



Transportation Engineering Technology
HIGHWAY TRAFFIC OPERATIONS

PROGRAM DETAIL MANUAL

Please check NICET's web site (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.

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 February 1994.

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

PAYMENT OF ANNUAL RENEWAL BILL

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

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

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

RECERTIFICATION POLICY

DELETION OF TEST RECORDS

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

IMPORTANT INFORMATION TO ALL CERTIFICANTS AND APPLICANTS

THIS CERTIFICATION PROGRAM HAS UNDERGONE SOME REVISIONS SINCE THE LAST PRINTING OF THE PROGRAM DETAIL MANUAL IN APRIL 1989. ONE CHANGE IS THAT WE WILL NO LONGER CERTIFY PERSONS DIRECTLY AT LEVEL IV UNDER A REDUCED EXAM REQUIREMENT. IN ADDITION, LEVEL I STUDENT ENROLLMENT IS NO LONGER AVAILABLE; INSTEAD, CERTIFICATION AT LEVEL I (TECHNICIAN TRAINEE) IS NOW AVAILABLE.

LEVEL I CERTIFICATION

Becomes operational May 1, 1994. Any person testing on or after that date who meets the Level I exam requirement is eligible for certification at Level I. Level I certification is not awarded retroactively.

FIRST TIME TESTING

Persons testing in this program for the first time after July 1, 1994 **must** comply with the requirements as they are written in this manual. Persons who receive this manual in time to test in May or June 1994 are urged to comply with the examination requirements as they are written in this manual to avoid the disappointment that the constraints in the next paragraph could bring.

ALREADY BEGUN TESTING, BUT NOT YET CERTIFIED

Persons who began testing in Highway Traffic Operations using the First Edition of the manual who have not yet achieved certification at any level have through April 30, 1995 to complete the examination requirements listed in the April 1989 program detail manual. After May 1, 1995, all candidates must switch to the examination requirements in this manual.

ALREADY CERTIFIED

Persons already certified in Highway Traffic Operations may upgrade to a higher level through April 30, 1995 by satisfying the examination requirements listed in the April 1989 program detail manual. After May 1, 1995, all candidates must switch to the examination requirements in this manual.

Whenever an exam requirement changes, those persons who are already certified should understand that they do not need to comply with any changes for the level(s) of certification they have already been awarded -- they only have to satisfy the incremental exam requirements for the higher level(s).

In other words, if you are already certified, NICET recognizes you as having met **all** the exam requirements for that level even if the requirement changes from what it was when you were awarded certification.

**FIELD OF TRANSPORTATION ENGINEERING TECHNOLOGY
SUBFIELD OF HIGHWAY TRAFFIC OPERATIONS
TABLE OF CONTENTS**

GENERAL INFORMATION.....	1
WORK ELEMENT DESCRIPTIONS	1
WORK ELEMENT IDENTIFICATION NUMBERS	1
REQUIREMENTS FOR CERTIFICATION AT LEVELS I THROUGH IV	2
WORK ELEMENT SELECTION FOR AN INITIAL EXAM.....	2
EXAMINATION REQUIREMENTS CHART.....	3
WORK ELEMENT SELECTION FOR ALL SUBSEQUENT EXAMS	4
CROSSOVER WORK ELEMENTS.....	4
VERIFICATION OF WORK ELEMENTS	4
WORK EXPERIENCE REQUIREMENT	5
LEVEL IV WORK EXPERIENCE REQUIREMENT	5
EARLY TESTING OF LEVEL IV WORK ELEMENTS	5
PREPARATION FOR TESTING	6
SUPPORT MATERIALS FOR TESTING.....	6
TRAINING COURSES.....	6
WORK ELEMENT LISTING	
Level I General Work Elements	7
Level I Special Work Elements	8
Level II General Work Elements.....	9
Level II Special Work Elements.....	10
Level III General Work Elements.....	11
Level III Special Work Elements	13
Level IV General Work Elements	14
Level IV Special Work Elements	15
PERSONAL TALLY SHEET	17
SELECTED GENERAL REFERENCES.....	18
SAMPLE EXAMINATION SCORE REPORT	19

GENERAL INFORMATION

This Program Detail Manual contains the information needed to apply for the NICET certification examination in the Highway Traffic Operations 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).

This certification program was designed for technicians involved in traffic studies and traffic control. The program addresses knowledge of techniques and equipment; recordkeeping and report procedures; plans, specifications, and contracts; roadway geometrics; and analysis of data.

This program became operational in 1979. Development of the 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 (AASHTO.)

WORK ELEMENT DESCRIPTIONS

The typical job duties and associated responsibilities of highway traffic operations 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.

WORK ELEMENT IDENTIFICATION NUMBERS

In order for NICET to prepare individualized examinations for each candidate, identification numbers have been assigned to each work element. This identification number is normally five digits long.

The first digit identifies the technical subfield within the field of Transportation Engineering Technology:

(4) Highway Traffic Operations

- (1) Highway Construction
- (5) Highway Surveys
- (8) Highway Materials

- (2) Highway Design
- (7) Bridge Safety Inspection
- (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 25001:

Subfield:	4	(Highway Traffic Operations)
Level/Type:	5	(Level III General)
Work Element Number:	001	

This five-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 Traffic Operations.

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. The General work elements are further divided into Core Work Elements and Non-Core Work Elements.

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

5. When possible, select a few extra in each category so that failing one or more work elements leaves enough passed work elements to satisfy the examination requirements.
6. 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.
7. Unless your initial goal is Level I certification only, it is 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 requested 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.
8. It is suggested that all examination candidates keep a copy of their filled out applications. This will assist in resolving questions over the telephone.

EXAMINATION REQUIREMENTS CHART

(Subfield: Highway Traffic Operations)

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 achieve certification at Level I

Level I - General - 6
Level I - Special - 3

TOTAL 9

You must pass this many work elements to achieve certification at Level II

Level I - General - 8c
Level I - Special - 4
Level II - General - 10
Level II - Special - 4

TOTAL 26

You must pass this many work elements to achieve certification at Level III
Note (a)

Level I - General - 8c
Level I - Special - 6
Level II - General - 10
Level II - Special - 8
Level III - General - 15
Level III - Special - 5

TOTAL 52

You must pass this many work elements to achieve certification at Level IV
Notes (a) and (b)

Level I - General - 8c
Level I - Special - 7
Level II - General - 10
Level II - Special - 11
Level III - General - 15
Level III - Special - 10
Level IV - General - 5
Level IV - Special - 6

TOTAL 72

NOTES:

- (a) 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.
- (b) Read very carefully the two sections applicable to Level IV certification in this manual before seeking Level IV certification.
- (c) The one Core work element in this category must be passed to complete the exam requirement at this level.

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 17 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 two 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 plan to retest a failed work element, you need to read Policy #20 ("Retesting of Failed Work Elements") on our website (www.nicet.org).
2. If an adequate number of work elements have been selected to meet the desired certification requirement (with a few extra selected to provide a cushion), and there is room on the exam application to add more elements, it is permissible to select work elements from another field/subfield.

CROSSOVER WORK ELEMENTS

NICET makes every effort to identify work elements in a subfield that are identical or virtually identical in coverage and intent to work elements in one or more other fields/subfields. Once such a work element is passed on an examination it does not normally have to be taken again on any other examinations. Such work elements are classified as crossover work elements.

Crossover work elements within a given technical field which are passed on an examination are automatically credited to all subfields within that field. The recognized crossovers within the field of Transportation Engineering Technology are shown on the page entitled "Crossover Work Element Credit" in this manual. The crossover work elements are further identified in the Work Element Listing by an asterisk (*) after the work element number.

NICET has also developed "generic" work elements which are treated as crossover work elements among almost all of our certification programs. These generic work elements cover communication skills, math, physical science and other basic areas of knowledge which should be known by all engineering technicians. Call NICET to request a copy of the "Generic Work Element Crossover Credit Listing" if you have taken any previous exams and have passed any of these generic work elements. The generic crossover work elements are identified in the Work Element Listing by the symbol (^) after the work element title.

VERIFICATION OF WORK ELEMENTS

Verification should be provided by the applicant's immediate supervisor. The verifier, by signing his or her initials, is signifying that the applicant has actually performed at least the operations indicated in the work element description and that the verifier is confident that the applicant has performed the specific job tasks **repeatedly and satisfactorily**. Exposure to a job task through demonstrations by others or through partial involvement by the applicant should not be a basis for a supervisor to verify that the task can be performed correctly by the candidate under a variety of conditions.

WARNING

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

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

Certification, however, will not be awarded until all work elements counted toward certification are verified.

WORK EXPERIENCE REQUIREMENT

A preponderance of the work experience must be acquired while residing in the United States and its territories, employing U.S. standards and practices.

NICET certification is only conferred upon persons performing engineering technician level work. NICET will not certify persons performing higher level work (such as engineering) or lower level work (such as craft).

LEVEL IV WORK EXPERIENCE REQUIREMENT

In addition to the normal work experience information requested on the technician application form, all candidates for certification at Level IV, Senior Engineering Technician, in Highway Traffic Operations must establish in writing, their involvement in a recent complex traffic operations project in a senior position requiring broad responsibilities, including technical expertise, supervision of personnel, and coordination with other parties. It must be remembered that ten years or more of employment in the technical area, by itself, is not sufficient for the granting of a Level IV certification.

The writeup sent to NICET must provide a detailed, concise description of a highway traffic operations project which shows the candidate's involvement in a majority of the various aspects of traffic planning, design, and operations control. The pertinent work experience must be described in depth by the candidate personally -- official job descriptions or testimonials from others will not be evaluated.

The project writeup should include such information as:

- 1. magnitude of project:**
 - a. length of road, number of intersections, study area, etc.**
 - b. project start and end dates**
 - c. scope of work**
- 2. project location (urban, suburban or rural; traffic intensity);**
- 3. your supervisory responsibilities on the project; and**
- 4. the range of your experience on the project as related to traffic control during normal operations, special events, maintenance operations, and construction operations; signing and pavement marking programs; safety programs; signal timing (isolated and systems); accident analysis; intersection layout; traffic studies; recordkeeping, etc.**

Your documentation must address the Level IV requirement that your level of responsibility demonstrates independent engineering technician work, including delegated responsibilities and duties for which engineering precedent exists.

In order to avoid lengthy delays in processing the Level IV certification, this documentation should be provided with the Level IV examination application.

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 only three years 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 candidate's expense, at the time of the Level IV certification decision.

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

PREPARATION FOR TESTING

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

SUPPORT MATERIALS FOR TESTING

The exam is an open-book exam; 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 this program, ASTM or AASHTO followed by a number refer to nationally recognized standards which should be familiar and available to all technicians working in the field. For testing purposes, the current version of standards shall be the most recent edition provided the edition was published at least one year prior to the 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 Traffic Operations

LEVEL I - GENERAL WORK ELEMENTS

(Work at Level I Is Performed Under Direct Supervision)

ID No. Work Element Title and Description

CORE WORK ELEMENT

- 41009* BASIC METRIC UNITS AND CONVERSIONS (^)
Understand basic metric (SI) units and perform conversions to and from metric units. (E-380)

NON-CORE WORK ELEMENTS

- 41001* STANDARD PLANS AND SPECIFICATIONS
Use plans and specifications of standard jobs to determine dimensions, types of materials and equipment, power layout, grades, and simple geometric arrangements. Calculate required information from plans for curves, angles, locations, etc.
- 41002* BASIC SURVEYING
Perform basic surveying, including rodman, chainman, and recorder duties. Assist in surveys to determine ROW limits. Understand simple property descriptions. Reduce and check field book notes of simple survey to detect possible errors. Use approved procedures to correct and compute needed information. Plot and check basic cross sections from field book notes.
- 41003* BASIC DRAFTING (^)
Recognize and describe standard manual drafting techniques. Describe the characteristics and proper usage of standard drafting equipment. (See basic technical drawing textbooks.)
- 41004* INVENTORY STREETS AND ROADS
Participate in street and road inventories. Assist in preparation of required reports.
- 41005* INVENTORY INSTALLED TRAFFIC CONTROL DEVICES
Participate in inventories of installed traffic control devices. Assist in preparation of required reports.
- 41006 SYMBOLS AND STANDARD NOTATIONS
Understand the use symbols, scales, station numbers, equations and notations commonly used in the preparation of studies and reports on traffic movements and densities.
- 41007* STANDARD TRAFFIC CONTROL DEVICES
Know the appropriate uses of signs, markings and signals to effectively assist in traffic operations.
- 41008* INTERMEDIATE MATHEMATICS (^)
Perform mathematical calculations using basic algebra (fundamental laws, algebraic expressions), geometry, and the trigonometric functions of right triangles. (See basic textbooks on algebra and trigonometry.)

NOTE 1. General work elements can be categorized as either core or Non-Core Work Elements. Work element #41009, "Basic Metric Units and Conversions", is mandatory for certification at Levels II, III and IV. It is the only Core work element in this program at this time.

* Indicates that crossover credit to another subfield of Transportation Engineering Technology has been established for this work element. See the page entitled "Crossover Work Element Credit" in this manual.

(^) Indicates that generic crossover credit exists in other fields for this work element. Contact the Institute to request a copy of the "Generic Work Element Listing."

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

41010* BASIC COMMUNICATION SKILLS (^)

Use proper punctuation, vocabulary, spelling and sentence structure. Follow written instructions. (See basic grammar references.)

41011* BASIC PHYSICAL SCIENCE (^)

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

LEVEL I - SPECIAL WORK ELEMENTS

42001 QUANTITY SHEETS AND SKETCHES

Prepare basic quantity sheets and sketches for roadway improvements and sign or signal projects. Compute quantities and record on quantity sheets neatly and accurately to provide a permanent record.

42002 GUIDE SIGN PLAN SHEET

Using input from surveys and other sources, prepare a neat and understandable guide sign plan using standard symbols.

42003 SIMPLE COMPUTER INPUTS

Understand requirements for preparation of computer input data. Code data collected in a simple traffic study for processing by an available computer program.

42004 SPECIAL SPEED AND RESTRICTED TRAFFIC ZONES

Work with a crew studying need for special speed and restricted traffic zones (schools, hospitals, etc.). Understand the type and source of information used as criteria. Participate in formulation of recommendations to resolve problems by special zone and speed regulations, and, after supervisor has made decision, plot on maps the action taken.

42005 REMOTE COMPUTER TERMINAL

Operate a remote computer terminal to transmit to a computer or to recall information. Understand rules for computer use, symbols and commands to accomplish work. Understand information furnished in computer printouts.

42006 PERMIT ISSUING

Understand the circumstances under which permits are issued; how they are issued; and who the authority is for approval of permits for overloads, wide or high loads, and passage through congested areas (parades or other occurrences that require stoppage, slowing or detour of traffic). Understand where to obtain data that will tell how traffic will be affected.

42007 LOADOMETER STUDIES

Participate in weighing or loadometer studies. Understand the methods of gathering information and know what information is normally gathered.

42008 MANUAL CLASSIFICATION COUNTS

Participate in manual classification counts. Understand classifications of vehicles and record information accurately over designated time periods.

42009 O & D STUDIES

Participate in both internal and external origin and destination studies. Recognize sources of information and the comparative values of each. Assist in accurate compilation of data and summarize in a manner which is easily understood.

42010 TRAFFIC COUNTERS

Inspect traffic counters to assure they are working properly and that recorders are set and recording as required; perform minor lubrication, adjustments or maintenance; and install them in a safe and proper manner at the designated locations. Inspect installed counters; record information and make minor adjustments or repairs on the

spot, if possible.

42011 PARKING STUDIES

Participate in parking studies. Make necessary counts at locations and times designated. Report information in understandable manner and in format designated.

LEVEL II - GENERAL WORK ELEMENTS

(Work at Level II Is Performed Under General Supervision)

43001* SUPERELEVATION AND SAFE SPEEDS

Using appropriate formulas or computer programs, calculate safe speeds on horizontal curves and determine superelevations required for speeds designated.

43002* SIGHT DISTANCES

Sight distances on vertical curves and on screened horizontal curves. Make required measurements in the field or use verified survey data where possible. If these data or suitable photos are not available, compute sight distances on basis of plans or large scale maps. Check safety in light of prevailing speeds.

43003* COMPLEX PLANS AND SPECIFICATIONS

Use complex plans and specifications to determine information required for installation of traffic control devices and/or markings; or to make measurements used in accident or other analyses.

43004* CONSTRUCTION ZONE TRAFFIC CONTROL

Understand elements of traffic safety around construction sites. Recognize hazards on specific jobs and utilize signalmen, signals, signs and other controls to maintain safe movement of traffic. Recognize advantages and disadvantages of using detours or by-pass routes.

43005* BASIC INDIVIDUAL SAFETY(^)

Follow standard safety practices in performing job tasks. Recognize and call attention to improper safety practices at the work site. (OSHA 2202)

43006 LOCATION SURVEYS

Perform simple surveys, including horizontal, vertical and angular measurements necessary to locate traffic control devices. Determine needed information from field book notes or sketches prepared by surveyors. Compute and check information from field book notes and use correct procedures to make corrections or request new surveys, if necessary.

43007* AREAS, VOLUMES, AND COST EXTENSIONS

Based on survey notes, plans, line items or actual measurements or observations, perform math computations to determine and record areas, volumes and cost extensions.

43008* ACTIVITY COORDINATION

Know how information is sent to utility companies and government agencies. Know where to find utilities maps and how to find ground locations. Know what companies or agencies have responsibility to move utilities if required, know how to arrange for movement or for connections needed for signal hookups. Maintain good relations with residents of area. Inform them of plans and enlist their cooperation.

43009* TRAFFIC CONTROL SIGNS AND DEVICES

Place temporary or permanent traffic control signs and devices in accordance with plans and specifications, assuring locations are in conformance with requirements for safety and visibility. Observe safety requirements during installation. Record installations and perform inspections to see if installed devices are functioning properly. Report malfunctions and/or make minor adjustments as authorized. Select proper device for specific requirement on basis of MUTCD standards.

- 43010 **TRAFFIC CONTROL STUDIES EVALUATION**
 Receive, review and evaluate routine studies which serve as basis for action or lack of action on projects such as simple signalization requests, systems of signs and pavement markings, hazard elimination projects, and studies to determine conformance to established standards. Considering all information furnished, evaluate the adequacy of information, and the accuracy of the information. Weigh data furnished against standards set to justify proposed action. See if recommended devices or regulations are appropriate, and recommend approval, disapproval, or modification of the projects to supervisor.
- 43011 **TRAFFIC VOLUME DATA**
 Receive traffic volume data provided by others. Assemble, validate, and compile traffic volume data into required format. Evaluate sources of information and check mathematics or computer runs to assure use of proper factors. Present compiled data with suggested recommendations to engineers, planners, or statisticians for use in further studies or projections of traffic trends.
- 43012* **INTERMEDIATE PHYSICAL SCIENCE (^)**
 Solve problems in mechanics, electricity, heat, and inorganic chemistry. (Solutions may involve algebra and trigonometry.)
- 43013* **BASIC STATISTICS**
 Apply basic statistical concepts related to probability, frequency distributions such as histograms, central tendency measures such as mean and mode, and dispersion measures such as standard deviation. (See elementary statistics textbooks.)

LEVEL II - SPECIAL WORK ELEMENTS

- 44001 **SIGNALIZED INTERSECTION EQUIPMENT STUDIES**
 Analyze the plan for equipment for a signalized intersection to determine power requirements and operating cost. Compute total wattage required and hours of use. Compute cost of operation of signals.
- 44002* **REFLECTORIZED DEVICES**
 Determine from plans and/or from on-site inspection the manner in which vehicle lights will strike reflectORIZED devices. Using this information and the characteristics of the reflectORIZED materials, furnish recommendations as to the suitability of the devices in their present or proposed locations. Recommend changes in location or orientation as necessary.
- 44003 **ACCIDENT DATA**
 Understand the National Safety Council definitions and recommended classifications that characterize type of accident and type of collision. Know the sources of accident data and how to obtain additional data needed for performing intended analysis. Calculate accident rates for fatalities, personal injuries, and property damage.
- 44004 **ACCIDENT-PRONE LOCATIONS**
 Perform on-site investigations of accident-prone locations using accident reports and experience summaries. Determine contributing factors in accident frequency; interview persons involved in accidents, as well as witnesses and persons familiar with traffic patterns in the area. Assist in preparing situation reports and recommendations for actions that may be appropriate for resolving the problems.
- 44005* **SIGNS AND PAVEMENT MARKINGS**
 Understand the objectives of installed signs and pavement markings, perform on-the-spot investigations of the effectiveness of measures in use. Prepare reports and recommendations in approved format.
- 44006 **IMPROVEMENT AND INSTALLATION LAYOUTS**
 Use field survey notes, plans, maps, and instructions from engineers to prepare layouts indicating the installations of traffic control devices.

- 44007* PAVEMENT MARKING LAYOUTS
In accordance with approved plans or with standard practice, perform necessary field measurements to develop pavement marking layouts and establish guides for pavement marking by machines.
- 44008* NO-PASSING ZONES
Using standards set by local requirements and/or by MUTCD, survey in the field to establish appropriate sight distances and other pertinent factors, and clearly indicate beginnings and ends of no-passing zones.
- 44009 HIGHWAY PHOTOLOG INVENTORY
Assure that all photolog films are clearly marked and filed in accordance with a system permitting ready access. Assure currency of photolog files; completeness of coverage; and proper disposal of outdated information in accordance with agency policy. Work with the unit supervisor in requesting additional or special coverage and in formulating plans for regular updating of information.
- 44010 RAILROAD GRADE CROSSINGS
Receive, collate and evaluate reports on grade crossings. Assure completeness of information and accuracy of reports. Contact persons preparing reports or contact railroad companies for clarification of doubtful data or for additional information, as necessary. Prepare summaries as required.
- 44011 SPEED AND DELAY STUDIES
Perform on-site studies to determine speeds and delay factors at designated locations. Present this information in designated format and furnish recommendations based on observations to supervisor.
- 44012* DETOURS
Assure compliance of location, alignment, type, width and grade of detours and temporary roads with plans and specifications. Check signing and marking to assure safety and maintenance of safe speeds. Determine if special controls are necessary for peak periods.
- 44013 COLLISION AND CONDITION DIAGRAMS
Using site physical conditions and all available traffic accident reports, prepare condition and collision diagrams in standard practice format.
- 44014 DIVERTED AND RESIDUAL TRAFFIC
Determine diverted and residual traffic by using standard diversion curves and time and distance ratios which pertain to the specific problems. Perform necessary mathematical computations or provide input for computer determination of the required information.
- 44015 TRAFFIC DATA PROJECTIONS
Using appropriate factors to expand information obtained during limited time periods or by surveys covering only part of the required sections, calculate projections to cover a system or prepare necessary input for computer calculation. Present information (after checking for accuracy and adequacy) on designated forms, and note limitations, assumptions, and sources of data.
- 44016* FIRST AID PROCEDURES (^)
Know basic rules of first aid. (See general handbooks on first aid.)

LEVEL III - GENERAL WORK ELEMENTS

- 45001 SPEED LIMIT ZONES
Review existing speed limits in designated areas. Consider all factors which affect safe speeds for zones reviewed, including pedestrian traffic, turning movements, types of surfaces, prevailing traffic patterns, actual and potential obstacles, commercial and industrial development. Assign appropriate weight to signalization and coordination of signals, if appropriate. Evaluate all factors and draft recommendations for speed limit or speed zone changes.

- 45002 **TRAFFIC SIGNAL SYSTEM**
Evaluate existing standard traffic signal systems to include accident history, delay factors, and capacity. Using information on the state of the art in signalization, available traffic data, and characteristics of adjacent signal systems, develop plans for improvement of traffic movement and control in the designated zone. Draft recommendations.
- 45003 **TRAFFIC CAPACITY ANALYSES**
Using all appropriate studies and other data, and making on-site inspections where appropriate, analyze the capacity of intersections, highway segments, weaving areas and ramp junctions. Use mathematical calculations or prepare appropriate input for computer. Report findings.
- 45004 **APPLIED STATISTICS**
Apply basic statistical concepts to the sampling and evaluation of materials or component batches. Use established standards or develop limits of acceptance which consider the practical variability of sampling procedures. (ASTM E105, E122, E141, and Traffic Engineering, Chapter 7.)
- 45005 **ROAD GEOMETRICS**
Using survey notes, plans and/or other data, determine road geometry for minor improvements. Use good drafting techniques and symbolization. Prepare at specified scale and transmit to engineer for review.
- 45006 **COMPUTER SOFTWARE METHODOLOGY**
Know the state-of-the-art in computer software methodology which can be used in conjunction with traffic operations.
- 45007 **ANALYSIS OF TRAFFIC CONTROL DEVICES**
Know the state-of-the-art in traffic control devices. Consider the specific needs for traffic operations in a designated area of operations. Summarize available or obtainable devices and consider cost of procurement, maintenance and operation. Recommend the most effective devices.
- 45008 **WORK AND CHANGE ORDERS**
Receive general instructions from supervisor as to nature of work required, or follow standard procedure for specific types of projects. Draft work orders that clearly set forth the nature of work to be done and specify coordination with all crews and agencies engaged on the project. Draft detailed change orders for delivery to contractors to accomplish necessary modifications to work being done or to procedures being followed.
- 45009 **CREW SUPERVISION**
Supervise crews or parties employed in staking and locating signs, pavement marking zones and determining sight distances. Organize crew with proper personnel and equipment; lay out work for individuals and assign responsibility; direct work to assure compliance with standards and to effectively utilize resources. Check final work and prepare necessary reports.
- 45010 **COMPLEX PLANS AND SPECIFICATIONS**
Read, understand and use highly complex plans and specifications to accomplish assigned work during the design or construction phase of traffic control facilities.
- 45011* **PROJECT PLAN PREPARATION**
Obtain and compile all pertinent information from appropriate sources for complex traffic and/or safety projects. Use standard specifications pertaining to the specific project and determine special requirements. Draft bid proposal, making sure it is complete and accurate.
- 45012 **ACCIDENT PATTERNS**
On basis of detailed summaries of accident experience at specific locations, perform analyses of reasons for accidents and determine appropriate corrective measures. Present suggested corrective actions to engineer for review.
- 45013 **PRELIMINARY AND FINAL STAKEOUTS**
Using plans and specifications, verify the accuracy and completeness of preliminary and final stake-outs for

construction of traffic control facilities. Perform check surveys, if appropriate. Be sure that stakes provide sufficient information to permit effective construction. Require additional or modified staking by surveyors, if necessary.

45014 TIME-SPACE DIAGRAMS

Understand the concepts and practice of effectively controlling traffic movements with traffic signal progression. Prepare time-space diagrams to establish a coordinated system.

45015 FINAL PLANS-IN-HAND INSPECTION

Assist designated engineer in performance of plans-in-hand inspection to permit preparation of as-built drawings. Check compliance with plans and specifications and produce final copy of as-built drawings which comply with good standard practices.

45016 CONSTRUCTION CONTRACTS

Assure that all parties to a consulting or construction contract understand the obligations of the contract and comply with its requirements. Keep supervisor informed.

45017* 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.)

45018* OSHA AND OTHER SAFETY REQUIREMENTS (^)

Identify and apply OSHA, EPA, and other applicable safety regulations and procedures. (OSHA 2207)

LEVEL III - SPECIAL WORK ELEMENTS

46001 INTERVIEWS AND SURVEYS

Organize crews and give them proper instructions for performing surveys and conducting interviews. Assign work and check on quality and adequacy of manner in which work is performed by spot checks and by review of information gathered.

46002 ELEMENTARY STRUCTURAL ANALYSIS

Using appropriate mathematical calculations and/or tables for structural materials used, determine the structural integrity of simple sign and signal supports, with full attention to effects of wind and natural conditions. Submit to engineer for review.

46003 SIGNALIZATION AND SIGNAL SYSTEMS REVIEW

Assist engineer in review of signalization and signal systems that involve coordination of complex factors. Use surveys, tables, charts, computer modeling, experience factors, and mathematics, as required. Integrate information with characteristics of signal devices and other methods of traffic control.

46004 FIELD TRAFFIC DATA

Verify the accuracy and completeness of information generated by field surveys. Analyze data to determine application to specific problems within a designated geographical area and expand data by use of necessary processes to obtain predetermined requirements.

46005 TRAFFIC COUNTING SITE LAYOUT

Through analysis of requirements for traffic volume information, lay out a system of manual or automatic traffic counting sites which will provide the necessary information.

46006 FLOW MAPS

Using data from all appropriate sources, prepare comprehensive traffic flow maps using standard symbolization to represent types, volumes, directions and other essential information.

- 46007 TRAFFIC FIELD DATA
Supervise collection and validation of traffic volume, vehicle classification, turning movement, origin and destination, and related field data in a large geographical area. Organize work force and assign personnel effectively; assure compliance with procedures necessary to produce accurate and on-time results; have information collected and submit to designated processing office. Check personnel performance and quality of work.
- 46008 BEFORE AND AFTER STUDIES
Prepare before and after studies by using experience factors and through application of appropriate formulas, computer runs, charts and tables. Analyze effectiveness of measures taken or of projections. Report findings and recommendations.
- 46009 EQUIPMENT ACCEPTANCE
Using specs from contractual procurement, verify compliance with performance characteristics of delivered electronic traffic control and analysis equipment. Check circuit diagrams, assure good workmanship and good delivery condition of equipment. Be sure all equipment is accompanied by service manuals and that necessary spare parts are included.
- 46010 INITIAL REVIEW OF CONSTRUCTION PLANS
Review all provisions of construction plans to be sure that curves, superelevations, sight distances, etc. are in compliance with good standards to assure safe and effective traffic operations. Draft recommendations as appropriate for traffic portion of projects.
- 46011 MEETING COORDINATION
Provide assistance to engineers conducting meetings with citizens, government officials, utility representatives and others to review current operational conditions and proposed improvements. Assure adequate facilities for meetings, arranging for sound systems, large-scale plans, and graphic aids, etc. Provide adequate numbers of handout materials. Have good data available for responses to questions. Collect written questions and assist in keeping meeting within time schedule. Obtain attendance record by use of sign-in list; note names and addresses of speakers. Assist in preparation of official record of meeting or arrange for official recorder or tape recording machine.
- 46012 INITIAL REVIEW OF SIGN PLAN
Assure compliance with requirements of MUTCD and/or with standard procedures of state or other jurisdiction. Evaluate the adequacy of signing to assure safety and perform cost analyses of possible solutions to determine most economic solution. Present report to engineer for review.
- 46013 REGULATORY REVIEW
Coordinate establishment and revision of vehicular speed, parking and ROW regulations. Use and direct survey crews as needed, and review results of previous studies, experience factors, computer runs, etc. Compile and summarize findings. Draft recommendations for complying with the regulations.
- 46014 "SPECIAL" TRAFFIC REGULATIONS
In compliance with state and local laws, and in full coordination with appropriate officials, draft regulations to cover special occasions (parades, emergency vehicles, disasters, etc.) and movement of oversize or overweight traffic.

LEVEL IV - GENERAL WORK ELEMENTS

NOTE: Certification at Level IV requires that the candidate must have occupied a senior position of responsibility throughout the duration of at least one major traffic operations project. There are no exceptions to this requirement and documentation must be present in the work history listed on the application form.

- 47001 REVIEW OF CONSTRUCTION PLANS
Assure that road geometry, sign plans and application of regulations are coordinated in a manner to assure compliance with total traffic safety on a major project. Submit conclusions and recommendations to engineer.

47002* EFFECTIVE WORKING RELATIONS

Establish effective working relations within the organization and with outside units and agencies employed on the same type of work such as consultants, suppliers, contractors, government agencies, utilities, municipalities, property owners, and the general public. Assure smooth and effective teamwork by integrating the efforts of all units engaged on a comprehensive traffic program. Provide open channels of communication and inform the appropriate persons of what is going on and what is expected of them. Check work as it is completed, assure compliance with work schedules and deadlines, request additional information if needed, collate material and submit appropriate reports.

47003 QUALITY ASSURANCE

Through adequate documentation and through effective transmittal of information, assure quality control of all work performed or supervised.

47004 COST ESTIMATING

Obtain and compile all estimates of costs for traffic operations projects. Verify accuracy of unit prices and check cost extensions. Prepare appropriate reports.

47005 TRAFFIC CONTROL DEVICES MANAGEMENT

Supervise and coordinate inventory and analysis of traffic control devices on all highways and streets within area of responsibility. Obtain reports of number, location, type and condition of traffic control devices. Verify accuracy of information received by spot checks. Assure effective utilization of personnel and transportation to perform inventories. Compile survey data and prepare summary of results with recommendations for necessary action to improve traffic control.

47006 URBAN TRANSPORTATION PLANNING

Interact with planners, planning engineers, and technicians concerning use of traffic control concepts within the pattern of urban development. Understand the need for and how to estimate characteristics of future traffic.

47007* TECHNICAL PRESENTATIONS AND REPORTS (^)

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

LEVEL IV - SPECIAL WORK ELEMENTS

48001 CONSTRUCTION PROJECT FOLLOW-THROUGH

Follow-through on entire construction project to assure effective and safe operations in planning and construction stages (with regard to movement of traffic during construction), and after completion of project. Work with traffic engineers, construction project managers, and with contractors or consultants in assuring proper and effective use of signs, flagmen, by-passes or detours, and/or other means of moving and controlling traffic.

48002 SIGNALIZATION AND SIGNAL SYSTEMS PLANS

Obtain all background information required to prepare plans for complex signalization and signal systems. Using compiled information, prepare detailed plans to assure best and safest system to accomplish objectives. Coordinate and supervise parties, crews and individuals working on integral parts of the design. Assure quality and accuracy of work performed.

48003 TRAFFIC OPERATION STUDIES

Instruct and use crews or individuals to perform traffic operation studies. Assure accuracy and adequacy, and summarize information for use as required.

48004 OPERATIONAL PROGRAM MANUALS

Using all applicable laws and regulations, and with reference to MUTCD, AASHTO and other recognized regulatory and standards publications, develop consolidated operational program manuals to assure use of a logical system of standards and regulations in traffic operations. Work with policy-making authorities within the jurisdiction to obtain official approval of the manuals, and recommend legislative action or other measures that may

be necessary to maximize effectiveness of the program.

48005 COMPUTERIZED SIGNAL SYSTEMS

Know the types of computerized traffic signal systems that are available. Know the characteristics, capabilities, limitations, and costs of each.

48006 COMPUTERIZED SIGNAL SYSTEM OPERATION

Understand the parameters which may be used as bases for operation of computerized signal systems. Use appropriate systems to control operation of signals on the basis of time-of-day, response to traffic volumes, special speed limits during emergencies or re-routing to by-pass congestion, etc. Understand the type and form of input required to permit effective operation of a computerized system.

48007 TRAFFIC RESEARCH

Establish programs to observe examples of new methods, materials, equipment and techniques used to improve traffic operations. Utilize "before and after" method of evaluating new systems or use other procedures as required. Conduct research to cover wide range of conditions. Prepare reports for use by others.

48008 TRAFFIC OPERATIONS PROGRAMS

Participate as a contributing member of a multi-discipline team in development of a program of traffic operations to include all factors required to produce an efficient and safe system throughout a major section of a heavily-traveled highway with intersections and interchanges. Studies should include traffic signal timing, speed limits, passing restrictions, accident investigation and hazard elimination.

48009 SURVEILLANCE STUDIES

Supervise the activities of crews and equipment maintaining surveillance of highway and expressway systems in order to determine capacity appropriate to systems. Use available resources effectively, and prepare reports and recommendations for submittal to proper authorities.

48010 TRAFFIC LAWS

Understand the laws which govern transportation in the United States and in specific states or municipalities in which work is performed. Understand the process of changing, enacting, or repealing traffic laws and how transportation agencies can provide input to the legislative processes.

48011 ECONOMIC ANALYSIS

Understand the true costs of transportation activities. Prepare and use benefit-cost analyses.

PERSONAL TALLY WORKSHEET

Passed Work Elements in Highway Traffic Operations

- 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 in Transportation Engineering Technology.
- o Put a "G" next to the appropriate number if you have crossover credit from another field of testing (see Generic Crossover Listing).

Level I	Level II	Level II	Level III	Level III	Level IV
General	General	General	General	Special	General
__41001	__43001	__44001	__45001	__46001	__47001
__41002	__43002	__44002	__45002	__46002	__47002
__41003	__43003	__44003	__45003	__46003	__47003
__41004	__43004	__44004	__45004	__46004	__47004
__41005	__43005	__44005	__45005	__46005	__47005
__41006	__43006	__44006	__45006	__46006	__47006
__41007	__43007	__44007	__45007	__46007	__47007
__41008	__43008	__44008	__45008	__46008	
__41009 **	__43009	__44009	__45009	__46009	
__41010	__43010	__44010	__45010	__46010	Level IV
__41011	__43011	__44011	__45011	__46011	Special
	__43012	__44012	__45012	__46012	__48001
	__43013	__44013	__45013	__46013	__48002
		__44014	__45014	__46014	__48003
		__44015	__45015		__48004
		__44016	__45016		__48005
Level I			__45017		__48006
Special			__45018		__48007
__42001					__48008
__42002					__48009
__42003					__48010
__42004					__48011
__42005					
__42006					
__42007					
__42008					
__42009					
__42010					
__42011					

** This is a Core Work Element and is mandatory for achieving Levels II, III and IV.

SELECTED GENERAL REFERENCES*

A Policy on the Geometric Design of Highways and Streets. 1984 Edition. American Association of State Highway and Transportation Officials. Washington, D.C.

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

Construction Industry. (29 CFR/1926) OSHA 2207. U. S. Department of Labor. Washington, D.C.

Construction Industry - OSHA Safety and Health Standards Digest (OSHA 2202), 1990 Reprint, Government Printing Office. Washington, DC.

Highway Capacity Manual. 1985 Edition. Transportation Research Board. Washington, D.C.

Manual of Traffic Engineering Studies. 4th Edition. Institute of Transportation Engineers. Washington, D.C.

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

McShane & Ross. Traffic Engineering. Prentice-Hall. NJ.

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

Traffic Engineering Handbook. 4th Edition. Prentice-Hall, Inc. NJ.

Other useful publications may be obtained from:

The Institute of Transportation Engineers
525 School Street, SW
Suite 410
Washington, DC 20024-2729
202-554-8050

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

EXAMINATION SCORE REPORT

EXAM NO. 001009

APPL. NO. 123/45/6789

1420 King Street, Alexandria, Virginia 22314/703-683-2837

Report Date: 11/01/93

Date of Examination: 10/01/93

Examination Field: TRANSPORTATION ENGINEERING TECHNOLOGY

	SCORE	PASS/FAIL
WORK ELEMENT 04/1/001 Standard Plans and Specifications	60.00	PASS
WORK ELEMENT 04/1/002 Basic Surveying	74.44	PASS
WORK ELEMENT 04/1/003 Simple Drafting	50.00	FAIL
WORK ELEMENT 04/1/004 Inventory Streets and Roads	100.00	PASS
WORK ELEMENT 04/1/005 Inventory Traffic Control Devices	80.00	PASS
WORK ELEMENT 04/1/006 Symbols and Standard Notations	65.00	PASS
WORK ELEMENT 04/1/007 Standard Traffic Control Devices	34.00	FAIL
WORK ELEMENT 04/1/008 Intermediate Mathematics	67.50	PASS

DOE, JOHN
1420 KING STREET
ALEXANDRIA, VIRGINIA 22314-2715