Training Framework Recommendations:
Outdoor Residential Leak Detection & Repair

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Primary Author: Lisa Cuellar (lisa@calwep.org)

Background

The following deliverable details three suggested *Outdoor Residential Leak Detection & Repair Training* frameworks for consideration by the Bay Area Water Conservation and Supply Agency (BAWSCA) and Santa Clara Valley Water District (Valley Water), referred to herein as "Partner Agencies". The framework elements provided are intended to serve as a reference when developing formal contract solicitation(s) for the development of the training curriculum as well as training facilitation. The following suggested frameworks have been informed by extensive research activities performed by the California Water Efficiency Partnership (CalWEP), including water agency surveys, industry and trade organization interviews, expert roundtables and focus groups targeting landscape professionals and plumbers, as detailed in the contract with the Partner Agencies.

Please note that the following training framework suggestions are simply that, suggestions, and are not intended to be directives. Therefore, CalWEP recommends that the Partner Agencies conduct further internal review and evaluation of the recommended training frameworks and adjust where needed to arrive at a training approach that best achieves their objectives and accommodates staffing capacity and long-term budgets.

Training Objectives

The following training objectives, as requested by the Partner Agencies, were considered in development of the recommended training frameworks:

1.) Target professionals that service residential and multi-family accounts, including Homeowners Associations (HOAs)[1].
2.) Target professionals looking to set themselves apart from their colleagues.
3.) Maintain a directory of trained professionals accessible by water customers that can be updated at least annually and maintained regionally.
4.) Sustain a minimum of 20 professionals on the directory.
5.) Allow for regional partners to collaborate, continually improve, and administer the training program over at least a 5-year period.
6.) Balance cost effectiveness (longevity) and overall impact measured by training participation.

General Training Framework Considerations

Trainings that offer ***assessment-based certificates*** versus ***professional certification*** require different degrees of investment and have several perceived "Pros" and "Cons". The latter are summarized below in Table 2. Further, the Institute for Credentialing Excellence (ICE) provides a more detailed breakdown

[1] Training that addresses Commercial, Industrial, and Institutional (CII) leaks is outside of the scope for this framework, particularly due to the unique nature of CII properties. For example, leak types are specific to the services and operations conducted at the CII property (e.g., manufacturing and industrial processing, hospitality, etc.), whereas leaks across residential properties are somewhat standardized (e.g., leaking toilets, broken irrigation systems, etc.).

of differences between the two training approaches, a comparison document is included under Appendix A. The purpose, goal and assessment affiliated with each type of training is provided in Table 1, as defined by ICE:

Table 1: Comparison of "Assessment-based Certificate" and "Professional Certification" training programs (Source: Institute for Credentialing Excellence)

Training Type	Purpose	Goal	Assessment
Assessment-based certificate	Build capacity and recognition of a specialty area of practice or set of skills	Participants to acquire specific knowledge, skills, and/or competencies	Evaluate mastery of the intended learning outcomes; linked directly to the learning event, where assessment content may be narrower in scope
Professional certification	Recognize professionals who meet established knowledge, skills, or competencies	Validate the participant's competency through a conformity assessment system	Assure baseline competencies and to differentiate professionals; independent of a specific learning event, where assessment content is usually broad in scope

Certification programs also have long-term educational requirements that certificate programs do not. As the Irrigation Association (IA) explains: *"Certification isn't a one-time accomplishment. It's an ongoing commitment to expand your skills and knowledge by staying current on the latest technology, techniques and industry best practices".* The National Association of Landscape Professionals (NALP) provides a comparison of their certificate and certification programs (See Figure 1).

Figure 1: Comparison of NALP's "Landscape Management Certificate" and "Landscape Industry Certification" programs (Source: https://www.landscapeprofessionals.org/images/lp/education/documents/NALP_Certificate_v_Certification.pdf)

Table 2: Perceived "Pros" and "Cons" per Certificate and Certification training programs

	Assessment-based *Certificate* Program	**Professional *Certification* Program**
Pros	1- Lower start-up and maintenance costs. 2- No need for continuing education units, where the certificate does not lapse or expire. 3- Fewer requirements (i.e., No comprehensive exam, shorter instruction) could attract more attendees and help maintain minimum directory quota. 4- Fewer incentives needed to drive enrollment. 5- Fewer legal considerations compared to certification programs. 6- Lower registration fees and no renewal fees.	1- Attracts a higher caliber student looking to set themselves apart from the status quo, ultimately establishing a higher level of trust between client, professional and the water agency. 2- Continuing education units could equate to better skill retention and greater curriculum recall. 3- Because the certification can lapse, those professionals who do not retain their skill-set will be automatically purged from the directory.
Cons	1- Lower skill retention and curriculum recall if CEUs are not required. 2- Lower skill retention if participants are less committed to the work, a result of a "low bar of entry" to enroll and complete the training.	1- Higher start-up and maintenance costs and requires hiring consulting services to help develop and accredit training. 2- Bigger investment for participants (i.e., time, cost, must pass a comprehensive exam, more curriculum to master) could limit enrollment and in turn make it more challenging to achieve a minimum quota of professionals on the directory. 3- Requires continuing education, which can be perceived as an extra burden to certified professionals. 4- Potentially greater incentives to drive enrollment (Solution: pare with a customer coupon or voucher for services). 5- The certification is retained for a specific period and can lapse, reducing the number of professionals listed on the directory long-term. 6- Lack of renewal fee payment could result in certification lapse and removal from the directory. 7- More legal considerations compared to certificate programs: Ex.: Challenges related to fairness of obtaining certification

There are some additional aspects of a *certification* training that should be considered by the Partner Agencies in choosing a preferred training framework (assessment-based certificate vs. professional certification):

1) First, several *certification* trainings already exist for the landscape workforce. According to feedback we received from trade organizations and industry groups, participation in these trainings and other career development opportunities for the landscape industry are more commonplace than in the plumbing industry outside of trade schools. Therefore, initial barriers to participation should be somewhat reduced since **education is already valued and awarded within the landscape industry** at large. Such has been CalWEP's experience facilitating more than a dozen Qualified Water Efficient Landscaper (QWEL) certification training across the greater Bay Area, where demand for enrollment often exceeded available classroom capacity, resulting in the need for waitlists. Note that QWEL trainings were offered for free.

2) Second, CalWEP's research coupled with our experience facilitating QWEL certification trainings across the greater Bay Area have shown that **larger landscape companies**, rather than smaller owner/operator businesses with a handful of employees or less, tend to **invest in career development opportunities for their employees**. For larger companies, this is likely due to a few factors: 1) The absence of a few employees for an extended number of hours per week is not detrimental to business, 2) job mobility exists, lending to a business culture that prioritizes career development, and 3) employers can cover the overhead expenses attributed to training(s). This is not to say that smaller companies do not participate, they in fact do, but their relative proportion of attendance can be significantly less when compared to larger companies. For example, of 635 QWEL registrants spread over thirteen English trainings, 28% of registrants self-selected their employer as a "landscape company" whereas only 8% selected "self-employed". When we conducted a more segmented analysis, CalWEP discovered that English *evening* trainings had slightly better participation by "self-employed" professionals (10%) than did morning trainings (5%). Spanish trainings were only offered in the mornings. Of the twenty-six total participants in the Spanish QWEL trainings, 18 were employed by a "landscape company" whereas only 1 was "self-employed". The marketing approach could have played into this outcome. However, these results could indicate that different recruitment tactics would need to be implemented to attract both self-employed and Spanish-speaking landscape professionals to a certification training.

3) Third, **certification of professionals employed by larger landscape firms could result in fewer certified individuals listed on the directory**, since these employees are not looking for outside work or a side-hustle. As a work around, businesses could list themselves on the directory if a certain percentage of their employees earned the certification and if the company assured the Partner Agencies (perhaps through a participant agreement) that the professional(s) dispatched to a water customer's residence are those that have earned their certification. The National Association of Landscape Professionals (NALP) offers a "Landscape Industry Accredited Company" designation and the California Landscape Contractor's Association (CLCA) offers a "Certified Water Managers Company" designation for qualifying businesses. A similar model could be considered for the purpose of certifying businesses whose staff are trained in leak detection and repair.

4) Fourth, since landscape workforce certification trainings assess advanced level of competency, they do NOT always require participation in a training course to become certified. Passing an exam and/or a field exercise is typically all that is required. The assumption is that the student already possesses the required skill-set and the exam is utilized to assess this assumption. Such is the case with the Irrigation Associations certification courses. While applicants are only required to take and pass an exam, they can also participate in non-mandatory educational courses that do not teach to the exam. As explained on the IA website: "*The IA and other licensed providers offer educational courses that may be beneficial to the certification candidate. Education courses do not 'teach to the exam' nor are they all inclusive of the material that will be tested on the exam. . . IA classes are not required for certification nor endorsed by the IA Certification Board*" (source: IA Certification Candidate Handbook). Similarly, QWEL certification does not require attendance at training courses, but rather passing of a comprehensive exam and completion of an irrigation systems audit. However, most candidates prefer to take QWEL training courses, most likely to help them feel more confident taking the exam, but also perhaps to gain additional knowledge that they didn't currently posses (e.g., sustainable landscaping principles, water budgeting). Thus, given that training is not necessarily a cornerstone for obtaining certification, **an assessment-based certificate training could be a better approach to achieve the Partner Agencies objectives**, where the certificate training course aims to teach a new skill set and increase competency is leak detection and repair.

Model Training Frameworks

CalWEP identified a number of existing training programs offered in California by reputable organizations. They are summarized in the sections that follow.

Certification trainings for the landscape workforce

As noted above, several certification trainings already exist that target landscape professionals. This includes a number that are recognized by the U.S. EPA's WaterSense® program. Table 3 lists WaterSense® recognized certification trainings that are relevant to outdoor leak detection and repair training grouped by their training types: irrigation system auditor or irrigation system maintenance and installation professional.

Table 3: Select U.S. EPA WaterSense Recognized Certification Programs

WaterSense® Certification Training Types	Professional Description	Qualifying Trainings - Organization
Irrigation System Auditor (Specifications)	An individual who assesses the proper functioning of irrigation systems, visually identifies malfunctioning equipment, performs irrigation water audits, and recommends watering schedules.	1) ***Certified Landscape Irrigation Auditor* (CLIA)** - Irrigation Association **2) *Certified Water Management Program* - *CLCA*** 3) ***QWEL*** - Sonoma-Marin Saving Water Partnership 4) ***Watershed Wise Landscape Professional* (WWLP)** - G3LA:
Irrigation System Installation and Maintenance (Specifications)	An individual who installs new irrigation systems and/or repairs and maintains existing irrigation systems.	1) ***Certified Irrigation Contractor (CIC)*** - Irrigation Association

In addition to those recognized by WaterSense, several other organizations offer certification trainings that are relevant to leak detection and repair certification trainings, they include:

1. ReScape's Maintenance Qualification Trainings
2. Irrigation Association's Certified Irrigation Technician (CIT)
3. National Association of Landscape Professionals' Certified Landscape Technician Training

CalWEP has compiled a certification training comparison matrix (See Appendix D) for all trainings listed above. The matrix identifies the following elements per training:

- Certification description,
- WaterSense® recognized certification,
- Target student (e.g., entry level (0-5 years), mid-level (5-10 years), irrigation technicians, etc.),
- Instruction format (e.g., classroom lecture either in-person or virtual, online asynchronous and self-directed typically via a Learning Management System, and self-study exam prep.),
- Exam characteristic,
- Training and certification renewal fees, and
- CEU requirements.

Leak detection trainings

Leak detection trainings are typically offered by manufacturers and vendors of leak detection equipment. One training service in particular targets the landscape workforce directly: LeakTronics. A comprehensive description of LeakTronics training offerings can be found in the CalWEP report summarizing our initial phase of research findings[2]. Their "Irrigation Leak Detection Training" is offered fully online at a cost of $880 without an irrigation leak kit or $4,416 with an irrigation leak kit.

[2] CalWEP report, December 2022: "Design Considerations For A Residential Leak Detection & Repair Certification Training"

Completion of their course also includes unlimited technical support. LeakTronics also hosts an online directory of professionals who complete their training(s). Training module #2 from their standard course curriculum addresses both commercial and residential leak detection, and covers the following subtopics including specifics on how to utilize their proprietary leak detection equipment:

Commercial Irrigation
- A walk through on a country club golf course
- What to expect and how to prepare for the job
- Using the PG-2 and the soil probe

Residential Irrigation: Leak and Line Locating
- Finding lines under soil and concrete
- Proper use of the pressure rig
- Using the soil probe and deck plate attachment

Finding a leak that caused low pressure in a sprinkler line
- Identifying the issues
- Capping sprinkler heads
- Pressuring a line to find the leak with accuracy

Finding a leak in abandoned irrigation lines
- Locating abandoned lines with the PG-2
- Pressure testing and applying air and water to find a leak
- Mapping lines and finding leaks under concrete
- and more …

CalWEP Framework Recommendations

After reviewing the existing landscape certification trainings described above, CalWEP does NOT recommend that the Partner Agencies pursue the development of a *certification* training for outdoor residential leak and detection and repair. This recommendation is based on the following observations:

- Since leak detection and repair represent a smaller share of standard landscape services, professionals don't perceive a lengthy, multi-day certification training with a comprehensive exam necessary.
- Smaller owner/operator landscape companies are not as likely to be interested in participating given the cost and time commitment to earn a certification, thus limiting the number of professionals listed on the directory.
- The market is saturated with certification trainings offered by reputable organizations.

Previous inquiries from the Partner Agencies included whether or not it would be reasonable and feasible to develop a leak detection and repair training model under the existing QWEL training. Given that QWEL is a 20-plus hour certification training, the same concerns apply as listed above. In addition, a representative from the parent Professional Certifying Organization of QWEL noted that it would be a challenge to make the case to WaterSense® that a leak detection and repair training module is relevant to the irrigation system auditor designation. Not to mention, there is the added challenge of overcoming the QWEL Board's liability concerns regarding prescriptive curriculum addressing leak repairs.

Rather, CalWEP recommends development of a new assessment-based certificate training for outdoor residential leak and detection and repair. The objectives of certificate training seem most aligned with

those of the Partner Agencies. In essence, certificate trainings enable "participants to acquire specific knowledge, skills, and/or competencies" and are utilized to "evaluate mastery of the intended learning outcomes", where "assessment content may be narrower in scope", as explained by ICE. Per this recommendation, CalWEP has prepared three training frameworks for further consideration and evaluation by the Partner Agencies. Tables 3 to 5 provide a high-level summary of the distinguishing training elements for each of the three recommended frameworks. Continue reading for a more detailed description of each training framework.

Table 3: Key Element of Framework A – New Training – Asynchronous & Self-Directed (certificate program)

New Training – Asynchronous & Self-Directed Certificate Training	
Estimated Development Costs	$50,000 - $150,000*
Annual Expenses	$20,000 - $30,000 / yr. (directory & LMS subscription)
Estimated Training Costs	Negotiated – unit cost per training (leak detection only)
Estimated Participant Costs	NTE $150
Qualified Organizations	CLCA, IA, American Society of Irrigation Consultants, LeakTronics
Additional investments	Refresher Course

Table 4: Key Element of Framework B – New Training – In-person Leak Detection and Repair (certificate program)

New Training – In-person Leak Detection and Repair Certificate Training	
Estimated Development Costs	$50,000 - $150,000*
Annual Expenses	$20,000/ yr. (directory)
Estimated Training Costs	Negotiated – unit cost per training
Estimated Participant Costs	NTE $150
Qualified Organizations	CLCA, IA, American Society of Irrigation Consultants, LeakTronics
Additional investments	Refresher Course; Micro-website

Table 5: Key Element of Framework C – "Water Survey" & leak detection and repair (certificate program)

Assessment-based *Certificate* Training	
Estimated Development Costs	$75,000 - $175,000*
Annual Expenses	$20,000/ yr. (directory)
Estimated Training Costs	Negotiated – unit cost per training
Estimated Participant Costs	NTE $150
Qualified Organizations	Maddaus Water Mgmt., Environmental Incentives, Water Wise Consulting, CLCA, IA, American Society of Irrigation Consultants, LeakTronics
Additional investments	Refresher Course; Micro-website

**Estimated costs are rough and not based on any formal analysis, but rather CalWEP's knowledge managing QWEL trainings in multiple formats across the State. Contractor proposals and budgets could vary widely.*

Separate from any contracted services for training development, the Partner Agencies shall develop a contractor agreement for all training participants to ensure participants:

1. Are licensed and insured, and will sustain these requirements for at least two-years following training;
2. Work within the required service area;
3. Agree to a maximum customer-response time of 72-hours;

4. Agree to either a flat fee for house calls and/or a not-to-exceed billable hourly rate;
5. Attend the entirety of the course and complete the assessment activities (e.g., quizzes) in order to be listed on the directory; and
6. Agree to a refresher course every two-years to be listed on the directory.

In addition to the contractor agreement, the Partner Agencies shall develop a participant waiver of liability that indemnifies the water agency and the training facilitator from any medical or legal claims resulting from services rendered by trained professionals listed on the directory. Both must be signed by all enrollees prior to commencing training.

Framework A: New Training – Asynchronous & Self-Directed (modeled after NALP's Landscape Management Certificate Program)

CalWEP recommends that a new assessment-based certificate training for outdoor residential leak detection and repair be developed. This training shall be asynchronous and self-directed, meaning the content will be hosted on an online platform, typically a Learning Management System (LMS). Students will create an account on the LMS and complete the training at their convenience and own pace. Because the LMS is capable of hosting all training materials and includes a homepage with a course description, establishment of a separate "micro-website" is not required. NALP has structured their Landscape Management Certificate program using an LMS. A similar approach should be considered by the Partner Agencies. Note that curriculum, separate from the Landscape Management Certificate program, that focuses on leak detection and repair will need to be developed. Additionally, the asynchronous learning should be supplemented with a hands-on training component, which was expressed as critical for skill development by industry leaders and landscape professionals alike.

The primary benefits to this mostly online training framework include:

- Convenience for students by eliminating commutes and allowing training content to be accessed outside of work hours. This could translate to more certified individuals on the directory.
- Convenience for the Partner Agencies via automated registration and metrics tracking through the LMS, as well as reduced labor that is typically required for coordinating in-person events.

General Description and Approach

Partner Agencies would issue a request for proposal (RFP) for the development of the leak detection and repair certificate training program and materials, structured like NALP's Landscape Management Certificate Program model. The RFP could be issued as *a **fixed-fee competitive bid*** solicitation. Training development costs could be minimized if the organization that is selected chooses to maintain ownership of the training materials and enters into a licensing agreement with the Partner Agencies (See suggested indoor leak training frameworks using the SNWA/ IAPMO training example for additional details).

This contract approach would likely make it easier to scale-out the training state-wide, and perhaps be more attractive to bidding parties who could sustain a long-term profit stream from the subject training. Potential organizations to approach for training development include the California Landscape Contractor's Association and the Irrigation Association. Both are leaders in industry trainings and have a significant membership base whom they can direct training promotions and outreach.

Under separate contract, the Partner Agencies would procure professional services for supplemental hands-on leak detection training that would be offered at different times and locations throughout the year. The work could be issued under a ***sole-source contract***, as only a limited number of leak detection training services are available through manufacturers/vendors or LeakTronics as described above.

Two-Phased Contract Approach:

1. ***Fixed-fee training development contract*:**
    - **a.** Develop outdoor residential leak detection and repair training curriculum, including quizzes, that enables asynchronous, self-directed learning.
    - b. Develop program administration approach collaboratively with the Partner Agencies (e.g., qualifying criteria, participant policies, learning objectives).
    - c. Work collaboratively with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements.
    - d. Procure an LMS system for managing registration and to host the training materials
    - e. Build a web-based directory of trained professionals.
    - f. Develop refresher course materials.
    - g. Manage the web-based directory including spot-checking 25% of listed contractors for current licensure and insurance on an annual basis and beginning the second year of training.

2. ***Leak detection training contract (sole-source)*:**
    - a. Deliver in-person turn-key leak detection trainings.
    - b. Includes procuring qualified instructors and locating appropriate training facilities within agency service areas, amongst other responsibilities necessary to deliver a successful course.

The following are suggested training framework elements that can be folded into a Request for Proposal (RFP) Scope of Work. The Contractor shall be responsible for the following tasks as described below. Note that Tasks #1-3 are associated with the *Fixed-fee Training Development Contract*, and Task #4 is associated with the in-person *Leak Detection Training Contract*.

Task #1 – Asynchronous Training Design & Curriculum Development

- *a. Establish learning objectives jointly with the Partner Agencies.*
- *b. Contractor shall work with the Partner Agencies to identify a suitable Learning Management System for hosting training materials. Contractor shall procure an LMS subscription and cover any annual fees to maintain the subscription for at least the duration of the contract.*
- *c. Contractor shall work with the Partner Agencies, using NALP's Landscape Management training as a guide, to establish training format (e.g., video content and supplemental handouts), and criteria for curriculum progression (e.g., completion of module quizzes, etc.). Note that students should be able to review all training content within one business day.*
- *d. Establish qualification criteria for participants and related policies jointly with the Partner Agencies.*
- *e. Establish a registration fee structure jointly with the Partner Agencies.*

f. *Develop Instructor qualifications jointly with the Partner Agencies. Instructors shall possess at least 5 years of field experience working in a related landscape profession (e.g., irrigation or landscape designer, irrigation technician, etc.). If instructors are recruited from outside of California, they must get up-to-speed with relevant state and local codes prior to training instruction.*
g. *Develop curriculum and integrate into appropriate formats including video (with closed caption language translations), worksheets, handouts including leak detection and repair checklists, and other reference materials for hands-on demonstration in videos (*See Appendix E for CalWEP's suggested curriculum topics). Materials shall include but are not limited to: irrigation hardware, tools for leak repair, equipment catalogs and specifications, etc.*
h. *Develop a "refresher course" and associated materials.*
i. *A participant feedback form shall be developed jointly between the Participating Agencies and IAPMO. (*See Appendix G for example Qualified Water Efficient Landscaper Training feedback form)*
j. *Develop an online for-hire directory. Embed a customer survey that allows water agency customers to provide anonymous feedback about their experience utilizing a professional listed on the directory. [Note: Alternatively, the Partner Agencies could hire a web-developer to produce a micro-website to host the directory of professionals. Licensing and maintenance fees could approach $20,000 a year.]*

Task #2 - Marketing and Branding:

a. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements including: The training name, logos, and certificates.*
b. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop promotional language to include in outreach materials (e.g., emails and flyers).*
c. *Where feasible, Contractor will assist in the promotion of trainings to their wider membership and network of contacts.*

Task #3 - Administrative:

a. *Provide back-end management and troubleshooting of the LMS, as needed. At least one administrative account should be granted to the Partner Agencies.*
b. *Manage training registration and payment including refunds through the LMS.*
c. *Upload all training content to the LMS. Enable the LMS to automatically submit certificates to all students that successfully complete the training.*
d. *Facilitate at least one round of beta testing of the LMS system prior to public launch, and make adjustments based on feedback.*
e. *Submit a quarterly summary of trainee demographics and training metrics to Partner Agencies, including but not limited to: enrollment, training completion, business affiliation, employment title, and business service area.*

Task #4 – Leak Detection Training:

a. *Establish learning objectives and curriculum requirements and receive approval from the Partner Agencies.*
b. *Develop tailored leak detection and repair curriculum to meet the learning objectives and receive approval from the Partner Agencies.*
c. *Delivering in-person, turn-key leak detection training services. The training shall include hands-on demonstrations with tried-and-true leak detection equipment and tools.*
d. *Identify an appropriate training location and receive pre-approval from the Partner Agencies prior to securing. Any venue fees shall be covered by the Contractor.*
e. *Distribute the participant feedback form to participants in hard-copy form at the end of class. Once collected the feedback forms shall be provided directly to Participating Agencies' project manager for review and evaluation.*
f. *Submit a quarterly summary of trainee demographics and training metrics to Partner Agencies, including but not limited to: enrollment, attrition rate, pass rate, business affiliation, employment title, and business service area.*

Framework B: New Training – In-person Leak Detection and Repair Certificate Training

Under Framework B, CalWEP recommends that a fully in-person assessment-based certificate training be developed for outdoor residential leak detection and repair. Both Framework A and B would utilize the same curriculum, but rather than pre-recording the instruction and uploading to an LMS system, the curriculum would be delivered in real-time by live instructors. As suggested under Framework A, potential organizations to approach for training development include the California Landscape Contractor's Association and the Irrigation Association.

The primary benefit associated with an in-person training framework include:

- More hands-on demonstrations and in-person engagement (such as Q&A with instructors and classroom networking) that could lead to better skill retention and curriculum recall.

General Description and Approach

Like Framework A, Partner Agencies would likely issue two separate contracts: 1) ***Fixed fee-competitive bid*** solicitation for development of new curriculum, and 2) ***Bi-annual Training Contract***. Unlike Framework A, the Bi-annual Training Contract would include a more comprehensive scope of work that covers the full breadth of curriculum instructions as well as supplemental hands-on training. Costs for the bi-annual contract should be negotiated based on a per class unit cost. Additionally, Partner Agencies would cover the entire expense of the training. To recover a portion of the costs and limit participant attrition, a registration fee of $150 shall be paid directly to the Partner Agencies by registrants. A portion of the registration fee could be refunded upon completion of the course to help ensure sustained participation. Also, a clause could be added to the contractor agreement that states that "no-show" participants will not receive a refund but may opt to take another scheduled training at a later date.

As suggested under Framework A, potential organizations to approach for training development include the California Landscape Contractor's Association and the Irrigation Association. Both are leaders in industry trainings and have a significant membership base whom they can direct training promotions and outreach.

Two-Phased Contract Approach:

1. ***Fixed-fee training development contract*:**
    a. Develop outdoor residential leak detection and repair training curriculum, including quizzes.
    b. Develop program administration approach collaboratively with the Partner Agencies(e.g., qualifying criteria, participant policies, learning objectives).
    c. Work collaboratively with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements.
    d. Build a web-based directory of trained professionals.
    e. Develop refresher course materials.

2. ***Bi-annual training contract*:**
    a. Deliver turn-key trainings over 24-months, with option to renew. Includes procuring qualified instructors and locating appropriate training facilities within agency service areas, amongst other responsibilities necessary to deliver a successful course.
    b. Manage registration, including establishment of a web-based registration page and handling or registration fees, refunds, and partial refunds.
    c. Manage the web-based directory including spot-checking 25% of listed contractors for current licensure and insurance on an annual basis and beginning the second year of training.

The following are suggested training framework elements that can be folded into a Request for Proposal (RFP) Scope of Work. The Contractor shall be responsible for the following tasks as described below. Note that Tasks #1-2 are associated with the *Fixed-fee Training Development Contract*, and Tasks #3-4 are associated with the in-person *Bi-Annual Training Contract*.

Task #1 – Training Design & Curriculum Development

a. Establish learning objectives jointly with the Partner Agencies.
*b. Contractor shall work with the Partner Agencies to establish training duration, format, and schedules. Trainings shall be no shorter than 4-hours and should be limited to a single-day to increase participation. *Note that class lengths can be adjusted based on feedback from training participants.*
c. Establish qualification criteria for participants and related policies jointly with the Partner Agencies.
d. Establish a registration fee structure jointly with the Partner Agencies.
e. Develop Instructor qualifications jointly with the Partner Agencies. Instructors shall possess at least 5 years of field experience working in a related landscape profession (e.g., irrigation or landscape designer, irrigation technician, etc.). If instructors are recruited from outside of California, they must get up-to-speed with relevant state and local codes prior to training instruction.
*f. Develop curriculum (*See Appendix E for CalWEP's suggested curriculum topics). Integrate hands-on training that covers both leak detection and repair.*

g. *Develop all training resources, this shall include but is not limited to: Leak detection checklists, leak repair checklists, worksheets and handouts, reference materials such as plumbing hardware, irrigation efficiency standards by fixture type, equipment catalogs and specifications, and any other materials and resources needed for conducting hands-on lessons.*
h. *Develop a "refresher course" and associated materials.*
i. *A participant feedback form shall be developed jointly between the Participating Agencies and IAPMO. (*See Appendix G for example Qualified Water Efficient Landscaper Training feedback form)*
k. *Develop and maintain a "micro website" that shall host online training registration, the for-hire directory and a training resource repository. Embed a customer survey that allows water agency customers to provide anonymous feedback about their experience utilizing a professional listed on the directory. [Note: Alternatively, the Partner Agencies could hire a web-developer to produce a micro-website to host the directory professionals. Note that licensing and maintenance fees could approach $20,000 a year.]*

Task #2 - Marketing and Branding:

a. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements including: The training name, logos, and certificates.*
b. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop promotional language to include in outreach materials (e.g., emails and flyers).*
c. *Where feasible, Contractor will assist in the promotion of trainings to their wider membership and network of contacts.*

Task #3 - Administrative:

The Contractor shall be responsible for all administrative tasks in order to deliver turn-key trainings, this shall include be is not limited to:

a. *Manage training registration and payment including refunds.*
b. *Recruit qualified instructors and seek pre-approval from the Partner Agencies.*
c. *Recruit a minimum of two guest instructors that specialize in leak detection (e.g., leak detection equipment manufacturers and vendors) to supplement training curriculum.*
d. *Locate a training venue or facility that allows for effective hands-on training demonstrations. The hands-on training could be facilitated at a location separate from the primary location of instruction. Venue costs shall be accounted for within the Bi-Annual Training Contract.*
e. *Procure demonstration equipment such as irrigation hardware and tools and technology used for leak detection and repair to supplement training concepts and ensure skill development. Leak detection equipment should be tried-and-true amongst industry professionals and include any new technologies proven to make leak detection more efficient.*

f. *Submit a summary of training cohort demographics and training metrics to Partner Agencies upon completion of each training, including but not limited to enrollment, attrition rate, pass rate, business affiliation, employment title, and business service area.*

Task #4 – Training:

a. *Facilitate a pilot training with a smaller cohort of participants, prior to rolling training out to a larger region or service area, where pilot participation shall be capped between 15 and 20 participants.*
b. *Delivering in-person, turn-key training services. The training shall include hands-on demonstrations with tried-and-true leak detection and repair equipment and tools, as well as any new market technologies that improve efficiency in leak detection and repair.*
c. *Identify an appropriate training location and receive pre-approval from the Partner Agencies prior to securing. Any venue fees shall be covered by the Contractor.*
d. *Distribute the participant feedback form to participants in hard-copy form at the end of class. Once collected the feedback forms shall be provided directly to Participating Agencies' project manager for review and evaluation.*
e. *Contractor shall be responsible for delivering refresher course(s).*

Framework C: New Training – "Water Survey" training with a leak detection and repair training module

During industry interviews it was suggested that the training be broadened to a "water survey" training that includes a module dedicated to leak detection and repair. The thought was that many landscape professionals already feel proficient in handling leaks, and an agency could potentially increase enrollment in the training by packaging and marketing it from a water conservation and efficiency angle. Those who complete the training would earn a certificate in both outdoor water surveys and leak detection and repair.

In fact, water surveys often include elements of basic leak detection. CalWEP's landscape implementation guide (a members only benefit) lays out the technical elements of a water survey and distinguishes the process from a traditional water audit, where audits are more involved and require a certification in order to perform. (*See Appendix F for an excerpt from the Landscape Implementation Guide).

The benefits of developing a water survey certificate training that includes a leak detection and repair modules include:

- Eliminates direct competition with water auditor certification programs, including CLCA's Certified Water Manager and IA' s Certified Landscape Irrigation Auditor certification training.
- Landscape professionals could tout both water management skills and leak detection and repair to try and garner additional business or set them apart from competitors.
- Learning objectives could appeal to water agency conservation staff in addition to landscape professionals.
- Sometimes outdoor leaks are not the cause of high-water use outdoors. Rather, inappropriate irrigation controller schedules can lead to over irrigating. Water survey training would enable professionals to identify waste attributed to bad water management in addition to leaks.

General Description and Approach

Framework C would add a water survey component to Framework B. And like Framework B, CalWEP recommends that the water survey and leak training be hosted in-person. Since the survey targets residential customers, at least part of the training would take place at a residential parcel, where the instructor would walk through a full demonstration of how to complete a survey.

Similar to Framework B, the Partner Agencies would likely issue two separate contracts: 1) ***Fixed fee-competitive bid*** solicitation for development of new curriculum, and 2) ***Bi-annual Training Contract***. Costs for the bi-annual contract should be negotiated based on a per class unit cost. Additionally, Partner Agencies would cover the entire expense of the training. To recover a portion of the costs and limit participant attrition, a minimum registration fee of $150 shall be paid directly to the Partner Agencies by registrants. A portion of the registration fee could be refunded upon completion of the course to help ensure sustained participation. Also, a clause could be added to the contractor agreement that states that "no-show" participants will not receive a refund but may opt to take another scheduled training at a later date.

As suggested under Frameworks A and B, potential organizations to approach for the leak detection and repair training development include the California Landscape Contractor's Association and the Irrigation Association. Both are leaders in industry trainings and have a significant membership base whom they can direct training promotions and outreach. In addition, many consultants are familiar with water surveys and could be subcontracted by the Contract prime to help develop the water survey curriculum. CalWEP is familiar with at least three consulting firms in California that conduct water surveys, they include Maddaus Water Management, Environmental Incentives and Water Wise Consulting, Inc.

Two-Phased Contract Approach:

The two phased contract approach would be identical to Framework B with the following additional scope item to the Fixed-fee contract:

1. ***Fixed-fee training development contract*:**
   (Note items a-e same as Framework B)
   f. Develop residential outdoor water survey curriculum.

2. ***Bi-annual training contract*:**
   (Note items a-c same as Framework B)

The following are suggested training framework elements, in addition to those listed under Framework B, that can be folded into a Request for Proposal (RFP) Scope of Work. The Contractor shall be responsible for the following tasks as described below. Note that Tasks #1-2 are associated with the *Fixed-fee Training Development Contract*, and Tasks #3-4 are associated with the in-person *Bi-Annual Training Contract*.

Task #1 – Training Design & Curriculum Development

(Note: Same Task #1 subtasks as listed under Framework B, except for the following changes to f-g)

*f. Develop curriculum (*See Appendices F and G for CalWEP's suggested curriculum topics, and Landscape Implementation Guide for water survey topics). Integrate hands-on*

training that covers performing a water survey on a residential parcel as well as leak detection and repair.

g. *Develop all training resources, this shall include but is not limited to: water survey checklists, leak detection checklists, leak repair checklists, worksheets and handouts, reference materials such as plumbing hardware, irrigation efficiency standards by fixture type, equipment catalogs and specifications, and any other materials and resources needed for conducting hands-on lessons.*

Task #2 - Marketing and Branding:

(Note: Same Task #2 subtasks as listed under Framework B)

Task #3 - Administrative:

(Note: Same Task #3 subtasks as listed under Framework B, except for the following changes to d)

d. *Locate a training venue or facility that allows for effective hands-on training demonstrations. The hands-on training could be facilitated at a location separate from the primary location of instruction, this includes locating a residential parcel for conducting a water survey. Venue costs shall be accounted for within the Bi-Annual Training Contract.*

Task #4 – Training:

(Note: Same Task #4 subtasks as listed under Framework B, except for the following changes to b-c)

b. *Delivering in-person, turn-key training services. The training shall include both a hands-on water survey as well as demonstrations with tried-and-true leak detection and repair equipment and tools. New market technologies that improve efficiency in leak detection and repair should also be evaluated for inclusion in the training.*

c. *Identify an appropriate training location(s) for both classroom instruction and hands-on exercises, including a residential parcel for performing a water survey. Contractor must receive pre-approval from the Partner Agencies prior to securing. Any venue fees shall be covered by the Contractor.*

Other Considerations

There are a number of additional considerations, including knowledge gaps that require additional investigation beyond CalWEP's research, which could potentially impact the overall scope of work for establishing a training framework for outdoor leak detection and repair. Some of these considerations were shared by experts during our roundtable discussion on April 17, 2023. They are summarized below. For additional context, please see the roundtable notes included under Appendix C.

1. Residential pools and spas can waste a lot of water. Consider requiring pool and spa leak detection and repair curriculum as part of the training.
2. While the training is applicable to a variety of landscape professionals, promotion should target irrigation technicians including those who are members of the Irrigation Association. However, during our expert roundtables it was noted that many irrigation professionals lack contractor's

licenses possess certifications instead. Therefore, if licenses are required to participate in training, a large segment of irrigation technicians could potentially be excluded from the training opportunity.

3. If a flat fee for house calls and/or a not-to-exceed billable hourly rate are to be established as part of the contractor agreement, consider pursuing anti-trust legal advice. In addition, leak repairs that are subject to insurance claims would not be held to the established price- or billing-caps in the contractor agreement.
4. Potential liability issues should be vetted with in-house Partner Agencies' counsel. This includes legal issues that could arise from both detecting and repairing leaks in accordance with the training curriculum. Some of these legal issues could be addressed by including an indemnification clause in the contractor agreements that students will be required to sign prior to undertaking training.
5. CalWEP did not conduct a comprehensive annual operational cost analysis to run an assessment-based certificate training. Based on the Partner Agencies' training objectives cost should be assessed for a minimum period of 5 years. A more detailed cost analysis will help to ensure that enough fundings and staff resources are available to run the recommended training frameworks.
6. Development of an assessment-based certificate program could occur within a 12-month period. Eventually the certificate training framework could be adapted into a certification training. Note however, that under this scenario, certificate holders would most likely have to undergo the certification training and pass the associated exam to earn their formal certification. This could result in disgruntled professionals who are already listed on the directory, but whom would be removed if they did not fulfill the requirements of the certification training.
7. Target marketing audience should include both supervisors and field technicians. Targeting supervisors, in particular, could result in training buy-in, such that they become willing to send their staff to future trainings.

Recommended Frameworks & Training Objectives

The following tables summarize how Frameworks A, B, and C compare to the overall training objectives established by the Partner Agencies.

No.	Training Objective	Framework A – New Asynchronous Certificate	Framework B – New In-Person Certificate	Framework C – Water Survey & Leak Certificate
1	Target professionals that service residential and multi-family accounts, including Homeowners Associations	Broadest market appeal due to limited training requirements compared to certification, including time investment and the lack of a comprehensive certifying exam, and ability to learn at own pace and convenience.	Broad market appeal due to limited training requirements compared to certification, including time investment and the lack of a comprehensive certifying exam.	Broad market appeal due to limited training requirements compared to certification, including time investment and the lack of a comprehensive certifying exam. Could also attract water conservation staff, and property managers of multi-family complexes and HOAs due to water survey component. Property managers are seeing an increase in water saving interest from their clients.
2	Target professionals looking to set themselves apart	To some extent – broader industry appeal compared to certification training	To some extent – broader industry appeal compared to certification training	To greater extent, because of the dual certificate training (water surveys and leaks)
3	Maintain a directory of trained professionals	More likely to meet and sustain directory quota since assessment criteria (e.g., quizzes) are easier to pass than certification exams and there are no continuing education requirements.	More likely to meet and sustain directory quota since assessment criteria (e.g., quizzes) are easier to pass than certification exams and there are no continuing education requirements.	More likely to meet and sustain directory quota since assessment criteria (e.g., quizzes) are easier to pass than certification exams and there are no continuing education requirements.
4	Sustain a minimum of 20 professionals on the directory	Relatively easy on a regional scale (See #3). Would likely generate the largest directory listing due to ease of access via an LMS.	Relatively easy on a regional scale (See #3).	Relatively easy on a regional scale (See #3). Water Conservation staff certificate holders would be excluded from directory.
5	Administer over a 5-year period	12-month development and launch timeline and lower operational costs by utilizing an LMS to enable more logistical	12-month development and launch timeline is feasible. Operational costs will be higher than Framework A related to in-person	Potentially longer development period due to generation of water survey curriculum. Operational costs will be higher than Frameworks A & B

		automation. Makes sustaining 5 years of training relatively feasible.	logistical costs, but still reasonably low compared to formal certification training. Makes sustaining 5 years of training relatively feasible.	related to in-person water survey training, but still reasonably low compared to formal certification training. Makes sustaining 5 years of training relatively feasible.
6	Balance cost effectiveness with overall impact.	Most cost-effective due to lower development and operational costs associated with asynchronous learning via an LMS. Ability to pursue certificate at own pace and convenience should translate to higher directory numbers. Overall Framework A could have the highest ROI.	Cost-effective due to lower development and operational costs compared to certification training. Licensing the curriculum from the developer could help to keep costs lower. Fewer participants than Framework A due to venue capacity limitations could decrease the overall ROI.	Higher development and operational costs compared to Frameworks A & B due to hands-on water survey component. Fewer participants than Framework A due to venue capacity limitations could decrease the overall ROI.

APPENDICES

A. Institute for Credentialing Excellence “Defining Features of Quality Certification and Assessment-Based Certificate Programs” (2010)
B. Expert Roundtable Roster
C. Expert Roundtable Notes (April 17, 2023)
D. Landscape Certification Trainings Comparison Matrix
E. CalWEP’s Suggested Curriculum Topics
F. CalWEP Landscape Implementation Guide: Outdoor Water Survey
G. QWEL Feedback Form Example

APPENDIX A

Institute for Credentialing Excellence “Defining Features of Quality Certification and Assessment-Based Certificate Programs” (2010)

Defining Features of Quality Certification and Assessment-Based Certificate Programs

2025 M Street, N.W., Suite 800 ■ Washington, DC 20036-3309
Ph 202.367.1165 ■ Fax 202.367.2165 ■ www.credentialingexcellence.org

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Introduction

Established in 1977, the Institute for Credentialing Excellence (ICE, formerly the National Organization for Competency Assurance) is dedicated to promoting excellence in credentialing worldwide. It is the leader in setting quality standards for credentialing organizations and through its division, the National Commission for Certifying Agencies (NCCA), has provided more than 30 years of accrediting services to the credentialing industry. ICE is accredited by the American National Standards Institute (ANSI) as a developer of American National Standards.

The ICE Board recognized that quality assessment-based certificate programs, through the instruction and training they provide, play a valuable role in helping individuals to attain occupational/professional competence and thus, relate to ICE's mission of promoting excellence in credentialing. Furthermore, the Board noted that assessment-based certificate programs have some functions in common with professional or personnel certification, namely, identifying and evaluating the knowledge, skills, and competencies requisite to effectively performing occupational and professional roles. In January 2007, it established a Certificate Task Force, comprised of ICE members and other key parties, to:

(a) identify characteristics of quality certification and assessment-based certificate programs;
(b) outline the distinguishing features of each; and
(c) explore what ICE's future role might be with respect to assessment-based certificate programs.

The work of the Certificate Task Force was incorporated in this document, which highlights the similarities and differences between quality certification and assessment-based certificate programs.

Purpose

The purpose of this document is to aid stakeholders in gaining a better understanding of the distinctions between assessment-based certificate programs, certificates of attendance or participation, and professional or personnel certification programs. The document focuses on 12 key aspects of certification and assessment-based certificate programs:

- Primary Focus of the Program
- Content of the Program and How It Is Identified
- Program Oversight
- Provider Role in Education and Training
- Education and Training Requirements and Prerequisites
- Assessment
- Validation of Assessment Content

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- Standard Setting
- Evaluation of Assessments
- Credential Maintenance
- Identification of Individuals Who Have Completed Program
- Statement of Program Purpose

NOTE: The features of quality professional or personnel certification programs described in this document are derived from the National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs* (www.credentialingexcellence.org/ncca).

Definitions

An assessment-based certificate program is a non-degree granting program that:

(a) provides instruction and training to aid participants in acquiring specific knowledge, skills, and/or competencies associated with intended learning outcomes;
(b) evaluates participants' achievement of the intended learning outcomes; and
(c) awards a certificate only to those participants who meet the performance, proficiency or passing standard for the assessment(s) (hence the term, "assessment-based certificate program").

Distinctions Between Assessment-Based Certificates and Certificates of Attendance or Participation

Certificates of attendance or participation are provided to individuals (participants) who have attended or participated in classes, courses, or other education/training programs or events. The certificate awarded at the completion of the program or event signifies that the participant was present and in some cases that the participant actively participated in the program or event. Demonstration of accomplishment of the intended learning outcomes by participants is NOT a requirement for receiving the certificate; thus, possession of a certificate of attendance or participation does not indicate that the intended learning outcomes have been accomplished by the participant. These are key distinctions between a certificate of attendance or participation and an assessment-based certificate program.

Distinctions Between Assessment-Based Certificates and Professional or Personnel Certification Programs

Professional or personnel certification is a voluntary process by which individuals are evaluated against predetermined standards for knowledge, skills, or competencies. Participants who demonstrate that they meet the standards by successfully completing the assessment process are granted

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a time-limited credential. To retain the credential, certificants must maintain continued competence. The credential awarded by the certification program provider denotes that the participant possesses particular knowledge, skills, or competencies.

Whereas the focus of an assessment-based certificate program is on education/training, the focus of professional/personnel certification is on the assessment of participants. Moreover, the assessment is independent of a specific class, course or other education/training program and also independent of any provider of classes, courses, or programs. The assessments are NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program and the certification program provider is NOT the sole provider of any education or training that may be required for certification.

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification[1]	Assessment-Based Certificate Program[2]
Primary Focus of the Program	The primary focus of a professional/personnel certification program is on providing an independent[3] assessment of the knowledge, skills, and/or competencies required for competent performance of an occupational or professional role or specific work-related tasks and responsibilities. Certification also is intended to measure or enhance continued competence through recertification or renewal requirements. The certification awarded designates that participants have demonstrated the requisite, work-related knowledge, skills, or competencies and met other requirements established by the certification program provider (e.g., academic degree, specified number of years of occupational or professional experience).	The primary focus of an assessment-based certificate program is on facilitating the accomplishment of intended learning outcomes. Although assessment is an integral part of the certificate program, the primary purpose of the program is to provide education and training which supports the accomplishment of the intended learning outcomes. The certificate awarded designates that participants have completed the required education/training and demonstrated accomplishment of the intended learning outcomes.

[1] The features of quality professional or personnel certification programs as described in this document are derived from the National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs*.

[2] Assessment-based certificate programs are distinct from certificates of attendance/participation in that they require successful completion of an end-of-program assessment to confirm participants' accomplishment of the intended learning outcomes.

[3] The assessment is independent of a specific class, course or other education/training program and also independent of any provider of classes, courses, or programs. The assessment is NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program and the certification program provider is NOT the sole provider of any education or training that may be required for certification.

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification[1]	Assessment-Based Certificate Program[2]
Content of the Program and How It Is Identified	The content of a professional/personnel certification program is based on the knowledge, skills, or competencies required for competent performance of an occupational or professional role or specific work-related tasks and responsibilities. The knowledge, skills, and competencies that are the focus of the certification program are identified through a formal study (e.g., job/practice analysis, role delineation). Program content is defined by job incumbents and/or employers through the formal job/practice analysis or role delineation process. The knowledge, skills, and competencies targeted by the certification program are periodically updated, as needed, based on the findings of a formal study (e.g., job/practice analysis, role delineation) to ensure that the certification program continues to reflect current occupational or professional practice.	The content of an assessment-based certificate program may include knowledge, skills, or competencies related to: (a) an occupational or professional role or specific work-related tasks and responsibilities; or (b) general interest or leisure pursuits (e.g., first aid, sailing). The intended learning outcomes and associated knowledge, skills, and competencies that are the focus of the education/training are identified through a systematic analysis of the needs of: (a) participants; (b) industry; (c) consumers; and/or (d) other identified stakeholders. The content of the program (education/training and assessment) is reviewed periodically and updated, as needed, by subject-matter experts and qualified individuals to ensure that it remains current and accurate and consistent with generally accepted instructional design and measurement principles.
Program Oversight	A governing body with representation from relevant stakeholders[4] is charged with oversight of the certification program. This body is legally or administratively autonomous from other entities and maintains control over all essential decisions related to certification activities.	A governing body with oversight responsibilities for the assessment-based certificate program is NOT required; however, the program should function with input from subject-matter experts and qualified individuals, who assist in development, delivery, and evaluation of the program.

[4] **Stakeholders** are the various groups with an interest in the quality, governance, and operation of a certification program, such as candidates, certificants, employers, regulators, customers/clients and the public.

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Provider Role in Education and Training	The certification program provider conducts the certification program independently of any educational/training programs. That is, the assessment is NOT linked to a specific class, course or other education/training program or to a specific provider of classes, courses, or programs. The assessment is NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program, nor is the certification program provider the sole provider of any education or training that may be required for certification. The certification program provider also is not responsible for accreditation[5] of educational or training programs or courses of study leading to the certification.	The certificate program provider conducts or sponsors the education/training that is required for the certificate. The assessment is aligned with the education/training and is designed to evaluate accomplishment of the intended learning outcomes that the provider has identified for the class, course, or program.
Education and Training Requirements and Prerequisites	Eligibility requirements may include completion of specific education/training; however, the certification program provider is NOT the sole provider of any education/training that may be required for certification. Nor is the certification program provider responsible for accreditation of educational or training programs or courses of study leading to the certification.	The program requires completion of education/training offered or sponsored by the certificate provider. There may be other prerequisites in addition to the education/training required to attain the certificate.

[5] **Accreditation** is the voluntary process by which a nongovernmental agency grants a time-limited recognition to an institution, organization, business, or other entity after verifying that it has met predetermined and standardized criteria.

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Assessment	The purpose of the assessment process is to evaluate mastery of the knowledge, skills, or competencies required for certification. Any generally accepted assessment method may be utilized for this purpose. The assessment takes place *after* the participant has had the opportunity to acquire the targeted knowledge, skills, or competencies. The assessment is conducted in a standardized manner in a secure, proctored environment. Successful completion of the assessment is required to receive the certification.	Both formative and summative assessments are typically conducted. The purpose of formative assessment is to provide feedback to both participants and facilitators/instructors with the intent of enhancing the learning process. Formative assessment may include self-reflection and diagnostic components (e.g., pretest) and may be remedial (i.e., focusing on correction or improvement). Formative assessment may take place on one or more occasions throughout the learning process. Summative (end-of-program) assessment is used to evaluate participants' accomplishment of the intended learning outcomes and generally takes place at the completion of the education/training component of the program. Any generally accepted assessment method may be utilized for conducting the summative assessment. The certificate program provider ensures that the environments in which the assessment is conducted are comparable. Any additional specifications pertaining either to how the assessments should be conducted or the required level of security should be consistent with the intended purpose of the certificate program. Successful completion of the summative assessment is required to receive the certificate. ***NOTE:*** *If an assessment-based certificate program is promoted by the provider as being appropriate for regulatory purposes or for decision making related to hiring, promotion, and other key employment-related outcomes (e.g., hospital privileging for physicians), the assessment(s) should be developed and evaluated/scored in a manner that is consistent with generally accepted measurement principles and legally defensible. The assessment(s) also should be administered in a secure, proctored environment.*

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Validation of Assessment Content	The process of validating the content of the assessment includes: (a) a formal study (e.g., job/practice analysis, role delineation) conducted in accordance with generally accepted practice; and (b) documentation of the link between the study findings and the knowledge, skills, and competencies represented on the assessment. The assessment content is periodically revised, as needed, based on the findings of a formal job/practice analysis or role delineation process to ensure that it continues to reflect current occupational or professional practice.	The process of validating the content of the assessment includes, at a minimum, documentation of the link between the intended learning outcomes and the assessment (e.g., a table listing the knowledge, skills, and/or competencies needed for participants to accomplish the intended learning outcomes and identifying how the specified knowledge, skills, and/or competencies are covered by the assessment). For high-stakes certificate programs, the validation process should include a job/practice analysis or role delineation. The assessment content is periodically revised, as needed, by subject-matter experts and qualified individuals to ensure that it continues to reflect the scope and purpose of the program and remains aligned with the education/training and the intended learning outcomes.
Standard Setting	The certification program provider uses a generally accepted method for setting the passing standard. This method, in which trained stakeholders participate, should: (a) link the passing standard to the expected performance of individuals who possess the requisite knowledge, skills, or competencies; and (b) be consistent with the nature and intended use of the assessment. The governing body for the certification program retains authority for setting/approving the passing standard.	The certificate provider uses a generally accepted method for setting the performance, proficiency, or passing standard for the summative (end-of-program) assessment. This method, in which trained subject-matter experts participate, should: (a) link the performance, proficiency, or passing standard to the expected performance of a participant who has accomplished the intended learning outcomes; and (b) be consistent with the nature and intended use of the assessment. The certificate provider retains authority for setting/approving the performance, proficiency, or passing standard.
Evaluation of Assessments	The effectiveness of the assessment is evaluated on a regular basis to ensure its ongoing utility for measuring the knowledge, skills, and competencies targeted by the certification program. The procedures and analyses performed for this purpose are consistent with generally accepted measurement principles.	The effectiveness of the assessment is evaluated on a regular basis to ensure its ongoing utility for evaluating participants' accomplishment of the intended learning outcomes. The procedures and analyses performed for this purpose are consistent with generally accepted measurement principles.

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DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Credential Maintenance	A certification is time limited (i.e., it will lapse or expire at the end of a predetermined time period if recertification/renewal requirements are not met). To maintain the credential, a certificant is required to engage in specified activities designed to measure or enhance continued competence. Certificants are subject to disciplinary policy.	An assessment-based certificate is generally NOT time limited (i.e., it typically does NOT lapse or expire at the end of a predetermined time period). A certificate holder is generally NOT required to engage in subsequent activities to maintain the certificate; however, in some cases, providers may require additional education, training, and/or assessments for this purpose.
Identification of Individuals Who Have Completed Program	Certificants are "Certified in XYZ" or "Certified XYZ Professionals." (*NOTE: These terms are illustrative; they are not meant to be inclusive or prescriptive*). Certificants are awarded an acronym or letters for use after their names to signify that they have obtained and maintained the credential.	Certificate holders have a "Certificate in XYZ." (*NOTE: This term is illustrative; it is not meant to be inclusive or prescriptive*). Certificate holders are NOT awarded an acronym or letters for use after their names upon completion of the certificate program.
Statement of Program Purpose	Certification program providers publish an explicit statement regarding the primary purpose of the certification program (e.g., to protect the public, to provide employers with a tool for identifying qualified individuals). They also provide guidance to candidates, certificants and other stakeholders as to what inferences can properly be made regarding those who hold the certification. Furthermore, these inferences are consistent with the stated purpose of the certification and the type of assessments, evaluation/scoring procedures, and standard-setting methodologies utilized.	Assessment-based certificate program providers publish an explicit statement regarding the primary purpose of the certificate program (e.g., to assist participants in achieving specified learning outcomes). They also provide guidance to participants, certificate holders and other stakeholders as to what inferences can properly be made regarding those who hold the certificate. Furthermore, these inferences are consistent with the stated purpose of the certificate and the type of assessments, evaluation/scoring procedures, and standard-setting methodologies utilized.

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APPENDIX B

Expert Roundtable Roster

CalWEP ROUNDTABLE ROSTER: Outdoor Leak Detection & Repair Certification Training					
Name	**Phone**	**Email**	**City**	**Company/ Org.**	**Title**
Sandra Giarde	(916) 830-2780	sandragiarde@clca.org	Sacramento	CLCA	Executive Director
Eric Santos	925-525-3645	eric.santos@brightview.com	Pleasanton	Birghtview Landscape Services	VP of Irrigation Services; Board of Directors (Rescape CA)
Janet Luehrs	925-392-0237	janet@brookwater.com	Pleasanton	Brookwater, Inc.; American Society of Irrigation Consultants	President ASIC
Paul Piazza	(707) 547-1968	Paul.Piazza@scwa.ca.gov	Santa Rosa	Sonoma Water; QWEL	Principal Programs Specialist
Steve Hohl	(949) 635-0474	shohl@waterconcern.com	Rancho Santa Margarita	Water Concern	Irrigation Consultant
Sana Wazit		swazit@valleywater.org	Bay Area, CA	Valley Water	Water Conservation Specialist I
Kyle Ramey	(650) 349-3000	kramey@bawsca.org	Bay Area, CA	Bay Area Water Supply & Conservation Agency	Water Resource Specialist
Lisa Cuellar*	(916) 287-9837	lisa@calwep.org	Sacramento	California Water Efficiency Partnership	Director of Programs, *Roundtable Facilitator

APPENDIX C

Expert Roundtable Notes (April 17, 2023)

Roundtable: Outdoor Leak Detection & Repair Certification Training

Monday, April 17, 2023

9:00 – 11:00 AM PCT

Facilitator: Lisa Cuellar, California Water Efficiency Partnership (CalWEP)

Funding Water Agencies: Bay Area Water Supply & Conservation Agency (BAWSCA); Valley Water

Attendees: **See Roster*

GOAL

To receive your **candid** and **honest feedback** regarding multiple elements of a potential *Outdoor Leak Detection and Repair Certification Training* geared towards plumbers.

ROUNDTABLE OBJECTIVE

Your feedback will help inform a leak training *framework* that will be submitted by CalWEP to the funding water agencies. Eventually the framework will be adapted into an RFP package for the development of the training materials. *Note that the RFP solicitation date has yet to be determined.

TRAINING OBJECTIVE

Landscape Professionals who complete the training will be placed on a public-facing directory. Water agencies will promote the directory amongst customers looking for leak detection and/or repair services.

****

ROUNDTABLE TOPICS

General

1. **In order to qualify, landscapers/irrigation professionals must:**
    a. **Maintain a contractor's license.**
    Response (Eric): – bonded and insured w/ Contractor's license
    Response (Janet): – Irrigation professionals have certifications not license

    b. **Agree to price-ceiling/cap – For or against? Flat rate or hourly?**
    Response (Sandra): Anti-trust legal advice regarding setting of pricing caps/ ranging. Investigate how to make defensible? Expose to any adverse risk
    Response (Steve): In the association code of ethics they agree not to discuss costs. Response time can be included in ethics code. Once insurance gets called in for leak repair – contractor has nothing to do with costs. Ex. Sub slab leak repair – amount of money transferred b/w insurance and plumber blew his mind.
    c. **Commit to a response time of 72 hours or less?**

Response (Paul): Supports this requirement because after a leak notification initial responsibility falls on customer within 72 hours. Utility doesn't want to assume the type of leak.
Response (Sandra): Definitions are important: What does response mean? Is 72 hours business hours? Note that "mark and locate" could take several days.

d. **Others?_____**

2. **Who would most likely take this training? Entry level professionals, (0-5 years of experience), field supervisors?**
Response (Paul): Supervisory level to decide if it's useful. Smaller companies may be different.
Response (Sandra): Target entry level but expect supervisors to take to see if it's worthwhile for their staff.
Response (Eric): If a registration fee is charged most would pick one person from team who's worth investing in – Ex. A senior irrigation tech. If free then most contractors would send multiple employees.

3. **What do you perceive as the biggest hurdle to getting folks to attend?**
Response (Sandra):
   - Unfortunate reality due to subsidies – workforce is looking for something for free. Another option can get a partial payback for hitting milestones. Certification programs are awesome but 80% don't survive.
   - Three top hurdles: 1) cost, 2) time to invest including taking an exam, and 3) how far do we have to go? 10 miles + full day – okay. 50 miles + half day.
   - Good point about competition – how does training compete with own business model (Ex. Time away, or how could erode customer base).

   Response (Paul): Value proposition is key. Marketing strategy is key.

4. **Could existing trainings, like QWEL, expand to include a leak detection and repair model?**
Response (Paul): QWEL module – struggling with other propositions to see how they fit under umbrella as an "irrigation systems audit" certification training. EX. Rainwater catchment and similar with grey water. Where does this fit? Greywater – EPA doesn't offer a cert. for that topic under WaterSense brand. Begs question – how do you pay for it? Any continued expansion of QWEL is cost intensive. Are they the proper organization?
Response (Janet): Perhaps IA could be a possibility? Even water auditor?
Response (Eric): Existing for CIC (very comprehensive exam – geared toward irrigation contractor) or CIT (original intent was modular, how to rebuild a valve, how to replace sprinkler, evolved into everything that a technician should know) > leak detection would fall under both categories. Comprehensive exam pass rate for entry level is not as high as you would think (But neither have a hands-on component). Faculty does not instruct to prepare for the exam, but the class that's offered for prep for CIT exam is a separate full two-day course.
Clear distinction b/w education and certification. Those who educate do not interact with those on certification board. Can't interact on what's being taught and what's on exam.

Auditors – that's the one class that gets you prepared to pass to the exam.

5. **Instructors must have sufficient design and installation experience – how hard is it to secure instructors? Minimum qualifications?**
   Response (Eric): To build training course start with someone who's been doing leak detection for years and years. That's the guy who should be teaching - Not in business and so does not hold back, no competition issue.
   Response (Sandra): CLCA instructors are cause dedicated. Subject matter experts with field experience- have to consider where to identify experts & who creates the curriculum. Program would have a specific geographic area where they wouldn't solicit business in that area at all.

6. **What are the best marketing outlets? How would you get the word out?**
   Response (Sandra): Collaborate with water agency. CLCA multiple points of impression – state and chapter level. Website and social media. Could work with funders to promote that once you are certified you can be on referral list.
   Response (Eric): Utilize irrigation distributors and water agencies to get the word out.
   Response (Paul): Connection with businesses where irrigation managers shop. Face time with local contract community. Market to customers and create demand. Contractors see value coming from customers.

Leak Detection

7. **New Technologies -what's out there that seems promising?**

   Response (Eric): New ultrasonic flow sensing but that's different than equipment to find a leak. Sensitive flow meter (1st thing to get started with new technology)

   Response (Steve): Plumber and slab leak. Headphones and microphone technology (penetrated concrete). Took 10 minutes.

8. **What's in your leak detection toolbox? Equipment type and manufacturer:_____**
9. **Leak detection training must be hands-on. Agree or disagree?**
   Response (Paul): Yes to see what tools are needed.
   Response (Janet): Yes I think hands-on would be critical.
10. **Should irrigation system auditing (e.g., catch can tests) be a standard method of leak detection?**
    Response (Ashley): No for catch-can. Unless there's a big leak on sprinkler.
    Response (Paul): Constant pressure vs. an irrigation leak when system is actuated. Usually a lot of other queues.

Training Structure

11. **In-person or Virtual (Online) trainings – which is better?**
    Response (Eric): Must be in-person. Only so much you can cover virtually. Allows utilization of equipment.
    Response (Ashley): Being on a list is a pretty strong reason to show up.

12. **What are the pros and cons of each of these training frameworks?**
    a. **Non-certification –**
    b. **Certification – Ex. QWEL**
        i. **In order to offer a certification one must? _____**
        ii. **Who should be the certifying body?**

    Response (Paul): Exam is key, some folks would be interested in training but not if an exam is involved. Note that Sandra agrees with Paul.

    - Level of risk that certifying organization takes on. Very little risk perceived with conducting an irrigation audit (under QWEL). Easier for water agencies to swallow. There should be a liability and legal risk discussion regarding certification training.

    Response (Sandra): Now that you've got your certification do you need to demonstrate continued competency? Is there a cost to maintain? Certificate vs. certification are very different paths.

13. **How do you ensure legal defensible curriculum/ recommended best practices?**
    Response (Paul): Utilities are risk adverse. Depending on how the property is plumbed – it's made pretty clear not to tell a customer decisively where it's occurring. B/c if the diagnosis is wrong utilities could be liable. Could mitigate with a "hold harmless" agreement.
    Response (Sandra): There are legal implications/ challenges with certification training. ANSY standards? Note that other organizations (Admin, scoring, outcomes of testing) are not legally valid. Are the assessment results (e.g., exam results) defensible in the court of law? Defensible and fair? Big deal and complicated. Certification programs are more than knowledge recall. Looking at documentation, procedure, validity, reliability, fairness & equity, robust & secure delivery process.

14. **Are there CA-specific codes and standards that must be addressed?**
    Response (Janet): Residential properties need to have flow sensing if it's over 5000 sq. ft.
    Response (Steve): Not sure if it's certain age of building, how long they go before set off, shut system down until repaired.
15. **Any recommended training facilities or supply houses?**
    Response (Eric): Defer to Sandra, CLCA used to have CLT – specific location ID. Some community colleges like Foothill and Las Positas college have a new horticulture department and building.
    Response (Sandra): Irrigation testing is performed exclusively at sites that had plumbed areas, Cuyamaca college/ American River, Foothill college. Supply houses have parts but not sites. Can be a roadblock to have replica environment ready to go.

16. **Which do you recommend: CEUs or a refresher course every 2 years?**
    Response (Paul): Refresher course makes more sense than CEU's – b/c CEU courses might not be tailored to course. CEUs are problematic, can be broader than curriculum, a lot to manage. Offer the class with info you want them to retain. It's a safety issue, demonstrate knowledge.

Response (Eric): Backflow refresher that most use, but taking exam every three years. 8 hours of CEUs for backflow cert.

Curriculum – Basic Topics

*In general, what do you think about the curriculum outline below? Anything missing?

Response (Eric): Most of the stuff covered on A- similar to IACIT cert irrigation technician exam. Anything to help trainee speak on these topics and communicate concepts to customer.
Response (Sandra): Always start with common core. At least with CLCA you have to go back to step one. Might need to do an assessment with cohort to see if there's something that they are unaware of.
Response (Paul): Regarding A.a – Irrigation Plan Reading, note that Irrigation plans are few are far between and as-builts rarely exist. Good skill if certification training is for irrigation tech. but perhaps not for leak detection. Focus more on-site assessment -what are you able to pick up quickly and translate? Won't be able to get landscape plan from average property owner. I agree with customer feedback to maintain integrity. Want to hear from people with complaints to make positive program improvements. Advocate for checklist approach.

A. ***Common Core –*** *Is this necessary (?) – Example: NALP Landscape - Technician Irrigation Section*
   a. *Irrigation Plan Reading*
   b. *Irrigation Components and Principles*
   c. *Basic Electricity and Underground Wiring, Hydraulics, Soil Types, Controllers and Remote Control Valves, Pressure Loss, Elevation Change and PSI, Velocity and Surge, Water Delivery Methods*
   d. *Irrigation Methods and Procedures*
   e. *Installation of : Pipes and Fittings, Mounting and Wiring of: Connections, Controllers and Valves. Backfilling and Compacting, Flushing, Nuzzling and Sprinkler Head Adjustments, Electrical and Hydraulic Troubleshooting, Damaged Component Replacement and Repair, Winterizing.*
   f. *Equipment and Tools*
   g. *Trenchers and Pipe pulling equipment*
   h. *Controller Programming*

B. ***Water Conservation***
   a. *Lead with the "WHY": Water waste from leaks is staggering! Landscape professionals are the unsung heroes who can help customers save hundreds of millions of gallons collectively.*
   b. *Lead with the Benefits: Recognition and new clients/ more work. Offer marketing collateral: digital logos, brochures.*
   c. *Most common leaks found outdoors and how much they waste*
   d. *WaterSense equipment – Look for the label*
   e. *Local agency rebates*
   f. *Model Water Efficient Landscape Ordinance*
   g. *Automated Metering Infrastructure - What is it and how does it detects leaks? Rise in leak notifications driving customer interest.*

h. *Flume devices and other flow monitoring devices – What are they and how do they detect leaks? How smart apps are alerting customer to potential leaks.*
i. *Codes and Standards that address leaks*

C. Customer Communication

a. *Acknowledge your training (show training badge/logo) and ID local water agency endorsement*
b. *No upselling*
c. *Customer feedback forms (online – sent directly to water agency)*

D. Leak Detection

a. *Standardized Check-list* – what should be included?
    i. *Utilizing the main water meter (or DIM)*
    ii. *Check the controller schedule or battery operated timers (maybe it's not a leak at all)*
    iii. *Isolation of system valves (main, AVB, pool fill, etc.)*
    iv. *How to ID common failures: valve diaphragms, ruptured drip lines, broken pipes*
    v. *Pressure management*
    vi. *Pressure decay testing*
    vii. *Leak detection technologies, including acoustic devices, FLIR cameras, others* _____
    viii. *When to call a leak detection company?*

17. **Vendor demonstrations: Who should we invite?_____**
    Response (Eric): Will provide potential person to invite
    Response (Paul): WSO, Kavanaugh (might be familiar with new technologies)

18. **Hands-on component: _____**

E. Leak Repair

a. *Toolkit must haves:* _____
b. *Leak Repair Types:*
    i. *Valves*
    ii. *Drip lines*
    iii. *Broken nozzles*
    iv. *Hose bibs*
    v. *Broken fittings and on occasion pipes*
    vi. *Pools and other water features*
    vii. *Under slab*
    viii. *Service line to house*
c. *When to repair and when to replace?*
d. *When to pull a permit when not to?*
e. *How insurance claims can impede work?*

19. Vendor demonstrations: Who should we invite?_____
20. Hands-on component: _____

F. Replacement of old systems & Upgrades

a. *Codes and Standards*
    i. *Backflow prevention*
b. *Best practices*
    i. *Efficient alternatives (transition from overhead to spray or mp rotators)*
    ii. *Install master valve (?)*
    iii. *Entire zone sprinkler replacement*
    iv. *Update controller*
c. *Efficient technology upgrades*
    i. *Smart controllers*
    ii. *Submeters*

Testing

21. Certification exam: Who creates? Ever heard of a Psychometric Consulting and Exam Development?
22. If not certifying, are quizzes enough?
23. Can you elaborate on your exam structure?

24. What did I forget to ask?

Response (Paul): Consider landscape companies plumbed with recycled water- how to effectively repair, inspect; may be other requirements.
Response (Eric): Recycled water: No cross connection. Has to happen as a daylighted inspection. Draw the line between upselling and benefitting the customer down the line.

APPENDIX D

Landscape Certification Trainings Comparison Matrix

Select Outdoor Certification Trainings for the Landscape Workforce

Training	Description	US EPA WaterSense Cert.	Target Student[1]							
			Entry Level (0-5 yrs.)	Mid-Level (6-10 yrs.)	Supervisor/ Mgmt.	Irrigation Techs	Water Managers	Designers/ Architects	Green Gardeners	Application (Y/N)
Qualified Water Efficient Landscaper	Provides knowledge in water efficient and sustainable landscape practices, including water management and preservation of other valuable resources. Training addresses irrigation system troubleshooting lessons.	✓	●	●	●	●	●	●	●	N
Watershed Wise Landscape Professional	Qualifies conservation, water quality and landscape professionals to evaluate irrigation systems and factor rainwater use efficiency into outdoor water efficiency analysis, and includes making basic repairs to the irrigation system.	✓	●	●	●	●	●	●	●	N
CLCA Water Manager	Helps the green industry reduce landscape water usage by certifying individuals through performance-based water budgeting.	✓	●	●	●	●	●	●	●	N
IA Certified Landscape Irrigation Auditor	CLIAs quantify and analyze landscape irrigation water use. Includes "make maintenance recommendations and perform minor repairs"	✓	●[2]	●	●	●	●	●	●	Y
IA Certified Irrigation Contractor	CICs install, maintain and repair irrigation systems. Certifies that candidate has met an advanced level of competency.	✓	●[3]	●		●			●	Y
IA Certified Irrigation Technician	CITs are field technicians who install, maintain and repair irrigation systems.		●[4]	●		●			●	Y
ReScape Maintenance Qualification	Learn about regenerative landscape practices from leading experts in soil health, irrigation, plant care, integrated pest management, and more.		●	●					●	N
NALP Certified Landscape Technician	Credential demonstrate your expertise in the field of exterior landscaping (installation, maintenance and irrigation)		●	●	●				●	N

[1] *Deduced target audience based on certification description. Note this does not preclude anyone who is interested from undertaking certification.*

[2] *IA recommends at least one year of irrigation-related work experience before becoming CLIA certified.*

[3] *IA recommends at least three years of irrigation-related field experience before becoming CIC certified.*

[4] *IA recommends at least 6 months or 1,000 hours of irrigation-related field experience before becoming CIT certified.*

Prepared by CalWEP (May 2023). Source: Internet Research

Select Outdoor Certification Trainings for the Landscape Workforce

Training	Educational Format			Training Fee	Exam Details		Post Certification	
	Classroom Lecture (in-person or virtual)	Online Asynchronous (self-directed)	Self-Study (Exam only)		Exam Fee	Exam Length	Annual Renewal Fee	CEUs
Qualified Water Efficient Landscaper	✓		✓	Variable[5]	$30	100 MC	NA	2 hrs/yr
Watershed Wise Landscape Professional		✓		$150	NA	?	?	?
CLCA Water Manager	✓			Variable[5]	$200	50 MC	$250	12-month site mgmt.
IA Certified Landscape Irrigation Auditor			✓	NA	$495	125 MC	$125	20 /bi-annual
IA Certified Irrigation Contractor			✓	NA	$495	150 MC	$125	20 /bi-annual
IA Certified Irrigation Technician			✓	NA	$300	100 MC	$125	20 /bi-annual
ReScape Maintenance Qualification	✓			$745	NA	<100	<$100	3 hrs/yr
NALP Certified Landscape Technician		✓	✓	NA	$645	?	?	?

[5] *Typically if trainings are sponsored by water agencies, the agency subsidizes the course to enable Free or significantly reduced registration fees (approx. $100 - $250 per/registrant)*

Prepared by CalWEP (May 2023). Source: Internet Research

APPENDIX E

CalWEP's Suggested Curriculum Topics

Suggested Outdoor Leak Detection and Repair Training Curriculum Topics

Prepared by CalWEP and reviewed by expert roundtable participants on (4/17/2023)

A. *Common Core* *(Example: NALP Landscape Technician Irrigation Section)*

a. *Irrigation Plan Reading*
b. *Irrigation Components and Principles*
c. *Basic Electricity and Underground Wiring, Hydraulics, Soil Types, Controllers and Remote Control Valves, Pressure Loss, Elevation Change and PSI, Velocity and Surge, Water Delivery Methods*
d. *Irrigation Methods and Procedures*
e. *Installation of : Pipes and Fittings, Mounting and Wiring of: Connections, Controllers and Valves. Backfilling and Compacting, Flushing, Nuzzling and Sprinkler Head Adjustments, Electrical and Hydraulic Troubleshooting, Damaged Component Replacement and Repair, Winterizing.*
f. *Equipment and Tools*
g. *Trenchers and Pipe pulling equipment*
h. *Controller Programming*

B. *Water Conservation*

a. *Lead with the "WHY": Water waste from leaks is staggering! Landscape professionals are the unsung heroes who can help customers save hundreds of millions of gallons collectively.*
b. *Lead with the Benefits: Recognition and new clients/ more work. Offer marketing collateral: digital logos, brochures.*
c. *Most common leaks found outdoors and how much they waste*
d. *WaterSense equipment – Look for the label*
e. *Local agency rebates*
f. *Model Water Efficient Landscape Ordinance*
g. *Automated Metering Infrastructure - What is it and how does it detects leaks? Rise in leak notifications driving customer interest.*
h. *Flume devices and other flow monitoring devices – What are they and how do they detect leaks? How smart apps are alerting customer to potential leaks.*
i. *Codes and Standards that address leaks.*

C. *Customer Communication*

a. *Acknowledge your training (show training badge/logo) and ID local water agency endorsement*
b. *No upselling*
c. *Customer feedback forms (online – sent directly to water agency)*

D. Leak Detection

- *a. Standardized Check-list*
  - *i. Utilizing the main water meter (or DIM)*
  - *ii. Check the controller schedule or battery operated timers (maybe it's not a leak at all)*
  - *iii. Isolation of system valves (main, AVB, pool fill, etc.)*
  - *iv. How to ID common failures: valve diaphragms, ruptured drip lines, broken pipes*
  - *v. Pressure management*
  - *vi. Pressure decay testing*
  - *vii. Leak detection technologies, including acoustic devices, FLIR cameras, others*
  - *viii. When to call a leak detection company?*

APPENDIX F

CalWEP Landscape Implementation Guide: Outdoor Water Survey

Excerpt from CalWEP's Landscape Implementation Guide: Outdoor Water Surveys

Full text available here: https://calwep.org/guide/survey-and-audits/

**Note must be logged in to your MyCalWEP account to access information*

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Technical How-Tos

Surveys typically include inspections of the following landscape and irrigation components:

1. Review the meter with customer, landscape maintenance contractor, or both. Check for leaks. For a dedicated irrigation meter, watch for movement at the meter when the irrigation system is turned off. Mixed meters should have all indoor water turned off prior to checking the meter. Locate and repair any leaks if movement is seen.
    - Review consumption history.
    - Identify irrigated area of each irrigation only meter (s) for the purpose of creating water budgets for the customer
2. Take a water pressure reading. If it is too high, suggest the installation of a pressure regulator or adjustment to their existing pressure regulating device. If the pressure is too low, it can be corrected by adding a booster pump or redesign the irrigation system.
3. Check for over watering by reviewing the program on the irrigation controller. Ask what the Peak Summer irrigation schedule was? How many days, cycles for each plant type. Document the settings for runtimes per station per program, document the times of day and days per week the controller is set. Add the total minute's runtime for the week for each station and compare to the ET_0 based runtimes for that week.
4. With assistance (preferably with the landscape professional on site), run each station and visually assess the condition of the system. Note if there are leaks, breaks or misaligned heads. Visually check for head to head coverage for uniform distribution on spray systems. Observe the type of irrigation system and note if the system has matched manufacturer heads and nozzles or if the station mixed irrigation uses (i.e. sprays with drip and/or rotors).
5. While the irrigation is running, see if the spray from the heads are blocked by vegetation, or sunk into the ground with turf blocking the spray pattern

or no longer at a 90 degree angle to the ground. Recommend the vegetation is cleared from the spray or realign the head.

6. See if water is running off the planted area and suggest adjustment of runtimes by reprogramming for multi runtimes. Recommend check valves to correct low head drainage.
7. Take a soil sample at least 6" deep to check for organic material level and recommend application of compost where appropriate to improve the pore space for irrigation.
8. Check that all irrigation is watering the root zone of the plants. This can be checked with a soil moisture sensor or manually with a soil probe. Eliminate irrigation systems that are no longer watering vegetation.
9. Check that vegetation is requiring the same water needs, the plants are receiving the same sun exposure and equal microclimates on each station. Suggest adding stations to correct for the design flaw.
10. Drip systems require close investigation for missing emitters, splits in tubing, clogged emitters, missing end caps. Listen for escaped water emitting at a faster rate than the balance of the system. Recommend flushing the drip system, clearing clogged emitters, cleaning the filter and replacing all broken and missing parts.

APPENDIX G

QWEL Feedback Form Example

Qualified Water Efficient Landscaper (QWEL) Training Class and Exam Feedback

Date:_____ Location:_____

1) What were your goals for attending this training class? (check all that apply)

___ To receive a certification in landscape water efficiency.

___ To learn about landscape irrigation auditing.

___ To be able to review and certify landscapes for compliance with the State Landscape Ordinance.

___ To better my business and client services.

___ To learn about water efficient practices to protect the environment.

___ Other reason(s). Please explain:_____

2) How did you learn about the class?_____

3) The class description accurately reflected the content of the class:

___Strongly Agree ___Agree ___Disagree ___Strongly Disagree

4) **The instructor demonstrated knowledge of the topic and presented it in an informative manner:** ___Strongly Agree ___Agree ___Disagree ___Strongly Disagree

5) This class has stimulated your interest in the topic:

___Strongly Agree ___Agree ___Disagree ___Strongly Disagree

6) The information provided in this class will help you better manage landscapes for water efficiency: ___Strongly Agree ___Agree ___Disagree ___Strongly Disagree

7) The information provided in this class will help you educate your clients, managers or others involved with a landscape site about landscape and irrigation water efficiency:

___Strongly Agree ___Agree ___Disagree ___Strongly Disagree

8) The class was what you expected: ___Yes ___No If No, Why?

_____

9) What did you find most useful about the class?_____

_____

10) Is there any other feedback you would like to provide on the class content?

_____

_____

11) Please rate the logistical aspects of the class. Circle an opinion.

Day:	Excellent	Good	Fair	Poor
Time:	Excellent	Good	Fair	Poor
Length:	Excellent	Good	Fair	Poor
Location:	Excellent	Good	Fair	Poor

12) Your overall rating of the class is: ___Excellent ___Good ___Fair ___Poor

Thank you! Your feedback is very important to us.

Qualified Water Efficient Landscaper (QWEL) Training Class and Exam Feedback

Please provide feedback on any test questions that require an edit, need clarification or were difficult to understand. Be as specific as possible. Your input will assist us to improve future tests.

Question No.	Comment