ENGINEERING
TECHNICAL
INFORMATION
SYSTEM

FIELD NOTES•TECHNICAL REPORTS
DATA RETRIEVAL•MANAGEMENT
PROFESSIONAL DEVELOPMENT

VOLUME 12 NUMBER 7

Field Notes

PELZNER RECEIVES ASTM AWARD

CONCRETE CYLINDER TRANSPORTATION

THE ELECTRONIC FIELD NOTEBOOK

HYDRAULIC ROCK RAKE

LOT SIZE IN PUBLIC LAND SURVEYS

PRECONSTRUCTION PERFORMANCE
TESTING & TRAINING PROGRAM

ECCP ASSESSMENT

FOREST SERVICE NOVEMBER—DECEMBER 1980

U.S. DEPARTMENT OF AGRICULTURE

ENGINEERING FIELD NOTES

Volume 12 Number 7

Information contained in this publication has been developed for guidance of employees of the United States Department of Agriculture–Forest Service, its contractors, and its cooperating Federal and State agencies. The Department of Agriculture assumes no responsibility for the interpretation or use of this information by other than its own employees.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval of any product or service by the United States Department of Agriculture to the exclusion of others that may be suitable.

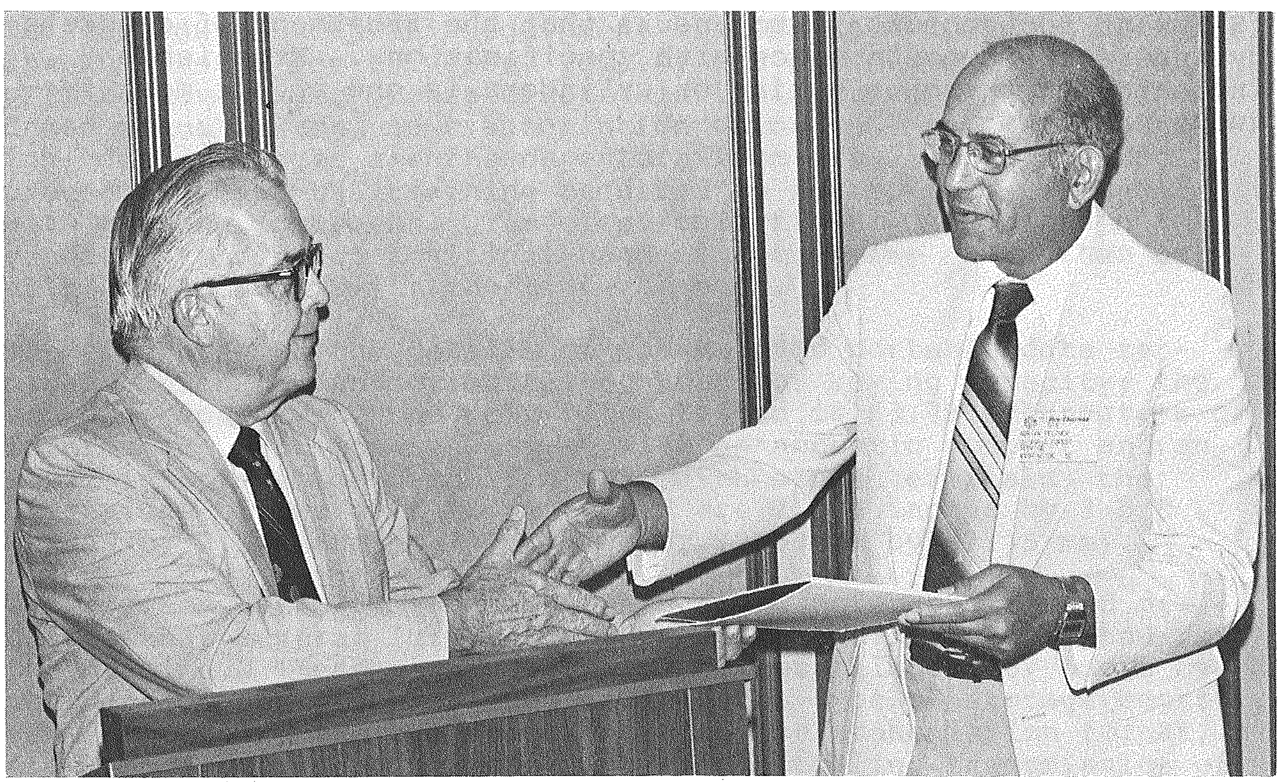
The text in the publication represents the personal opinions of the respective author, and must not be construed as recommended or approved procedures, mandatory instructions, or policy, except by FSM references. Because of the type of material in the publication, all engineers and engineering technicians should read each issue; however, this publication is not intended exclusively for engineers.

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
Washington, D.C. 20013

PELZNER RECEIVES ASTM AWARD

Adrian Pelzner of the Washington Office staff received the Committee D-18 Special Service Award at an awards dinner held June 24 in Chicago. Committee D-18 on Soil and Rock for Engineering Purposes is sponsored by the American Society for Testing and Materials (ASTM); Pelzner is first vice-chairman.

In a letter to Myles Howlett, Forest Service Director of Engineering, Committee Chairman Arnold Johnson wrote that Pelzner "has not only been of great assistance to the committee as a whole, but has carried out many special assignments. The award was presented for those many efforts and accomplishments on behalf of this committee and of ASTM as a whole."



Adrian Pelzner (right) receives Committee D-18 Special Service Award from Arnold I. Johnson, Chairman

CONCRETE CYLINDER TRANSPORTATION

Steve Monlux
Materials Lab Engineer, Region 1

The cylinder carrier described in the June 1980 Field Notes solves the physical damage problems associated with transporting concrete cylinders, but does not meet the requirements of AASHTO T-23, section 8, unless the cylinders are transported within 24 hours of fabrication. Because cylinder molds must be stripped within 20 ±4 hours of fabrication, and because the cylinders usually are not shipped to the lab within 24 hours, we encourage Forests to use curing cans for transportation. These cans, which are available from Soil Test, protect the cylinders from damage, meet the moist cure requirements for storage, and assist in obtaining even curing temperatures.

Individuals should know AASHTO T-23, sections 7 (Curing) and 8 (Shipment to Laboratory) to ensure that the treatment of concrete cylinders is in conformance with specifications. Experience indicates that proper curing of cylinders is one of our most frequent problems.

THE ELECTRONIC FIELD NOTEBOOK

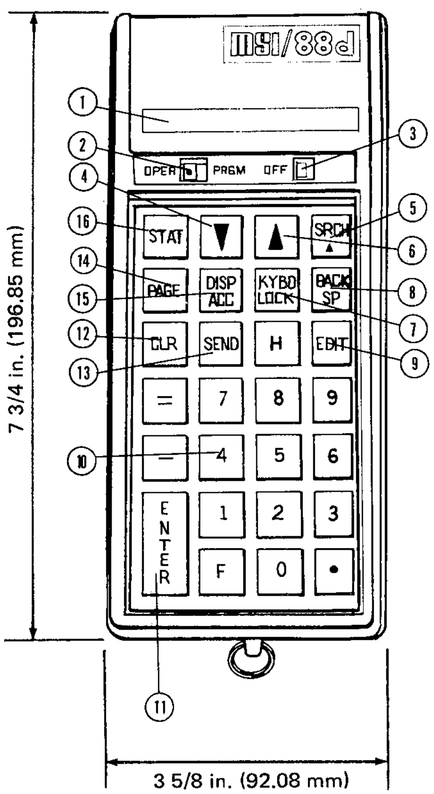
J. S. Campbell
Civil Engineer, WO

The Systems Development Group in Engineering (WO) and the San Dimas Equipment Development Center are developing procedures to use the MSI/88D portable data terminal as an electronic field notebook for collecting survey data for the Road Design System (RDS). In the past, similar devices have been used for taking inventory in shopping centers. Since its introduction, the equipment has been continuously upgraded. Many of the previous problems (such as limits in communications and transferring information) prevented the use of this kind of equipment in surveying. The present equipment is more adaptable in its ability to collect data, and more complex applications have become possible.

The procedures with this equipment will be used to input data for the RDS system for traverse, levels, and cross sections. The primary advantages of the electronic field notebook will be reduced manual error, no transcription error, and improved notetaking; disadvantages are the departure from standard notetaking procedures, and the training required to familiarize personnel with the new equipment. The electronic field notebook is not expected to replace the right-hand-side traverse notes that usually are included with the traverse book.

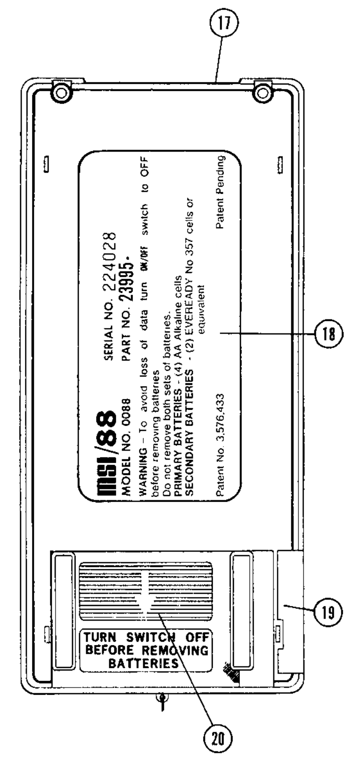
The figure shows the details of the MSI/88D portable data terminal, which has approximately 50 hours of keying capacity; the storage capacity of the unit being tested is 63,791 characters of information. It comes equipped with an acoustic coupler and an RS232 interface for communications with other terminals; the dimensions of the unit being tested are 7 3/4 inches by 3 5/8 inches by 2 1/4 inches (196.85 mm by 92.08 mm by 57.15 mm).

The process by which the electronic field notebook is used requires that several initialization parameters be established for the machine. These parameters will be established for users by the development process; they include the type of storage control, a case counter, the transmission rate, the transmission format, a blocking factor, and various factors controlling transmission of data from the unit.



CONTROLS, INDICATORS & CONNECTORS

1. LED Display can show up to 16 digits, depending on how you parameterize the terminal.
2. PRGM/OPER Switch selects either the program or operating mode. Use the tip of a pen to slide it to the right position.
3. ON/OFF Switch is used to turn the unit on initially or following a display timeout. It also turns unit off, disabling the keyboard, display, and operation of the unit.
4. ▼ Forward Review Key lets you review one line of information at a time (press and release) or, if held for two seconds or more, three lines per second.
5. SRCH Key lets you search for a previously recorded item.
6. ▲ Reverse Review Key lets you review one line of information at a time (press and release) or, if held for two seconds or more, three lines per second.
7. KYBD LOCK Key is used to disable the keyboard while scanning, then pressed a second time to reenable the keyboard.
8. BACK SP Key permits erasing data in the display by moving the cursor (⊣) to the left, removing whatever was in its place.
9. EDIT Key is used to insert, delete, and change entries previously recorded.
10. White Data Keys – The characters 0-9, H, F, =, – and • – allow data to be entered in the terminal. (Non-numeric keys may be assigned special meanings through parameterization.)
11. ENTER Key causes data keyed into the display to be recorded in the terminal's memory.
12. CLR Key sets up the display for data entry and is also used to silence the audible alarm.
13. SEND KEY initiates data transmisssion.
14. PAGE Key is pressed after a page number has been entered in the display to cause that page to be selected for recording data.
15. DISP ACC Key displays the page number and the amount in the accumulator for that page.
16. STAT Key is pressed and held to display page number, current entry number, and memory positions remaining.
17. Input/Output Connector is used to connect the terminal to various optional components such as optical wands and communications modules.
18. Terminal Identification Label shows the terminal's serial number.
19. Secondary Battery Compartment
20. Primary Battery Compartment



MSI/88D portable data terminal.

To record cross-section data, establishment of specific codes for certain types of descriptions will be necessary. This is done by establishing numeric codes 1 through 26 for the letters A through Z, respectively. In addition, specific numeric codes will be established for the descriptions listed in the table.

The user can choose not to use any specific code except code 40, for the turning point. Because the numeric calculations will rotate on the turning point, this code is fixed and must be used. Nonspecific codes will be used in the following manner: To indicate the centerline, use the numeric reference for C and L; this code would be 0312 because C is the third letter and L is the twelfth letter of the alphabet. Thus, the user can describe a cross-section point with the two letters he/she wishes to use.

The data entry process is as follows. The first entry is the geographic location, the fiscal year, and the project number. The

SPECIFIC DATA CODES

Code	Description	Abbreviation
40	Turning point	TP
41	Centerline of Road	CL
42	Edge of surface	ES
43	Edge of road	ER
44	Edge of ditch	ED
45	Bottom of ditch	BD
46	Bottom of cut	BC
47	Top of cut	TC
48	Edge of Clearing	EC
49	Top of fill slope	TF
50	Bottom of fill slope	BF
51	Creek edge	CE
52	Creek centerline	CC
53	Center of draw	DC
54	Marshy area	MA
55	Section corner	SC
56	One quarter corner	4C
57	Benchmark	BM
58	Rock	RK
59	Fench line	FL
60	Utility line	UL
61	Building	BG

second entry is the current date of the survey. The third entry indicates the type of survey being done. These data are established by a code reference that will be covered in the user's guide for the equipment. After the type of survey designation, data for the type of survey being done is entered using symbols compatible with the keyboard shown in the figure. Preliminary development efforts indicate that this type of method is feasible. Testing with field personnel using the equipment and the data entry process will be necessary before a final determination can be made.

After the information is entered in the MSI/88D, the operator takes the device to a communications terminal that can be connected to the Fort Collins Computer Center. Two types of terminals have been tested for this application: the Execuport 300 and the Execuport 4000. The data must be sent twice to test transmission accuracy; two data files will be built.

An output is sent back to the user. The type of output depends on the survey data transmitted. For traverse, the output will contain the section, station, input angles, and distance entered. For profiles, it will contain the section, station, and data entered. For cross sections, the output will consist of the section, station, elevation, and cross section. The cross section will be shown as a bar graph, with the alphabetic description codes and turning points in their proper positions. The output for each station will include the input that came from the MSI unit. Also, the output will produce an error list, which will consist of diagnostic statements.

Preliminary testing will be completed with nonintelligent terminals, which are not equipped for receiving data with the acoustic coupler. The MSI/88D, however, has an acoustic coupler and can be used with an intelligent terminal if the terminal has a program to handle the coupler interface. Testing should be completed in 1981. The test will consist of a class 1 survey in construction and reconstruction projects.

The Systems Development Group, WO Engineering, would like to hear from any field unit that has experience with this type of equipment.

NEW HYDRAULIC ROCK RAKE IMPROVES THE EFFICIENCY OF ROAD MAINTENANCE OPERATIONS

James W. Tour
Mechanical Engineer, MEDC

Increasing equipment and fuel costs, coupled with limited FR&T funds, has reduced the miles of road Forests can grade each year. A few Forests report that as little as 10 percent of their road system can be graded annually.

Engineers at the Missoula Equipment Development Center (MEDC) have been working with Forest engineering road maintenance personnel to develop "light duty" machines that will improve grading productivity. One such machine is the hydraulic rock rake, a refined design of a rake successfully used by the Nezperce National Forest. It can be used to make the last few passes generally required by the grader. On many low-volume roads the rock rake can be substituted for the grader to accomplish light duty work.

The new rake attaches directly to the bed of a 1-ton (9.1-kg) service truck; it is operated entirely from the cab. Electro-hydraulic controls allow the operator to adjust the rake while moving--for rapid maneuvering around stumps, over cattle guards, and through turnarounds.

Advantages over older trailer rakes include side shifting to keep the vehicle away from the road edge, and rotation in two planes to eliminate "deadheading" and to improve spreading surface material. A raking speed as high as 15 mph (21.1 km/h) can be attained without "washboarding."

Two hydraulic cylinders control rake pressure on the road. Adjusting the pressure difference between the cylinders tilts the rake so berms can be redistributed on the road as desired. Neutralizing the pressure in both cylinders allows the rake to "float," conforming to the road's surface.

Hinged sections at each end of the rake fold up, reducing its 11-foot (3.4-m) width to 8 feet (2.4 m). This allows the rake to be transported on public roads at normal speeds while mounted on the truck.

The new rock rake can mean more efficient road maintenance operations:

1. More miles of road maintenance each year at no increase in cost

2. More miles of road bladed each year

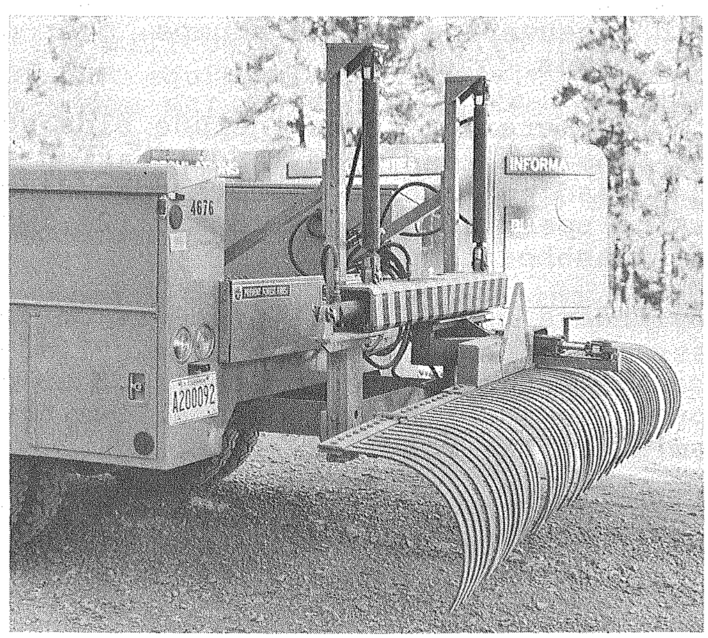
3. Less swamper time spent removing rocks

4. Greater motor grader productivity

Currently, the Bitterroot and Helena National Forests use these rakes to maintain their roads.

A contract has been awarded to establish a commercial source for these rakes. Cost estimates for each rake range from $6,000 to $7,000. Additional information, including specifications and film footage (without sound) of the rake in operation, can be obtained by writing:

Director
USDA, Forest Service
Equipment Development Center
Bldg. 1, Fort Missoula
Missoula, Montana 59801



Hydraulic rock rake.

LOT SIZE IN THE PUBLIC LAND SURVEYS

W. H. Valentine, P.E., L.S.
Leader, Geometronics Group, R-1

Anyone ever having struggled with the problem of determining the dimensions of Government Lots given the acreage will agree that at times the solution to the problem is elusive. Many a surveyor has wondered "how on earth they got that figure!"

Yet the plat acreage usually is the key clue to the lot dimensions, and the dimensions must be determined if the true lot boundaries are to be laid out in any subsequent survey.

The official acreage often differs from the actual. Even though the acreage is not the actual size of a lot, the measurements used to derive it must hold (in proportion) to legally establish the lot boundaries.

Several methods were used through the years to compute acreage. Rules for lottings changed. Chapter 8 of Land Survey Systems by J. G. McEntyre contains an excellent discussion of this problem, and outlines the specific methods employed.

The table summarizes the various methods used and factors affecting lotting and the computation of acreage. The figure tabulates the size of a sample lot as derived under the various methods. It shows that the lot size can vary considerably depending on the method used. It also shows where the lot dimensions, computed from a given area, will vary according to the method used.

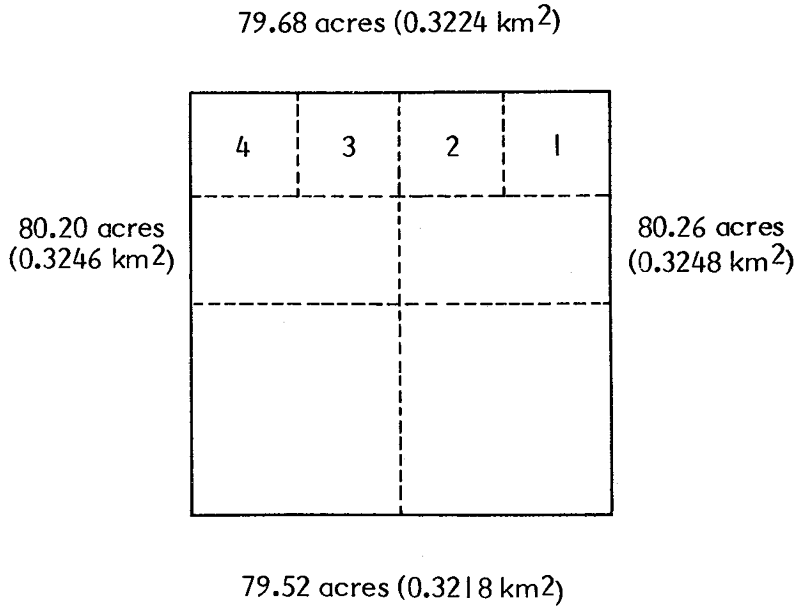
A warning! Rules in effect were not always followed; nonstandard methods were sometimes used. Therefore, these techniques cannot be rigidly employed.

COMPUTATION OF LOT ACREAGE FOR LOTS IN THE NORTH (AND WEST) TIERS (AND ELSEWHERE IF APPLICABLE)

Manual Period	N(W)1/16 Corner Position	S(E) Lot Boundary Dimension	Section Line Limits/Mile	Regular Lots	Computation Method Section 6 lots		
					1,2,3	4	5,6,7
1855-1880	Mid-Point 1/4 cor to C.C.	Proportional	80 ch ± 100 lk; N & S (E & W) boundary of sec are =, ± 100 lk	Average[1] dimensions	Average dimensions	Average dimensions	Average dimensions
1881-1893	20 ch N(W) of 1/4 cor	Proportional	So. boundary of tier ± 80 lk; N & S (E & W) boundary are =, ± 80 lk	Average dimensions	Average dimensions	Average dimensions	Average dimensions
1894-1929	20 ch N(W) of 1/4 cor	Assumed 20 ch if in limits, otherwise proportional	So. boundary of tier ± 50 lk; N & S (E & W) boundary are =, ± 50 lk	"d" quotient[2] or sum of sides;[4] average dimensions if out of limits	"q" difference and sum of sides;[3] average dimensions if out of limits	Average dimensions	"d" quotient or sum of sides; average dimensions if out of limits
1930-Present	20 ch N(W) of 1/4 cor	Assumed 20 ch if in limits, otherwise proportional	80 ch ± 50 lk; ± $0^\circ 21'$ from cardinal.	Sum of sides[4] or average dimensions if out of limits	Sum of sides or average dimensions	Average dimensions	Sum of sides or average dimensions

1. 1/10 product of average length by average width in chains.
2. McEntyre, Land Survey Systems, page 242; Manual (1902) page 76.
3. Op. cit., page 243.
4. Sum of meridional (latitudinal) sides in chains.

NOTE: 1 mile = 1.6 km; 1 chain (ch) = 66 ft = 20.1 m; 1 link (lk) = 7.92 in. = 0.201 m



Manual Period	Area Lot 4 - Acres (km2)	Method
1855-1881	$\frac{1}{10}\frac{(20.10 + 20.108)}{2}\frac{(19.91 + 19.92)}{2} = 40.04$ (0.1620 km^2)	Average dimensions, 1/16 cor@ mid-pt
1881-1893	$\frac{1}{10}\frac{(20.20 + 20.215)}{2}(19.915) = 40.24$ (0.1628 km^2)	Average dimensions 1/16 cor@ 20 ch (402.3 m)
1894-1929	$\frac{0.06}{4} = 0.01\frac{2}{4}$, d=0.01 2(20.20) + 0.01 = 40.41 (0.1635 km^2)	"d" quotient
1930-present	20.20 + 20.215 = 40.42 (0.1636 km^2)	Sum of meridional sides
Quadrilateral rule	(20.20 x 19.92 + 20.215 x 19.91) (0.05) = 40.24 (0.1628 km^2)	

Sample lot size calculations.

DEVELOPMENT OF THE PRECONSTRUCTION PERFORMANCE TESTING AND TRAINING PROGRAM UTILIZING THE TEST DEVELOPMENT FOR QUALIFICATION AND TRAINING PROCESS

Kenneth L. Tompkins
Transportation Systems, Preconstruction Engineer, WO

Preconstruction Performance Testing and Training (PPT&T) has been evolving slowly on a Service-wide basis for approximately 4 years, using the Construction Certification Program format. Job Performance Requirements (JPRs) and tests for several preconstruction activities have been developed to various degrees.

The report of the Road and Bridge Preconstruction Activity Review, published in July 1977, established an action plan to correct deficiencies, and to improve performance and effectiveness at all levels; the development of JPRs, standards, and related training for preconstruction engineering was identified as one of the major remedies. The Chief's Action Plan included in the July report required:

> "The Chief shall issue a policy statement that requires all road designs to be developed under the direct supervision of a designer certified in advanced road design."

As a result of the requirement in the Action Plan, FSM 7720.31 now states: "A preconstruction certification program is to be established." FSM 7721.04a states: "The Chief will develop minimum acceptable standards to be used in qualifying preconstruction and construction personnel."

In October 1978, a task group was formed to develop alternatives for a Service-wide program. The group recommended that the program be developed using the Test Development for Qualification and Training (TDQT) process. The first working session of a Service-wide committee to develop the PPT&T program using TDQT was held in the WO in August 1980. Their initial task is development of a Job Inventory.

There are three essential items in a performance testing and training program:

1. Job Requirements that provide a detailed and accurate description of what a person must do and produce.

2. A valid Performance Test that accurately measures a person's ability to perform the Job Requirements.

3. A set of Training Requirements that specify the skills and knowledge a person must acquire to be able to perform on the job.

Figure 1 shows the development process and the relationship of these three items.

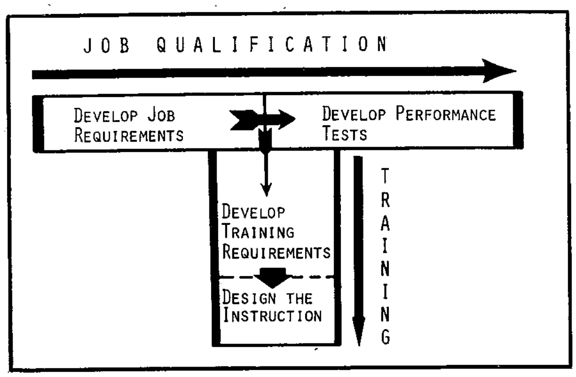


Figure 1. Development Process

These items can be divided into developmental stages that outline the complete testing-training process, as shown in figure 2.

The Job Inventory is the first and most important stage in the testing-training development process. Experience has shown that when problems develop in later stages, they are almost always traced back to deficiencies in the Job Inventory.

The Job Inventory is developed as a job is broken down and each component described. A classification scheme called "Successive Approximation" is used to break an event down from the broad to the specific (figure 3). The actions, conditions, and standards become the basis for all developmental activities in the Testing-Training Development Process.

The Service-wide committee will use the following steps as they develop the Job Inventory.

1. Collect and review job-related documents.
2. Write general description of job.
3. List major duties.
4. Break duty into tasks.

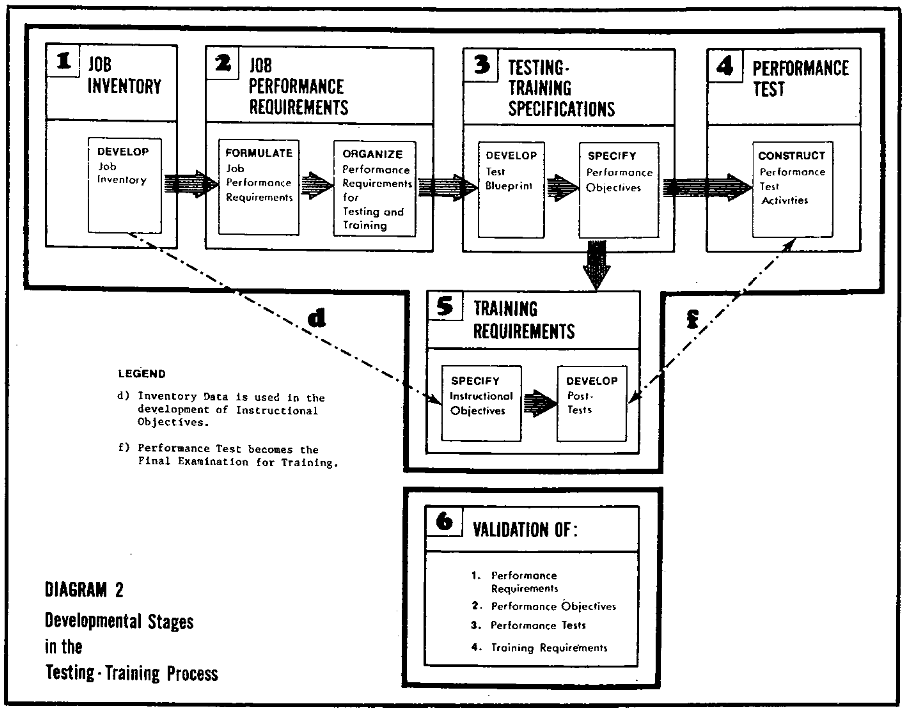


Figure 2. Testing-Training Process

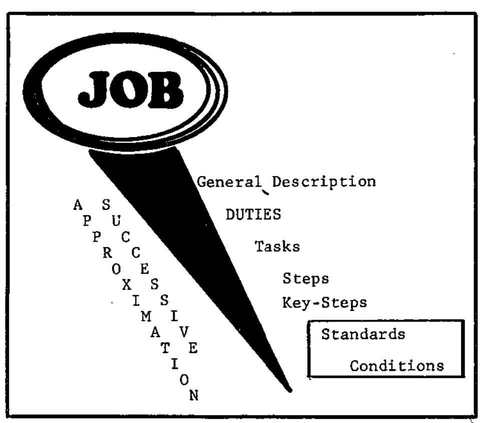


Figure 3. Successive Approximation

5. Review tasks for single action and product.
6. Examine action verb for observable action.
7. Examine product - single - measurable.
8. Identify tasks as "Interim" or "End".
9. Group tasks in sequence.
10. Repeat 4-9 for each duty.
11. Verify duties and tasks with others.

12. Write standards for each task product.
13. Break each task into steps.
14. Identify key steps.
15. Review each key step to assure completed performance.
16. Write standard for each key step.
17. Specify condition for each task.
18. Identify need for contingency action.
19. Repeat 4-18 for each duty.
20. Check inventory for completeness.
21. Consult with other master performers.
22. Review other master performer suggestions.
23. Revise, and validate with at least six master performers.

After the Job Inventory is completed, the full range of road pre-construction activities (from route location through preparation of the final drawings and specifications for contracts) will be described. The committee will complete the five remaining developmental stages, resulting in a performance testing and training program that will function as shown in figure 4.

This method will result in an effective program that will be used:

1. To evaluate employees against actual job requirements.

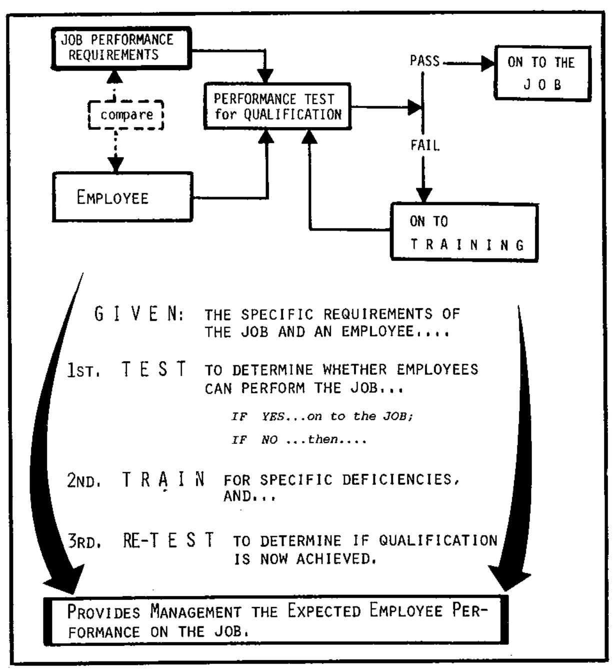


Figure 4. Development of Performance Testing and Training Program

2. To train employees only for those activities that they cannot perform adequately at the present time.

3. To provide management with the employee's expected on-the-job performance

The committee's draft of the Job Inventories can be used in developing or monitoring performance elements that are required by the new performance appraisal process.

The long-range development stages and their approximate completion dates are:

June 1981	Job Inventory
September 1981	Job Performance Requirements
December 1981	Testing Training Specifications
March 1982	Performance Test
June 1982	Training Requirements
September 1982	Validation Complete
December 1982	PPT&T Program Ready

ECCP ASSESSMENT

Russell L. Rogler
Engineer, Technical Recruitment and Development, WO

The Engineering Construction Certification Program (ECCP Assessment 1979 (EM 7115-2) has been published and distributed; copies should be available at Forest Supervisors' Offices. This report is the result of a survey of a cross section of Forest Service personnel involved with the ECCP.

A statistically selected sample of 468 FS specialists and managers received copies of a questionnaire in August 1979. The questionnaire contained 24 agree/disagree hypotheses (on a scale of 1 to 5) and three narrative response requests:

1. Other areas of FS activity that would benefit from a certification program

2. Problems with the current structure and administration of the ECCP

3. Suggestions for improvements in the program

Questionnaires completed by 374 individuals resulted in an impressive 80% response rate for the agree/disagree portion, and 1,348 specific comments and suggestions. The report is a statistical summary of these responses and comments; it does not include detailed recommendations.

The survey response included many negative comments, but positive comments and constructive suggestions outweighed the negative items. The survey is considered a valid and constructive critique of a major engineering program; it documents general support for the program and a need to improve examinations, training, and administration.

The most significant suggestions are:

Improve feedback from exams by immediately scoring and promptly informing participants, and their supervisors, of exam scores and weak areas that were identified.

Clarify the role of prerequisite and remedial training in the overall program.

Strengthen administration of the program. Hold managers accountable for followup of indicated training and certification.

Continue top-priority effort to improve exam quality: eliminate trick questions; include more performance-related questions.

Increase program emphasis on job performance; reduce emphasis on passing a written exam.

Administer exams at the Forest level where possible, and include on-the-job performance testing.

Establish a strong apprenticeship program to "bring along" trainees.

Increase Line awareness and involvement in the program; one method is the use of activity reviews.

Simplify program by reducing the number of certification categories, and simplify the recertification process.

Provide oral exams for those demonstrated performers who have difficulty taking (written) exams.

Many other suggestions for improvements to the program are summarized in appendix D of the report.

The overall conclusions of the assessment are:

The quality of constructed facilities has improved.

Engineering Construction Certification Program objectives are not clearly understood.

The examination, training, and administration aspects of the program need improvement.

Many participants believe that the ECCP neither improves morale and job opportunities, nor contributes to career enhancement.

The program does not ensure use of qualified, competent personnel on construction projects.

The quality of construction project administration has improved.

FS personnel report that contractors/timber purchasers think the program has not improved competence of CORs, ERs, and Inspectors (FS opinion).

The program should be continued.

Consideration should be given to expansion of certification into other areas.

On some issues, responses of the local employee groups or particular Regions differ significantly from average response; this indicates where improvements might be made to gain better commitment to the program.

Recommendations resulting from the Assessment are:

1. Continue the Engineering Construction Certification Program.

2. Expand certification programs in other areas, as indicated in the suggestions. Furnish assessment data to staff units affected.

3. The Washington Office, with assistance from the Regions, should develop a detailed plan to define indicated problems more precisely, and take corrective action to strengthen the program.

These suggestions, conclusions, and recommendations provide a framework for a renewed effort to make ECCP more effective.

The Assessment was a major topic of discussion at the National Certification and Technical Data Systems Workshop (June 1980). The Action Plan developed at the Workshop includes nine issues directly related to suggestions included in the Assessment Report; Washington and Regional Office personnel with ECCP responsibilities will be working on these issues over the next several months. The result should be improved program administration. In addition, alternatives for improving the examinations are being explored. Progress and changes will be reported in subsequent issues of Field Notes.

In January 1983, we will send the same questionnaire used for this study to an appropriate sample of each respondent group. This action will allow us to monitor the effectiveness of the corrective actions we are undertaking and will provide an opportunity for the identification of any new problem areas.

INVITATION TO READERS OF *FIELD NOTES*

Every reader is a potential author of an article for *Field Notes*. If you have a news item or short article you would like to share with Service engineers, we invite you to send it for publication in *Field Notes*.

Material submitted to the Washington Office for publication should be reviewed by the respective Regional Office to see that the information is current, timely, technically accurate, informative, and of interest to Forest Service Engineers (FSM 7113). The length of material submitted may vary from several short sentences to several typewritten pages; however, short articles or news items are preferred. All material submitted to the Washington Office should be typed double-spaced, and, ideally, all illustrations should be original drawings, glossy prints, or negatives.

Field Notes is distributed from the Washington Office directly to all Regional, Station, and Area Headquarters, Forests, and Forest Service retirees. If you are not currently on the mailing list, ask your Office Manager or the Regional Engineering Technical Data Systems Coordinator to increase the number of copies sent to your office. Copies of back issues are also available from the Washington Office.

Field personnel should submit material for publication or questions concerning *Field Notes* to their Regional Coordinators:

R-1	Melvin Dittmer	R-4	Ted Wood	R-9	Mujeebul Hasan
R-2	Royal M. Ryser	R-5	Paul Stutes	R-10	Bo McCoy
R-3	Juan Gomez	R-6	Kjell Bakke	WO	Al Colley
		R-8	Tom Vanderpool		

Coordinators should direct questions concerning format, editing, publishing dates, and other problems to:

Forest Service - USDA
Engineering Staff (RP-E Bldg)
Attn: Gordon L. Rome, Editor
P.O. Box 2417
Washington, D.C. 20013

Telephone: (Area Code 703) 235-8198

☆U.S. GOVERNMENT PRINTING OFFICE: 1981 — 723-574/696 REGION 3-1