Los Medanos and College of San Mateo have programs that provide training that contributes directly to a pipeline for entry-level or apprenticeship work at utilities. This model should be expanded or replicated to link nearby community college programs to entry-level work in EMT/Instrument Technician.

Appendix A: Suggested High School Coursework and Experiences

Critical

- Algebra
- English (reading/writing)
- Microsoft Office/Typing

Important

- Trigonometry
- Chemistry
- Physics
- Geometry
- Electricity/Electronics
- Metal Shop
- Machinery Repair
- Building/Maintaining Computers
- Computer Applications

Helpful

- Technical Drafting
- Intro to Engineering
- Building Construction and Repair

For high school students interested in water and wastewater EMT/Instrument Tech careers, coursework in Biology and Chemistry is also suggested as critical for preparing for vocational training.

Source: BAYWORK.org Skilled Trades Worker profiles, interviews with Water and Wastewater Utility Supervisors and Community College staff.

Appendix B: Sample Questions Reflecting Skills Needed for Vocational Training

The Perfect Storm Worksheet

The transmitter senses the water pressure (sensor's input), which is determined by the water height in the tank; the transmitter sends a representative signal (transmitter's output) to the plant's control system. The transmitter's *LINEAR* output signal represents water height in the tank, in such a way that a signal of 4 milliamps represents a water level of 0 feet, and a signal of 20 milliamps represents a level of 19.8 feet of water. We used this pressure pump to apply a precise pressure to the sensor at 5 points along its "input range" and we wrote down the output signal values for each step. We need to see if the sensor's output is within 2% tolerance, of the original input versus output signal range it was calibrated to represent.

Below are the data we gathered from the transmitter. Is this within tolerance? Use this worksheet to help us solve this problem.

Input (ft.)	0	4.9	9.8	14.7	19.6
Actual Output (mA)	3.96	7.76	11.52	15.52	19.4
Expected Output(mA)					
Percent Error					

The **actual output** values are the actual values from the transmitter. We're not sure if they are accurate so we need to find the **expected output** values from a mathematical model. By comparing the expected and actual output values, we can determine if the transmitter is functioning correctly. To create a math model we need to know a little about the tank and the transmitter. The tank can have between 0 to 19.6 feet of water in it. The transmitter ranges from 4 to 20 mA. Thus if there is 0 feet of water in the tank, the transmitter should read 4mA. If there is 19.6 feet of water in the tank the transmitter should read 20mA. This will take a few steps. Are you ready?

Create a linear equation and then fill in the expected outputs.

1. Define your variables in a complete sentence and algebraically.
2. Determine the constants of the equation. For linear equations, this is the slope and the y-intercept.
3. Create the linear equation.

4. Use the input values in the above table and your linear equation to fill in the expected output values in the table. Good job! Compare the actual and expected output values. Are they the same or different? Why?
5. A percent is a fraction. To find the Percent Error, divide the difference between the actual and the expected output values by the overall range of the transmitter. Fill in the table.

$$\%Error = \frac{Actual - Expected}{Overall Range}$$

6. Are these values positive, negative or both? Why?
7. Are there units for the percent error? Why or why not?

Great work! Thank you for the careful analysis. Now let's see if this transmitter is functioning within tolerance. The magic number is 2%. Is the transmitter within 2% tolerance?

Essay question

Your boss thanks you for all your hard work and now needs you to write up a report. This report will be read by all new recruits so something like this NEVER HAPPENS AGAIN. Explain in detail exactly what happened:

Paragraph one

- What was the original problem?
- Why did you collect data? Why are you comparing output with the **expected value**?

Paragraph two

- What did you find? What did the data tell you?
- Was the transmitter functioning within tolerance?
- What do you suggest needs to be done?

*Source: The BAYWORK Contextualized Learning Project, by Tue Rust for **The Perfect Storm***

Appendix C: Tutoring Services Available for EMT/Instrument Tech Training and Credentialing

Table C-1: Tutoring Companies and the Subjects Offered

	Khan Academy	Chegg	Vocational Information Center	Tutor.com	Slader.com	WyzAnt	East Bay Tutoring	Microsoft Office Help	Sacramento State University
ALGEBRA	X	X		X	X	X	X		
GEOMETRY	X	X		X	X	X	X		
TRIGONOMETRY	X	X	X	X	X	X	X		
PRE-CALCULUS	X	X		X	X	X	X		
TYPING									
ENGLISH (READING/ WRITING)	X	X		X	X	X	X		
PHYSICS	X	X		X	X	X	X		
CHEMISTRY	X	X		X	X	X	X		
COMPUTER APPLICATIONS				X				X	
TECHNICAL DRAFTING			X						
ELECTRICITY/ ELECTRONICS									
INTRO TO ENGINEERING									
AUTO SHOP									
WELDING									
METAL SHOP			X						
WOODSHOP									
MAINTENANCE AND REPAIR OF BICYCLES OR MOTOR VEHICLES									
BUILDING CONSTRUCTION AND REPAIR									
WOOD/METAL CRAFTING			X						
MACHINERY REPAIR			X						
BUILDING OR MAINTAINING COMPUTERS									
BIOLOGY	X	X		X	X	X	X		
WATER/ WASTEWATER TREATMENT									X
WATER/ WASTEWATER DISTRIBUTION									X

Table C-2: Tutoring Company Information

Tutoring Resource	Cost	Location	Website
Khan Academy	Free	Online	https://www.khanacademy.org/
Chegg	Free	Online	http://www.chegg.com/tutors
Vocational Information Center	Free	Online	http://www.khake.com/page88.html
Tutor.com	Varies	Online	http://www.tutor.com/subjects
Slader.com	Free	Online	http://www.slader.com/tutoring/peer/
WyzAnt	Varies	Online, In-Person	https://www.wyzant.com/resources
East Bay Tutoring	Varies	In-Person	http://eastbaytutoring.com/
Microsoft Office Help	Free	Online	https://support.office.com/en-us/?legRedir=true&CorrelationId=e3e5eb71-bb73-47b7-842b-0c57ad2406e1
Sacramento State University	Varies	Online	http://www.owp.csus.edu/courses/catalog.php

Source: Research provided by MWH Global

Appendix D: Training Opportunities in the Bay Area for Careers in Electronic Maintenance and Instrument Technician

Training Institution	Type Of Training Institution	Training Program	Link to Training Program
College Of San Mateo	Community College	Electrical Power Systems	http://collegeofsanmateo.edu/powersystems/
Laney College	Community College	Electrical & Electronics Technology	http://www.laney.edu/wp/electricity_electronics/
Diablo Valley College	Community College	Electrical/Electronic Technology	http://www.dvc.edu/academics/psed/architectural-engineering/electronics/index.html
Los Medanos College	Community College	Electrical And Instrumentation Technology	http://www.losmedanos.edu/EETEC/default.asp
College Of Marin	Community College	Electronics Technology	http://www.marin.edu/Apps/Directory/ProgramProfile.aspx?AcadProgramID=62
Skyline College	Community College	Electronics	http://www.skylinecollege.edu/electronics/index.php
City College Of San Francisco	Community College	Electronics	http://www.ccsf.edu/en/educational-programs/school-and-departments/school-of-science-and-mathematics/engineering-and-technology/electronics_program.html
Marin County ROP	ROP	Electronics/Engineering	http://www.marinschools.org/ROP/Pages/Courses.aspx
John O'Connell High	High School	Environmental Technology Integrated Lab	http://jochs-sfusd-ca.schoolloop.com/cms/page_view?d=x&piiid=&vpid=1408532468306

Source: Research provided by Luis Portillo and interviews with Tara Sanders (Los Medanos College), Cecil Nasworthy (Los Medanos College)

Appendix E: Financial Aid Available for EMT/Instrument Tech Training

Overview of Financial Support for Education

There are many ways to receive financial assistance when paying for an education. The following are typical types of education financial aid:

- **Scholarships** – a form of financial aid that does not need to be repaid and is typically awarded on the basis of academic or other achievement.
- **Grants** – a form of financial aid that does not to be repaid and is typically based on financial need.
- **Loans** – A borrowed sum of money to be used for education expenses that must be paid back, usually with interest. The most common loan program is the Federal Student Aid administered by the US Department of Education. The Free Application for Federal Student Aid (FAFSA) can be found here: <https://fafsa.ed.gov/>
- **Work Study** – a financial aid program where students are given a part-time job, allowing them to earn money to help pay education expenses.
- **Fee Waivers** – Educational fees may be waived at certain institutions as a form of financial aid.

At the beginning of the financial aid search, it may be challenging to understand the wide array of financial aid options available to students and decipher which options are best suited for an individual student. The resources in this section will provide students and their families with the following:

- An overview of the financial aid basics and tips for where to start the process.
- Checklist of activities to do in middle school and high school to help prepare for college and the associated fees
- Definitions of common financial aid terminology to help understand student aid descriptions, applications and contracts.
- An explanation of the difference between grants, scholarships, loans and additional options
- Evaluation methods to compare financial aid packages from different schools
- Tools to search for financial aid opportunities
- Recommendations for reducing the cost of going to school

Resources:

- <http://www.educationplanner.org/students/paying-for-school/index.shtml>
- <http://www.losmedanos.edu/studentervices/finaid/terms.asp>

Community College and Vocational Training Financial Aid and Scholarships

The resources in this section will provide students and their families with the following:

- List of grants and scholarships available for community college students specifically
- Lists of scholarships specific to industry and career types
- Searches for scholarships, grants and loans
- Free workshop opportunities to help families navigate the process of preparing for and funding higher education

Resources:

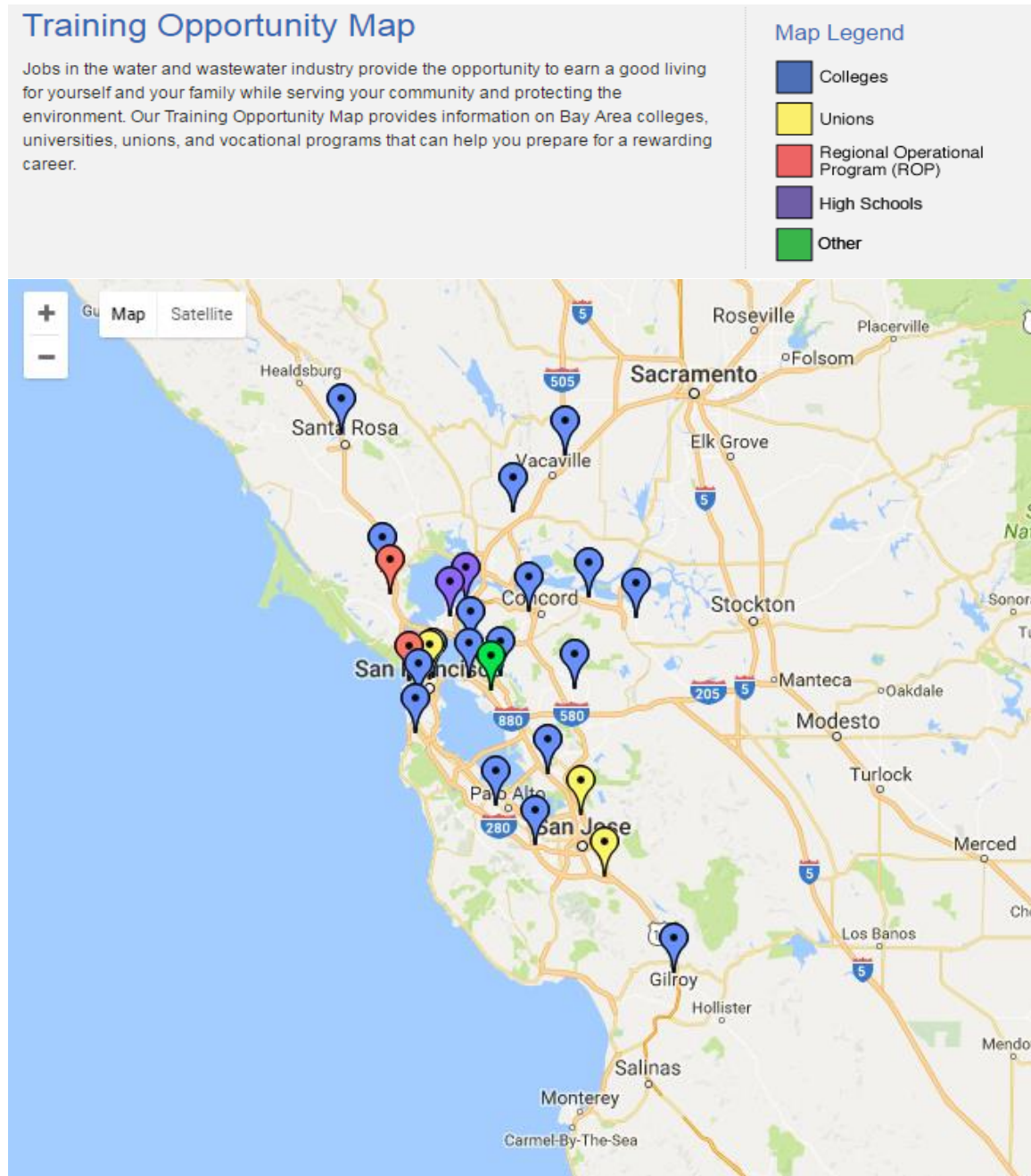
- <http://www.scholarshipsandgrants.us/community-college-scholarships/>
- <https://www.salliemae.com/>
- <http://www.thesalliemafund.org/>
- <http://www.khake.com/page57.html>

To find more information regarding financial aid at a specific Bay Area Community College, click on the link for the community college in Table E-1 to be directed to their financial services webpage.

Table E-1: Bay Area Community College Financial Aid Resources

College or training program	Financial support available
Gavilan College	http://www.gavilan.edu/finaid/index.html
College Of San Mateo	http://www.collegeofsanmateo.edu/finaid/
Napa Valley College	http://www.napavalley.edu/student-services/FinancialAid/Pages/default.aspx
Cabrillo College	https://www.cabrillo.edu/services/finaid/
Santa Rosa Junior College	https://financialaid.santarosa.edu/
Laney College	http://www.laney.edu/wp/financial_aid/
Las Positas College	http://www.laspositascollege.edu/financialaid/
Ohlone College	http://www.ohlone.edu/org/finaid/
Contra Costa College	http://www.contracosta.edu/home/student-services/financial-aid/
Diablo Valley College	http://www.dvc.edu/financialaid
Los Medanos College	http://www.losmedanos.edu/financialaid/
College Of Marin	http://www.marin.edu/financial_aid/procedures.htm
Solano Community College	http://www.solano.edu/financial_aid/
Cañada College	http://canadacollege.edu/financialaid/
Skyline College	http://www.skylinecollege.edu/financialaid/
Mission College	http://missioncollege.edu/student_services/financial_aid/
West Valley College	http://westvalley.edu/services/financialaid/
Evergreen College	http://www.evc.edu/current-students/enrollment-services/financial-aid-and-scholarships
San Jose City College	http://www.sjcc.edu/current-students/on-campus-resources/financial-aid-and-scholarship
Foothill College	http://www.foothill.edu/aid/
De Anza College	https://www.deanza.edu/financialaid/
City College Of San Francisco	https://www.ccsf.edu/en/student-services/financial-aid.html
Hartnell College	http://www.hartnell.edu/financial-aid

Appendix F: Locations of EMT/Instrument Technician Training Programs and Employers in Bay Area



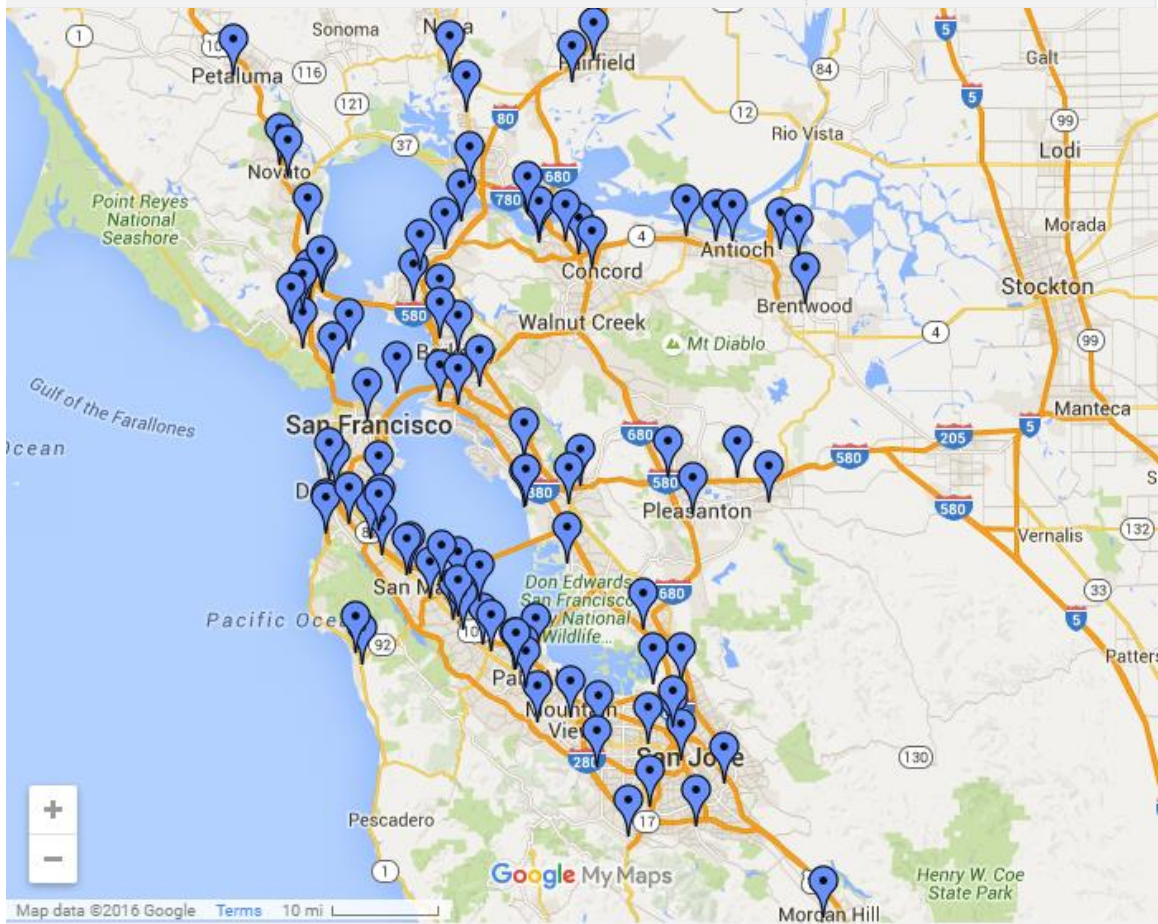
This map shows locations of unions, community colleges and other organizations offering vocational training in Electronic Maintenance Technician/Instrument Technician. The interactive map is available on Baywork.org.

Employer Location Map

There are over 70 water and wastewater utilities in the Bay Area, ranging from large municipal utilities to small private companies. Our Employer Location Map helps you locate these employers.

[Learn More](#)

CA Employment Development Department



This map shows locations of employers in the water and wastewater industry in the Bay Area. The interactive map is available on Baywork.org.

Appendix G: Challenges in the EMT/Instrument Tech pathway and related BAYWORK projects

	BAYWORK Projects												
	Brochures	Posters	Presentations	Facility Tours	Career Fairs	Contextualized Learning Curriculum	Water-related curriculum	White Paper Project	Website	Community College Advisory Committee	Community Colleges Curriculum Development	Internship Development	Equipment Donation to Community Colleges
Limited awareness of the water/wastewater industry	X	X	X	X	X	X	X	X	X	X	X	X	
Limited awareness of skilled trades and engineering jobs	X	X	X	X	X	X		X	X			X	
Limited awareness of skills needed to obtain skilled trade/engineering jobs	X		X			X	X	X	X	X	X		
Limited career technical education available in high school								X					
Uneven career technical education available in community colleges								X		X	X		
Inadequate equipment in community college programs								X					X
Difficulty finding qualified career technical education instructors								X					
Difficulty developing industry relevant curriculum								X		X	X		
Limited union apprenticeships								X					
Limited financial support for students								X					
Lack of tutoring resources to address skills needed for training								X					
Insufficient internships in skilled trades and engineering								X				X	
Limited entry-level positions in skilled trades and engineering								X					

The table above shows challenges in the EMT/Instrument Tech pathway and the related BAYWORK projects that address these challenges.

Source: Baywork.org, interviews with Candidate Development Subcommittee