

**NSPS - ACSM
SURVEY TECHNICIAN CERTIFICATION**

**PROGRAM BOOK
AND
EXAM PREPARATION INFORMATION**



**NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS
A MEMBER ORGANIZATION OF
THE AMERICAN CONGRESS ON SURVEYING AND MAPPING**

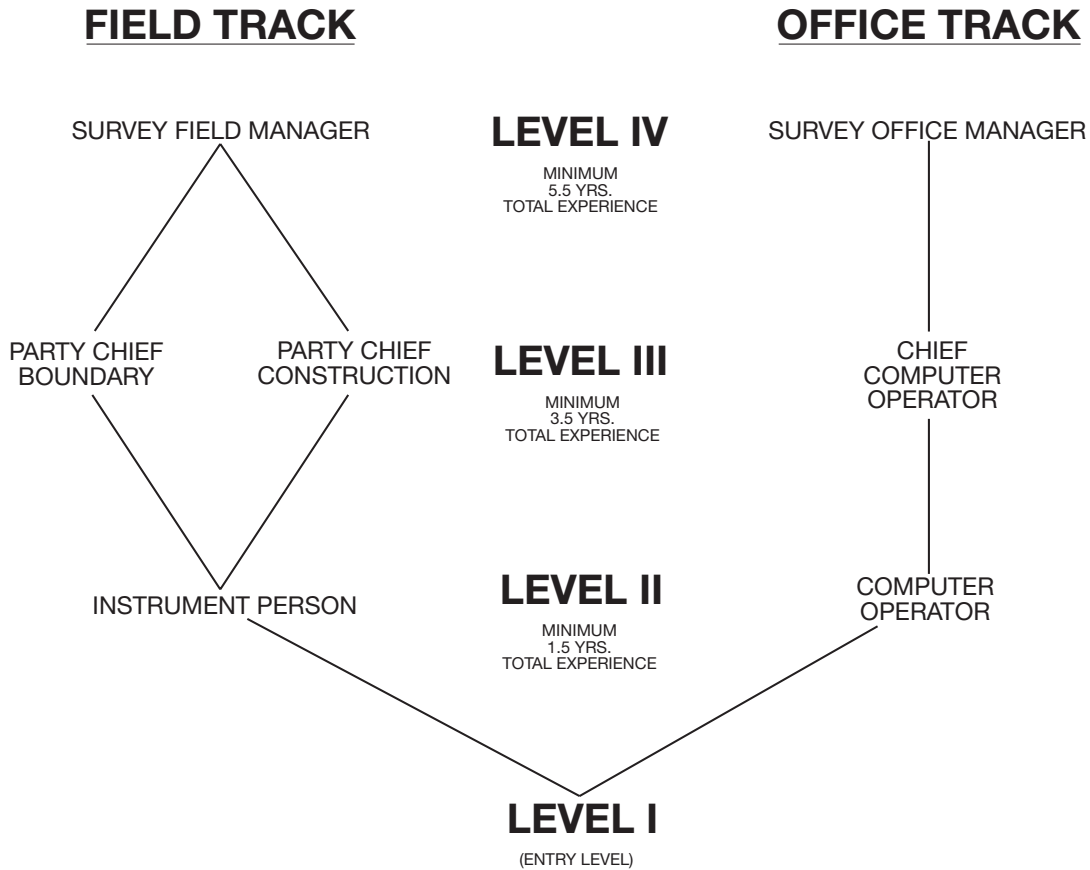
REVISED JANUARY 2005

NSPS - ACSM

SURVEY TECHNICIAN CERTIFICATION

ORGANIZATION CHART

TECHNICIAN CERTIFICATION PROGRAM



CERTIFICATION MAY BE SOUGHT IN EITHER THE FIELD TRACK
OR THE OFFICE TRACK OR IN BOTH TRACKS.

Detailed knowledge, skills & ability requirements are described under each position description
and further defined under each respective work element section.

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Level II: In addition to the Level I requirements, Level II Technicians are required to demonstrate more detailed knowledge of survey computations, types of surveys and field operations. The individual in this position is familiar with comprehensive field note taking, plan reading and preparation. The field track technician possesses a detailed working knowledge and application of standard field equipment. The office track technician possesses a detailed working knowledge and application of related computer hardware and software. The technician has a basic knowledge of the principles of the profession. Work Elements further describe the requirements related to this position.	
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SURVEY TECHNICIAN CERTIFICATION PROGRAM

SUMMARY OF PROGRAM

The National Society of Professional Surveyors (NSPS), a member organization of the American Congress on Surveying and Mapping (ACSM), sponsors a comprehensive national certification program for survey technicians. The program is recognized by the U.S. Department of Labor as part of the National Apprenticeship Program. The Survey Technician Certification Board (STCB), which administers this program, recognizes the importance of technicians to the surveying and mapping profession.

As the Technician Certification Program Organization Chart shows, the program has four levels of certification (I through IV) and two main tracks (Field and Office). Certification is by examination and experience. The certification program was initiated in 1986 and testing at Level I began in 1988. The fact sheet on the next page provides additional background information on the program.

The goals of the Survey Technician Certification Program are:

- Recognize the important contribution that technicians provide to the surveying and mapping profession.
- Provide credentials to technicians.
- Identify those who have achieved specific technical competencies.
- Provide a career ladder for technicians.
- Provide firms who support and utilize certified technicians a way to evaluate applicants and an opportunity to promote the fact that their technical staff is certified.

REQUESTS FOR CERTIFICATION INFORMATION

All requests for certification information must be directed to NSPS in writing. In this manner better records of requests and payments can be kept.

Note: The NSPS-ACSM Survey Technician Certification Program is looking for ideas, suggestions and questions.

Program information can be obtained from the ACSM web site at <http://www.acsm.net> or by e-mail: lee.canfield@acsm.net

Please Send to:

NSPS - Survey Tech.
6 Montgomery Village Avenue, Suite #403
Gaithersburg, MD 20879-3557

CERTIFICATION VALUE

Certification as a survey technician is official recognition by NSPS-ACSM that a person has demonstrated that he or she is minimally competent to perform surveying tasks at a specified technical level. Certification provides the individual with a sense of achievement, since it reflects advancement in the field of surveying. Certification also provides employers with a method of determining job assignments and advancement since certification is an indication of one's ability to perform specific job tasks.

LEGAL ASPECTS

Certification does not license individuals to practice surveying. Professional survey licensing is regulated by state boards of registration. This program is sponsored by NSPS-ACSM and should not be confused with any other certification program.

SURVEY TECHNICIAN ORGANIZATIONS

Survey technicians seeking technical development through publications and educational opportunities may want to consider joining NSPS, a member organization of ACSM. Educational programs, publications and other member services are provided by ACSM. Membership in NSPS-ACSM is not required for certification. Those interested in membership can obtain information by writing:

NSPS/ACSM
6 Montgomery Village Avenue, Suite #403
Gaithersburg, MD 20879-3557
<http://www.nspsmo.org>

NSPS - ACSM

SURVEY TECHNICIAN CERTIFICATION PROGRAM

FACT SHEET

What: A four-level certification program for surveying technicians throughout the United States. The program is being developed and implemented by a Certification Board established by the National Society of Professional Surveyors - American Congress on Surveying and Mapping. The program uses “work elements” to define the testing parameters. Minimum qualifications at each level are based on hours of experience.

Why:

- To give important and needed recognition to the survey technicians in public and private practice.
- To provide objectives for improvement and advancement for field and office survey technicians (particularly as four-year degree requirements become mandatory for licensure or registration).
- To give employers a way of judging the qualifications of potential employees.

How: All Levels:

• Application fee:	Student	none
	*Member	\$30.00
	Non-Member	\$50.00
• Examination fee:	Student	\$110.00
	*Member	\$120.00
	Non-Member	\$150.00

Levels I Through III:

- Quarterly testing nationwide.
- Examinations from two to seven hours in length.
- Multiple choice questions, machine graded.
- Cycle review determines passing score.
- If failed, no reapplication necessary (within 1 year period), just examination fee for retesting.

- All fees are non-refundable.
- **Open book exams.**
- Examination review request; in writing within 60 days of notification of test results.
- Certificate suitable for framing.
- Annual renewal of certification: \$30.00 fee.
Reinstatement fee \$10.00
- Group discount available for 10 or more examinees.
Call 240/632-9716 for details.
- Available over the Internet (Proctored)

Level IV:

- Offered Cycle I—Applications are due on Dec. 15.
- “Take Home” exam format.
- Two months to complete.
- Essay/Report form.
- Pass/Fail grade.
- Must hold active level III certification.

*** A member is a NSPS dues-paying individual or an employee of an ACSM sustaining member.**

The information contained in this booklet is general in nature. Specific information relating to testing fees, policies, and procedures will be included in the confirmation package, which is mailed upon acceptance of the application.

Frequently Asked Questions:

- Is membership in ACSM required? No.
- Is membership in ACSM possible? Yes.
- Can one start testing/certification at any level? Yes, except for Level IV, as long as one satisfies the work experience criteria for that level. **For Level IV you MUST have an active Level III certification.**
- Can one certify in all categories (FIELD: boundary, construction and OFFICE) available in a level? Yes, if one satisfies the experience and testing requirements.
- How is this program related to licensure and licensure exams? It isn't. This is a technician level program, not a professional level program.
- What type of calculator, computer or data collector is allowed at the examination? Programmable calculators are allowed if they are: silent, without external power or communication links and without “QWERTY” style keyboard.
- Is exam currently offered in languages other than English? No.

Visit www.acsm.net/cst/cstfaqs for additional FAQ's.

TESTING POLICIES

Based on pre-testing, examinations will be designed so that a minimally competent individual will answer 70% or more of the questions correctly. The normal passing score for the survey technician examination will be 70%, however the Board shall have the right to modify the cut-off score for any exam based upon the exam analysis furnished by the testing agent. The Board will periodically review test results and adjust the passing score if necessary.

In the event that it becomes necessary to postpone the examination date, the examination can be rescheduled for the next test date at the same location. The first postponement will be made at no cost, however, subsequent postponements are subject to additional fees. The additional fees will be equal to 50% of the original examination fees. A postponement request will be accepted until the date specified. Non-payment of exam fees will result in exam cancellation. A cancellation due to non-payment will require payment in full prior to rescheduling the examination.

In order to advance within the program, annual recertification must be kept active.

If applicant fails an examination, the application will be retained for one year after the test date. Applicants who re-test at the same level within that year will be assessed only the exam fee. If more than one year has passed or if applicant changes level, the applicant must update the application information and pay the application and exam fees. If an applicant fails the same examination in three consecutive attempts, formal and documentable proof of continuing education relating to the work elements failed is required before a fourth attempt will be scheduled. Or, whenever possible, applicants can step down a level.

The final scores of all examinations will be established by the Board. **Examination review will be made upon written request.** Requests must be received within 60 days of notification of the test results. Examination review will be conducted at NSPS headquarters.

Challenges of examination questions must be made on the day of examination on form(s) provided by test proctors. The Board reserves the right to be the final judge of all challenges and extenuating circumstances pertaining to examination scoring. **Any examination returned with missing pages will result in a failing grade.**

While Level IV requires a broad foundation of knowledge, the Survey Technician Certification Board feels that, due to the nature of the Level IV Exam, questions can be focused quite narrowly in only one or two areas. So to ensure the overall quality and consistency of the Technician Certification Program and to be certain that technicians are qualified in all of the specific work elements of their area, examinees for Level IV must first have successfully passed one of the Level III Exams (Party Chief Boundary, Party Chief Construction, Chief Computer Operator).

TESTING RESULTS

TESTS ARE GRADED ONCE PER CYCLE. YOU CAN EXPECT TEST RESULTS TO BE MAILED TO YOU ABOUT SIX WEEKS AFTER THE END OF THE CYCLE.

**CYCLE 1 RESULTS — MID MAY
CYCLE 2 RESULTS — MID AUGUST**

**CYCLE 3 RESULTS — MID OCTOBER
CYCLE 4 RESULTS — MID FEBRUARY**

REVIEW COURSE/INFORMATION FOR SURVEY TECHNICIAN EXAMINATION

To provide some guidance in preparing for an exam or a training session or seminar, the Survey Technician Certification Board offers the following:

- Presentation Outline for an Introductory Talk About the Program could be used along with a Fact Sheet
- Detailed List of the Contents of Work Elements, Typical Test Questions, and a Question Matrix for the Level I, II, and III Exams
- References by Topic

I. Self Study—The Importance of Preparing for the Exam

Be prepared: These tests require a significant amount of computations.

Test results over the last few years have shown that many examinees who had a good deal of experience and, in some cases, even formal surveying education did not pass an examination. The Technician Certification Exam sequence is a challenging, timed test. Perhaps the fact that it is an open book examination may tend to give examinees a false sense of security. You must be prepared to move purposefully through 2 to 6 hours of testing. Study, review, and practice in the Work Element areas is important to prepare you for the questions.

If you are planning to study for one of the exams on your own, you might start by taking some paper and listing all of the different topics listed in each of the Work Elements for your exam on a separate line along with the number of questions you will be asked in that Work Element. (See Examination Matrices attached.) This will give you a topical study guide to work with as well as how much weight is placed on each Work Element area. As you complete your studies in each topic, cross out or check off that line.

The number of questions on your exam will differ depending on which level you are taking and whether or not you have requested a second specialty examination.

Level I	= 200 questions	(4 hours to complete)
Level II	= 180 questions	(6 hours to complete)
Level III	= 150 questions	(6 hours to complete)

II. Review Course

Since most attendees of a training session will be interested in preparing themselves for only one of the three levels, instruction should be geared for that particular level. However, in the event that you wish to provide a general overview training for any and all levels, we recommend you gauge the amount of time you spend on each Work Element by the needs of the audience. Such a “general” training session should be clearly noted in any promotional material so that those who just want, for example, Level II training, realize the scope of the program.

Due to the fact that it would be impossible for the Survey Technician Certification Board (STCB) to attend and critique every planned training session, it should be clearly stated in promotional literature and handout material used in the training that while guidelines were provided by NSPS/STCB, the Board, while encouraging such training, has not endorsed this specific training program or instruction.

The sample presentation outline, fact sheet, lists of Work Elements, question matrices, references, and sample test questions, given in the following pages, are provided to help in preparing a review course for one or more of the exams.

The following is a suggested presentation outline for a one to four hour overview of the program that could be used at Chapter and State Society meetings:

A SAMPLE PRESENTATION OUTLINE

What is it all about and who is it for?

- A brief history of the program.
- Purpose of the program.
- Combination of job competency and testing.
- Levels I, II, III, and IV.
- Field/Office Route.
- Test dates, Location, and Cost.
- U.S. Department of Labor Registration.
- License/Registration versus Technician Certification.
- Seals and Stamps.
- Sample Test.
(A voluntary short sample test will be available to take, so bring your calculators.)

Any of this information can be duplicated, used as overheads, etc.

Sample tests are available. Please contact 240-632-9716, ext. 112.

LEVEL I
SURVEY TECHNICIAN CERTIFICATION
POSITION DESCRIPTION, WORK ELEMENTS AND TYPICAL QUESTIONS

POSITION DESCRIPTION

Level I Technicians are required to demonstrate knowledge of basic first aid skills and safety requirements. The individual in this position possesses a basic knowledge of field operations and types of surveys as well as familiarity with field equipment and procedures used in these functions. Additional skills required include computational ability, survey note taking, drafting/CAD and map reading. Work Elements further describe the requirements related to this position.

WORK ELEMENTS

Test problems will be taken from the following work elements:

- 1) *Types of Surveys* (10)
Knowledge of the different types of surveying and the basic differences between them.
- 2) *Field Equipment & Instruments* (41)
Knowledge of the care, cleaning and use of surveying tools and equipment, including field radios. Understand the names, purpose and parts, setup, transport and the need for calibration of various surveying field instruments. Some historical knowledge is required.
- 3) *Survey Computations* (50)
Knowledge of mathematics and measurements relating to surveying (including linear, angular, elevations and unit systems conversion).
- 4) *Control Points: Horizontal & Vertical* (6)
Knowledge of types of survey control points and their differences.
- 5) *Field Operations* (21)
Knowledge of the field duties of a Survey Technician. Such duty areas may include line clearing, establishing points, taping, leveling and compass reading.
- 6) *Field Notes* (5)
Knowledge of the basic types of surveying field notes.
- 7) *Plan Reading* (17)
Knowledge of the types of surveying maps and the ability to obtain basic information from these maps.
- 8) *First Aid & Safety* (20)
Basic knowledge of treatment practices for a variety of medical emergencies. Knowledge of traffic control and safety procedures for surveying and construction operations, including Occupational Safety and Health Administration (OSHA) standards.
- 9) *Drafting/CAD* (17)
Knowledge of basic drafting and CAD skills, tools and procedures.
- 10) *Electronic Instruments* (8)
Knowledge of the handling, setup and care of electronic instruments and their accessories.
- 11) *Surveying History* (5)
Knowledge of the historical development of survey procedures and practices.

LEVEL II QUALIFICATIONS

SPECIALTY AREAS

FIELD:

3,000 hours or 1.5 years

OFFICE:

3,000 hours or 1.5 years

(Of the 3,000 hours, 750 hours can be education) Classroom or correspondence studies will be counted toward the 750 hours provided a transcript is provided. The 750 hours constitute one year full time schooling based upon a minimum of 12 credit hours per semester or quarter. 1 CEU = 10 CLASSROOM HOURS = 0.5 CREDIT HOURS.

For those applicants who wish to test in additional specialties, experience must be documented in each specialty field.

LEVEL II

SURVEY TECHNICIAN CERTIFICATION

POSITION DESCRIPTION, WORK ELEMENTS AND TYPICAL QUESTIONS

POSITION DESCRIPTION

In addition to the Level I requirements, **Level II Technicians** are required to demonstrate more detailed knowledge of survey computations, types of surveys and field operations. The individual in this position is familiar with comprehensive field note taking, plan reading and preparation. The field track technician possesses a detailed working knowledge and application of standard field equipment. The office track technician possesses a detailed working knowledge and application of related computer hardware and software. The technician has a basic knowledge of the principles of the profession. Work Elements further describes the requirements related to this position.

WORK ELEMENTS

Test problems will be taken from the following work elements:

- 1) *Types of Surveys* (F=10; O=10)
Knowledge of the principles of performing basic surveys: leveling, traversing, triangulation, trilateration, public land surveys, metes and bounds surveys, construction surveys, photo control surveys, and GPS surveys.
- 2) *Field Equipment & Instruments* (F=35; O=15)
Knowledge of the care, cleaning, and use of a variety of surveying tools and equipment, including field radios. Knowledge of the operation, checking, and basic field adjustments on transits, theodolites, total stations, robotic total stations, data collectors, levels, compass, tribrachs, tripods, and GPS equipment. This would include repeating observations. Some historical knowledge is required.
- 3) *Survey Computations* (F=40; O=55)
Knowledge of trigonometry, geometry, algebra, coordinate geometry, and basic surveying computations. A familiarity with hand-held calculators and micro-computers is important. With either a hand-held calculator or micro-computer software, be able to enter field data and produce positional information (i.e. leveling, traversing, stadia, topographic mapping and construction stakeout). Demonstrate lot, area, and intersection (bearing-bearing, distance-distance, bearing-distance) computations. Knowledge of the reduction and checking of field notes for determination of positions and elevations. Have an elementary comprehension of computer operating systems and GIS.
- 4) *Control Points: Horizontal & Vertical* (F=10; O=10)
Know how to interpret control point records and data sheets, as well as locate points in the field.
- 5) *Field Operations* (F=35; O=10)
Under the supervision of a party chief, be able to coordinate field work for a variety of standard types of surveys. Know how to observe the Sun and Polaris for True North determination. Know basic sources of measurement errors. Know principles of staking and stake markings. Know procedures for GPS surveys.
- 6) *Field Notes* (F=10; O=10)
Know how to keep neat and orderly field notes for standard surveying operations: leveling, traversing, topographic mapping, layout, as-built surveys, boundary surveys, profile and cross-section surveys.
- 7) *Plan Reading & Preparation* (F=15; O=45)
Knowledge and understanding of the basic plan reading and preparation (i.e. site plans, boundary plans, highway plans, profile and cross sections, horizontal and vertical curves, pipeline plans, foundation plans, and developing existing and finished contours). A basic knowledge of the terminology and principles of drafting, including computer-aided drafting (CAD).

- 8) *First Aid & Safety* (F=15; O=15)
 Basic knowledge of treatment practices for a variety of medical emergencies. Knowledge of traffic control and safety procedures for a variety of surveying and construction operations, including Occupational Safety and Health Administration (OSHA) standards.
- 9) *Principles of the Profession* (F=10; O=10)
 Knowledge of surveying ethics and technical standards. Show responsibility in the profession (i.e. attire, honesty, respect for personal property), awareness of related professional association.

TOTAL NUMBER OF QUESTIONS = 180, TIME = SIX HOURS

LEVEL III QUALIFICATIONS SPECIALTY AREAS

FIELD:		OFFICE:	
Level II Experience	3000 hours (1.5 years)	Level II Experience	3000 hours (1.5 years)
PLUS		PLUS	
Party Chief - Boundary	4000 hours	Chief Computer Operator	4000 hours
Party Chief - Construction	or 2.0 years		or 2.0 years
TOTAL	3.5 Years	TOTAL	3.5 Years

Level III hours are cumulative: 4000 hours as a Party Chief plus the 3000 hours required for Level II equals 7000 hours total (3.5 Years minimum)
 (Of the 7000 hours, 1750 hours can be education) Classroom or correspondence studies will be counted toward the 1750 hours provided a transcript is provided. The 1750 hours constitutes 2.33 years full time schooling based upon a minimum of 12 credit hours per semester or quarter. 1 CEU = 10 CLASSROOM HOURS = 0.5 CREDIT HOURS

LEVEL III SURVEY TECHNICIAN CERTIFICATION POSITION DESCRIPTION, WORK ELEMENTS AND TYPICAL QUESTIONS

POSITION DESCRIPTION

In addition to the Levels I and II requirements, **Level III Technicians** are required to demonstrate a thorough knowledge of survey computations, types of surveys and field operations. The individual in this position is well versed with field note reduction and in depth plan interpretation and preparation. The Level III technician possesses supervisory skills and a detailed working knowledge of standard field and office procedures. The technician has knowledge of the principles of the profession and various technical standards. Work Elements further describe the requirements related to this position.

Test problems will be taken from the following work elements:

- 1) *Types of Surveys* (F=7, O=7)
 Know the principles and methods used in performing a variety of types of surveys such as: photo control surveys, state plane coordinate surveys, public land surveys, metes and bounds surveys, GPS surveys, construction surveys, and as-built surveys.
- 2) *Field Equipment & Instruments* (F=34, O=11)
 Extensive knowledge of proper field procedures, knowledge of the care, cleaning, and use of a variety of surveying tools and equipment, including field radios. Know how to operate, check, and perform basic field adjustments on rods, compass, transits, levels, tribrachs, theodolites, total stations, robotic total stations, data collectors, tripods, and GPS equipment. Some historical knowledge is required.
- 3) *Survey Computations* (F=21, O=21)
 Have extensive knowledge of trigonometry, geometry and algebra as related to traverse, inverse and intersection computations. Be capable of performing horizontal and vertical traverse adjustments, area and quantity computations, and horizontal and vertical curve computations.
- 4) *Control Points: Horizontal & Vertical* (F=8, O=8)
 Know when to use, how to obtain, and how to interpret control point records and data sheets, as well as locate points in the field.

- 5) *Field Operations* (F=30, O=8)
Have a knowledge of a wide variety of surveying field operation methods including but not limited to: traversing; triangulation; trilateration; observation of the Sun and Polaris for True North determination; repeating observations and precision measurements using steel tapes and theodolites; construction layout methods and procedures. Know procedures for GPS surveys.
- 6) *Field Notes* (F=7, O=7)
Know how to create, reduce, and check orderly field notes for standard surveying operations such as but not limited to: leveling, traversing, topographic mapping, construction layout, as-built surveys, boundary surveys, profile and cross section surveys.
- 7) *Plan Reading & Preparation* (F=8, O=30)
Have a knowledge and understanding of plan reading and preparation (i.e. site plans, boundary plans, highway plans, profiles and cross sections, horizontal and vertical curves, pipeline plans, foundation plans, and developing existing and finished contours).
- 8) *First Aid & Safety* (F=11, O=11)
Basic knowledge of treatment practices for a variety of medical emergencies. Have a general knowledge of traffic control and safety procedures for surveying and construction operations including Occupational Safety and Health Administration (OSHA) standards.
- 9) *Principles of the Profession* (F=7, O=7)
Have a knowledge of ethics and the various technical standards of groups such as ALTA, NGS, NSPS, ACSM, BLM, and ASCE. Show responsibility in the profession (i.e. attire, honesty, respect for personal property) and awareness of related professional associations.
- 10) *Office Operations* (F=7, O=30)
Using hand calculations or micro-computer software, be able to enter field data and produce positional information (i.e. leveling, traversing, as-built surveys, topographic mapping). Have a knowledge and familiarity with general applications of computer aided drafting (CAD). Have knowledge of microcomputer operating system and hardware peripherals.
- 11) *Supervisory Skills* (F=10, O=10)
Have a basic knowledge and familiarity with: client contacts, dealing with the public and governmental agencies, field crew management, scheduling, equipment and supplies management. Have a knowledge of general company policies as they relate to field and office operations, office work flow procedures, and field and office problem solving techniques. Also have a knowledge of proper record keeping, time keeping, and job charges. Be able to coordinate and supervise field work, staking and stake marking for a variety of standard types of surveys. Have a general familiarity with local and state land use regulations as they relate to lot site development.

TOTAL NUMBER OF QUESTIONS = 150, TIME = SIX HOURS

LEVEL IV QUALIFICATIONS SPECIALTY AREAS

SURVEY FIELD MANAGER

Level IV Experience	4,000 hours (2.0 years)
PLUS - Level II and Level III Experience	
Party Chief — Boundary	7,000 hours
Party Chief — Construction	or 3.5 years
TOTAL	5.5 Years

SURVEY OFFICE MANAGER

Level IV Experience	4,000 hours (2.0 Years)
PLUS - Level II and Level III Experience	
Chief Computer Operator	7,000 hours
Chief Draftsperson	or 3.5 years
TOTAL	5.5 Years

Level IV hours are cumulative: 7,000 hours at Level II AND Level III plus 4,000 hours are required for Level IV equals 11,000 hours total. (5.5 Years minimum)

(Of the 11,000 hours, 2,750 hours can be education). Classroom or correspondence studies will be counted toward the 2,750 hours if a transcript is provided. The 2,750 hours constitutes 3.66 years full time schooling based upon a minimum of 12 credit hours per semester or quarter. 1 CEU = 10 CLASSROOM HOURS = 0.5 CREDIT HOURS

For those who wish to test in the other area, one year of additional experience must be documented in that field.

PHILOSOPHY AND OBJECTIVES OF LEVEL IV

The Board recognizes that in many Surveying and Mapping firms the principal/professional performs the tasks and functions of a chief of parties/office manager. However, in many other firms those tasks are performed by technicians. The purpose of this exam is to test and certify those individuals.

The testing for this level differs significantly in format and content from the other three levels. **Before you open the sealed envelope, realize that the thoroughness required by the Board will result in reports of 10 to 30 pages in length on which you will have expended in excess of 30 hours of research and writing.**

The test is in a “take home/open book” format and will consist of two or more essay questions which will be sent to the individual. The examinee will be given two months to complete the examination and return it to the Certification Board. The responses must be typed in report form with copies of complete supporting documentation and have an affidavit that the exam was completed by the examinee.

Among the knowledge, tasks and skills subject to evaluation by this test will be:

- Budgeting and project cost control
- Clear and concise communications
- Client contact
- Codes and regulations
- Delegating and coordinating
- Evaluating and selecting equipment and supplies
- Good management practices
- Good organizational ability
- Independent investigating/Researching - Problem solving
- Permitting processes
- Project estimating
- Scheduling
- Staffing
- Thorough understanding of plans and specifications
- Training
- Understanding company structure

In summary, this individual is someone who has the level of judgment to put all of the pieces together, weed out extraneous information and respond to a variety of situations while maintaining quality and minimizing costs.

An examinee in the Field route must be capable of answering questions in either the Boundary or Construction area. An examinee in the Office route must be capable of answering questions in either the Computer or the Drafting area.

LEVEL IV SURVEY TECHNICIAN CERTIFICATION *POSITION DESCRIPTION AND WORK ELEMENTS*

POSITION DESCRIPTION

In addition to the **Level I, II and III** requirements, **Level IV** technicians are required to demonstrate a more comprehensive knowledge of surveys and field operations. This shall include but is not limited to independent judgment, communication and supervisory abilities. The individual in this position is well versed in the day to day operational functions of a field and/or office survey organization. The **Level IV** technician possesses advanced technical and supervisory skills. Work elements listed below further describe the requirements related to this position.

Essay questions will include the following work elements:

- 1) *Types of Surveys*: Know the principles of performing basic surveys such as leveling, traversing, public land surveys, metes and bounds surveys, topographic surveys, construction surveys, horizontal control surveys, State Plane Coordinate surveys and as-built surveys. In addition, be familiar with requirements of global positioning (GPS) and geographic/land information systems (GLIS). Have a general knowledge of hydrographic, mining and photogrammetric surveying.
- 2) *Field Equipment & Instruments*: Be familiar with proper procedures for the care, cleaning and use of a variety of surveying tools and equipment, including field radios. Have ability to inventory, evaluate, specify, and purchase field equipment. Be able to determine proper equipping of personnel. Know how to operate, check, and perform basic field adjustments on theodolites, total stations, data collectors, levels, compass, tribrachs, and tripods. This would include repeating observations and steel taping. Have ability to inventory, evaluate, specify, and purchase field instruments. Some historical knowledge is required.

- 3) *Survey Computations*: Perform mathematical checks of trigonometry, geometry, algebra, coordinate geometry, and basic surveying computations. Having a working knowledge of hand-held calculators is important. Also be able to perform traverse and level loop computations including closure, precision determination and adjustment computations. Be familiar with taping corrections, basic principles of measurement, EDM baseline comparison computations, error propagation, and astronomic azimuth determination. Perform and/or check lot, area, and intersection (bearing-bearing, distance-distance, bearing-distance) computations. Have a familiarity with land use regulations as they relate to lot and site development.
- 4) *Control Points: Horizontal & Vertical*: Know when to use, how to obtain, and how to interpret control point records and data sheets.
- 5) *Field Operations*: Be able to coordinate and supervise field work for a variety of standard types of surveys. Also have a knowledge of proper record keeping, timekeeping, and job expenses.
- 6) *Field Notes*: Know how to keep, reduce, and check (for completeness and accuracy) neat and orderly field notes for standard surveying operations: leveling, traversing, topographic mapping, layout, as-built surveys, boundary surveys, profile and cross section surveys.
- 7) *Plan Reading & Preparation*: Have a knowledge and understanding of plan reading and preparation. Also have a knowledge of and familiarization with general applications of computer aided drafting (CAD). Be able to coordinate design elements obtained from professionals and format into final drawings.
- 8) *First Aid & Safety*: Have a basic knowledge of treatment practices for a variety of medical emergencies. Have a general knowledge of traffic control and safety procedures for a variety of surveying and construction operations.
- 9) *Principles of the Profession*: Have a knowledge of ethics and technical standards and organizations such as ALTA, NGS, NSPS/ACSM, BLM, ASCE. Show responsibility in the profession (i.e. attire, honesty, respect for personal property).
- 10) *Office Operations*: Using hand calculations or micro-computer software, be able to enter or check field data and the resulting positional information. Have a knowledge of microcomputer operating systems and peripheral computer equipment. Be able to inventory, evaluate, and specify computer software peripheral equipment and supplies.
- 11) *Supervisory Skills*: Have a comprehensive knowledge of and familiarity with: client contacts, dealing with the public and governmental agencies, field crew management, scheduling, equipment and supplies management. Have knowledge of on-site office operation, office work flow procedures, and field and office problem solving techniques. Also, be able to evaluate personnel performance, and perform basic budgeting and cost control techniques. Have ability to train personnel in all aspects of field and/or office surveying practices.

SEALS AND STAMPS

There is no official seal or stamp which can be applied to drawings, specifications, or other documents prepared by a certified survey technician. Use of an individually designed seal or stamp which refers to the NSPS-ACSM certification number is unauthorized because the NSPS-ACSM certification has no legal standing by itself. Use of “custom-designed” seals and stamps will discredit NSPS-ACSM and decrease the value of issued certificates for everyone.

In those cases where it is appropriate to call attention to work having been done by an NSPS-ACSM certified survey technician, it is suggested that you write CST (Certified Survey Technician) after your name, followed by your level of certification and your certification number; i.e., John J. Jones, CST I(0588-1234) or Susan S. Smith, CST Computer II (0588-1234).

The use of the CST logo is permitted on business cards. However, if this logo is to be used on stationery it shall be accompanied by the following support statement. We support and encourage NSPS/ACSM certification. It is not acceptable to print the NSPS/ACSM certified mark on letterhead stationery without the support statement because it then looks like the company is NSPS/ACSM certified.

If NSPS-ACSM receives knowledge of the conviction of any CST for improper use of the designation of certified survey technician, the CST designation will be revoked and the individual will not be allowed to continue in the program.

BIBLIOGRAPHY/REFERENCES

BY TOPIC

FOR SURVEY TECHNICIAN CERTIFICATION

FUNDAMENTAL SURVEYING TEXTS

Elementary Surveying, latest edition, Wolf and Ghilani *
Surveying Theory and Practice, latest edition,
Anderson and Mikhail
Surveying, latest edition, Moffit/Bossler

OTHER SURVEYING TEXTS

Surveying: Theory and Practice, latest edition,
Anderson and Mikhail *
Land Survey Review Manual, latest edition, Buckner
Land Surveyor Reference Manual, latest edition, Harbin
GPS for Land Surveyors, latest edition, Van Sickle
Land Surveying Computation, Buckner
Introduction to Geodesy: The History and Concepts of
Modern Geodesy, Smith
Land Surveyor's Formulas with Applications, Keen
Getting started with Geographic Information Systems,
Clarke
1001 Solved Surveying Fundamentals Problems, Van Sickle

BOUNDARY

Brown's Boundary Control and Legal Principles,
latest edition, Robillard and Wilson
Evidence and Procedure for Boundary Location,
latest edition, Robillard and Wilson

PUBLIC LAND

Manual of Instruction (BLM)
Restoration of Lost and Obliterated Corners and Subdivision
Corners 1883-1974, Landmark Enterprises
Land Survey Systems, McEntyre (info@pcpressinc.com)

NATIONAL SURVEY STANDARDS

Minimum Standard Detail Requirements for and
Classifications of ALTA/ACSM Land Title Surveys,
www.acsm.net/alta.html
Standards & Specifications for Geodetic Control Networks,
Federal Geodetic Control Committee, www.ngs.noaa.gov/
FGCS/tech_pub/1984-stds-specs-geodetic-control-
networks.htm
Geometric Geodetic Accuracy standards and Specifications
for Using GPS Relative Positioning Techniques, Federal
Geodetic Control Committee, www.ngs.noaa.gov/
FGCS/tech_pub/GeomGeod.pdf

DRAFTING AND COMPUTERS

Inside AutoCAD (latest version), Harrington
AutoCad 2005 for Dummies, Middlebrook
Inside Micro Station, Conforti
Windows for Dummies, Rathbone

CONSTRUCTION

Manual on Construction Layout, NSPS/ACSM
Surveying with Construction Applications, latest edition,
Kavanaugh *
Construction Surveying and Layout, latest edition, Crawford

FIRST AID AND SAFETY

Community First Aid and Safety, American Red Cross
latest edition *
OSHA Title 29, Chapter XVII, Part 1926, Occupational
Safety and Health Standards for the Construction
Industry with Amendments (latest published version
found at www.cch.com) available online at
http://www.osha-slc.gov/Publications/Const_Res_Man/ *

DICTIONARIES

American College Dictionary, Random House
(or any other college dictionary)
Glossary of the Mapping Sciences, 1994, ASCE, ACSM
and ASPRS
Definitions of Surveying and Associated Terms, ACSM *

NOTE:

You should review the work elements for which you will
be testing. If there are areas in which you feel you need
additional study, you should be able to find one or two
possible books from this list to assist you. Many of these
books or others like them are quite often available at public
libraries or may be borrowed from acquaintances in the field.

***This is an open book test. These and other materials can be
brought into the testing facility.***

****Minimum texts to bring to Level 1 exams as recommended
by CST Board***

NSPS - SURVEY TECH
6 Montgomery Village Avenue, Suite #403
Gaithersburg, MD 20879-3557