



# Collection System Maintenance Certification

2009

## Candidate

## Handbook



This booklet contains...

- Subject matter for the Collection System Maintenance tests
- Education and experience requirements
- Selected study references
- Certification policies
- Frequently Asked Questions

# Collection System Maintenance

2009

## 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: Biosolids, Collection System Maintenance, Environmental Compliance Inspection, Laboratory Analyst, Plant Maintenance (Electrical/Instrumentation and Mechanical Technologist), and Industrial Waste Treatment Plant Operator.

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.

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

Today CWEA offers certification in six different vocational programs with a total of 23 different certifications. About 2,000 certification applications are processed every year and over 5,500 certificates are currently held by individuals in California, Michigan, Hawaii, and Missouri.

## The Certification Process

To become certified, **all applicants** must complete the Application For Technical Certification, pay the application fee, have appropriate experience/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 the certification database. Acceptance letters are then mailed to all applicants. The experience and education given on the application is then reviewed by CWEA staff. If the application is approved, then the applicant will receive an acceptance letter. If the application is rejected, the applicant will be notified and may be asked to supply more information if warranted. After completing the test, applicants are sent official test-results. Those who pass the exam will then be 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. Applicants eligible for the test will receive an acceptance letter and 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

CWEA also provides reasonable accommodations for those with physical or learning disabilities (See following page: "Accommodations For Those With Physical or Learning Disabilities").



**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 may a candidate begin the exam. Candidates do not require to show their acceptance letters to enter the test site.

**Test Security:** Beginning January 2009, all exams will be computer-based format. No reference material, laptop computers, or cameras are allowed in the test site. Candidates will have access to an on-screen calculator, however, examinees are welcome to bring pre-approved calculator (visit [www.cwea.org/cbt](http://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. There are no exceptions to this policy.

### Test Design And Format

**Test Design:** All certification tests are designed to test knowledge and abilities required to perform *Essential Duties* with minimal acceptable competence. The *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 sub-committees, 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 written in the English language only.

**Test Format:** All Collection System Maintenance tests are given completely in the multiple choice format (see *Sample Test Questions* in this booklet for examples). 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 CWEA. The overall test score will determine if you pass or fail the test. Generally, the minimum score

required to pass the test is 75% (this passing score may be adjusted downward depending on the difficulty level of each particular test). The minimum passing score is determined by the modified Angoff Method. When taking your test it is recommended that you try your best to score as high as possible. Do not try to target the minimum passing score.

**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 Instructions

#### Reschedule your Testing Window

To reschedule your application you must submit a written request (a letter stating that you wish to reschedule) to the adjacent (next) window once without a fee. A \$40 administrative fee is required to reschedule your application again to the third window. There are no exceptions to this policy.

#### Reschedule your Test Appointment

If you already have a scheduled exam with our testing administrator, Pearson VUE (PV), and wish to reschedule your appointment, you must contact (PV) one (1) business day in advance to avoid losing your exam fee.

#### Cancel your Application

To cancel your application you must submit a written request (a letter stating you wish to cancel your application) to CWEA. The written request must be received at the CWEA office before the testing window begins. Full refunds, less a \$40 administrative fee, will be made within 4 weeks after the scheduled date.

### 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

Exam results are routinely mailed to certificate candidates approximately 4 weeks after the exam date. No results are given over the phone, via fax or email. All results are confidential and are only released to the certificate candidate. There are no exceptions to this policy.



**Issue of Certificate/Blue Wallet Card**

Certificates and blue wallet cards will be issued to all candidates who pass the exam. Certificates and blue wallet cards are mailed about two to three weeks after result notifications have been mailed.

**Renewal of Certification**

All certificates must be renewed annually. The first renewal is due one year from the last day of the month in which the certification exam was held. Certificate renewals less than one year past due are subject to the renewal fee plus a penalty fee of 100 percent of the renewal fee. Certificates more than one year past due will need to retest to regain certification. 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.

**Re-Certification:**

CWEA Certificate holders shall be required to renew certificates annually, and shall be required to provide evidence of completion of 12 contact hours of continuing education requirements every two years. For more information, visit CWEA's website: [www.cwea.org](http://www.cwea.org).

**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 examination. Written requests for special accommodations must be made no later than 3 weeks before the examination date.



# 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 and abilities required to perform the *Essential Duties* of 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 an Collection System Maintenance Technologist performing the *Essential Duties* listed below. Many candidates without the recommended experience have difficulty successfully completing the computer-based test.

## Essential Duties 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 *Essential Duties*. The certification test measures knowledge, skills and abilities required to perform the *Essential Duties*.

### Essential Duties for Grade I

1. Participates in inspecting, cleaning, maintaining, constructing, and repairing of wastewater collection systems, utilizing a variety of equipment including rodders, high velocity cleaners, and related equipment
2. Performs pump station inspections, records instrument readings, and makes minor adjustments to keep flow steady
3. Performs a variety of manual tasks including the lifting, carrying and removal of heavy loads including materials, equipment, and debris
4. Inspects and maintains easements, some of which may be remote or difficult to access
5. Participates in excavating, shoring, and repairing the collection system, including damaged pipe, manholes and casting adjustments

6. Breaks, cuts, and restores concrete and paved surfaces using jackhammers, concrete saws, etc.
7. Prepares, inspects, and maintains vehicles for use; ensures vehicles are in proper operating condition and arranges for maintenance when required
8. Ensures that tools and equipment are in proper operating condition for daily use and arranges for maintenance when required
9. Participates in the maintenance and repair of wastewater collection system lift stations and components
10. Maintains accurate, legible, and timely records of work performed
11. Participates in maintaining proper traffic safety controls at work sites to move traffic safely and efficiently around work site
12. Performs basic buildings and grounds maintenance at collection systems facilities.
13. Responds to public inquiries in a courteous manner and provides information appropriate to the area of assignment
14. Adheres to safe work practices and abides by all applicable regulations, policies and procedures
15. Reads and interprets collection system maps to determine basic flow characteristics and construction details
16. Participates in the containment and cleanup of spills emanating from the collection system
17. Stays abreast of new trends and innovations in the field of wastewater collection system operation and maintenance

## 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 *Essential Duties* listed above. 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.



## Test Content Areas

The following list is an outline of *Test Content Areas*. Each content area is a Knowledge, Skill, or Ability that is required to perform the *Essential Duties* listed above. Since all of the Knowledge, Skills, or Abilities are required to perform the *Essential Duties* they are all equally important in the demonstration of acceptable competency. Thus, all of the content areas listed below are equally weighted on the test.

### Test Content Areas for Grade I

#### Knowledge of:

101. Operations, services, and activities of a wastewater collection system operations and maintenance program
102. Methods and techniques of recording instrument readings and related measuring devices
103. Methods and techniques of traffic control
104. Operation and proper application of collection system maintenance equipment and tools
105. Occupational hazards and standard safety practices
106. Applicable codes, regulations, policies, and procedures
107. Underground Service Alert (USA) markings

#### Skill to:

108. Establish and maintain cooperative relationships with those contacted in the course of work
109. Communicate accurately, clearly, and concisely: in writing, orally, and electronically, in the English language
110. Read and interpret essential technical information including maps and drawings
111. Perform basic mathematical calculations

#### Ability to:

112. Perform operation, maintenance, and repair of the wastewater collection system
113. Operate a variety of specialized equipment including vehicles and collection system maintenance devices, hand and power tools, air compressors and jackhammers

114. Perform basic facilities and grounds maintenance
115. Understand and follow oral and written instructions
116. Learn more difficult collection systems construction, maintenance, and repair techniques
117. Properly lift and carry heavy loads in a variety of difficult conditions
118. Obtain appropriate licenses and certifications
119. Work in hazardous, difficult, and disagreeable conditions



# 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
<b>A</b>	None	4 full-time years in Collection System Maintenance
<b>B</b>	Hold Grade I CSM Certificate for 1 yr.	2 full-time years in Collection System Maintenance
<b>C</b>	AA/AS degree in a related field	2 full-time years in Collection System Maintenance
<b>D</b>	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.

## Essential Duties 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 *Essential Duties*. The certification test measures knowledge, skills and abilities required to perform the *Essential Duties*.

### Essential Duties for Grade II

- Essential duties identified on the Test Content Specifications for Collection System Maintenance Grade I
- Performs and directs the duties of Collection System Maintenance Grade I
- Inspects, trouble-shoots, and maintains proper collection system operation using advanced techniques and instruments including closed-circuit TV, smoke testing, and related procedures.
- Conducts confined-space entries
- Performs maintenance and repair of wastewater collection system
- Provides information and reports on activities as required
- Provides assistance to other agencies and private organizations in locating and identifying utilities and manholes
- Plans routine traffic safety at work sites and performs non-routine traffic control under general supervision
- Resolves routine complaints in an efficient and timely manner
- Monitors crew performance to ensure adherence to safe work practices and compliance with all applicable regulations, policies, and procedures
- Participates in the development and propagation of safe work practices and procedures
- Attends and participates in professional group meetings; stays abreast of new trends and innovations in the field of waste water collection system operation and maintenance



### 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* listed above. 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.

### Test Content Areas

The following list is an outline of Test Content Areas. Each content area is a knowledge, skill, or ability that is required to perform the *Essential Duties* listed above. Since all of the knowledge, skills, or abilities are required to perform the *Essential Duties* they are all equally important in the demonstration of acceptable competency. Thus, all of the content areas listed below are equally weighted on the test. Candidates should also be thoroughly familiar with the Grade I Collection System Maintenance Technologist *Test Content Areas*.

#### Knowledge of:

##### Test Content Areas for Grade II

200. Knowledge, skill and ability identified on the Test Content Specifications for Collection Systems Grade I
201. Operations, services and activities of a wastewater collection system operations and maintenance program
202. Methods and techniques of wastewater collection system inspection, maintenance and repair
203. Operation and characteristics of collection system maintenance equipment and tools including heavy equipment, CCTV inspection, and monitoring devices
204. Methods and techniques, tools and materials used in the maintenance and repair of wastewater collection systems and lift stations

205. Safe working practices pertinent to wastewater collection system maintenance, repair, and construction
206. Occupational hazards and standard safety practices
207. Applicable codes, regulations, policies, and procedures

#### Skill to:

208. Establish and maintain effective relationships with those contacted in the course of work
209. Communicate accurately, clearly, and concisely: in writing, orally, and electronically, in the English language
210. Perform simple algebra and geometrical calculations

#### Ability to:

211. Perform maintenance and repair of the wastewater collection system
212. Operate a variety of collection system maintenance construction equipment such as air compressors, compactors, vibrators, jackhammers, tampers, cutters and CCTV inspection and monitoring devices
213. Work independently in the absence of direct supervision
214. Understand and follow oral and written instructions
215. Learn new and advanced collection systems construction, maintenance, and repair techniques
216. Effectively assess and interpret situations and conditions and apply independent judgement
217. Operate a variety of heavy construction equipment, such as backhoes, loaders, dozers, and dump trucks



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

## Using Your Education To Help Qualify For The Test

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.

## Essential Duties 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 *Essential Duties*. The certification test measures knowledge, skills and abilities required to perform the *Essential Duties*.

### Essential Duties for Grade III

1. Essential duties identified on the Test Content Specifications for Collection Systems Grades I and II
2. Plans, coordinates, and reviews the performance of the duties of Collection System Maintenance Grade I and Grade II
3. Coordinates with other utilities, agencies, and private organizations to address complex or non-routine issues
4. Participates in the evaluation of the performance of the wastewater collection system such as energy efficiency, material costs, and preventive maintenance programs
5. Participates in the development and implementation of training of assigned employees in their areas of work in wastewater collection system inspection and repair methods, techniques, equipment, and safety
6. Verifies the work of assigned employees for accuracy, proper work methods, techniques, and compliance with applicable standards and specifications
7. Monitors and inspects the work of contractors for a variety of construction or maintenance projects
8. Analyze and review system data to recommend priorities, schedules, and workload performance measures
9. Develops and directs the execution of complex or non-routine traffic safety plans
10. Responds to exceptional and/or non-routine public inquiries in a courteous manner, and participates in the development of formal reports and responses to the media
11. Participates in, ensures the development of,



- and adherence to the safety program
- 12. Participates in fact-gathering to respond to liability claims
- 13. Participates in investigations into potential wrong-doing or policy violations
- 14. Attends and participates in professional group meetings; stays abreast of new trends and innovations in the field of wastewater collection system operation & maintenance

### 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* above. 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.

### Test Content Areas

The following list is an outline of Test Content Areas. Each content area is a Knowledge, Skill, or Ability that is required to perform the *Essential Duties* listed above. Since all of the Knowledge, Skills, or Abilities are required to perform the *Essential Duties* they are all equally important in the demonstration of acceptable competency. Thus, all of the content areas listed below are equally weighted on the test. Candidates should also be thoroughly familiar with the Grade I and II Collection System Maintenance *Test Content Areas*.

#### Test Content Areas for Grade III

##### Knowledge of:

- 300. Knowledge, skill and ability identified on the Test Content Specifications for Collection Systems Grades I and II
- 301. Operations, services, and activities of a wastewater collection system operations and maintenance program
- 302. Principles of leadership, supervision, and training
- 303. Methods and techniques of wastewater collection system inspection, predictive/preventive maintenance and repair
- 304. Operation and characteristics of collection system maintenance equipment and tools.

- 305. Methods and techniques, tools and materials used in the maintenance and repair of wastewater collection systems
- 306. Procedures, methods, tools, and equipment used in the operation of motors, pumps, controls, and instrumentation
- 307. Safe working practices applicable to wastewater collection system maintenance, repair and construction
- 308. Pipeline and manhole design and construction
- 309. Occupational hazards and safety practices including the management of exceptional circumstances
- 310. Office equipment including computers and supporting word processing, spreadsheets, and databases
- 311. Applicable codes, regulations, policies and procedures

##### Skill to:

- 312. Establish and maintain cooperative working relationships with those contacted in the course of work
- 313. Communicate accurately, clearly, and concisely: in writing, orally, and electronically, in the English language
- 314. Perform advanced algebra, geometry, statistical analysis, including cut sheet problems

##### Ability to:

- 315. Lead and train maintenance and repair staff. Includes scheduling and assigning personnel and the use of materials and equipment to assure desired quality and quantity of work
- 316. Work cooperatively with co-workers; identify and minimize conflict
- 317. Compute time requirements, labor, materials, and equipment needed for various jobs
- 318. Plan, organize, and schedule training
- 319. Inspect and diagnose operating problems on pumps, electrical motors, and automatic control systems
- 320. Supervise and direct the most difficult collection system maintenance and repair tasks
- 321. Work independently under general supervision
- 322. Competently inspect the work of contractors and staff
- 323. Operate a variety of collection system maintenance equipment and tools



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

## 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.

## Essential Duties 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 *Essential Duties*. The certification test measures knowledge, skills and abilities required to perform the *Essential Duties*.

### Essential Duties for Grade IV

- Essential duties identified on the Test Content Specifications for Collection Systems Grades I, II, and III
- Administers and manages the performance of the duties of Collection System Maintenance Grade I, Grade II and Grade III
- Responsible for all services and activities associated with the operation, maintenance and repair of the wastewater collection system
- Manages the development and implementation of goals, objectives and policies for the wastewater collection program
- Directs and supports supervisors and staff to ensure high performance in a customer service-oriented work environment that supports achieving desired goals and objectives
- Evaluates the performance of the wastewater collection system such as staffing levels, preventive maintenance programs, energy efficiency, and material costs
- Plans, directs, coordinates, prioritizes, and reviews the work plan for the collection system
- Selects, motivates and evaluates personnel; works with employees to achieve performance goals and objectives; implements disciplinary procedures; conducts general labor relations activities
- Develops, implements and oversees a comprehensive equipment selection and maintenance program



10. Coordinates wastewater collection system activities with other divisions, outside agencies and organizations. Negotiates and resolves sensitive and controversial issues
11. Provides responsible and complex technical support to upper management and prepares/presents staff reports, including organizational studies
12. Originates and administers the work of contractors/consultants/engineers for a variety of construction or maintenance projects
13. Develops and administers safety training programs for wastewater collection system staff, and ensures compliance with safe working practices, rules and regulations
14. Develops and administers the training of assigned employees in wastewater collection system inspection and repair methods, techniques, and equipment
15. 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
16. Initiates, develops and administers programs, policies, and procedures to ensure the safe and efficient operation of the wastewater collection system
17. Attends and participates in professional group meetings; stays abreast of new trends and innovations in the field of wastewater collection system operation and maintenance; ensures the availability of opportunities for all staff to participate in professional development
18. Responds to difficult and sensitive public inquiries in a courteous manner and develops formal reports and responses to the media
19. Responds to liability claims
20. Investigates potential wrong-doing or policy violations

### 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.

### Test Content Areas

The following list is an outline of *Test Content Areas*. Each content area is a Knowledge, Skill, or Ability that is required to perform the *Essential Duties* listed above. Since all of the Knowledge, Skills, or Abilities are required to perform the *Essential Duties* they are all equally important in the demonstration of acceptable competency. Thus, all of the content areas listed below are equally weighted on the test. Candidates should also be thoroughly familiar with the Grade I, II, and III Collection System Maintenance *Test Content Areas*.

#### Test Content Areas for Grade IV

##### Knowledge of:

400. Knowledge, skill and ability identified on the Test Content Specifications for Collection Systems Grades I, II, and III
401. Operational characteristics, services and activities of a wastewater collection system maintenance program
402. Operation and characteristics of collection systems maintenance equipment and tools
403. Methods and techniques, tools and materials used in the maintenance and repair of wastewater collection systems
404. Wastewater collection system inspection methods and techniques
405. Principles and practices of program development and administration
406. Principles and practices of budget preparation and administration.
407. Principles of leadership, supervision, training and performance evaluation
408. Principles of labor relations administration
409. Recent developments, current literature and sources of information related to wastewater collection
410. Office equipment including computers and supporting word processing, spreadsheets, databases and specialized computer software programs
411. Occupational hazards and general safety practices
412. Applicable codes, regulations, policies, and procedures

##### Skill to:

413. Establish and maintain cooperative relationships with those contacted in the course of work
414. Communicate accurately, clearly, and concisely: in writing, orally, and electronically, in the English language



415. Perform budget development, expenditure forecasting, statistical evaluation, and cost analysis

**Ability to:**

416. Manage, direct and coordinate the work of staff
417. Select, supervise, train, and evaluate staff
418. Oversee and direct the operations, services and activities of a wastewater collection system
419. Manage and administer inspection services on wastewater collection system projects
420. Read and interpret blueprints, construction drawings and specifications
421. Develop and administer goals, objectives and procedures
422. Interpret, explain, and enforce division policies and procedures
423. Develop and implement safety training programs
424. Prepare and administer program budget
425. Prepare clear and concise administrative and financial reports
426. Research, analyze, and evaluate new methods and techniques
427. Interpret and apply appropriate codes, regulations, policies, and procedures
428. Understand, follow and provide oral and written instructions
429. Effectively assess and interpret situations and conditions and apply independent judgment

## 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

### 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%

**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

<b>Answer Key To Sample Test Questions</b>				
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



## 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. <a href="http://www.owp.csus.edu">www.owp.csus.edu</a>	P	P	P	P
"Collection System Maintenance Study Guide", Grades 1-4 (2001) CWEA (510) 382-7800 <a href="http://www.cwea.org">www.cwea.org</a>	P	P	P	P
"Confined Space Entry", WEF Publication, Water Environment Federation, 601 Wythe Street, Alexandria, VA. 22314-1994, Phone: 1-800-666-0206. <a href="http://www.wef.org">www.wef.org</a> ISBN: 1-57278-122-X	P	P	P	P
"Wastewater Collection System Maintenance", Michael J. Parcher CRC Press. ISBN: 1566765692 <a href="http://www.crcpress.com">www.crcpress.com</a> Phone: 800/272-7737 Fax: 800/374-3401 email: <a href="mailto:orders@crcpress.com">orders@crcpress.com</a>	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 <a href="http://www.wrights-trainingsite.com">www.wrights-trainingsite.com</a> (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. <a href="http://www.wef.org">www.wef.org</a>			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. <a href="http://www.owp.csus.edu">www.owp.csus.edu</a>				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 <a href="http://www.crcpress.com">www.crcpress.com</a> ISBN: 0877620892				S
"Utility Management" Office of Water Programs California State University Sacramento 6000 J Street Sacramento, CA 95819-6025 916/278-6142 <a href="http://www.owp.csus.edu/">www.owp.csus.edu/</a>	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 <a href="http://www.dot.ca.gov">www.dot.ca.gov</a> Download from <a href="http://www.cwea.org/book_brcsg_csm3.shtml">www.cwea.org/book_brcsg_csm3.shtml</a> or <a href="http://www.dot.ca.gov/manuals.htm">www.dot.ca.gov/manuals.htm</a>	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 <a href="http://www.wef.org">www.wef.org</a> 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; <a href="http://svhqsg4.dot.ca.gov/hq/traffops/signtech/signdel/pdffiles.htm">http://svhqsg4.dot.ca.gov/hq/traffops/signtech/signdel/pdffiles.htm</a>	P	P	P	P
"Mathematics for Collection System Operators, a Workshop Manual OCT, Inc. P.O. Box 332 Gladstone , OR 97027 ; <a href="http://www.octinc.com">www.octinc.com</a>	S	S	S	S
"Sewer Rehabilitation Handbook NASSCO" 140 Circle Dr. , Suite 103 Maitland, FL 32751 <a href="http://www.nassco.org">www.nassco.org</a>	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 ; <a href="http://www.wef.org">www.wef.org</a>	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 x Velocity

#### Area:

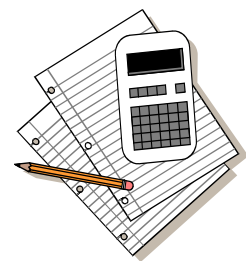
Rectangle = Length x Width  
 Circle =  $0.785 \times (\text{Diameter})^2$

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

#### Volume:

Rectangular Solid = Length x Width x 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 *Essential Duties* and *Test Content Areas* for the test that you are considering. If you are not familiar with most of the *Essential Duties* 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.

**Using the Essential Duties and Test Content Areas as a Guide to Your Study:** The Essential Duties (EDs) are a basic outline of the test subject matter. You can use the EDs as your study guide by referring to the EDs in the primary Selected References. For example, if you are preparing for the Grade II test, and you are not very familiar with ED #7 (Routine traffic safety planning), you can look up "Traffic control zones" in the index of *Operation and Maintenance of Wastewater Collection Systems Volume 1*. There you can read about safe procedures for traffic control on pages 141-145. Similarly, you could read about Test Content Area (TCA) #6 (Occupational hazards and standard safety), in the same reference. As you study you will find that the TCAs are related to the EDs (TCA #6 is clearly related to ED #7). Each test question is written to address at least one TCA and its related ED.



## 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](http://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



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

