



Collection System Maintenance Certification

2013

Candidate

Handbook



This booklet contains...

- Subject matter for the Collection System Maintenance tests
- New KSA descriptions including KSA weighting
- Selected study references
- Certification policies
- Frequently Asked Questions

Collection System Maintenance

2013

Candidate Handbook



This handbook contains information about the Collection System Maintenance certification program. Please read this entire handbook to become familiar with certification procedures and policies. As a certificate applicant, you are responsible for knowing the contents of this handbook. If you have any questions please contact your Local Section Chair (listed in the TCP Application) or the CWEA office at 510-382-7800.

Statement of Non-Discrimination Policy

CWEA does not discriminate among applicants on the basis of age, gender, race, religion, national origin, disability, sexual orientation or marital status.

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Introduction

The California Water Environment Association
CWEA's mission is to enhance the education and effectiveness of California wastewater professionals through training, certification, dissemination of technical information, and promotion of sound policies to benefit society through protection and enhancement of the water environment.

CWEA is a California Nonprofit Corporation and is a Member Association of the Water Environment Federation and a member of the National Organization for Competency Assurance.

The Technical Certification Program

The Technical Certification Program (TCP) was created to offer multilevel technical certification for individuals employed in the water quality field. Tests are written by vocational specialists and administered throughout the year in six different disciplines: Collection System Maintenance, Environmental Compliance Inspection, Laboratory Analyst, Plant Maintenance (Electrical/Instrumentation and Mechanical Technologist), Industrial Waste Treatment Plant Operator, and Bio-solids Land Application Management.

CWEA first offered a certification program for operators of wastewater treatment plants in 1937. The program was administered by CWEA until 1973 when the State of California assumed responsibility for the program. During those 36 years, CWEA awarded 3,915 operator certificates.

The first committees were formed in 1975 to establish a new voluntary certification program for water quality professionals specializing in disciplines other than plant operation. The Voluntary Certification Program (VCP) emerged with specialized certificate programs for Collection System Maintenance, Plant Maintenance, Environmental Compliance Inspection, and Laboratory Analyst with certifications first issued in April 1976. In the 1980s, two more disciplines were added: Electrical/Instrumentation, and Industrial Waste Treatment Plant Operator.

Today CWEA offers certification in vocational programs with a total of 23 individual certifications. About 2,000 certification applications are processed annually and currently 5,500 certificates are held by individuals in California and neighboring states.

The Certification Process

To become certified, **all applicants** must complete the Application For Technical Certification, pay the application fee, have suitable experience and education, and pass the computer-based test. Application instructions and fee schedules are listed on the application.

Important Information

After applications are received at the CWEA office, applicant information is compiled in a database and reviewed by CWEA staff and subject matter experts for the respective vocation applied for. If approved, the applicant will receive an acceptance letter. If the application is rejected, the applicant will be notified and asked if warranted to supply more information. After completion of the computer-based test and grading, applicants are mailed official test results. Those who pass the exam, are mailed certificates and blue wallet cards.

Code of Ethics

The Code of Ethics is intended to reflect the standards and behavior that California Water Environment Association certificate holders and applicants expect of each other as they perform their work protecting public health and the environment and that reaffirm the value of holding a CWEA certificate. The purpose of the Code of Ethics is to ensure public confidence in the integrity and service of professional water quality workers while performing their duties.

All California Water Environment Association certificate holders and applicants are expected to meet the following standards of professional conduct and ethics:

1. To protect public health, themselves, their co-workers, property, and the environment by performing the Essential Duties of the CWEA certified vocation safely and effectively, and complying with all applicable federal, state and local regulations.
2. To represent themselves truthfully and honestly throughout the entire certification process.
3. To adhere to all test site rules and make no attempt to complete the test dishonestly or to assist any other person in doing so.
4. To refrain from activities that may jeopardize the integrity of the Technical Certification Program.

Test Administration And Admission

Testing Dates and Sites: Tests are given throughout the year within four quarterly windows (see Application for Technical Certification for test schedule). Applicants who are eligible to take the test will be mailed an acceptance letter with instructions on how to schedule their exam.

Testing Window	Test Dates	Application Deadline
Spring	April 1 - June 30	February 28
Summer	July 1 - September 30	May 31
Fall	October 1 - December 31	August 31
Winter	January 1 - March 31	November 30



Test Site Admission: Certificate candidates are required to show at least one valid government issued photo identification (State driver's license or ID, or passport). Only after positive identification has been made by the testing proctor can a candidate be allowed to take a CWEA certification test. Candidates are not required to show their eligibility letters to enter the test site.

Test Security: All tests are computer-based. No reference material, laptop computers, or cameras are allowed in the test site, see PV policy (www.cwea.org/cbt). Candidates will have access to an on-screen calculator, however, candidates are welcome to bring pre-approved calculator (visit www.cwea.org/cbt). Candidates are not allowed to take any notes from the test site. Candidates who violate test site rules may be asked to leave the site and may be disqualified from the test. All violations of test security will be investigated by CWEA and appropriate action will be taken.

Test Design And Format

Test Design: All certification tests are designed to test knowledge and abilities required to perform the Knowledge Domains listed at the end of the section with minimal acceptable competence.

The Knowledge Domains previously known as Essential Duties and Test Content Areas for each certification were determined by a job analysis and meta-analysis of job specifications by two independent psychometric consulting firms. The studies gathered data from onsite visits of over 31 water and wastewater agencies, interviews with 110 water and wastewater professionals, and analysis of more than 300 job specifications. All research was conducted under the guidance of the Technical Certification Program Committee, vocational subcommittees, and CWEA staff. All test questions are designed to measure at least one area of knowledge or ability that is required to perform an essential duty.

Test Delivery Mechanism: All tests are computer-based format and are available in the English language only.

Test Format: All TCP tests are in multiple choice format (see *Sample Test Questions* in this booklet for an example). The multiple choice format is considered the most effective for use in standardized tests. This objective format allows a greater coverage in content for a given amount of testing time and improves competency measurement reliability. Multiple choice questions range in complexity from simple recall of knowledge to the synthesis and evaluation of the subject matter.

Test Scoring

Scoring Method: All tests are electronically scored by Pearson VUE pending approval by CWEA. Most test items are valued at one point. Some test items requiring calculations are worth multiple points varying from two to five (possibly more). After tests are scored, total points are compiled and an overall score is calculated as the sum of all points earned on the test. If the overall score is equal to , or greater than the established pass point, the candidate has passed the test. Total points possible for each test varies, but the average is 100 points plus or minus 25.

How Passing Scores Are Set: Each time a certification test is given the questions are changed resulting in a different test form. Since each form has different questions the difficulty level of the test may not be the same from form to form. The passing score is developed as an overall estimate of minimal acceptable competence in the Test Content Areas by subject matter and testing experts. Passing scores are determined by an overall passing score, not by performance on individual Test Subject Areas, and are independent of other candidate's scores. Partial credit will not be awarded for any test item answered incorrectly.

Test Rescheduling and Cancellation

To reschedule your application you must submit a written request (a letter stating that you wish to postpone to the adjacent testing window. You may only reschedule your application to the next window once without a fee. Additional postponing will require a \$40 reschedule fee. There are no exceptions to this policy.

To cancel your application you must submit a written request to CWEA. The written request must be received at the CWEA office no later than 2 weeks after the approved test window begins. Full refunds, less the administrative fee, will be made within 4 weeks after the scheduled test date. There are no exceptions to this policy.

If you already have a scheduled exam with our testing administrator, Pearson VUE, and need to cancel your appointment, you must contact them 24 hours in advance to avoid losing your exam fee.

Item Appeals

Candidates who wish to appeal a specific test item must do so during the test by completing *Candidate Comment Review Screen* during the exam. Candidate comments will be evaluated and appropriate adjustments will be made to the test content. Candidates submitting comments will not be contacted in regards to the appeal.



Test Result Notification

Official test results are routinely mailed to certificate candidates approximately two weeks after the test date. Results are never given over the phone, via fax or email. All results are confidential and are only released to the certificate candidate.

Issue of Certificate/Blue Wallet Card

Certificates and blue wallet cards are issued to all candidates who pass the test. Certificates and blue wallet cards are mailed within three weeks after result notifications are mailed.

Certificate Renewal

All certificates are renewable annually. The first renewal is due one year from the last day of the month in which the certification test was held. Certificate renewals less than one year past due are subject to the renewal fee plus \$25 late fee. Certificates more than two years past due are only renewable through retesting. Renewal notices are mailed to certificate holders two months before the due date. It is the responsibility of the certificate holder to ensure that his or her certificate(s) remains valid. Continuing education will be required for renewal after 2001.

Accommodations For Those With Physical or Learning Disabilities

In compliance with the Americans with Disabilities Act, special accommodations will be provided for those individuals who provide CWEA with a physician's certificate, or its equivalent, documenting a physical or psychological disability that may affect the individual's ability to successfully complete the certification test. Written requests for special accommodations must be made with the test application along with all supporting documents of disability.



Grade I Collection System Maintenance

Collection System Maintenance Grade I Certification is designed to demonstrate competency at the entry and basic working level. More specifically, Grade I certification implies competence in the *Knowledge, Skills, & Abilities (KSAs)* required to perform an entry Collection System Maintenance Technologist.

Eligibility Criteria For Taking The Test

There are no experience or education requirements for Grade I certification. Completing the Application for Technical Certification, paying the appropriate application fee, and passing the examination are the only requirements. It is, however, *recommended* that Grade I candidates have at least one year of experience working as a Collection System Maintenance Technologist performing the *Knowledge, Skills, & Abilities* listed below. Many candidates without the recommended experience have difficulty successfully completing the computer-based test.

Knowledge, Skills & Abilities (KSAs) Of The Grade I Collection System Maintenance Technologist

Individuals certified as Grade I Collection System Maintenance Technologists are expected to possess acceptable competency when performing the tasks that are necessary for entry level Collection System Maintenance Technologists. These necessary tasks are known as the *Knowledge, Skills, & Abilities*.

Complexity Of Test Questions

At the Grade I level, certificate candidates are expected to have basic knowledge of the job and the ability to safely perform the *Knowledge, Skills, & Abilities*. Examinees will have to answer multiple choice questions that test knowledge, comprehension, and application of the subject matter. The complexity of the questions will range from basic recall of previously learned material and the ability to understand the meaning of the subject matter, to being able to apply knowledge to new situations.

Understanding The KSAs

The key to success on the CWEA certification test is understanding the KSAs and having adequate training, education, and experience in those KSAs. Each KSA describes the competencies required of an individual to successfully perform the essential duties of the job at grade level. Although the KSAs do not correspond precisely to every individual Grade I position description, they do reflect the core competencies and essential duties required of Grade I Collection System Maintenance Technologists employed at any collection system. The KSAs are developed from a job analysis that includes research of the essential duties at a representative cross-section of systems and facilities throughout California and other participating states.

This section outlines each KSA and includes descriptions of the general competencies, math competencies, and suggested reading for that KSA. Candidates are expected to understand the competencies described in this section and seek further educational opportunities to address those KSAs that have not been mastered. Although each candidate is encouraged to find educational opportunities that suits his or her needs best, typical educational opportunities include:

- On the job training
- Print or online training materials
- Manuals of practice, technical documents, regulations, etc.
- Mentoring
- Trade, vocational, or college courses
- Professional education sessions and seminars

Candidates seeking Collection System Maintenance Grade I certification should review the KSAs presented in this section and seek to understand how they apply to everyday duties and responsibilities.

KSA Weight

KSA Weight is the approximate percent of the test content covered by a KSA. For example, a KSA with a weighting of 7% will have about 7% of all questions (or points) dedicated to that KSA, or 7% of the test is about that KSA. The KSA weight is approximate and shows the relative importance of a KSA compared to the other KSAs. The KSA weight on the actual certification test may vary slightly.



Suggested Reading

The Suggested Reading lists some materials that are representative of each KSA. Each reference includes chapters, sections, or pages that are representative of the KSA. This is not an exhaustive list of sources relevant to the KSA and candidates are strongly encouraged to seek additional material that covers each KSA especially in those KSAs where the candidate is not adequately prepared.

KSA 101

Weight: 8%

Participates in inspecting, cleaning, maintaining, constructing, and repairing of wastewater collection systems utilizing a variety of mechanical and specialized equipment including but not limited to, rodders, CCTVs, high velocity cleaners, construction equipment, and related equipment.

KSA 102

Weight: 5%

Performs and assists with pump station inspections, maintenance and repair; record instrument readings, and makes minor adjustments to ensure proper operation.

KSA 103

Weight: 6%

Performs a variety of manual tasks such as lifting and carrying of heavy loads including material, equipment, and debris, while seeking assistance and utilizing equipment when appropriate.

KSA 104

Weight: 5%

Inspects and maintains easements, some of which may be remote or difficult to access.

KSA 105

Weight: 5%

Participates in the repair of wastewater collection system, including damaged pipes, manholes, and casting adjustments, which may include excavation and shoring.

KSA 106

Weight: 4%

Participates in the removal and restoration of concrete and paved surfaces using a wide variety of construction equipment, hand and power tools.

KSA 107

Weight: 6%

Conducts pre/post trip inspections of vehicles and equipment, performs lubrication and minor operating adjustments to ensure proper operation and arranges for maintenance as needed.

KSA 108

Weight: 5%

Ensures that hand and power tools are in proper operating condition for daily use and arranges for maintenance when required.

KSA 109

Weight: 5%

Completes and maintains accurate, legible, and timely records of work performed.

KSA 110

Weight: 8%

Participates in establishing proper traffic control measures at work sites to protect both workers and the public.

KSA 111

Weight: 3%

Performs basic building and grounds maintenance at collection system facilities.

KSA 112

Weight: 6%

Responds to public inquiries in a courteous manner and provides information appropriate to the area of assignment.

KSA 113

Weight: 8%

Adheres to safe work practices and abides by all applicable regulations, policies, and procedures.



KSA 114 **Weight: 6%**
Reads and interprets collection system maps to determine basic flow characteristics and construction details.

KSA 115 **Weight: 6%**
Participates in the containment and clean-up of sanitary sewer overflows (SSOs) and provides notifications and filed documentation to immediate supervisor.

KSA 116 **Weight: 1%**
Stays abreast of new trends and innovations in the field of wastewater collection system operation and maintenance.

KSA 117 **Weight: 5%**
Participates in confined space entries including but not limited to, atmospheric monitoring, hazard mitigation, rescue activities, and use of a self-contained breathing apparatus.

KSA 118 **Weight: 5%**
Responds to and investigates requests for service or complaints concerning such matters as sewer odors, sewer trouble, sewer back-ups, and makes the necessary corrections.



Grade II Collection System Maintenance

Collection System Maintenance Grade II Certification is designed to demonstrate competency at the skilled or journey level. More specifically, Grade II certification implies competence in the knowledge, skills, and abilities required to perform the *Essential Duties* of a skilled Collection System Maintenance Technologist.

Eligibility Criteria For Taking The Test

The basic requirement is four years of full-time work in Collection System Maintenance. You may also qualify by having two years of experience and holding a Collection System Maintenance Grade I Certificate for one year, **OR** having two years of full-time experience and holding an Associate's degree in a related field, **OR** having one year of full-time experience and holding a Bachelor's, or higher, degree in a related field.

Eligibility criteria are summarized in the table below. You may qualify by meeting either Education/Experience Combination **A**, **B**, **C**, or **D**. If you do not meet any of the combinations of experience and education, then you do not qualify for Grade II:

Combination	EDUCATION & CERTIFICATIONS	+	EXPERIENCE
A	None		4 full-time years in Collection System Maintenance
B	Hold Grade I CSM Certificate for 1 yr.		2 full-time years in Collection System Maintenance
C	AA/AS degree in a related field		2 full-time years in Collection System Maintenance
D	Hold a BA/BS, or higher, degree in a related field		1 full-time year in Collection System Maintenance

Qualifying With Your Education

Holding a college degree, or its equivalent, in a field related to your vocation will reduce the number of years required for your test (see the table above). Your degree must be in a field that is related to the certificate for which you are applying. If you are uncertain if your degree is related to your vocation you should still include your degree information in your application. The Technical Certification Program Committee will determine if your degree qualifies. If it does not, you will be accepted for the next highest grade level for which you qualify. Associate's and Bachelor's degrees in technical fields are usually accepted. Degrees are evaluated on a case-by-case basis upon receipt of the application. College credit without a degree is not accepted unless it can be demonstrated that the credit is equivalent to a degree.

Knowledge, Skills & Abilities (KSAs) Of The Grade II Collection System Maintenance Technologist

Individuals certified as Grade II Collection System Maintenance Technologists are expected to possess acceptable competency when performing the tasks that are necessary for skilled or journey level Collection System Maintenance Technologists. These necessary tasks are known as the *Knowledge, Skills & Abilities*.

Complexity Of Test Questions

At the Grade II level, certificate candidates are expected to have the knowledge, skill and ability to safely and effectively accomplish most of the *Essential Duties*. Grade II candidates are also expected to be familiar with the Grade I Test Content Areas. Examinees will have to answer multiple choice questions that test comprehension, application and analysis of the subject matter. The complexity of the questions will cover the ability to basically understand the subject matter; to recall and apply principles, ideas, and theories; and to break down ideas and theories into their constituent parts.

Understanding The KSAs

The key to success on the CWEA certification test is understanding the KSAs and having adequate training, education, and experience in those KSAs. Each KSA describes the competencies required of an individual to successfully perform the essential duties of the job at grade level. Although the KSAs do not correspond precisely to every individual Grade II position description, they do reflect the core competencies and essential duties required of Grade II Collection System Maintenance Technologists employed at any collection system. The KSAs are developed from a job analysis that includes research of the essential duties at a representative cross-section of systems and facilities throughout California and other participating states.



This section outlines each KSA and includes descriptions of the general competencies, math competencies, and suggested reading for that KSA. Candidates are expected to understand the competencies described in this section and seek further educational opportunities to address those KSAs that have not been mastered. Although each candidate is encouraged to find educational opportunities that suits his or her needs best, typical educational opportunities include:

- On the job training
- Print or online training materials
- Manuals of practice, technical documents, regulations, etc.
- Mentoring
- Trade, vocational, or college courses
- Professional education sessions and seminars

Candidates seeking Collection System Maintenance Grade II certification should review the KSAs presented in this section and seek to understand how they apply to everyday duties and responsibilities.

KSA Weight

KSA Weight is the approximate percent of the test content covered by a KSA. For example, a KSA with a weighting of 7% will have about 7% of all questions (or points) dedicated to that KSA, or 7% of the test is about that KSA. The KSA weight is approximate and shows the relative importance of a KSA compared to the other KSAs. The KSA weight on the actual certification test may vary slightly.

Suggested Reading

The Suggested Reading lists some materials that are representative of each KSA. Each reference includes chapters, sections, or pages that are representative of the KSA. This is not an exhaustive list of sources relevant to the KSA and candidates are strongly encouraged to seek additional material that covers each KSA especially in those KSAs where the candidate is not adequately prepared

KSA 200 **Weight: 11%**
May perform essential duties on the Test Content Specifications for Collection Systems Grade 1.

KSA 201 **Weight: 9%**
Directs, instructs, oversees and provides feedback to personnel performing Collection System Maintenance Grade I duties.

KSA 202 **Weight: 9%**
Inspects, trouble-shoots, and maintains proper collection system operation using advanced techniques and instruments including but not limited to closed-circuit TV, smoke testing, and related procedures.

KSA 203 **Weight: 8%**
Supervises and oversees all aspects of confined space entries and completes confined space entry permit.

KSA 204 **Weight: 10%**
Provides detailed oral, written or electronic information on a daily basis on activities including but not limited to timesheets, field activity reports, condition assessment reports, confined space entries permits and crew performance feedback reports.

KSA 205 **Weight: 7%**
Provides assistance to agencies and private organizations in locating and identifying utilities and manholes.



KSA 206

Weight: 10%

Plans routine traffic control measures at work sites and performs non-routine traffic control under general supervision.

KSA 207

Weight: 9%

Investigates and directs the resolution of routine complaints and requests for service in a safe, efficient and timely manner, including providing feedback to the customer.

KSA 208

Weight: 11%

Monitors crew performance to ensure adherence to safe work practices and compliance with all applicable regulations, policies, and procedures.

KSA 209

Weight: 6%

Participates in the development and propagation of SOPs (standard operating procedures) including safe work practices and procedures.

KSA 210

Weight: 1%

Attends and participates in technical group meetings; stays abreast of new trends and innovations in the field of wastewater collection system operation and maintenance.

KSA 211

Weight: 9%

Direct and oversee the containment and clean-up of sanitary sewer overflows (SSOs) and provides notification and field documentation for the reporting of sanitary sewer overflows.

Grade III Collection System Maintenance

Collection System Maintenance Grade III Certification is designed to demonstrate competency at the lead or advanced technical level. More specifically, Grade III certification implies competence in the knowledge, skills and abilities required to perform the *Essential Duties* of a lead or advanced Collection System Maintenance Technologist.

Eligibility Criteria For Taking The Test

The basic requirement is six years of full-time work in Collection System Maintenance. You may also qualify by having four years of experience and holding a Collection System Maintenance Grade II Certificate for two years, **OR** having four years of full-time experience and holding an Associate's degree in a related field, **OR** having three years of full-time experience and holding a Bachelor's, or higher, degree in a related field.

Eligibility criteria are summarized in the table below. You may qualify by meeting either Education/Experience Combination **A**, **B**, **C**, or **D**. If you do not meet any of the combinations of experience and education, then you do not qualify for Grade III:

Combination	EDUCATION & CERTIFICATIONS	EXPERIENCE
A	None	6 full-time years in Collection System Maintenance
B	Hold Grade II CSM Certificate for 2 years.	4 full-time years in Collection System Maintenance
C	Hold an Associate's degree in a related field	4 full-time years in Collection System Maintenance
D	Hold a BA/BS, or higher, degree in a related field	3 full-time years in Collection System Maintenance

Qualifying With Your Education

Holding a college degree, or its equivalent, in a field related to your vocation will reduce the number of years required for your test (see the table above). Your degree must be in a field that is related to the certificate for which you are applying. If you are uncertain if your degree is related to your vocation you should still include your degree information in your application. The Technical Certification Program Committee will determine if your degree qualifies. If it does not, you will be accepted for the next highest grade level for which you qualify. Associate's and Bachelor's degrees in technical fields are usually accepted. Degrees are evaluated on a case-by-case basis upon receipt of the application. College credit without a degree is not accepted unless it can be demonstrated that the credit is equivalent to a degree.

Knowledge, Skills & Abilities (KSAs) Of The Grade III Collection System Maintenance Technologist.

Individuals certified as Grade III Collection System Maintenance Technologists are expected to possess acceptable competency when performing the tasks that are necessary for lead or advanced level Collection System Maintenance Technologists. These necessary tasks are known as the *Knowledge, Skills & Abilities*.

Complexity Of Test Questions

At the Grade III level, certificate candidates are expected to have the knowledge, skill and ability to safely and effectively accomplish and coordinate complex tasks as listed in the *Essential Duties*. Grade III candidates are also expected to be familiar with the Grade I and II Collection System Maintenance Technologist knowledge, skills and abilities. Examinees will have to answer multiple choice questions that test application, analysis, and synthesis of the subject matter. The complexity of the questions will cover the ability: to abstract in particular and concrete situations; to clarify and organize theories and ideas; and to put facts together to form a new solution.



Understanding The KSAs

The key to success on the CWEA certification test is understanding the KSAs and having adequate training, education, and experience in those KSAs . Each KSA describes the competencies required of an individual to successfully perform the essential duties of the job at grade level. Although the KSAs do not correspond precisely to every individual Grade III position description, they do reflect the core competencies and essential duties required of Grade III Collection System Maintenance Technologists employed at any collection system. The KSAs are developed from a job analysis that includes research of the essential duties at a representative cross-section of systems and facilities throughout California and other participating states.

This section outlines each KSA and includes descriptions of the general competencies, math competencies, and suggested reading for that KSA. Candidates are expected to understand the competencies described in this section and seek further educational opportunities to address those KSAs that have not been mastered. Although each candidate is encouraged to find educational opportunities that suits his or her needs best, typical educational opportunities include:

- On the job training
- Print or online training materials
- Manuals of practice, technical documents, regulations, etc.
- Mentoring
- Trade, vocational, or college courses
- Professional education sessions and seminars

Candidates seeking Collection System Maintenance Grade III certification should review the KSAs presented in this section and seek to understand how they apply to everyday duties and responsibilities.

KSA Weight

KSA Weight is the approximate percent of the test content covered by a KSA. For example, a KSA with a weighting of 7% will have about 7% of all questions (or points) dedicated to that KSA, or 7% of the test is about that KSA. The KSA weight is approximate and shows the relative importance of a KSA compared to the other KSAs. The KSA weight on the actual certification test may vary slightly.

Suggested Reading

The Suggested Reading lists some materials that are representative of each KSA. Each reference includes chapters, sections, or pages that are representative of the KSA. This is not an exhaustive list of sources relevant to the KSA and candidates are strongly encouraged to seek additional material that covers each KSA especially in those KSAs where the candidate is not adequately prepared.

KSA 301

Weight: 6%

Plans, coordinates, and evaluates the performance of Collection System Maintenance Grades I and II personnel.

KSA 302

Weight: 4%

Coordinates wastewater collection system with other utilities, agencies, private organizations, government entities and the general public to address complex or non-routine issues.

KSA 303

Weight: 6%

Participates in the evaluation of the performances of the wastewater collection system such as but not limited to energy efficiency, material costs, sanitary sewer overflows (SSOs) and preventative and predictive maintenance programs.

KSA 304

Weight: 6%

Participates in the development and implementation of training programs for Collection System Maintenance Grade I and II personnel.



KSA 305 **Weight: 7%**
Verifies the work of Collection System Maintenance Grade I and II personnel for accuracy, proper work methods, complaints and compliance with applicable standards and specifications.

KSA 306 **Weight: 6%**
May work with contractors performing a variety of construction, inspection and maintenance projects.

KSA 307 **Weight: 6%**
Analyze and review system data to recommend priorities, schedules, and workload performance measures.

KSA 308 **Weight: 6%**
Develops and directs the execution of complex or non-routine traffic safety plans under the California Manual on Uniform Traffic Control Devices for Streets & Highways (MUTCD).

KSA 309 **Weight: 6%**
Responds to exceptional and /or non-routine inquiries in a professional, courteous and timely manner.

KSA 310 **Weight: 9%**
Assists and participates in the development, and ensures adherence to the wastewater collection safety program.

KSA 311 **Weight: 6%**
Participates in fact-gathering to respond to liability claims.

KSA 312 **Weight: 5%**
Participates in the investigation of employer policies or agency ordinances.

KSA 313 **Weight: 6%**
Coordinates and participates in technical/professional group meetings; stays abreast of new and innovations in the field of wastewater collection system operation and maintenance.

KSA 314 **Weight: 8%**
Direct and oversees the containment and clean-up of sanitary sewer overflows (SSOs) as well as reports sanitary sewer overflows.



Grade IV Collection System Maintenance

Collection System Maintenance Grade IV Certification is designed to demonstrate competency at the program manager level. More specifically, Grade IV certification implies competence in the knowledge, skills and abilities required to perform the *Essential Duties* of a management level Collection System Maintenance Technologist.

Eligibility Criteria For Taking The Test

The basic requirement is eight years of full-time work in Collection System Maintenance. You may also qualify by having six years of experience and holding a Collection System Maintenance Grade III Certificate for two years, **OR** having six years of full-time experience and holding an Associate's degree in a related field, **OR** having five years of full-time experience and holding a Bachelor's, or higher, degree in a related field. All Grade IV candidates must also demonstrate at least one year of experience supervising the work of others. Eligibility criteria are summarized in the table below. You may qualify by meeting either Education/Experience Combination **A, B, C,** or **D**. If you do not meet any of the combinations of experience and education, then you do not qualify for Grade IV:

Combination	EDUCATION &	EXPERIENCE
A	None	8 years in Collection System Maintenance with one of those years supervising others
B	Hold Grade III CSM certificate for 2 years.	6 years in Collection System Maintenance with one of those years supervising others
C	Hold an AA/AS, or higher, degree in a related field	6 years in Collection System Maintenance with one of those years supervising others
D	Hold a Bachelor's, or higher, degree in a related field	5 years in Collection System Maintenance with one of those years supervising others

Qualifying With Your Education

Holding a college degree, or its equivalent, in a field related to your vocation will reduce the number of years required for your test (see the table above). Your degree must be in a field that is related to the certificate for which you are applying. If you are uncertain if your degree is related to your vocation, you should still include your degree information in your application. The Technical Certification Program Committee will determine if your degree qualifies. If it does not, you will be accepted for the lower grade level for which you qualify. Associate's and Bachelor's degrees in technical fields are usually accepted. Degrees are evaluated on a case-by-case basis upon receipt of the application. College credit without a degree is not accepted unless it can be demonstrated that the credit is equivalent to a degree.

Knowledge, Skills, & Abilities Of The Grade IV Collection System Maintenance Technologist

Individuals certified as Grade IV Collection System Maintenance Technologists are expected to possess acceptable competency when performing the tasks that are necessary for management level Collection System Maintenance. These necessary tasks are known as the *Knowledge, Skills & Abilities*.

Complexity Of Test Questions

At the Grade IV level, certificate candidates are expected to have the knowledge, skill and ability to administer, coordinate and manage complex programs described in the *Essential Duties* above. Grade IV candidates are also expected to be familiar with the Grade I, II, and III Collection System Maintenance Technologist knowledge, skills and abilities. Examinees will have to answer multiple choice questions that test analysis, synthesis and evaluation of the subject matter. The complexity of the questions will cover the ability: to clarify and organize theories and ideas; to put together facts to form new solutions; to make managerial level judgments.

Understanding The KSAs

The key to success on the CWEA certification test is understanding the KSAs and having adequate training, education, and experience in those KSAs. Each KSA describes the competencies required of an individual to successfully perform the essential duties of the job at grade level. Although the KSAs do not correspond precisely to every individual Grade IV position description, they do reflect the core competencies and essential duties required of Grade IV Collection System Maintenance Technologists employed at any collection system.



The KSAs are developed from a job analysis that includes research of the essential duties at a representative cross-section of systems and facilities throughout California and other participating states.

This section outlines each KSA and includes descriptions of the general competencies, math competencies, and suggested reading for that KSA. Candidates are expected to understand the competencies described in this section and seek further educational opportunities to address those KSAs that have not been mastered. Although each candidate is encouraged to find educational opportunities that suits his or her needs best, typical educational opportunities include:

- On the job training
- Print or online training materials
- Manuals of practice, technical documents, regulations, etc.
- Mentoring
- Trade, vocational, or college courses
- Professional education sessions and seminars

Candidates seeking Collection System Maintenance Grade IV certification should review the KSAs presented in this section and seek to understand how they apply to everyday duties and responsibilities.

KSA Weight

KSA Weight is the approximate percent of the test content covered by a KSA. For example, a KSA with a weighting of 7% will have about 7% of all questions (or points) dedicated to that KSA, or 7% of the test is about that KSA. The KSA weight is approximate and shows the relative importance of a KSA compared to the other KSAs. The KSA weight on the actual certification test may vary slightly.

Suggested Reading

The Suggested Reading lists some materials that are representative of each KSA. Each reference includes chapters, sections, or pages that are representative of the KSA. This is not an exhaustive list of sources relevant to the KSA and candidates are strongly encouraged to seek additional material that covers each KSA especially in those KSAs where the candidate is not adequately prepared.

KSA 400

Weight: 5%

Have a working knowledge and understanding of the essential duties identified on the Test Content Specifications for Collection Systems Grades I, II, and III.

KSA 401

Weight: 5%

Administers and manages the work performance and duties of Collection System Maintenance Grades I, II, and III personnel.

KSA 402

Weight: 5%

Responsible for assigned services and activities associated with the operation, maintenance and repair of the wastewater collection system.

KSA 403

Weight: 5%

Manages the development and implementation of goals, objectives, and policies for the wastewater collection program.

KSA 404

Weight: 5%

Directs and supports supervisors and staff to ensure high performance in a customer service-oriented work environment that encourages achieving desired goals and objectives.

KSA 405

Weight: 5%

Evaluates the performance of the wastewater collection system such as staffing levels, energy efficiency, material costs, sanitary sewer overflows (SSOs), and predictive/preventive maintenance programs.



KSA 406**Weight: 5%**

Plans, directs, coordinates, prioritize, and reviews the work plan for the wastewater collection system.

KSA 407**Weight: 5%**

Participates in hiring process, conducts performance evaluations, works with employees to achieve performance goals and objectives, implements disciplinary procedures, and conducts general labor relation activities.

KSA 408**Weight: 5%**

Develops, implements, oversees and makes recommendations for wastewater collection equipment selection and maintenance program.

KSA 409**Weight: 5%**

Ability to negotiate and resolve wastewater collection system operational issues that involve other utilities, agencies, private organizations, government entities and the general public to address complex or non-routine issues.

KSA 410**Weight: 5%**

Provides responsible and complex technical support to upper management and prepares/presents staff reports including organizational studies.

KSA 411**Weight: 5%**

Originates and administers the work of contractors/consultants/engineers for a variety of wastewater collection system construction and/or maintenance projects.

KSA 412**Weight: 6%**

Responsible for the development and administration of safety training programs for wastewater collection system staff; and ensures compliance with safe working practices, rules and regulations.

KSA 413**Weight: 7%**

Administers training to wastewater collection system staff in their areas of work such as but not limited to inspection and repair procedures, methods, and equipment.

KSA 414**Weight: 5%**

Oversees and participates in the development and administration of the wastewater collection system annual budget; tracks and forecasts resources needed for staffing, equipment, materials, and supplies; monitors and approves expenditures and implements adjustments.

KSA 415**Weight: 5%**

Initiates, develops and administers wastewater collection programs, policies, and procedures to ensure a safe, effective and efficient operating system.

KSA 416**Weight: 4%**

Attends and participates in professional group meetings; stays abreast of new trends and innovations in the field of wastewater collection system operation and maintenance; ensure the availability of opportunities for all staff to participate in professional development.

KSA 417**Weight: 5%**

Responds to difficult and sensitive public inquiries in a professional and courteous manner, and develops formal reports and responses to the media.

KSA 418**Weight: 4%**

Reviews and responds to liability claims and participates in the investigation of violations of employer policies or agency ordinances.

KSA 419**Weight: 5%**

Oversees the process of containing and clean-up of spills emanating from the collection system and certifies documentation for sanitary sewer overflows.



Sample Test Questions

The following sample test questions are provided to help you become familiar with the multiple choice format. These questions reflect only a sample of the subject matter covered at each grade level.

For each question, choose the single most correct answer. An answer key is provided on page 14.

Grade I Collection System Maintenance

1. Operation and maintenance of a Wastewater Collection System means keeping the:
 - a. power supply available.
 - b. system in good operating condition.
 - c. water flowing from the spigot.
 - d. electrical equipment dry.
2. Upon arrival to a service request for a building lateral stoppage, you notice a constant flow coming up from the clean-out. The first thing you should do is:
 - a. cap the clean-out and see if any sewage comes into the building.
 - b. set up the hydro-cleaner at the downstream manhole.
 - c. open the upstream manhole to see if it is full.
 - d. make sure that water is not being used in the building.
3. In order to complete a sewer repair, the crew had to cut out a section of sidewalk 4 feet wide, 8 feet long and 4 inches thick. How many cubic yards of concrete are needed to restore the sidewalk?
 - a. 3.5 cubic yards
 - b. 0.39 cubic yards
 - c. 9.6 cubic yards
 - d. 0.96 cubic yards
4. What types of information is it important for field crews to record?
 - a. Materials used on a job.
 - b. Safety training history.
 - c. Equipment costs.
 - d. All of the above.

Grade II Collection System Maintenance

1. A report of a clean-out cover missing in the side walk is routed to you. Which of the following would be the best response?
 - a. Make a note and take care of it when you are in the area.
 - b. Respond immediately and put a cone over it.
 - c. Take care of it after lunch.
 - d. Respond immediately and repair or replace the clean-out cover.
2. While conducting a video inspection, the camera becomes stuck. Which of the following would be the first step in solving this problem?
 - a. Call for a backhoe and dig up the area where the camera is stuck.

- b. Disconnect the wires and close the manhole; return the following morning to see if it has freed itself.
- c. Attempt to dislodge the camera by using the tag line.
- d. Attach pulling cable to a truck hitch and pull through the bad spot, then continue your inspection.

3. A new sewer line is installed using a bubble level. For every foot of pipe installed, the level measures a quarter (1/4) inch of fall. A quarter (1/4) inch of fall for every foot is equal to what percent?
 - a. 4%
 - b. 1.4%
 - c. 2%
 - d. 0.002%
4. Four conditions are necessary to create an explosion. Three of these conditions are combustible gas, adequate oxygen and sufficient heat. What is the fourth?
 - a. Constant supply of combustible gas
 - b. Enclosed area that will hold the gases
 - c. Proper mixing of gas and oxygen
 - d. Constant ventilation

Grade III Collection System Maintenance

1. The main advantage of using variable speed pumping equipment is that the pumping rate can be adjusted to meet:
 - a. head loss rate.
 - b. discharge rate.
 - c. inflow rate.
 - d. friction loss.
2. When preparing a lift station maintenance program, which of the following factors should be considered first?
 - a. Computer activity codes
 - b. Station I.D. codes
 - c. Equipment specifications
 - d. History of stoppages
3. A wet well is 115 feet long by 85 feet wide and has a water level of 18 feet. The flow is 22 million gallons a day. What is the detention time?
 - a. 76 minutes
 - b. 1 hour 26 minutes
 - c. 1 hour 43 minutes
 - d. 2 hours 26 seconds
4. Which characteristic is typical of workers who are high achievers in performing their jobs?
 - a. Seeking out problems rather than avoid them
 - b. Developing faster methods without seeking supervisory advice
 - c. Resolving routine problems
 - d. Achieving mediocre results with abundant resources



Grade IV Collection System Maintenance

1. You receive an anonymous complaint that one of your maintenance vehicles is parked in a neighborhood and two employees are inside of the vehicle drinking alcohol. What steps, if any, should you take?
 - a. Call in all maintenance personnel and have everyone tested for drugs and alcohol.
 - b. Go out to the site and send the suspected employees home.
 - c. Suspend the employees until fact finding is complete.
 - d. Take another supervisor out to the site, observe employees, ask questions and investigate the circumstances.

2. One of your maintenance crews reports to you that a contractor working within your jurisdiction is pumping raw sewage into a nearby creek. Which of the following should you do first?
 - a. Tell your crew to ask the contractor to keep a record of how many gallons are pumped into the creek.
 - b. Take a police officer to the site, have the contractor arrested, and call the health department.
 - c. Have your crews contain the sewage in the creek, pump it back into a nearby sanitary sewer, and have the contractor let them know if any more sewage is to be pumped.
 - d. Go to the site, confirm the illegal discharge, advise the contractor to stop, take photos, take down names, and notify the health department.

3. Which of the following would be a detrimental effect of excessive infiltration and inflow?
 - a. Contamination of the ground water supply
 - b. Higher power costs for pump stations
 - c. Reducing storm water runoff
 - d. Reducing root intrusion into sanitary sewer lines

4. Which of the following would be a typical item in the Operating Budget?
 - a. Purchase of a new backhoe
 - b. A large sewer main replacement project
 - c. Purchase of daily materials and supplies
 - d. Reserve funding for future projects

Answer Key To Sample Test Questions

Question #	Grade I	Grade II	Grade III	Grade IV
1	b	d	c	d
2	d	c	c	d
3	b	c	b	b
4	a	c	a	c



Selected References

The following table lists references that may be useful when studying for the certification test. The table lists primary and supplementary study references. Primary study references are recommended as the best sources for studying for the certification test. Supplementary study references are recommended as sources that will help to further your understanding of the subject matter beyond the primary references.

For each reference a "P" indicates Primary reference and an "S" indicates a Supplementary reference. Check the Grade column that corresponds to the grade level you will be taking to determine if a reference is Primary or Supplementary. Blank boxes indicate that the reference is not appropriate for that grade level.

For information about obtaining these publications, use the contact information listed in the reference. If no phone number or website is listed, contact the publishing agency directly or contact your local library or bookstore.

This reference list is intended to assist certificate candidates in their preparation for the Collection System Maintenance Technologist certification test. Use of these references does not guarantee successful completion of the test. There may be other publications that may be helpful to candidates preparing for the test. CWEA encourages you to identify and utilize other resources in preparing for your test.

Reference	GRADE			
	I	II	III	I
"Operation and Maintenance of Wastewater Collection Systems", Volume I, Kenneth Kerri, Office of Water Programs, California State University Sacramento, 6000 J Street, Sacramento, CA. 95819-6025, (916) 278-6142. www.owp.csus.edu	P	P	P	P
"Collection System Maintenance Study Guide", Grades 1-4 (2001) CWEA (510) 382-7800 www.cwea.org	P	P	P	P
"Confined Space Entry", WEF Publication, Water Environment Federation, 601 Wythe Street, Alexandria, VA. 22314-1994, Phone: 1-800-666-0206. www.wef.org ISBN: 1-57278-122-X	P	P	P	P
"Wastewater Collection System Maintenance", Michael J. Parcher CRC Press. ISBN: 1566765692 www.crcpress.com Phone: 800/272-7737 Fax: 800/374-3401 email: orders@crcpress.com	P	P	P	P
"The Math Text for Water and Wastewater Technology" Second Edition, Wrights Training, P.O. Box 515, Elmira, CA. 95625-0515. (707) 448-3659 www.wrights-trainingsite.com (download form to order)	P	S	S	
"Operation and Maintenance of Wastewater Collection Systems" Volume II, Kenneth Kerri, Office of Water Programs, California State University Sacramento, 6000 J Street, Sacramento, CA. 95819-6025, Phone: (916) 278-6142.			P	P
"Wastewater Collection Systems Management", (Manual of Practice No.7), 5th Edition, ISBN: 1-57278-152-1 Water Environment Federation, 601 Wythe Street, Alexandria, VA. 22314-1994, 1-800-356-5705. www.wef.org			P	P
"Manage for Success: Effective Utility Leadership Practices", Office of Water Programs, California State University Sacramento, 6000 J Street, Sacramento, CA. 95819-6025, (916) 278-6142. www.owp.csus.edu				S
"Supervisor's Guide to Safety and Health Programs", Water Environment Federation, 601 Wythe Street, Alexandria, VA. 22314-1994, 1-800-666-0206.				S
"Applied Math for Wastewater Operators", Joan Kirkpatrick Price, CRC Press, 1-800-374-3401 www.crcpress.com ISBN: 0877620892				S
"Utility Management" Office of Water Programs California State University Sacramento 6000 J Street Sacramento, CA 95819-6025 916/278-6142 www.owp.csus.edu/	S	S	P	P
"Manual of Traffic Controls for Construction and Maintenance Work Zones-1996 State of California Department of Transportation 1900 Royal Oaks Drive Sacramento, CA 95815 www.dot.ca.gov Download from www.cwea.org/book_brcsg_csm3.shtml or www.dot.ca.gov/manuals.htm	P	P	P	P
"Safety and Health in Wastewater Systems", WEF Manual of Practice SM-1 Water Environment Federation 601 Wythe St. Alexandria, VA 22314-1994 800/666-0206 www.wef.org ISBN:1-881369-87-0	P	P	P	P



Reference	GRADE			
	I	II	III	IV
"Manual of Traffic Controls for Construction & Maintenance Work Zones—1990 State of California Department of Transportation 1900 Royal Oaks Dr. Sacramento , CA 95815 (916)445-3520; http://svhqsgj4.dot.ca.gov/hq/traffops/signtech/signdel/pdf/files.htm	P	P	P	P
"Mathematics for Collection System Operators, a Workshop Manual OCT, Inc. P.O. Box 332 Gladstone , OR 97027 ; www.octinc.com	S	S	S	S
"Sewer Rehabilitation Handbook NASSCO" 140 Circle Dr. , Suite 103 Maitland, FL 32751 www.nassco.org	S	S	S	S
"Trench Safety Shoring Manual, Red Cass Cruise Publications 1430 Tully Road, suite 416 San Jose, CA 95122	S	S	S	
"Operation and Maintenance of Wastewater Collection Systems, WEF Manual of Practice No.7-1985" Water Environment Federation 601 Wythe Street Alexandria, VA 22314-1994 ; (800)666-0206 ; www.wef.org	S	S	S	S

Conversions and Formulas Given in the Certification test

Conversions

12 inches = 1 foot
 36 inches = 3 feet = 1 yard
 5,280 feet = 1 mile
 1,440 minutes = 1 day = 24 hours
 144 square inches = 1 square foot
 9 square feet = 1 square yard
 43,560 square feet = 1 acre
 1,728 cubic inches = 1 cubic foot
 27 cubic feet = 1 cubic yard
 1 cubic foot of water contains 7.48 gallons
 1 cubic foot of water weighs 62.4 pounds
 1 gallon of water = 8.34 pounds
 1 million gallons per day (mgd) = 694 gallons per minute (gpm)
 1 million gallons per day (mgd) = 1.55 cubic feet per second (cfs)
 1 kilowatt = 1,000 watts

Formulas

Flow = Area×Velocity

Area:

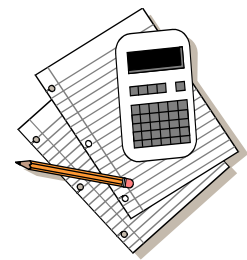
Rectangle = Length×Width
 Circle = $0.785 \times (\text{Diameter})^2$

Circumference of a Circle =
 $3.14 \times \text{Diameter}$

Volume:

Rectangular Solid = Length×Width×Depth
 Right Rectangular Cylinder = $0.785 \times (\text{Diameter})^2$
 = $B \times (\text{Radius})^2 \times \text{Length}$

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$



Preparing For Your Test

This section addresses a few possible methods for preparing for the certification test. Since you are most familiar with your own abilities you are responsible for determining the best method for preparing for your certification test. Following the suggestions in this section does not guarantee you will pass the certification test.

Determining Your Preparedness: An individual's preparedness for the certification test depends on a number of things including amount of practical experience in the vocation and years of education. If you are unsure how prepared you are for the test review the Knowledge, Skills & Abilities (KSAs) and *Test Content Areas* for the test that you are considering. If you are not familiar with most of the KSAs and *Test Content Areas* you should consider reviewing some of the material in the references listed for that grade level. You may also want to consider applying for a lower grade level if appropriate.

Using The Selected References: After evaluating how well prepared you are for the test you may want to review some of the Selected References. The references in this list may be used to review those Test Content Areas that you are not familiar with or those for which you have little background. Well prepared candidates may only have to brush-up on a few topics while those less prepared may have to study extensively.

Study Sessions: CWEA Local Sections host at least two study sessions in various parts of California. All applicants will be mailed the date and location of the nearest preparation classes if provided by Local Section to CWEA staff. Usually these classes are given about one month before the test date and last a full day with Grades I and II material covered in the morning and Grades III and IV. covered in the afternoon.



FAQs Frequently Asked Questions

Question: Is it required that I begin at the Grade I level then work my way up from there to higher levels?

Answer: No, you may take any test that you qualify for with your education and experience. However, if you are just starting out you can see by the education and experience requirements that you can work your way up the grade levels faster if you become certified at Grade I, then achieve each successive certification as soon as you get the required education and experience.

Question: If I take a Grade II, III, or IV test will I have to know the Test Content Areas for the lower level tests?

Answer: Yes, the subject matter for each test builds on the subject matter for those tests below its grade level. A thorough knowledge of the Test Content Areas for the grade level that you are taking is most important to your preparation, but you should expect questions from any of the lower grade levels.

Question: If I am re-taking a test that I had previously failed do I need to re-submit a full application and the entire application fee?

Answer: No, you must complete the Re-Test application with appropriate fees.

Question: Is continuing education required to renew my certification?

Answer: Yes. For any certificate earned on or after July 2001, you need to obtain 12 hours of continuing education every two years. For more information, visit www.cwea.org, or feel free to call the CWEA office.

Question: How long is the test?

Answer: All tests have about 75-100 questions and 3 hours are given for completion.

Question: Can I take more than one certification test at a same time?

Answer: Yes, but you can only take up to two at a same time (under a different vocation). You will be given a total of three hours to complete both tests.

Question: How do I get a receipt showing I paid for the test?

Answer: A receipt is sent to all applicants upon request. Hold on to this receipt until the certification process is over in case you have to submit it to your employer for reimbursement.

Question: If I am applying for the Grade IV test do I need to be a Supervisor?

Answer: No, you just need to have about one year of supervision experience, verified by your manager. You do not have to hold the title of "Supervisor."



Testing Window	Test Dates	Application Deadline
Spring	April 1 - June 30	February 28
Summer	July 1 - September 30	May 31
Fall	October 1 - December 31	August 31
Winter	January 1 - March 31	November 30

Other CWEA Certificate Programs

- ◆ Biosolids Land Application Management
- ◆ Environmental Compliance Inspector
- ◆ Laboratory Analyst
- ◆ Plant Maintenance
 - Electrical Instrumentation
 - Mechanical Technologist
- ◆ Industrial Waste Treatment Plant Operator



California Water Environment Association
 7677 Oakport Street, Suite 600
 Oakland, CA 94621



Have a question?
 Give us a call at (510) 382-7800.

