



NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES®
sponsored by the National Society of Professional Engineers

Land Management and Water Control
EROSION AND SEDIMENT CONTROL

PROGRAM DETAIL MANUAL

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Effective upon issuing a new edition of any program detail manual, all previous editions of that program detail manual become obsolete.

This manual may be freely copied in its entirety.

Field Code: 022
Subfield Code: 01

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FIELD OF LAND MANAGEMENT AND WATER CONTROL

SUBFIELD OF EROSION AND SEDIMENT CONTROL

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IMPORTANT INFORMATION TO ALL CERTIFICANTS AND APPLICANTS

This certification program has undergone some revisions since the last printing of the program detail manual in June 1991. These changes include the following:

- o we have increased the exam requirement at all levels. See the chart on page 3.
- o we will no longer certify persons directly at Level IV under a reduced exam requirement. See the chart on page 3.
- o effective immediately (October 1, 1996), Level I Student Enrollment is no longer available; instead, certification at Level I (Technician Trainee) is now available. Certification at Level I is not retroactive; you must test October 1, 1996 or after to be eligible, even if you have already met the Level I exam requirement.
- o work element #11011, "Basic Metric Units and Conversions," is now mandatory for certification at Levels II, III and IV.

FIRST TIME TESTING

Candidates testing in this program for the first time on or after June 1, 1997 **MUST** comply with the *certification requirements as they are written in this manual and on the website (www.nicet.org).

Candidates whose first test in Erosion and Sediment Control occurred prior to June 1, 1997 have until December 31, 1997 to complete the exam requirements as they are listed in the June 1991 program detail manual.

BEGAN TESTING PRIOR TO JUNE 1, 1997

Whenever an exam requirement changes, individuals who are already certified who do not intend to upgrade their level of certification do not need to comply with any changes for the level(s) of certification they have already been awarded.

Individuals who wish to upgrade must satisfy the new exam requirement and any other new certification requirements for the higher level once the deadline has been passed (December 31, 1997).

*The Certification Requirements consist of:

1. passing an examination requirement;
2. having an approved, current personal recommendation on file;
3. having appropriate work experience for the field/subfield of certification;
4. having approved supervisor verification (signature) for passed work elements.

CAUTION

The Institute occasionally makes changes in its certification programs which will significantly affect the currency of individual program detail manuals. These changes could include any or all of the following:

- o deletion, modification, or addition of work elements
- o modification to the Examination Requirements Chart
- o modification to crossover work element credit
- o changes to the work experience requirement
- o changes to the verification requirement

**KEEP YOUR
MANUALS
CURRENT**

Since these changes could affect the requirements for certification, it is highly recommended that you contact the Institute before applying for an examination if this manual is more than a year old. The date of publication of this manual is April 1995.

It is the applicant's responsibility to make sure he/she is using a current manual.

PAYMENT OF ANNUAL RENEWAL BILL

Once certified, each certificant will be mailed an annual renewal bill. If the yearly payment is not made for three consecutive calendar years, the certification "EXPIRES" (all certification records as well as all testing records will be deleted) and certification can be regained only by reapplying as a new applicant and meeting the current criteria.

Payment of an exam fee does not substitute for payment of the annual renewal fee.

All certificants need to be aware of Policy #30, "Continuing Professional Development." This Policy can be found on our website (www.nicet.org). The first Recertification period begins in 1996.

RECERTIFICATION POLICY

DELETION OF TEST RECORDS

All test records for an individual certification area will be purged from the database after 5 years if no further testing is done in that certification area and you are not certified in that certification area. See Policy #26 on our website (www.nicet.org).

GENERAL INFORMATION

This Program Detail Manual contains the information needed to apply for the NICET certification examination in the Erosion and Sediment Control subfield of Land Management and Water Control Engineering Technology.

This manual does **not** contain all of the rules and procedures for obtaining certification. For this, you must refer to the website (www.nicet.org).

**National Institute for Certification
in Engineering Technologies (NICET)
1420 King Street, Alexandria, Virginia 22314-2794
703-684-2835 (staff response 9am to 4pm Eastern Time)
1-888-IS-NICET (voice mail only - 24 hr.)**

This certification program was designed for engineering technicians involved in all phases of erosion and sediment control work. Areas covered include knowledge of soils, the erosion process, small watershed hydrology, hydraulics of basic water control structures, sedimentation process, principles of erosion and sediment control, construction practices, construction inspection, and field investigation reports.

This program became operational in 1988. Development of the program was initiated in 1986 with technical assistance provided by the Pennsylvania Department of Environmental Resources.

WORK ELEMENT DESCRIPTIONS

The typical job duties and associated responsibilities of erosion and sediment control technicians have been broken down into discrete work elements which form the basis for an evaluation of the candidate's knowledge. Each work element is written in sufficient detail to permit candidates who have the appropriate work experience to make reasonable assumptions about the types of questions likely to be asked.

In addition, the supervisor verifying the experience of the candidate should be able to interpret the scope of the activities associated with each work element.

FIELD CODE AND WORK ELEMENT IDENTIFICATION NUMBERS

In order for us to prepare individualized examinations for each applicant, identification numbers have been assigned to each technical field and to each work element. Each technical field is represented by a 3-digit number. The technical field code number of Land Management and Water Control is 022.

The identification number assigned to each work element is 5 digits long. The first digit identifies the technical subfield within the field of Land Management and Water Control Engineering Technology:

(1) Erosion and Sediment Control

At present, there are no additional subfields operational in this technical field. Subfields under consideration for future development in this field include certification programs covering hydro projects.

The second digit identifies the level (Levels I through IV) and the work element type (General or Special):

GENERAL WORK ELEMENTS

- (1) Level I General
- (3) Level II General
- (5) Level III General
- (7) Level IV General

SPECIAL WORK ELEMENTS

- (2) Level I Special
- (4) Level II Special
- (6) Level III Special
- (8) Level IV Special

The third, fourth and fifth digits identify the individual work element within each category. A sample of this numbering system is illustrated below for work element number 022/15001:

Technical Field Code:	022	(Land Management and Water Control)
Subfield:	1	(Erosion and Sediment Control)
Level/Type:	5	(Level III General)
Work Element Number:	001	

This eight-digit identification number is needed when using the application form to request a work element on an exam or to provide work element verification.

CERTIFICATION AT LEVELS I THROUGH IV

Level I is designed for entry-level technicians with very limited relevant work experience in this technical subfield. The Institute recommends that persons with eighteen or more months of relevant work experience set their initial certification goal at Level II. Certification at Levels II, III, and IV does **NOT** require prior certification at a lower level. The Examination Requirements Chart on page 3 shows how many work elements must be passed to meet the exam requirement at each level.

WORK ELEMENT SELECTION FOR AN INITIAL EXAM

1. Refer to the Examination Requirements Chart on the following page.
2. Select the appropriate box for the level of certification desired.
3. Note the number/type of work elements required for certification, by category, as shown in the selected box.
4. Turn to the Work Element Listing section and carefully select work elements from the required categories, paying attention at each level to whether they are classified as **General** or **Special** work elements. The General work elements are further divided into **Core** Work Elements and **Non-Core** Work Elements.

Core Work Elements are those whose successful completion is **mandatory** for certification at a particular level. When selecting work elements for testing, it is recommended that Core Work Elements be given preference; then selection should be based on those remaining work elements most likely to be passed.

5. When possible, select a few extra in each category so that failing one or more work elements leaves enough passed work elements to satisfy the examination requirements.
6. It is highly recommended that the maximum number of work elements (34) be selected for each examination taken. Selection of 34 work elements provides the greatest opportunity for successful completion of the examination requirements with the smallest number of subsequent examinations. Recognize, however, that all elements selected on an exam application **will be scored**, even if no attempt is made to answer the questions. That is, a score of "0" will be assigned to the work element even if the questions are not answered and the work element will have one failure marked against it.
7. If the requirement for the desired level is more than 34, it is advisable to examine first all lower level work elements needed to achieve certification. Save the upper level work elements for a subsequent examination.
8. It is suggested that all examination candidates keep a copy of their filled out applications. This will assist in resolving questions over the telephone.

EXAMINATION REQUIREMENTS CHART

(Subfield: Erosion and Sediment Control)

You must pass the number of work elements shown in each box to achieve certification at that level.

You must pass this many work elements to complete the **Level I** exam requirement

Level I - General - 5 Level I - Special - 2 TOTAL 7
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You must pass this many work elements to complete the **Level II** exam requirement

Level I - General - 9a Level I - Special - 5 Level II - General - 9 Level II - Special - 4 TOTAL 27
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You must pass this many work elements to complete the **Level III** exam requirement
Note (b)

Level I - General - 9a Level I - Special - 5 Level II - General - 9 Level II - Special - 14 Level III - General - 6 Level III - Special - 5 TOTAL 48

You must pass this many work elements to complete the **Level IV** exam requirement
Notes (b) and (c)

Level I - General - 9a Level I - Special - 5 Level II - General - 9 Level II - Special - 18 Level III - General - 6 Level III - Special - 12 Level IV - General - 3 Level IV - Special - 4 TOTAL 66
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NOTES:

- a. Work Element #11011, "Basic Metric Units and Conversions", must be passed to achieve certification at Levels II, III, and IV.
- b. Time restrictions dictate that no more than 34 work elements can be scheduled for any single examination sitting. Therefore, at least two examination sittings will be needed in order to complete this requirement.
- c. Read very carefully the two sections applicable to Level IV certification in this manual before seeking Level IV certification.

GENERAL NOTES:

- 1. Work elements passed which are in excess of the requirement for a particular type and level, but which are needed to meet the requirement at the next higher level are automatically applied to that higher level requirement.
- 2. Use the Personal Tally Worksheet on page 16 of this manual to keep track of the number of work elements you have successfully passed.

WORK ELEMENT SELECTION FOR ALL SUBSEQUENT EXAMS

All the items listed on page 2 for the initial examination apply to subsequent exams. In addition, the following should be understood:

1. It is not necessary to retest work elements which were failed on an earlier examination if there are other work elements in the appropriate categories which can be selected instead. If you need to retest a failed work element, you must wait 120 days from the last time you failed it before you will be permitted to test that element again. In addition, you will be blocked from signing up for a work element a fourth time **if it has been previously failed three times**. For further information, read Policy #20 ("Retesting of Failed Work Elements").
2. If an adequate number of work elements has been selected to meet the desired certification requirement (with a few extra selected to provide a cushion), and there is room on the exam application to add more elements, it is appropriate to include work elements that will satisfy the examination requirement of the next level of certification or to include work elements from another field/subfield.

CROSSOVER WORK ELEMENTS

"Crossover" work elements are those which we have identified as being identical or nearly identical in topic coverage and test questions to work elements in selected other fields/subfields. In addition, almost all of the certification programs have "generic" crossover work elements covering communication skills, mathematics, physical science and other basic areas of knowledge which should be known by all engineering technicians. Once a crossover work element is passed on an examination, it does not normally have to be taken again on any other examinations. Crossover credit for the passed elements will be assigned to an examinee's record according to items 1-8 below.

1. **First Time Testing in New Subfield:** As soon as you test work elements from a new subfield (at least one element), any crossover credit from previously-tested subfields will automatically be assigned to the new subfield. At the same time, any crossover credit from the new subfield will automatically be assigned back to previously-tested subfields. This assignment of crossover credit will occur every time a new subfield is tested.
2. **Additional Testing in Previously-Tested Subfield:** When you test new work elements or retest failed work elements from a previously-tested subfield, any crossover credit from the newly-passed work elements will automatically be assigned to all previously-tested subfields.
3. No crossover credit will be assigned to a subfield until you **test at least one work element** from that subfield.
4. We will print and mail, for a nominal fee, an **"Official Personal Transcript"** which will list all work elements presently credited to your testing record (including those passed on an exam and those achieved through crossover) for a designated subfield. See the website (www.nicet.org) for ordering information.
5. We will print and mail, for a nominal fee, a **"Personal Crossover Evaluation"** which will list your "potential" crossover credit to a designated **untested** subfield. This will enable you to see how close (or how far) you are from passing an exam requirement. See the website (www.nicet.org) for ordering information. People who obtain this "Personal Crossover Evaluation" need to read and understand the cautionary statement printed on the next page.
6. We will print and mail, free of charge, a **"Crossover Listing"** between any two subfields designated. This list is different from #5 above in that it is not printed for a specific examinee, but rather shows all **current** crossovers between the two specified subfields available to any examinee. See the website (www.nicet.org) for ordering information. The cautionary statement printed below needs to be understood.
7. Crossover credit will not be assigned to or from work elements if the certification is in Delinquent or Expired Status.

8. The same 120-day waiting period policy which applies to failed work elements (see item #1 at the top of page 4) also applies to all work elements which have crossover credit to that work element (read Policy #20).

CAUTION

Crossover credit shown on the "Personal Crossover Evaluation" (item #5 above) and on any "Crossover Listing" (item #6 above) cannot be assumed to be permanent since revisions to certification programs can occasionally eliminate previous crossover relationships or create new ones. For this reason, crossover credit is permanently assigned only when new testing (as described in item #3 above) takes place. Only those crossover relationships in existence at that point in time are credited.

If you receive a "Personal Crossover Evaluation", you must understand that the crossovers listed have not been posted to your record; therefore, it is a "potential" list. Only when a new subfield is tested and the crossover credit is posted to your record does it become permanent. Only the "Official Personal Transcript (item #4 above) shows the crossover credit actually awarded.

The work elements in the Erosion and Sediment Control Technology program which provide generic crossover credit to other programs are identified in the Work Element Listing by a circumflex (^) after the work element number.

VERIFICATION OF WORK ELEMENTS

Verification should be provided by your immediate supervisor. The verifier, by signing his or her initials, is indicating that you have actually performed at least the operations indicated in the work element description and that the verifier is confident that you have performed the specific job tasks **repeatedly and satisfactorily**. Exposure to a job task through demonstrations by others or through partial involvement should not be a basis for your supervisor to verify that the task can be performed correctly under a variety of conditions. Verification cannot be provided by a subordinate employee since this could be interpreted as a "conflict of interest" situation.

WARNING

NICET takes very seriously the role of the verifier. All certification candidates and their verifiers must understand that verification is an important component of the certification process.

NICET's Policy #2, "Handling of Certification Process Irregularities" says, in part, that if NICET determines that any verification was obtained from a non-qualified verifier or was given for tasks not actually performed, the NICET action against the candidate can be to permanently deny the certification sought or revoke the certification(s) held.

WORK EXPERIENCE REQUIREMENT

Your work experience will not be evaluated until after a written exam requirement has been met. We suggest that you carefully consider your actual work history before testing in areas where you have limited or no experience -- **meeting an exam requirement does not guarantee certification**. NICET certification is only conferred upon persons performing engineering **technician** level work. We will not certify persons performing higher level work (such as engineering) or lower level work (such as craft).

In order to be awarded certification, a preponderance of the work experience must have been acquired while residing in the United States and its territories, employing U.S. standards and practices.

LEVEL IV WORK EXPERIENCE REQUIREMENT

It must be understood that ten years or more of employment in the certification area, by itself, is **not** sufficient for the granting of Level IV. An absolute requirement for certification at Level IV is involvement in a major project which is **directly related to the subfield in which Level IV certification is sought**. The project selected for submission to NICET must show that you had senior-level responsibility on the project and that it included a majority of the various activities usually associated with the certification area. The project must be recent -- started and completed no more than four years prior to submission of the writeup. Do **not** submit the Level IV major project too early in your career in the certification area (after only 5 or 6 years, for example) -- it will not be reviewed.

The writeup on the project should include such information as:

- 1. description of the type of conservation practices and/or earthmoving activities;**
- 2. description of the complexity of the erosion control problems and the combinations of solutions designed or installed;**
- 3. your supervisory responsibilities on each activity; and;**
- 4. the range of your experience on each activity as related to planning, surveys, soils investigations and/or testing, design, construction, and quality assurance or inspection.**

Your writeup must address the Level IV requirement that your level of responsibility demonstrates independent engineering technician work, including delegated responsibilities and duties for which engineering precedent exists. The pertinent work experience must be described in depth by you personally -- official job descriptions or testimonials from others will not be evaluated.

EARLY TESTING OF LEVEL IV WORK ELEMENTS

Although NICET does permit testing of Level IV work elements prior to satisfying the work experience requirement, the Institute reserves the right to question the validity of Level IV work elements passed by, and verified for, persons with little work experience. If, for example, a technician with a total of 3 years of experience passes Level IV work elements, NICET may require documentation of how this higher level work knowledge was obtained without accumulating the requisite work experience. If documentation is inadequate, NICET may require specific work elements to be tested and passed again, at the candidate's expense, at the time of the Level IV certification decision.

In addition, NICET reserves the right to require reverification of work elements designated for meeting the Level IV examination requirement if the verifications are over three years old at the time of the Level IV certification decision.

PREPARATION FOR TESTING

As the NICET written examinations are designed for the individual who has already performed the work elements associated with the program, it is anticipated that preparation for this examination should be minimal.

SUPPORT MATERIALS FOR TESTING

The exam is open-book; therefore, bringing standards, references, or textbooks to the exam is permitted (and encouraged). When appropriate, the work element description is specific in mentioning applicable standards or procedures.

When work elements are keyed directly to specific industry-wide standards, they will be identified by a normally-used notation at the end of the work element description. For this program, ASTM, AASHTO, or ACI followed by a number refer to nationally-recognized standards which should be familiar and available to all technicians working in the field. For testing purposes, the current version of standards shall be the most recent edition provided the edition was published at least one year prior to the exam date.

Additionally, when a specific publication is used as an authoritative source in writing the work element questions, the

title will be listed at the end of the work element. Refer to the "Selected General References" in this manual for publisher information.

TRAINING COURSES

NICET does not endorse, certify, or accredit training programs and any claims to that effect should be viewed with caution. NICET does, however, provide information on the certification procedures and objectives so that training courses can be developed specifically to help persons planning to take a NICET certification exam.

WORK ELEMENT LISTING

Erosion and Sediment Control

LEVEL I - GENERAL WORK ELEMENTS

(Work at Level I Is Performed Under Direct Supervision)

CORE WORK ELEMENTS (See Note 1)

ID No. Work Element Title and Description

11011^ BASIC METRIC UNITS AND CONVERSIONS
Perform conversions to and from basic metric (SI) units. (ASTM E-380.)

NON-CORE WORK ELEMENTS

11001^ BASIC MATHEMATICS
Solve mathematical problems requiring simple addition, subtraction, multiplication, division, and raising numbers to exponential powers. Round to the correct number of significant figures, calculate percentages, read graphs, and use simple geometric definitions and formulas. (See general mathematics textbooks.)

11002^ BASIC COMMUNICATIONS SKILLS
Use proper punctuation, vocabulary, spelling, and sentence structure. Follow written instructions. (See dictionaries and basic grammar references.)

11003^ BASIC PHYSICAL SCIENCE
Apply terms, definitions, and concepts from mechanics, electricity, heat, and chemistry. (Solutions may involve simple formulas found in basic physics textbooks, but will not involve algebraic manipulation or trigonometry.)

11004 SOIL AND ROCK TERMINOLOGY
Understand standard definitions of terms relating to soils and rocks. (ASTM D-653)

11005^ BASIC INDIVIDUAL SAFETY
Follow standard safety practices in performing job tasks. Recognize and call attention to improper safety practices at the work site.

11006 BASIC GEOLOGY
Comprehend basic geology and understand use of pertinent data in analysis, reports, or field operations. (See basic geology textbooks)

11007 SIMPLE PLANS AND SPECIFICATIONS
Use simple plans and specs to determine dimensions, types and specs of materials, elevations, slopes, depths at which samples are required, locations, spacing of sample sites, etc.

Note 1: General work elements are categorized as either Core or Non-Core Work Elements. Work element #11011, "Basic Metric Units and Conversions", is mandatory for certification at Levels II, III and IV. It is the only core element in this program.

General Note: See "Selected General References" page in this manual for information on all listed publications. We do not provide these publications. You must obtain them from the listed publishers.

(^) Generic crossover credit exists in other fields for this work element. Read information on crossover work elements on pgs. 4 & 5.

- 11008 **BASIC SURVEYING**
 Perform basic surveying including rodman and chainman duties to required precision. Demonstrate basic knowledge of corrections for temperature, tension, etc. Reduce and check field book notes of simple survey to detect possible errors. Use approved procedures to correct and compute needed information. Determine, plot and check basic cross sections from field book notes. Proofread computer printout of earthwork computations (if applicable.)
- 11009 **TOPOGRAPHIC MAPS**
 Determine ground distances and areas. Determine elevations and differences of elevations and slopes. Determine direction of drainage.
- 11010 **EROSION AND SEDIMENT PROCESSES**
 Recognize the types of erosion, the principle causes of various types of erosion, the factors which influence the amount of erosion, and the indicators of the active erosion process.

LEVEL I - SPECIAL WORK ELEMENTS

- 12001 **BRUSH CLEARING**
 Perform brush clearing duties with minimal supervision. Use clearing tools safely and maintain them properly; select items to clear on basis of knowledge of required lines of sight.
- 12002 **LOCATING UTILITIES**
 Know where to find the necessary information to locate utilities in the field.
- 12003 **MEASURE ELEVATIONS**
 Determine elevations in the field using only hand level and tape or range poles.
- 12004 **SOIL LOSS EQUATION**
 Recognize the factors involved in predicting soil loss by use of the USLE (Universal Soil Loss Equation). Be familiar with the limitations to using the USLE to predict soil loss. (Reference: Agricultural Handbook Number 537, Predicting Rainfall Erosion Losses, A Guide to Conservation Planning)
- 12005 **BORING LOGS**
 Understand boring logs and boring location plans.
- 12006 **SOIL SURVEY**
 Have a basic working knowledge of the use of a soil survey to determine soil type, slope range, and general agricultural and engineering properties of soils.
- 12007 **WATERSHED CHARACTERISTICS**
 Determine the area, soil, and cover conditions of watershed areas from standard topographic maps and/or aerial photographs, verified by field observations. Calibrate and use planimeters to calculate drainage areas.

LEVEL II - GENERAL WORK ELEMENTS

(Work at Level II Is Performed Under General Supervision)

- 13001[^] **INTERMEDIATE MATHEMATICS**
 Perform mathematical calculations utilizing basic algebra (fundamental laws, algebraic expressions), geometry, and the trigonometric functions of right triangles. (See basic algebra and trigonometry texts.)

- 13002 SOIL PROFILES
Understand basic soil-forming factors and the pedological classification of soils.
- 13003 AREAS, VOLUMES AND COST ESTIMATES
Perform computations to determine areas and volumes of work items, including truck-load and in-place volumes. Record results. Understand loose, compacted and in-place volumes, weights, and densities, compute costs from unit prices.
- 13004 FIELD BOOK NOTES
Perform reductions of field book notes to determine required information. Perform mathematical checks to balance backsights and foresights on levels (differential). Check angular measurements by verifying closures about a point and by determining totals of angles in a polygon. (Error adjustment not required at this level.)
- 13005 STANDARD PLANS AND SPECS
Use plans and specs of standard jobs to determine dimensions, types of materials, elevations, slopes, depths at which samples are required, locations, spacing of sample sites, etc.
- 13006 BASIC SOIL CLASSIFICATION
Perform visual/manual classification of soils in field and laboratory. (ASTM D-2488)
- 13007^ BASIC DRAFTING
Recognize and describe standard manual drafting techniques. Describe the characteristics and proper usage of standard drafting equipment. (See basic technical drawing textbooks.)
- 13008 AERIAL PHOTOS AND PHOTOGRAMMETRY
Know general principles of how aerial photos can be used in preparing maps or plans. Recognize need for ground control and variations of scale due to elevation differences and tilt of camera. Recognize causes for angular variations due to same factors.
- 13009 ESTABLISHMENT OF VEGETATION
Identify the factors that affect establishment of vegetation on disturbed areas. Adjust seeding rates with consideration given to variation in seed quality (i.e., calculate pure live seed) and adjust fertilizer rates with consideration given to variation in analysis of available nutrients.
- 13010 PRINCIPLES OF SEDIMENT AND EROSION CONTROL
Using knowledge of control principles, recognize areas needing attention, recognize potential problems and develop strategies to solve problems that have arisen or will arise.
- 13011 SEDIMENT POLLUTION
Recognize and describe the impact of sediment pollution on the environment.

LEVEL II - SPECIAL WORK ELEMENTS

- 14001 ACTIVITY NOTES AND REPORTS
Prepare accurate and detailed laboratory and field notes and reports.
- 14002 STANDARD CONSTRUCTION EQUIPMENT
Know the primary use of construction equipment such as bulldozers, backhoes, cranes, scrapers, vibrators, rollers, draglines, pile drivers and drills.
- 14003 TOPOGRAPHIC MAP MAKING
Using good standard practice, plot and draft topographic information to include top and toe of slopes, drainage, contours, locations of features, etc.

- 14004[^] FIRST AID PROCEDURES
Understand the basic rules and procedures of first aid. (See general handbooks on first aid.)
- 14005 EARTHWORK PROJECTS
Have a basic knowledge of the special preparations that may be required prior to or during a major earthwork project because of subdrains, culverts, natural gas venting, organic materials, keys in soil or rock, etc.
- 14006 GRADING OPERATIONS
Have a basic knowledge of various potential construction problems that may occur during a grading operation; i.e., the effect of property line conditions, adjacent structures, off-site soil conditions, existing underground structures, etc.
- 14007 SOIL PLACEMENT
Be familiar with soil preparation and the equipment for placing and compacting soil on a grading project.
- 14008 STANDARD CONSTRUCTION SURVEY AND STAKING
Know how to set slope stakes, grade lines and temporary bench marks. Be familiar with the use of hand levels, tapes, rods, etc.
- 14009 PRECISION REQUIREMENTS
Have a knowledge of errors of closure limits for 3rd order and lower precision surveys and for standard property and construction surveys. Know field methods and instruments needed to meet precision requirements.
- 14010 INSTRUMENT DUTIES
Inspect instruments before use, including levels, transits and theodolites. Set up instruments properly (directly over corners as required); read horizontal and vertical information accurately; give readings to recorder; move instruments properly; and protect instruments during use. Store when work is completed.
- 14011 LINE AND GRADE
Work with qualified chief of party to stake out line and grade for construction project. Set stakes in proper locations (to include vertical and horizontal grades) and mark them properly.
- 14012 SIMPLE DRAINAGE STRUCTURES
Perform inspection to assure use of pipes or approved materials in compliance with size and type specified. Check for identifying marks such as heat numbers or departmental stamps. Assure proper and uniform bedding of structures; proper depth and compaction of backfill and cover; proper slope, approaches and outfall of conduits; and proper construction of headwalls and wingwalls. Check on final appearance and quality of work. Record findings.
- 14013 LANDSCAPING AND SLOPE PROTECTION
Perform inspection to assure proper preparation of soils for seeding, sodding or planting; proper slopes and drainage provisions; use of specified fertilizer seeds or plants; installation of required supports or protection. Record areas covered, plants placed, etc. Assure cleanup and provision for watering to establish growth as specified.
- 14014 TEMPORARY EROSION CONTROL PRACTICES
Have a basic knowledge of the design and proper usage of temporary practices to control erosion and sedimentation during construction.
- 14015 PERMANENT EROSION CONTROL PRACTICES
Have a basic knowledge of the design and proper usage of permanent practices to control erosion and sedimentation during and after construction.
- 14016 ESTIMATING SOIL LOSS

Predict soil loss using the Universal Soil Loss Equation. (Reference: Agricultural Handbook Number 537, Predicting Rainfall Erosion Losses, A Guide to Conservation Planning)

- 14017 SIEVE ANALYSIS (AGGREGATES)
Determine and record the particle size distribution of fine and coarse aggregate by sieving or screening. (ASTM C-136, AASHTO T-27)
- 14018 RUNOFF-SOIL COVER/COMPLEX METHOD
Determine the volume of runoff and peak discharge values from ungaged watersheds using the SCS Soil Cover Complex Method. Drainage area, runoff curve numbers, rainfall frequency, watershed slope need to be determined. (Reference: Soil Conservation Service Engineering Field Manual, Chapter 2)
- 14019 RUNOFF/RATIONAL EQUATION
Determine peak discharges for a range of occurrence frequencies using the Rational Equation.
- 14020 MANNINGS EQUATION
Use Mannings Equation in standard and derivative forms to determine flow velocities, flow volumes, and channel areas and flow velocities.
- 14021 READY-MIX CONCRETE
Be familiar with specifications for manufacture and delivery of ready-mix concrete. (ASTM C-94) Know requirements for placement, consolidation and curing of concrete. (ACI 301, 318)
- 14022 CONCRETE TESTING
Know procedures for representative sampling of fresh concrete as delivered to project site. Be familiar with slump and air content tests, and how to cast and store concrete specimens for subsequent testing.

LEVEL III - GENERAL WORK ELEMENTS

- 15001 COMPLEX PLANS AND SPECS
Utilize complex plans and specs to assure compliance during and after construction with intent and quality of project. Use plans and specs to plan inspection program and check stake-outs and preliminary work.
- 15002^ BUSINESS COMMUNICATIONS
Use the rules of syntax and style to write clear sentences and paragraphs in preparing routine correspondence and reports. Follow standard business communications procedures. (See basic grammar and writing handbooks.)
- 15003 PUBLIC RELATIONS
Assure dissemination of pertinent information to appropriate groups (land owners, local governments, citizen groups, utilities). Advise on how to comply with applicable laws and regulations. Advise local community and citizens of methods to deal with problems and/or grievances.
- 15004^ OSHA AND OTHER SAFETY REQUIREMENTS
Know which OSHA, local, state, or other governing body requirements pertain to jobs being performed. Know safety practices set by OSHA and others. Recognize improper safety practices on the job; recommend corrections. Be familiar with authority of OSHA inspectors. (References: Construction Industry Standards, OSHA 2207)
- 15005 COMPUTERS
Have a general knowledge of the function and use (and potential uses) of computers in the field of engineering and project management.
- 15006 SOILS CLASSIFICATION

Classify soils in accordance with the Unified Soil Classification System and the AASHTO Soil Classification System. (AASHTO M-145, ASTM D-2487, D-3282)

15007 INVESTIGATE AND SAMPLE SOILS AND ROCKS
Have a general knowledge of soil and rock investigation and sampling procedures for engineering purposes. (AASHTO T-86, ASTM D-420)

15008 PARTICLE-SIZE ANALYSIS OF SOILS
Determine the quantitative distribution of particle size in a soil sample. (AASHTO T-88, ASTM D-422)

LEVEL III - SPECIAL WORK ELEMENTS

16001 EROSION OF NATURAL AND MAN-MADE SLOPES
Know the basic requirements for surface drainage systems, surface preparation, and planting for natural and compacted earth fill slopes.

16002 TRENCH BACKFILL COMPACTION
Know the techniques and materials that should be employed to provide proper trench backfill under a variety of conditions.

16003 GEOFABRICS
Know the types, uses and installation of typical polypropylene/nylon fabrics for geotechnical purposes.

16004 SPECIAL CONDITIONS DURING GRADING OPERATIONS
Understand and solve various potential construction problems occurring during a grading project.

16005 EARTHWORK QUANTITIES
Compute earthwork quantities in the office, considering loss by shrinkage and other factors.

16006 SLOPE REPAIRS
Know the procedures and techniques used in restoring shallow, non-complex slumped or failed earthen slopes back to a condition similar to that existing prior to the failure.

16007 EARTHWORK PROJECT PREPARATIONS
Know the special preparations that may be required prior to or during an earthwork project because of subdrains, culverts, natural gas venting, organic materials, keys in soil or rock, etc.

16008 URBAN HYDROLOGY
Use referenced publication to predict peak runoff for the undeveloped and developed small watershed areas. Hydrograph development or subarea routing will not be required. (Reference: USDA Soil Conservation Service, Technical Release 55, Urban Hydrology for Small Watersheds, June 1986)

16009 VEGETATED CHANNELS
Design simple vegetation-lined channels. Stability and capacity computations shall be completed for various soil types with suitable vegetation linings. (Reference: SCS-TP-61, Handbook of Channel Design for Soil and Water Conservation, Source USDA Soil Conservation Service)

16010 NON-VEGETATED CHANNELS
Utilize standard equations to size and/or analyze flow characteristics in open channels. (Does not require complex analysis such as water surface profile, tractive stress or structural analysis.) See appropriate channel flow handbooks.

16011 HYDRAULICS OF CULVERTS

Select a culvert size for inlet and outlet control. (Reference: Bureau of Public Roads, Hydraulic Engineering Circular No. 5 and/or Soil Conservation Service EFM, Chapter 3.)

16012 HYDRAULICS OF OTHER STRUCTURES

Select a properly-sized drop inlet, weir, principal spillway, or orifice for a given flow and elevation difference of water.

16013 SUBSURFACE DRAINS

Know the proper materials used in subsurface drainage, the need for envelopes (filters), the depth and capacity of drains, the use of drainage coefficients for water removal. (Reference: Soil Conservation Service Engineering Field Manual, Chapter 14, or American Society of Agricultural Engineers, Engineering Practice Standard 260.3)

16014 STREAMBANK PROTECTION

Know standard procedures and methods to size rock streambank stabilization measures.

16015^ BASIC STATISTICS

Apply basic statistical concepts related to probability, frequency distributions such as histograms, central tendency measures such as mean and mode, and dispersion measures such as standard deviation. (See elementary statistics textbooks.)

16016 TIMBER HARVESTING

Know the general principles of erosion and sediment control used in conjunction with timber harvesting operations.

LEVEL IV - GENERAL WORK ELEMENTS

NOTE: Certification at Level IV requires that the candidate must have occupied a senior position of responsibility throughout the duration of at least one major erosion and sediment control project. There are no exceptions to this requirement.

17001^ TECHNICAL PRESENTATIONS AND REPORTS

Organize and deliver oral presentations and prepare technical reports and correspondence.

17002 CONSTRUCTION SURVEYS

Perform, supervise and coordinate construction surveys to assure compliance with plans and specs, including drainage, grade, line, earthwork, curbs and gutters. Place sufficient stakes to permit accurate work and in locations that will not be knocked down. Use and care for survey instruments and EDM instruments properly; utilize crew effectively; read angles and distances to designated precision; oversee recording in professional manner; check accuracy of notes. Prepare as-built reports and quantity surveys. Verify dimensions and volumes by trigonometric and quantity survey methods. (Example: Determine quantities removed from borrow pits.)

17003 INSPECTION COORDINATION

Organize and conduct inspection efforts in accordance with the instructions of the engineer. Be responsible for equipment selection, personnel assignments, report reviewing, interfacing with other concerned parties.

17004 INSPECTION OF MAJOR PROJECT

Act as chief inspector or assistant to project engineer on one or more projects encompassing all aspects of a comprehensive project. Supervise inspectors and survey parties, soils and materials samplers and testers, and other technicians and workers on job. Assure full compliance with plans, specs and contract provisions. Supervise and coordinate safety and traffic movement. Supervise submittal of required reports, certificates, payrolls, etc., and maintain project files in good order. Keep current records of work to permit ready preparation of as-built plans and records. Have all data in shape to permit acceptance of job by designated authority.

17005 EFFECTIVE WORKING RELATIONS

Establish effective working relations with contractors, subcontractors, suppliers, consultants, utility companies, government agencies, municipalities, property owners, employees and the public. Arrange work schedules to permit effective accomplishment of work by all involved.

LEVEL IV - SPECIAL WORK ELEMENTS

- 18001 **SPECIAL TRAINING NEEDS**
Evaluate the need for training programs to increase the skills of workers performing special duties. If program is needed, get approval, select subject matter, recruit and supervise instructors, and work with instructor on course program. Evaluate OJT and other training programs.
- 18002 **URBAN HYDROLOGY**
Predict peak run-off and run-off volumes for undeveloped and developed small watershed areas. Evaluate effects of changed land use within subwatershed areas on the peak discharge for entire watershed. (Reference: USDA Soil Conservation Service, Technical Release 55, Urban Hydrology for Small Watersheds, June 1986)
- 18003 **ADVANCED STABILIZATION ESTABLISHMENT TECHNIQUES**
Determine lime and fertilizer requirements based on soil test; make seeding species selection based on soil, climate, and future use. Recognize mulch techniques and soil mat materials applicable to site conditions.
- 18004 **ALTERATIONS TO DESIGN**
Carefully review plans and specs to determine applicability to specific jobs. Recognize design deficiencies and/or mistakes or changed conditions in plans and specifications; analyze needs of job to determine appropriate corrective action, and to prepare detailed recommendations for delivery to appropriate authority.
- 18005 **MAINTENANCE PRACTICES**
Identify the critical maintenance requirements for erosion and sediment control practices. Identify practices whose functions are adversely affected by improper maintenance.
- 18006 **ENVIRONMENTAL IMPACT**
Aid engineering staff in delineating beneficial and adverse impact of project on environmental conditions, including contamination, topography alterations, archeological problems, etc.

PERSONAL TALLY SHEET

Passed Work Elements in Erosion and Sediment Control

- o Put a checkmark next to the appropriate work element number when you receive a passing score on your Examination Score Report.
- o Put a "C" next to the appropriate work element number if you have crossover credit from another field. Read pages 4 and 5 in this manual concerning crossover credit.
- o Refer to the chart on page 3 to determine whether you have passed an exam requirement.

Level I <u>General</u>	Level I <u>Special</u>	Level II <u>General</u>	<u>Level II</u> <u>Special</u>
_11001	_12001	_13001	_14001 _14012
_11002	_12002	_13002	_14002 _14013
_11003	_12003	_13003	_14003 _14014
_11004	_12004	_13004	_14004 _14015
_11005	_12005	_13005	_14005 _14016
_11006	_12006	_13006	_14006 _14017
_11007	_12007	_13007	_14007 _14018
_11008		_13008	_14008 _14019
_11009		_13009	_14009 _14020
_11010		_13010	_14010 _14021
_11011 (Core)		_13011	_14011 _14022

Level III <u>General</u>	Level III <u>Special</u>	Level IV <u>General</u>	Level IV <u>Special</u>
_15001	_16001	_17001	_18001
_15002	_16002	_17002	_18002
_15003	_16003	_17003	_18003
_15004	_16004	_17004	_18004
_15005	_16005	_17005	_18005
_15006	_16006		_18006
_15007	_16007		
_15008	_16008		
	_16009		
	_16010		
	_16011		
	_16012		
	_16013		
	_16014		
	_16015		
	_16016		

SELECTED GENERAL REFERENCES*

Peabody, A.W. Control of Pipeline Corrosion. The National Association of Corrosion Engineers. Houston, TX.

Annual Book of ASTM Standards. American Society of Testing and Materials. Philadelphia, PA.

Concrete Pipe Installation. American Concrete Pipe Association. Vienna, VA.

Design and Construction of Subsurface Drains in Humid Areas. (EP2603). American Society of Agricultural Engineering. St. Joseph, MI.

Design and Control of Concrete Mixtures. Portland Cement Association. Skokie, IL.

"Digest of Construction Industry Safety and Health Standards, " (OSHA 2202). Code of Federal Regulations (CFR), Title 29, Parts 1010 and 1026. Occupational Safety and Health Administration. Washington, D.C.

Forms of Corrosion - Recognition and Prevention. (NSACE Handbook 1). The National Association of Corrosion Engineers. Houston, TX.

Fundamentals of Quality Precast. National Precast Concrete Association. Indianapolis, IN.

A Guide for the Installation of Ductile Iron Pipe. Ductile Iron Pipe Research Association. Birmingham, AL.

Handbook of Channel Design for Soil and Water Conservation. (SCS-TP-61). USDA Soil Conservation Service. Washington, D.C.

Hydraulic Design of Highway Culverts. (Hydraulic Engineering Circular No. 5). Federal Highway Administration. Washington, D.C.

"Predicting Rainfall Erosion Losses, A Guide to Conservation Planning," (No. 537). Agricultural Handbook. Department of Agriculture. Washington, D.C.

Standard First Aid and Personal Safety. American Red Cross. Washington, D.C.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing. American Association of State Highway and Transportation Officials. Washington, D.C.

Urban Hydrology for Small Watersheds. (Technical Release 55). USDA Soil Conservation Service. Washington, D.C. June 1986.

Utility Structures. National Precast Concrete Association. Indianapolis, IN.

*This listing is not intended to be complete or representative.



NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES
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EXAMINATION SCORE REPORT

SAMPLE

Exam No. 99999

Test Date: 06/11/96

Examinee: JOHN EXAMINE

Report Date: 06/28/96

Work Element Number and Title

Score (%) Pass/Fail

EROSION AND SEDIMENT CONTROL

22013001 Intermediate Mathematics	15.00	P
22013002 Soil Profiles	80.00	P
22013003 Areas, Volumes and Cost Estimates	35.00	F*
22013004 Field Book Notes	65.00	P
22013005 Standard Plans and Specs	80.00	P
22013006 Basic Soil Classification	100.0	P
22013001 Basic Drafting	20.00	F**
22013008 Aerial Photos and Photogrammetry	90.00	P
22013009 Establishment of Vegetation	50.00	F***

* This failed work element cannot be retested prior to 120 days after the test date shown on this score report.

** This is your second failure for this work element. It cannot be retested prior to 120 days after the test date shown on this score report.

JOHN DOE
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Alexandria, Virginia 22314-2115