



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

Transportation Engineering Technology  
**HIGHWAY SURVEYS**

**PROGRAM DETAIL MANUAL**

Please check NICET's web site ([www.nicet.org](http://www.nicet.org)) to make sure you have the most recent edition of this document.

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: 001  
Subfield Code: 05

Fifth Edition  
September 2004

## **IMPORTANT INFORMATION TO ALL CERTIFICANTS AND APPLICANTS**

**This Fifth edition of the Highway Surveys manual contains no substantive changes from the 1994 Fourth Edition. The only changes are to the explanatory text.**

**All candidates testing in this program must comply with the certification and examination requirements as they are written in this Fifth Edition manual (or in the Fourth Edition manual) and our website ([www.nicet.org](http://www.nicet.org)).**

**The current 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;**
- 5. having an approved Level IV special writeup.**

## 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 June 1997.

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

Once certified, you will be mailed an annual renewal bill each year (Read "Recertification Policy" below). If the yearly payment is not made for three consecutive calendar years, the certificate "EXPIRES" (the certification record as well as all testing records applying to that certificate will be deleted) and certification can be regained only by reapplying as a new applicant and meeting the current criteria.

**PAYMENT OF  
ANNUAL RENEWAL  
BILL**

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

All certificants need to read Policy #30, "Continuing Professional Development," which is on our website ([www.nicet.org](http://www.nicet.org)). 1998 will be the last year we will mail an annual renewal invoice. In 1999, all certificants will be subject to the Recertification Policy.

**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](http://www.nicet.org)).

# FIELD OF TRANSPORTATION ENGINEERING TECHNOLOGY

## SUBFIELD OF HIGHWAY SURVEYS

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**GENERAL INFORMATION**

This Program Detail Manual contains the information needed to apply for the NICET certification examination in the Highway Surveys subfield of Transportation Engineering Technology.

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

**National Institute for Certification  
in Engineering Technologies (NICET)  
1420 King Street, Alexandria, Virginia 22314-2794  
1-888-IS-NICET (staff response from 9am to 4pm)  
(all other times, weekends and holidays, voice mail is available)**

This certification program is for technicians involved in field and/or office aspects of highway surveying. The technician, when reaching Level IV (senior grade), will have had experience in a variety of activities such as horizontal and vertical measurements, traversing, cross-sectioning, staking, mapping, photogrammetry, land descriptions, and platting.

Development of this program was initiated in 1976 with funding from the Federal Highway Administration and technical guidance from a task force appointed by the American Association of State Highway and Transportation Officials. The program was inaugurated in 1979 and was oriented toward field personnel. The broadened program (inaugurated July 1992) now accommodates office personnel.

**WORK ELEMENT DESCRIPTIONS**

The typical job duties and associated responsibilities of highway surveys 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 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 NICET 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 number for Transportation Engineering Technology is 001.

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

- |                                |                     |                              |
|--------------------------------|---------------------|------------------------------|
| (1) Highway Construction       | (5) Highway Surveys | (7) Bridge Safety Inspection |
| (2) Highway Design             |                     | (8) Highway Materials        |
| (4) Highway Traffic Operations |                     | (9) Highway Maintenance      |

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 001/55001:

Technical Field Code:	001	(Transportation Engineering Technology)
Subfield:	5	(Highway Surveys)
Level/Type:	5	(Level III General)
Work Element Number:	001	

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

**REQUIREMENTS FOR 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 any level does **NOT** require prior certification at a lower level. The Examination Requirements Chart on page 3 lists the examination requirements for certification at Levels I, II, III, and IV in Highway Surveys.

**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 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. Select first those 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 certification criteria.
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.

# EXAMINATION REQUIREMENTS CHART

## (Subfield: Highway Surveys)

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

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

Level I - General - 6 Level I - Special - 4  TOTAL 10
--

You must pass this many work elements to complete the **Level II** exam requirement  
**Read Note (a) below**

Level I - General - 11a Level I - Special - 4 Level II - General - 11 Level II - Special - 2  TOTAL 28
---

You must pass this many work elements to complete the **Level III** exam requirement  
**Read Notes (a) and (b) below**

Level I - General - 11a Level I - Special - 7 Level II - General - 11 Level II - Special - 6 Level III - General - 13 Level III - Special - 5  TOTAL 53
--

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

Level I - General - 11a Level I - Special - 7 Level II - General - 11 Level II - Special - 8 Level III - General - 13 Level III - Special - 10 Level IV - General - 6  TOTAL 66
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**NOTES:**

- (a) Work Element #51012, "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 at a particular level and which can be used 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 20 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 do retest a failed work element, you will be blocked from signing up a fourth time if it has been previously failed three times. For further information, read the website ([www.nicet.org](http://www.nicet.org)).
2. If an adequate number of work elements has been selected to meet the 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 subfield or another field.

### **CROSSOVER WORK ELEMENTS**

"Crossover" work elements are those which have been identified by NICET as being identical or virtually identical in coverage and intent 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 1-7 below.

1. **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. **Further 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 your testing record for a subfield until you test **at least one** work element from that new subfield.
4. NICET will print and mail, for a nominal fee, a **"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](http://www.nicet.org)) for ordering information.
5. NICET 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](http://www.nicet.org)) for ordering information. Read the **Caution** statement on page 5.
6. NICET will print and mail up to three **"Crossover Listings"** free of charge. These listings are different from #5 above in that they show **all** current crossovers between any two specified **subfields**; they are not specific to the requestor. These may be ordered by phone. Read the **Caution** statement on page 5.
7. Crossover credit will not be assigned to or from work elements if the certification is in Delinquent or Expired Status.
8. It is suggested that all examination applicants keep a copy of their filled out applications. This will assist in resolving questions over the telephone.

The work elements in the Highway Surveys program which provide crossover credit are identified in the Work Element Listing by an asterisk (\*) after the work element number. The "generic" crossover work elements are identified by a circumflex (^) after the work element number.

#### CAUTION

Crossover credit shown on a **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 crossovers 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.

In other words, 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.

#### VERIFICATION OF WORK ELEMENTS

Verification is a process by which your **supervisor** confirms that you have actually performed the specific job task or have utilized the knowledge required in that work element under a variety of conditions and have done so **repeatedly and correctly**. If your supervisor does not have technical expertise in the specialty area you are testing or you have no supervisor, you must obtain verification from another individual who does have technical expertise in the specialty area and who has first-hand knowledge of your specific job skills.

The verifier, by signing his or her initials, is certifying that he/she has personally observed you perform the job task or utilize the knowledge required by the work element. Exposure to a job task through demonstrations by others or through partial involvement is not a valid basis for verification.

#### WARNING

*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. The NICET action against the verifier can be to terminate the privilege of serving as a verifier. If the verifier is NICET-certified, the certification(s) could be revoked.*

Lack of verification on any (or all) work elements does not prevent you from testing those work elements. Certification, however, will not be awarded until all work elements counted toward certification are verified.

#### 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 SPECIAL WRITEUP**

Ten years or more of employment in the certification area, by itself, is not sufficient for the granting of Level IV certification. An absolute requirement for certification at Level IV is senior-level involvement in activities which are **directly related to the subfield in which Level IV certification is sought**. The writeup must address full-time involvement in activities that are recent (started no more than **4 years** prior to the submission of the writeup). If the activities have not yet been completed, they must have been ongoing for at least one year. A writeup submitted too early (for example, after only 5 or 6 years in the certification area) will not be reviewed.

For this program, the writeup must show senior-level involvement in a variety of significant field or office highway surveys activities. These activities/projects should be related to roadways and their associated structures, special facilities, and drainage accommodations.

**The writeup should also include the following information:**

- 1. type of road (interstate, primary, secondary, local, urban or rural, etc.);**
- 2. magnitude of activity/project (miles, time period, scope of work, etc.);**
- 3. category of survey work (control, preliminary, construction, cadastral, topographic, etc.);**
- 4. your supervisory responsibilities.**

The writeup must address the Level IV requirement that your level of responsibility demonstrates independent senior 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 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 candidates'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 were signed three years prior to the time of the Level IV certification decision.

### **PREPARATION FOR TESTING**

As NICET exam questions are written for individuals who routinely perform the job tasks assigned to the certification program, 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. When appropriate, the work element description is rather 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 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 date of testing.

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

## Highway Surveys

### LEVEL I - GENERAL WORK ELEMENTS

(Work at Level I Is Performed Under Direct Supervision)

#### ID No. Work Element Title and Description

#### CORE WORK ELEMENT (See Note 1)

51012^ BASIC METRIC UNITS AND CONVERSIONS  
Perform conversions to and from basic metric (SI) units. (ASTM E-380)

#### NON-CORE WORK ELEMENTS

- 51001\* SIMPLE PLANS AND SPECIFICATIONS  
Understand and use simple plans and specifications to determine dimensions, elevations, slopes, locations and other information required to accomplish surveys.
- 51002 NOMENCLATURE AND USE OF STANDARD EQUIPMENT  
Demonstrate knowledge of nomenclature and use of standard equipment and instruments for 3rd order surveys through supervised use of tapes, range poles, levels and transits, stakes and straight-edges and EDM. Handle equipment and instruments properly; keep them clean; and store them as required.
- 51003 IDENTIFICATION OF ESTABLISHED POINTS  
Know the meanings and values of having an established datum. Recognize types of monuments and markers used and know what they signify. Locate markers and monuments in the field.
- 51004 PHYSICAL MEASUREMENT OF DISTANCES  
Use standard chains and tapes in the field for measurement of horizontal distances. Correct for slopes and for short or long tapes. Determine true length of tape and know mathematics used for corrections. Demonstrate "breaking tape" method and mathematical correction for slope distances. Handle tapes in proper manner and clean as required.
- 51005 TRIGONOMETRY AND GEOMETRY  
Use trigonometric functions, laws, and identities to solve problems involving right and oblique triangles, and vector addition. Recognize the properties of lines and planes, circles and spheres, ellipses, parabolas, and hyperbolas. Calculate distances, slopes, and intersections involving straight lines. (See textbooks on trigonometry and elementary analytical geometry.)
- 51006 FIELD BOOK NOTES  
Perform reductions of field book notes to determine required information. Perform math 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.)
- 51007 STANDARD CROSS SECTIONS  
Participate in surveys to determine elevations along planned highway section. Prepare notes on basis of survey. Determine, plot and check standard cross sections through use of notes.

Note 1: Work element #51012, "Basic Metric Units and Conversions", is **mandatory** for certification at Levels II, III and IV.

General Note: See "Selected General References" page in this manual for information on listed publications.

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

(\*) Crossover credit exists in selected other fields/subfields for this work element. Read information on crossover elements on pages 4/5.

- 51008 WORK ELEMENT DELETED. **(Credit is retained by those who previously passed it.)**
- 51009 PRECISION REQUIREMENTS  
Know the 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.
- 51010 PROPERTY LINE PLOTS AND SIMPLE COMPLETED SURVEYS  
Use good standard practice to draft property line plots and simple survey information from field book notes. (Finished design quality drafting not required, but graphic information should be clear and of acceptable technical quality and accuracy and at a proper scale.)
- 51011\* TOPOGRAPHIC MAPS  
Determine ground distance and areas from maps. Determine elevations, differences of elevations and slopes. Use topo maps to locate work areas, to supplement sketches and to check completed surveys.
- 51013^ BASIC COMMUNICATION SKILLS  
Use proper punctuation, spelling, and sentence structure. Follow written instructions. (See basic grammar references.)
- 51014^ BASIC PHYSICAL SCIENCE  
Apply terms, definitions, and concepts from mechanics, electricity, heat, and chemistry. (Solutions may involve simple formulas found in basic physics texts, but will not involve algebraic manipulation or trigonometry.)
- 51015^ BASIC INDIVIDUAL SAFETY **(Note 2)**  
Follow standard safety practices in performing job tasks. Recognize and call attention to improper safety practices at the work site. (OSHA 2202)

### **LEVEL I - SPECIAL WORK ELEMENTS**

- 52001 CHAINMAN DUTIES  
Perform front and rear chainman duties on a 3rd order survey with minimal supervision. Align tape or chain between stations; "break tape" as necessary; read partial tape distances to nearest .01 foot (1/8 inch). Exert proper uniform pull.
- 52002 RODMAN DUTIES  
Perform rodman duties on a 3rd order survey with minimal supervision. Follow hand signals to plumb rod or use bullseye level; select proper locations for topographic readings; provide clear sights when possible; and use extended rod properly.
- 52003 BRUSH CLEARING DUTIES  
Perform brush clearing duties with minimal supervision. Use clearing tools safely and maintain them properly; do not destroy growth unnecessarily; select items to clear on basis of knowledge of required lines of sight.
- 52004 FLAGMAN OR TRAFFIC CONTROL DUTIES  
Perform traffic control duties with minimal supervision. Use flag or signals properly; provide best traffic movement commensurate with complete safety of crew; provide sufficient advance warning to traffic to permit adequate control. Have general knowledge of safety requirements and OSHA regulations necessary to perform proper safety precautions.

**Note 2:** This work element was formerly numbered #53002. All examinees who passed it as #53002 have had their credit changed to #51015. In some cases, therefore, it may be necessary to pass an additional Level I Special work element.

- 52005 LAND AND PROPERTY CORNER SEARCH  
Assist in locating approximate sites of corners by using cadastral records, maps or plans. Use magnetic or other devices to find metal corner pins and dig properly to avoid disturbing corners. Mark located corners properly and reference them if necessary.
- 52006 3RD ORDER SURVEY NOTES  
With minimal supervision, act as recorder for a survey party doing 3rd order work. Record vertical and horizontal readings accurately and clearly; make corrections and changes properly; include reference sketch, names of party members, weather, and location sketch. Perform field checks of math and readings.
- 52007 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.
- 52008 ESTABLISH POINTS  
Following orders of party chief, place stakes at proper locations to avoid being disturbed. Set monuments in manner to permit ready recovery and in compliance with requirements for order of monument. Place appropriate metal marker. Place reference markers if appropriate. Mark stakes with paint or keel in compliance with standard practice.
- 52009 RANGE POLE DUTIES  
Raise range poles to sufficient height to permit line of sight in rough country. Assure proper plumb of poles over point.
- 52010 EDM PRISMS  
Raise range poles to sufficient height to permit line of sight in rough country. Assure proper plumb of poles over point, but use Electronic Distance Measuring prisms. Insure safe mounting to avoid damage to prisms.
- 52011 CLEAN EQUIPMENT AND SHARPEN TOOLS  
Clean and sharpen equipment and tools to assure continued usability. Take proper measures to avoid rust, mildew or other damage and use proper cleaning agents.
- 52012 LINE AND GRADE  
Work with qualified chief of party to stake out line and grade for construction project. Set stakes in correct locations (to include vertical and horizontal grades) and mark them properly.
- 52013^ BASIC DRAFTING  
Recognize and describe standard manual drafting techniques. Describe the characteristics and proper usage of standard drafting equipment. (See basic technical drawing textbooks.)
- 52014 PLOT SIMPLE DEEDS  
Plot to scale simple deeds which describe rural property by township range, section and quarters. Apply simple field surveying ties.
- 52015 LAND TRANSFER DOCUMENTS  
Know the basic legal documents used in land transfer of title, including warranty deeds, quitclaim deeds, leases and easements.
- 52016 SURVEY DRAWINGS  
Recognize and describe standard survey drawing symbols. Use standard practice to draw property line plots and survey information from field book notes.
- 52017 SKETCHING  
Use good standard practice to sketch features that are important to the survey underway. Be familiar with commonly-used symbols and notations.

- 52018 TYPES OF DEEDS  
Distinguish between the different types of deeds that convey property rights. Know how a warranty deed, a deed of trust, a quit claim deed, and other deeds look.
- 52019 PUBLIC LAND SURVEY SYSTEM (PLSS)  
Know the method of describing public land into township blocks and lots.

## **LEVEL II - GENERAL WORK ELEMENTS**

(Work at Level II Is Performed Under General Supervision)

- 53001 STANDARD METRIC UNITS AND CONVERSIONS  
Use both English and metric units interchangeably. Convert from one to the other and use tables in either system.
- 53002 WORK ELEMENT NUMBER RENUMBERED AS 51015. **(Read Note 2 on page 9)**
- 53003\* COMPLIANCE WITH FEDERAL, STATE, AND LOCAL PROGRAMS  
Be familiar with requirements of programs (EEO, OJT, Davis-Bacon, Workman's Compensation, etc.), and assure compliance on-the-job by scheduled and non-scheduled inspections.
- 53004\* TRAFFIC SAFETY REQUIREMENTS  
Know and practice basic requirements of traffic safety at and around work sites. Be familiar with proper protective clothing and equipment to use while on job. (MUTCD - Part VI)
- 53005^ FIRST AID PROCEDURES  
Understand the basic rules and procedures of first aid. (See general handbooks on first aid.)
- 53006\* CONSTRUCTION SURVEYS COORDINATION  
Assure compliance with plans and specifications by coordinating, supervising, recording and checking the accurate performance of a construction survey for line and grade. Act as instrumentman (or chief of party under supervision). Read angles, distances and measurements to required degree of precision and provide properly marked stakes. Layout and stake job in accordance with plans and specifications, and verify dimensions and volumes by trig and quantity survey methods.
- 53007\* STANDARD PLANS AND SPECIFICATIONS  
Use plans and specifications of standard jobs to determine dimensions, elevations, slopes, locations and other information. Calculate required information from dimensions, curves, angles and other data on plans and specifications.
- 53008 MATERIALS AND EQUIPMENT ACCOUNTABILITY  
Implement and enforce effective equipment and materials procedures. Comply with requirements for completing property records which are current and reflect location, condition and use of equipment and instruments. Assure proper control of instruments, equipment and supplies. Investigate loss or damage of equipment or instruments and complete necessary report forms.
- 53009 TOPOGRAPHIC AND HYDROGRAPHIC MAPS AND CHARTS  
Determine information from contours. Know principles of scale conversion and how maps are compiled. Use topo maps to verify or check changes in surveys. Read and use hydrographic charts to determine depths, bottom slopes, sedimentation, etc.
- 53010 ADJUST SIMPLE OPTICAL INSTRUMENTS  
With approval of supervisor and under general supervision, perform minor adjustments to simple optical instruments. Check and adjust level bubbles, cross hairs, mountings, etc. On transits perform same work, plus verify calibration of horizontal and vertical circles.

- 53011 TRIANGULATION AND TRAVERSE SURVEYS  
Perform field measurements and checks in compliance with specified 3rd order precision standards, for approval of an engineer or qualified surveyor.
- 53012 BENCH LEVEL RUNS AND CROSS-SECTIONING  
Perform field measurements and checks in compliance with specified 3rd order precision standards, for approval of an engineer or qualified surveyor. Includes balancing of backsights and foresights.
- 53013 CALIBRATE TAPES OR CHAINS  
Verify length of tapes or chains against established 3rd order precision standards. Verify availability of temperature and tension adjustment factors. Perform measurement and adjust for appropriate factors (including slopes) to meet specified standards for 3rd order work and for approval of an engineer or of a qualified surveyor.
- 53014 DIRECT RODMEN AND CHAINMEN ON LOCATION SURVEYS  
Instruct and direct rodmen and chainmen to set up and take measurements at locations that will permit accomplishment of readings by instrumentmen as required for an effective route survey.
- 53015 PLOT AND DRAFT TOPOGRAPHIC INFORMATION  
Using good standard practice, plot and draft topographic information to include top and toe of slopes, drainage, contours, locations of features, etc. Submit to qualified surveyor for approval.
- 53016 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.
- 53017 ALGEBRA  
Solve linear and exponential algebraic equations and systems of equations. (See algebra textbooks.)
- 53018^ INTERMEDIATE PHYSICAL SCIENCE  
Solve problems in mechanics, electricity, heat, and inorganic chemistry. (Solutions may involve algebra and trigonometry.)
- 53019 RURAL-LAND SURVEYS  
Understand the terminology and methods by which rural property is described -- by metes and bounds, by rectangular system (townships, sections), and by coordinates.
- 53020 URBAN-LAND SURVEYS  
Understand the terminology and methods by which urban property is described -- by lot and block; by metes, bounds, and lots; by metes and bounds to city monuments; and by coordinates.
- 53021^ 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.)

## **LEVEL II - SPECIAL WORK ELEMENTS**

- 54001 RIGHT-OF-WAY LIMITS  
Using verified plans and/or property descriptions and plats, work with chief of party to identify and stake ROW limits.
- 54002 PILE CUTOFFS  
Using plans and specifications, establish proper pile cutoff points under supervision of qualified person. Check cutoffs for compliance with plans and specifications.

- 54003 FENCE LINES  
Using previously established control and plans, specifications and/or property descriptions and plats, stake fence line under supervision of instrumentman and chief of party in a manner that will permit precise construction.
- 54004 GUARDRAILS  
Using previously established control and plans, specifications and/or property descriptions and plats, stake guardrail line under supervision of instrumentman and chief of party in a manner that will permit precise construction.
- 54005 CLEARING LIMITS  
Using previously established control and plans, specifications and/or property descriptions and plats, stake clearing limits under supervision of instrumentman and chief of party in a manner that will permit precise construction.
- 54006 ALIGNMENT AND GRADE  
Participate in surveys to assure that staked or completed line and grade comply with plans and specifications.
- 54007 SIGNS AND TRAFFIC CONTROL DEVICES  
Using plans and specifications, and working with instrumentman or chief of party, stake signs and traffic control devices properly. Plot actual locations of staked devices and indicate any changes in original plans.
- 54008 AS-BUILT ITEMS  
Using plans and specifications, and working under supervision of qualified engineer, surveyor or senior technician, use survey methods to determine actual location of items constructed; verify plans and indicate correct location of items not corresponding to locations indicated on plans.
- 54009 LAND AND PROPERTY CORNER SEARCHES  
Assist in locating approximate sites of corners by using cadastral records, maps or plans. Use magnetic or other devices to find metal corner pins and dig properly to avoid disturbing corners. Mark located corners properly and reference them as necessary. Indicate on plats or plans the nature of corners recovered or re-established.
- 54010 BENCH MARK (AND TRIG STATION) LOCATIONS  
Using bench mark and/or trig station lists published by appropriate agency, locate monuments. Understand information available from lists and application to surveys being performed. Participate in surveys using bench marks or trig stations as sources of information. Understand value of closing on monumented stations.
- 54011 HORIZONTAL AND VERTICAL CURVES AND TRAVERSES  
Compute stations on circular horizontal and parabolic vertical curves; lay out stations on curves; stake on curves; use offsets from tangents. Determine rectangular coordinates (latitudes and departures or eastings and northings) from traverses and compute errors of closure on closed traverses.
- 54012 ADJUST AND CALIBRATE INSTRUMENTS  
With approval of supervisor and under general supervision, perform minor adjustments to simple optical instruments. Check and adjust level bubbles, cross hairs, mountings, etc. Perform same work on transits, plus verify calibration of horizontal and vertical circles. On basis of findings from operations performed in 53010, make standard adjustments and calibration of instruments under supervision of an engineer or qualified surveyor.
- 54013 PHOTO CONTROL POINTS  
Locate pre-designated photo control points in the field or select points that can be readily identified for such purposes and use in ground control surveys. Extend control, designating necessary additional control points by appropriate survey methods to designated precision. Provide full and sufficiently precise information on photos after calculation from notes. Obtain approval and check from qualified surveyor.
- 54014 EDM EQUIPMENT  
Participate in surveys using Electronic Distance Measuring equipment. Understand precision and limitations of equipment used.

- 54015 DRAINAGE COURSES  
Participate in surveys to determine existing or planned drainage courses; stake drainage courses and location of drainage structures; and plot information accurately from field notes.
- 54016 SIMPLE RADIAL LINE PLOTS  
Using stereo photo pairs with ground control indicated on photos, prepare simple radial line plots to determine actual relative location of points.
- 54017 DEED-TRANSFERRED LEGAL RIGHTS  
Understand what legal rights are transferred in each type of document (warranty deed, deed of trust, partial release, quit claim deed, etc.).
- 54018 PLOTTING OF DEEDS  
Plot to scale simple deeds which describe rural property by metes and bounds and local coordinates. Know third order closure requirements. Apply field surveying ties given in coordinate geometry.
- 54019 PROPERTY ABSTRACTS  
Understand what an abstract of property is and identify the location and appearance of the common sources of information presented in an abstract of property at a courthouse location.
- 54020 COORDINATES  
Use elementary coordinates to establish points for plats and deeds.
- 54021 SET PROPERTY LINES/PLOTTING LAND SURVEYS  
Prepare plats and deeds for urban or rural land surveys by metes and bounds and by rectangular system.
- 54022 COMPUTER-AIDED DRAFTING (CAD) SYSTEMS  
Know terminology and operation of computer-aided drafting systems. Access information network for surveying data, connect modem, etc.
- 54023 SIMPLE CHAIN OF TITLE  
Research a simple chain of title in courthouse records in both rural and urban locations.
- 54024 LAND TITLE  
Know the legal principles affecting title to land by adverse possessions; boundaries established by mutual consent; title to publicways; and land courts.
- 54025 METES AND BOUNDS DESCRIPTIONS  
Describe or plot a piece of land by citing bearings, distances, and features which aid in clarifying where the boundary is truly located.

### **LEVEL III - GENERAL WORK ELEMENTS**

- 55001\* COMPLEX PLANS AND SPECIFICATIONS  
Use complex plans and specifications to assure compliance before, during and after construction. Use plans and specifications to plan necessary construction surveys or for as-built surveys.
- 55002 FIELD BOOKS AND SKETCHES  
Prepare and review field books and sketches for drainage structures, earthwork, grades, and curbs and gutters for ready use by office personnel; check to verify legibility, clarity, completeness and accuracy of information and sketches.
- 55003 ROADWAY LOCATION AND STAKING SURVEY PARTIES  
Supervise and direct survey parties in location surveys, staking excavation and embankment grades, cross-

sectioning and slope staking, and staking ROW for road and bridge layout. Assure availability of adequate personnel and equipment (to include transportation and communication); provide for safety measures; plan work on project and assign responsibilities and duties; assure performance of work in conformance with requirements for job; prepare or review notes and sketches; and deliver complete package to crews or offices which will utilize the material.

55004 SURVEY RECORDS

Check records and files of government agencies, local surveyors and firms which may have worked in the area to locate records of existing controls; evaluate any records obtained to see if they still apply to the project. If entire survey can be applied or if any portions pertain, utilize information retrieved to avoid repeat work or as checks on work performed in re-survey.

55005 STRUCTURE LOCATION AND SURVEY PARTIES

Supervise and direct surveys parties in location surveys, staking substructure lines and grades, foundation piles, structure excavation limits, curbs and gutters, sewers and underdrains, culverts, box culverts and minor structures. Perform duties listed in work element 55003 on projects listed above.

55006 2ND ORDER BENCH LEVEL RUNS

Using instruments adequate for the precision requirements of 2nd order work, operate levels in bench level runs with provisions for weather and with sufficient repetitions as required.

55007 2ND ORDER TAPES AND CHAIN CALIBRATION

Perform operations listed for work element 53013 to 2nd order precision standards. Perform operations under normal and extreme field conditions.

55008 THEODOLITES

Perform angular measurements with theodolite to conform to 2nd order precision standards. Perform operations under normal and extreme field conditions.

55009 MERIDIANS

Meet 3rd order standards in establishment of meridians. Use appropriate ephemerii, almanacs and tables and perform necessary computations.

55010 2ND ORDER EDM EQUIPMENT CALIBRATION

Using equipment capable of meeting 2nd order standards and following applicable instructions from manufacturers, adjust, calibrate and use Electronic Distance Measuring equipment to provide 2nd order measurements.

55011 MATHEMATICAL ADJUSTMENTS TO SURVEY INFORMATION

Use mathematical processes to adjust traverse, triangulation and differential leveling information to 3rd order precision.

55012^ TECHNICAL PRESENTATIONS AND REPORTS

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

55013 TRIGONOMETRIC LEVELING

Perform trigonometric leveling by establishment of necessary baselines, use of reference elevations and reading of appropriate vertical angles. Compute differences of elevation to accuracy appropriate to referenced information.

55014 PHOTOGRAMMETRIC COMPILATION AND BRIDGING

Locate pre-designated photo control points in the field or select points that can be readily identified for such purposes and utilize in ground control surveys. Extend control, designating necessary additional control points by appropriate survey methods to designated precision. Provide full and sufficiently precise information on photos after calculation from notes. Obtain approval and check from qualified surveyor. Perform surveys to establish picture points on vertical aerial photos to meet requirements for photogrammetric compilation and bridging with instructions from engineer or surveyor. Demonstrate knowledge of requirements to provide information of sufficient strength to permit photogrammetric bridging of control through photos having no ground control.

- 55015 **CADASTRAL INFORMATION**  
Be familiar with repositories of cadastral information. Conduct title searches and determine land boundaries, current ownership, easements, liens and deed restrictions. Use existing plats or plot required information.
- 55016 **STATE COORDINATE SYSTEM**  
Understand the state grid in use in the area in which operations are conducted (or of a common grid or coordinate system if none is used in the area). Know how grids are used at the state level and how highway or transportation surveys tie into coordinate systems. Understand map projection systems upon which grids or projections are based and problems associated with finding a projection which will be accurate throughout an extended area.
- 55017 **GEODETTIC CONTROL AND MAPPING**  
Understand the need for geodetic considerations in surveys covering large areas. Define differences between plane and geodetic surveys and explain general practices for geodetic surveys. Understand applications of geodetic surveys to mapping of large areas.
- 55018 **PROPERTY BOUNDARIES**  
Be familiar with property boundaries that have special conditions, including navigable and non-navigable streams.
- 55019 **FLIGHT LINES**  
Use topographic maps to lay out flight lines needed to permit adequate aerial photographic coverage for existing topography, section lines, and property lines.
- 55020 **CONFLICTS AND DISPUTES**  
Communicate with appraisers, negotiators, lawyers, surveyors, engineers, etc. Assist in solving property disputes.
- 55021 **MAPS**  
Compile and compute needed information from maps (topographic, utilities, cadastral and wall) commonly used in site surveying.
- 55022\* **FIELD SURVEY REQUEST**  
Prepare a survey request in sufficient detail to permit a field survey party to obtain the required information.
- 55023 **GLOBAL POSITIONING SYSTEM (GPS) SATELLITE NETWORK**  
Be familiar with the global positioning system (GPS) by which control points are located on the earth's surface.

### **LEVEL III - SPECIAL WORK ELEMENTS**

- 56001 **TRUE POSITIONS ON AERIAL PHOTOS**  
Perform the necessary functions to determine true locations of points from a stereo photo pair. Plot on paper, metal or plastic arms, or optical photogrammetric equipment.
- 56002 **UNDERGROUND UTILITIES**  
Contact utility companies, municipalities or central records agency to elicit information on all utilities in area of project. Determine locations of all underground or concealed utilities. Stake utilities locations in such a manner as to prevent inadvertent destruction of lines or to permit safe removal or movement of lines. Be aware of special precautions necessary when dangerous conditions exist.
- 56003 **DRAINAGE AREAS**  
Determine divides and basins from topographic maps or ground survey information. Use grid square system, geometry or planimeter to determine acreage of drainage basin above point at which information is required. Submit data to engineer for review and approval.

- 56004 **PROPERTY DESCRIPTIONS**  
Using existing descriptions, plats or surveys and employing proper terminology, prepare a description of property.
- 56005 **SHEET PILING LAYOUT**  
Using plans and specifications, provide necessary survey to perform stakeout of sheet piling.
- 56006 **SEWAGE FACILITIES**  
Using plans and specifications, perform necessary survey to permit staking of collection lines, laterals and treatment facilities (if part of job). Indicate excavation information on stakes and provide reference stakes for checking depth, gradient and alignment.
- 56007 **UTILITIES RELOCATION**  
Using plans and specifications, perform necessary survey to permit staking of utilities relocation. For underground utilities, provide necessary reference stakes for determining depth, gradients (if necessary) and alignment. Indicate excavation depths on stakes if required.
- 56008 **COMPLEX RADIAL LINE PLOTS**  
Perform operations using stereo photo pairs with ground control indicated on photos, prepare simple radial line plots to determine actual relative location of points for a complex project extending over more than a single stereo pair.
- 56009 **TOPOGRAPHIC MAPS BY PHOTOGRAMMETRIC METHODS**  
Use optical or digitalized photogrammetric equipment to compile a topographic map at a uniform scale.
- 56010 **GROUND CONTROL**  
Use points previously established on state coordinate system (state grid) or by federal agency to perform surveys and extend the ground control by establishing additional points tied to the grid. Report new control to appropriate agency.
- 56011 **GEODETIC SURVEYS**  
Using equipment and methods suitable for geodetic work, perform surveys to appropriate level of precision and compute positions on geodetic datum.
- 56012 **BAROMETRIC LEVELING**  
Determine elevations of isolated high or low points by use of barometers calibrated to established standards and read simultaneously with a barometer at a point of known elevation in the general vicinity. Adjust elevations determined by reference to base stations.
- 56013 **CONSTRUCTION STAKE-OUTS**  
Perform surveys necessary to verify that the work performed complies with the plans and specs by coordinating, supervising, recording and checking the accurate performance of a construction survey for line and grade. Act as instrumentman (or chief of party under supervision). Read angles, distances and measurements to required degree of precision and provide properly marked stakes. Layout and stake job in accordance with plans and specifications, and verify dimensions and volumes by trig and quantity survey methods. Be sure all aspects of stake-out work refer to same horizontal and vertical datum. Recommend corrections or additions to project engineer if required.
- 56014 **2ND ORDER MERIDIANS**  
Meet 2nd order standards in establishment of meridians. Use appropriate ephemerii, almanacs and tables and perform necessary computations.
- 56015 **NATIONAL MAP ACCURACY STANDARDS**  
Know the requirements for compliance with National Standards for Map Accuracy. Verify compliance with standards by performing surveys to determine correct horizontal and vertical locations of points shown on map. Report findings to designated agency.
- 56016 **DEED-ASSOCIATED LEGAL DOCUMENTS**  
Comprehend all the legal documents associated with deeds, uncomplicated leases and transfers of property rights.

- 56017 INTERPRET PROPERTY ABSTRACTS  
Reconcile boundaries in conjunction with actual field data. Synthesize information into final plots of existing properties.
- 56018 COMPLEX TITLE TRANSFER  
Know the legal principles in land transfer of title and plot a complex abstract-of-title, including partition deeds, liens, list pendens and judgements.
- 56019 TRIANGULATION NET  
Compute standard triangulation nets, including strength of figures.
- 56020 TRAVERSE NET  
Adjust traverse nets to distribute the field errors in a reasonable manner so that all final results will be consistent.
- 56021 LAMBERT STATE PLANE COORDINATE SYSTEM  
Understand the Lambert projection system and convert coordinates between Lambert grids to unadjusted plane surveying grids and latitude/longitude. Calculate grid azimuths from astronomical observations given in field notes. Apply corrections to the projection based on differential elevations between the Lambert datum and the local position of the point under consideration. Know the potential errors involved in state plane coordinates in the conic projection. Interpret the relationships and accuracies of state plane coordinates in the Lambert projection with 1st, 2nd, and 3rd order surveying specifications.
- 56022 TRANSVERSE MERCATOR STATE PLANE COORDINATE SYSTEM  
Understand the transverse mercator projection system and convert coordinates between mercator grid to local unadjusted plane surveying grids and latitude/longitude. Calculate grid azimuths from astronomical observations given in field notes. Apply corrections to the projection based on differential elevation between the mercator datum and the local position of the point under consideration. Know the potential errors involved in state plane coordinates in the cylindrical projections. Interpret the relationships and accuracies of state plane coordinates in the transverse mercator projections with 1st, 2nd, and 3rd order surveying specifications.

#### **LEVEL IV - GENERAL WORK ELEMENTS**

**NOTE: Certification at Level IV requires that the candidate must have occupied a senior position of responsibility throughout a variety of substantive highway surveying activities. There are no exceptions to this requirement.**

- 57001 FIELD AND OFFICE OPERATIONS  
Supervise operations described in General Work Elements for Levels I through III with regard to field and office work. Schedule work and crews in a manner which assures efficient operations and work load and which accomplishes work on schedule. Maintain records of costs for completion of work items and determine and correct inefficiencies or low quality in crew or individual productivity. Keep records of available funds for operations and assure accomplishment of assigned work within budget. Check all work produced to assure compliance with requirements for completeness and quality of work.
- 57002 PROPERTY RECORDS  
Supervise operations described in General Work Elements for Levels I-III with regard to field and office work. Schedule work and crews in a manner which assures efficient operations and work load and which accomplishes work on schedule. Maintain records of costs for completion of work items and determine and correct inefficiencies or low quality in crew or individual productivity. Keep records of available funds for operations and assure accomplishment of assigned work within budget. Check all work for compliance with requirements for completeness and quality. Assure compliance with special programs (such as OSHA, EEO, OJT and Davis-Bacon)

where appropriate, and maintain records to indicate such compliance.

57003\* EFFECTIVE WORKING RELATIONS

Establish effective communication, through proper channels with contractors, subcontractors, consultants, government agencies, municipalities, landowners, employees and the public. Provide clear understanding to all organizations of what is required by contract provisions and document all meaningful discussions for possible future reference in claims or litigation. Schedule access of outside work crews to site as required. Be sure of authority to commit any funds or require extra work.

57004 EQUIPMENT NEEDS

Take all possible steps to assure availability of adequate equipment and materials that will permit accomplishment of work in effective and economical manner. If budgetary limitations restrict availability, make best use of equipment on hand. Submit requests for equipment for future use with full economic and technical justification. Return all equipment to central office for redistribution, as required or return equipment for servicing, as necessary. Make adjustments to equipment on hand, if required, in conformance with manufacturers' recommendations or with policy of employing agency.

57005 INTERDIVISIONAL COORDINATION

Establish effective communication with all users of survey information (including photogrammetric, construction, design and traffic operations divisions) to assure complete accomplishment of work in full compliance with requirements for subsequent operations.

57006 COMPLEX PROPERTY DESCRIPTIONS

Prepare a complex property description for final copy from existing descriptions, plats or surveys. Employ proper terminology, recognize and correct errors.

57007 INTERPRETATION OF DEEDS

Interpret and comprehend the chain of title of complicated business leases, multiple ownerships, corporate property rights, and all of the legal documents associated with the transfer of property rights.

57008 PLOTTING OF COMPLEX DEEDS

Plot to scale deeds of property involving all types of descriptions including leases, multiple ownerships, state plane coordinate, riparian rights and information taken from photography. Apply 1st order closure requirements and field surveying confirmation ties to all descriptions. Know how to re-establish section corners from original government surveying notes.

57009 DEED RESEARCH

Compile a complete abstract of property involving all sources of information such as deeds, wills sectional indexes, direct and indirect records, list pendens and other records. Write the abstract in a clear, concise manner.

**PERSONAL TALLY WORKSHEET**

- 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 subfield. (Read the information on pages 4 and 5 in this manual concerning crossover credit.)

Level I <u>General</u>	Level II <u>General</u>	Level II <u>Special</u>	Level III <u>General</u>	Level III <u>Special</u>	Level IV <u>General</u>
_51001	_53001	_54001	_55001	_56001	_57001
_51002	_53002**	_54002	_55002	_56002	_57002
_51003	_53003	_54003	_55003	_56003	_57003
_51004	_53004	_54004	_55004	_56004	_57004
_51005	_53005	_54005	_55005	_56005	_57005
_51006	_53006	_54006	_55006	_56006	_57006
_51007	_53007	_54007	_55007	_56007	_57007
_51008*	_53008	_54008	_55008	_56008	_57008
_51009	_53009	_54009	_55009	_56009	_57009
_51010	_53010	_54010	_55010	_56010	
_51011	_53011	_54011	_55011	_56011	
_51012	_53012	_54012	_55012	_56012	
_51013	_53013	_54013	_55013	_56013	
_51014	_53014	_54014	_55014	_56014	
_51015**	_53015	_54015	_55015	_56015	
	_53016	_54016	_55016	_56016	
Level I	_53017	_54017	_55017	_56017	
<u>Special</u>	_53018	_54018	_55018	_56018	
_52001	_53019	_54019	_55019	_56019	
_52002	_53020	_54020	_55020	_56020	
_52003	_53021	_54021	_55021	_56021	
_52004		_54022	_55022	_56022	
_52005		_54023	_55023		
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_52018					
_52019					

\* Work element deleted. Credit retained by those who passed it prior to the deletion.  
 \*\* Work element #53002 renumbered as #51015. As of January 1, 1994, all persons who had passed the work element as a Level II General had their credit switched to a Level I General. Candidates are cautioned that they might have to make up an additional Level II General work element. Refer to the chart on page 3.

## SELECTED GENERAL REFERENCES\*

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

Construction Industry - OSHA Safety and Health Standards Digest (OSHA 2202). U.S. Department of Labor. Washington, D.C. (Available from U.S. Government Printing Office.)

Definitions of Surveying and Associated Terms (Manual No. 34). American Congress on Surveying and Mapping and American Society of Civil Engineers. New York, NY.

Hardin, Andrew L. Land Surveyor Reference Manual. Professional Publications, Inc. Belmont, CA.

Hickerson, Thomas F. Route Location and Design. McGraw-Hill Book Company. New York, NY.

McCormac, Jack C. Surveying Fundamentals. Prentice Hall. Englewood Cliffs, NJ.

Manual on Uniform Traffic Control Devices for Streets and Highways. Federal Highway Administration. U.S. Department of Transportation. Washington, D.C.

Map Uses, Scales, and Accuracies for Engineering and Associated Purposes. American Society of Civil Engineers. New York, NY.

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

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

**We do not provide these publications. You must obtain them from the listed publishers. In all cases, we suggest you obtain the most recent edition.**

## SAMPLE SCORE REPORT

Exam No. 99999  
Examinee: JOHN EXAMINE

Test Date: 06/17/96  
Report Date: 07/11/96

Work Element Number and Title	Score (%)	Pass/Fail
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### TRANSPORTATION ENGINEERING TECHNOLOGY

#### HIGHWAY SURVEYS

1055001	Complex Plans and Specifications	20	F*
1055002	Field Books and Sketches	60	P
1055003	Roadway Locations and Staking Survey Parties	70	P
1055004	Survey Records	80	P
1055005	Structure Location and Survey Parties	100	P
1055006	2nd Order Bench Level Runs	50	F**
1055007	2nd Order Tapes and Chain Calibration	80	P
1055008	Theodolites	100	P
1055009	Meridians	20	F***
1055010	2nd Order EDM Equipment Calibration	75	P

\* 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 EXAMINE  
1420 King Street  
Alexandria VA 22314