ENGINEERING TECHNICAL INFORMATION SYSTEM

FIELD NOTES • TECHNICAL REPORTS • TEXTS
DATA RETRIEVAL • CURRENT AWARENESS

Field Notes

Volume 3 Number 5 May 1971

FOREST SERVICE • U.S. DEPARTMENT OF AGRICULTURE

ENGINEERING FIELD NOTES

This publication is a monthly newsletter published to exchange Engineering information and ideas among Forest Service personnel.

The publication is not intended to be exclusive for engineers. However, because of the type of material in the publication, all engineers and engineering technicians should read each monthly issue.

The publication is distributed from the Washington Office directly to all Forest, Regional, Center, Station, Area, Laboratory, and Research Offices. Adequate copies are printed to provide all who wish a personal copy. If you are not now receiving a personal copy and would like one, ask your Office Manager or the Regional Information Coordinator to increase the number of copies sent to your office. Use form 7100-60 for this purpose. Copies of back issues are also available from the Washington Office and can be ordered on form 7100-60.

It is intended that the material in the Field Notes be primarily written and used by Forest Service Field Engineers; however, material from other publications may be used

Field Note material should always be informative and cannot contain mandatory instructions or policy. The length of an article may vary from several sentences to several typewritten pages. Material need not be typed (neatly written or printed is acceptable), or edited before being submitted to the Washington Office. This will be done in the Washington Office to accommodate our format and allowable space.

Each Region has an Information Coordinator to whom field personnel should submit both questions and material for publication. The Coordinators are:

R-1		R-6	
R-2	Alfred Buerger	R-8	Ernest Quinn
R-3	Dan Roper	R-9	Clifford Hill
R-4	Fleet Stanton	R-10	Loren Adkins
R-5	Chuck Paletti	WO	Norman Sears

FIELD NOTES

BRYANTS FORK - A TEMPORARY CAMPGROUND

by Richard G. Harris, Civil Engineer
Uinta National Forest

Utah's Strawberry Reservoir is recognized as one of the State's major recreation areas. Located within about 1 hour's driving distance of three-fourths of a million people and adjacent to U. S. Highway 40, its fishing, boating, and camping pressures have increased dramatically over the last few years. Except for a small area along the western shoreline within the Uinta National Forest, the land surrounding the reservoir is privately controlled. Serious water pollution and sanitation problems have developed.

As recreational use of this National Forest land increased, the need to provide a high-density, sanitary campground for fishermen was recognized, and a site survey was made in August 1969. We planned to have the new campground in use by July 1, 1970; if the designs were completed during the winter, only about 1 month would be available for construction the next spring. Also, as part of the Central Utah Project, the reservoir will be enlarged and the site will be inundated in 5 to 7 years. Because of these factors, the design was based on winter prefabrication, fast field assembly, and salvagability of as many components as possible.

We decided to provide temporary facilities consisting of a gravelled road system with put-through parking to accommodate trailers and boats, a water system, a sanitary system consisting of a garbage can at each unit and eight self-contained 1,000-flush recirculating chemical toilets supplemented by 270-gallon fiberglass vaults, and cable carriers to prevent camping on the shore outside the campground limits. Studies have shown that the type of camping in Utah is predominantly pickup/camper and trailer, and for this reason the design did not include tables, grills, or fire circles. Because of limited construction funds and the close proximity of private ramps, no boat launching facilities were planned. It was decided to construct the campground by force account as the Forest has a fine recreation construction crew and all necessary equipment.

As the design progressed, each component was discussed as to the best and most economical way to accomplish the desired objectives. The construction crew was consulted frequently for ideas on jigs and forms, shop assembly, storage, transportation, and field assembly of components.

The recirculating chemical toilets are housed in fiberglass shells which require pads for mounting (figs. 1 and 2). The pads for each unit were precast from concrete and were designed so two of them could be laid side by side with the joint formed to support a garbage can rack and also to house the vault cleanouts. During construction a pit was dug and the vaults installed. The pads were then positioned over the vaults and the toilets fastened to the pad. In this manner two 1-unit toilets were assembled and ready for use in about 8 hours. A water hydrant was installed nearby for cleaning. The toilets are portable and can be used elsewhere on the Forest during the winter. The vaults require pumping only once a year (fig. 3).

Figure 1.--Installing precast concrete toilet pads.

Figure 2.--Precast concrete pad in place.
Note vault cleanouts.

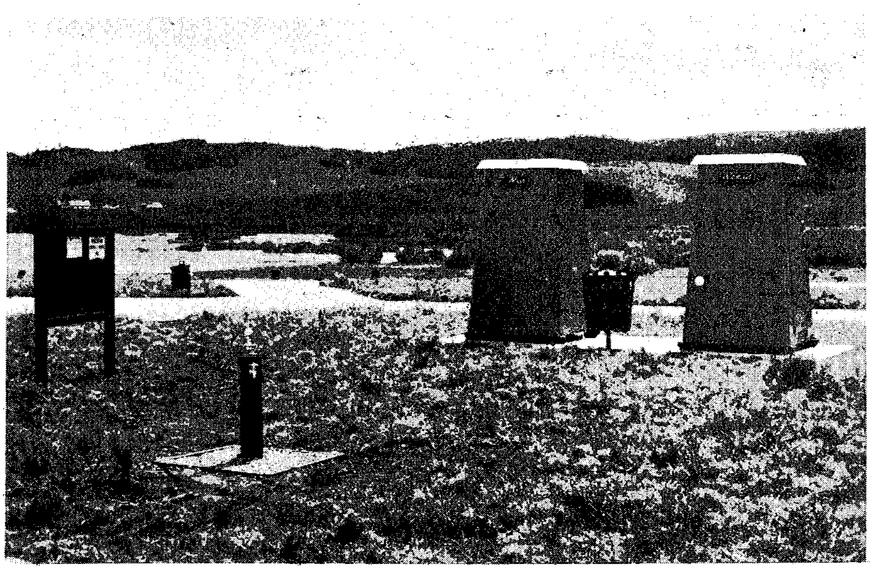

Figure 3.--Toilets in place.
Note garbage cans and water hydrant.

During the winter the water system pipe and fittings were ordered according to design quanities. The hydrants and the lead-in pipe were installed on a standard campground hydrant post which had been prefinished. A jig was made to hold this component in position while it was being connected to the water line and backfilled.

A portable chlorinator housing was constructed from a 2-foot section of 48-inch corrugated metal pipe and all plumbing was installed so that the housing could be connected into the main water line and left until ready for the chlorinator. The chlorinator can be installed or removed without interrupting flow and with a minimum of effort. The housing can easily be removed and taken to another location when the site is inundated. A surplus stock watering tank was obtained for use as the chlorinator contact tank; enough water is available and a storage tank was not required. The valve boxes were purchased commercially and consisted of sections of small diameter corrugated metal pipe with a lid and locking hasp welded to one end. A set of operating instructions and "You Are Here" map were laminated between clear plastic sheets and posted in each valve box, the chlorinator, and at the spring box (figs. 4 and 5).

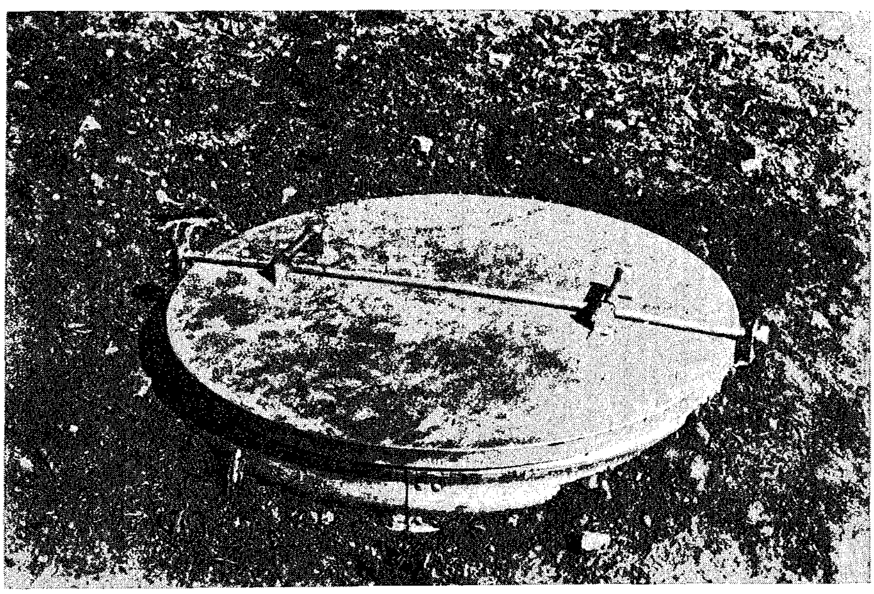

Figure 4.--Chlorinator housing.

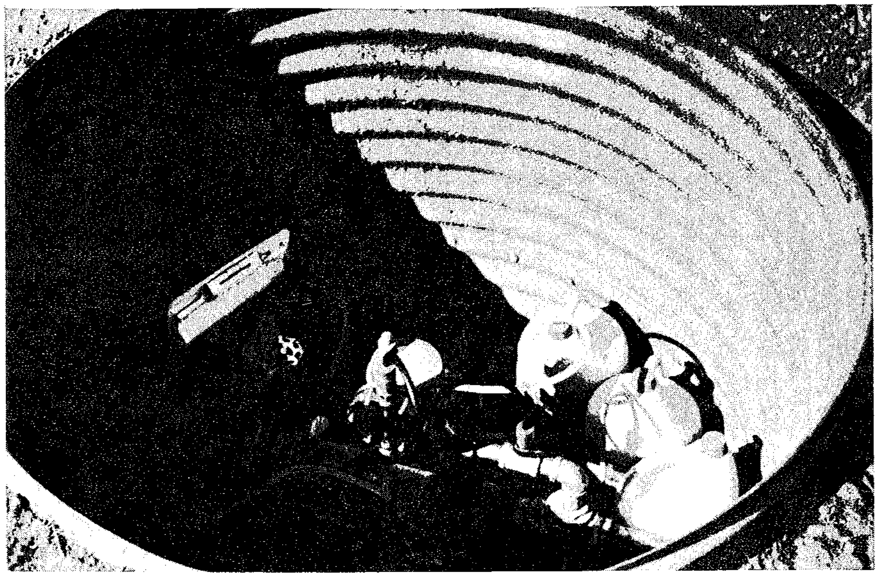

Figure 5.--Chlorinator.

The cable barrier posts were chamfered, drilled, and prefinished and surplus cable was obtained. As the barrier was installed, deadmen were placed at intervals to assure that the cable would not pull through the posts if a large load were applied (fig. 6).

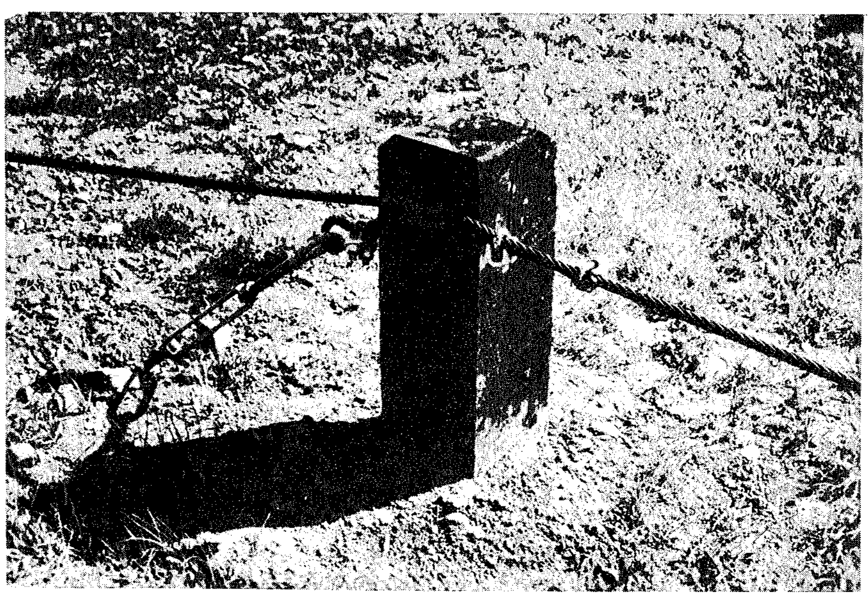

Figure 6.--Cable barrier. Note deadman.

There was other construction, but these are the main items of interest pertaining to the stated design objectives. The construction moved along smoothly and the stakeout crew was hard pressed to stay ahead. The components were easily field erected, will provide the necessary service, and will be salvaged for use elsewhere when the site is inundated. The campground is far superior to other facilities available around Strawberry Reservoir. It has 61 family units and was constructed at a cost of about $500 per unit.

During all phases of the project, very close coordination existed between the engineering landscape architecture, and the construction crews. This is recognized as a major reason for its successful completion (fig. 7).

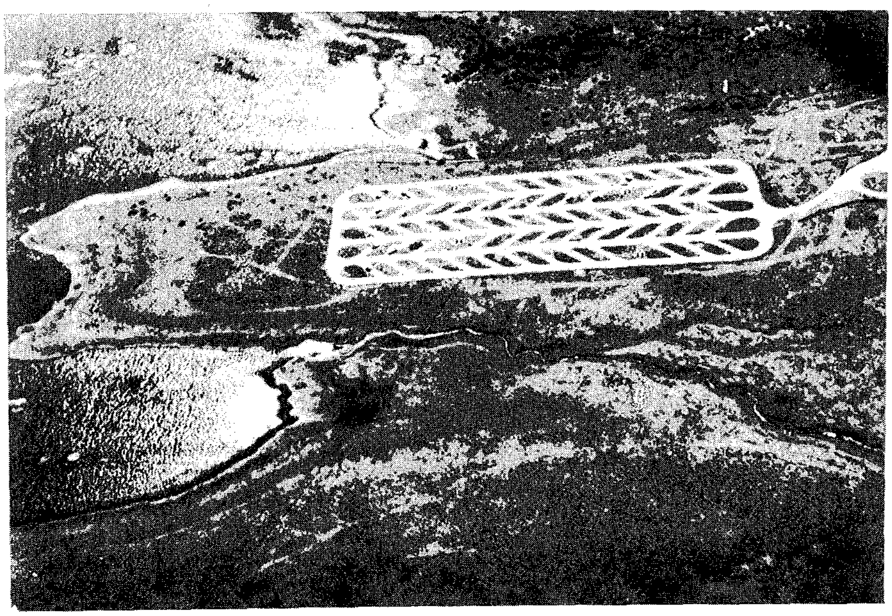

Figure 7.--Aerial view of completed campground.

DEVELOPMENT OF MAINTENANCE WORK STANDARDS

by John Platt, San Bernardino National Forest

The use of maintenance work standards at Forest Service work centers and shops offers distinct advantages to both the Government and the employee. Some of these advantages are:

- Installation of standards will lead to many operating improvements.
- The mere fact that standards are being established will result in better operation performance.
- Budgeting of labor loads can be achieved.
- Efficiency of maintenance operations can be determined.
- Costs of specific types of repairs can be determined.
- System improvements can be evaluated prior to installation of a standard. Thus, costly mistakes may be avoided by choosing the right procedure.
- Maintenance work can be planned and scheduled more accurately, resulting in the job being completed on time.
- Less supervision will be required, as a program of work standards tends to enforce itself.

Generally, maintenance standards are determined by four methods:

1. Estimating. Estimating maintenance standards is the most common practice. A standard under this method is only as good as the judgement of the person making the estimate. The cost of materials to do a job may be easily estimated but the time estimated to perform the job is solely dependent upon the personal experience, knowledge, and the ability of the estimator. If an estimate is too

tight, the workers lose interest in trying to meet unrealistic goals--if the estimate is too loose, they lose interest in a token program.

2. Historical Records. Historical records are a refined method of estimating, using the average time values based on past experience. Historical work orders, that have been performed with average times, are grouped by similar jobs to acquire the average standard time. The disadvantages of this method is that its accuracy is low and reflects only what has been done in the past. Today, with new methods of performance, better tools, or new equipment, the standard, based on past performance, would become loose and difficult to adjust.

3. Measurement by Standard Time Data. Measurement by standard time data is the most accurate method of determining job times. The standard time data should be gathered by a person trained in time study, or one of the synthetic methods, such as measurement time method (M.T.M.) or work factor. Standard data are expensive to generate and to keep updated. In maintenance shops of a scale typically found in the Forest Service, I generally recommend that the work sampling approach be taken in the development of standards.

4. Work Sampling. Work sampling for maintenance standards, by its nature, includes the things over which the workman has no control and that are reducing his effectiveness. The information of a work sampling survey report will allow the determination of average number of man-hours required to do a specific job. This information can be used to set up performance standards and also to estimate costs of future jobs. The work sampling method of acquiring data has several advantages over the conventional time study methods in that:

- Continuous observation by an analyst over long periods of time is not required,
- Clerical time is diminished,
- Total man-hours expended by the analyst are usually much fewer, and

- Crew operations can be readily studied by a single analyst.

In conducting a work sampling study, the analyst, preferably an experienced maintenance foreman, makes a large number of observations of the job at random intervals. The accuracy of data determined by work sampling depends upon the number of observations--unless the number of sample observations is of sufficient quantity, inaccurate results will occur. The whole theory of work sampling is based on the foundamental laws of probability. The statistical concepts behind work sampling, as well as actual practices in carrying out the survey, are readily available in texts on motion and time study.

With the growing amount and complexity of maintenance activities in the Forest Service, there is an eminent need for scientifically derived maintenance work standards. Private industry, for some time, has considered maintenance work as a very lucrative area in which to cut indirect costs. By establishing work standards, similar savings could be realized through the progressive management of Forest maintenance work.

. . . .

COMBINED RIGHT-OF-WAY AND ROAD DESIGN AERIAL PHOTOGRAPHY

by Max C. Montgomery, San Bernardino National Forest

The San Bernardino National Forest recently combined a contract to secure aerial photography, photogrammetric mapping, and ground control for right-of-way acquisition and road design purposes.

A photo scale of 1 inch = 500 feet produced a map scale of 1 inch = 100 feet with a 5-foot contour interval. This map scale was adequate for design and right-of-way purposes.

In conjunction with the horizontal control for photogrammetric models, all acceptable land corners which were pertinent to the legal requirements of right-of-way acquisition were targeted and tied to the basic horizontal control network. The coordinates of each corner were then calculated and later verified during the bridging process with first-order plotter.

The aerial method provided an 800-foot wide strip of topography compared with the 200-foot wide strip by conventional ground surveys. The additional topography allows for minor alignment changes and a better design understanding of surrounding topography.

The coordinates of land corners, tied with the horizontal control and the coordinate of points of ingress and egress, were correlated and checked with a desk-top computer which was preprogrammed for this problem. With the distances and bearing computed from all land corners, the right-of-way plat and description were completed in approximately half the time usually required by conventional methods.

The contract included ground survey, placement of aerial targets, aerial photography, contour strip map, and horizontal and vertical computations. The cost was $1,860 per mile. The savings were approximately 25 percent when compared to the conventional methods.

. . . .

NEWS ITEMS

REGION 2 MATERIALS TRAINING CONDUCTED IN REGION 4 MATERIALS LABORATORY

by Martin Everitt, Materials Engineer, Region 2

On invitation from Region 4, Region 2 personnel conducted a 2-week long materials training session in February 1970 and another in February 1971 at the Region 4 Materials Laboratory in Salt Lake City. The training sessions were held for construction inspectors and younger engineers and, in the two sessions, 33 students representing all of the Forests in Region 2 received training concentrated on field testing for quality assurance of soils, mineral aggregates, concrete, and bituminous materials.

The sessions were conduted by Martin Everitt, Region 2 Materials Engineer, with the enthusiastic participation from Region 4 of E. D. Hansen, Materials Engineer; Jerry Wilson, Laboratory Superintendent, and his staff; and several other engineers.

Region 2 expresses gratitude to Region 4 for the use of its modern, well-equipped laboratory and the participation of its staff for the sessions. Since no comparable facility is available in Region 2 the quality of instruction for the sessions would have been considerably lower. We appreciate having participated in two unusually fine occasions of interregional cooperation.

. . . .

TESTING TRAFFIC COUNTERS

Submitted by the Equipment Development Center at Missoula

During the past several years the Equipment Development Center at Missoula, Montana has been working on the development and testing of traffic counters. This work has stimulated several manufacturers to design new counters to more closely meet Forest Service needs.

Although testing has not been completed, one of the new road traffic counters that has performed well is the Spadet Jr.

The counter uses a remote loop coil sensor to detect vehicular traffic. Solid state circuits are used to provide the proper pulse to operate an integral visual totalizing counter. Expected battery life is 3 months. The counter, circuitry, batteries and necessary test meters are all housed in a weatherproof housing about 8 x 6 x 8 inches in size. The Spadet Jr. is manufactured by the Streeter Amet Division of Mangood Corporation, Gray Lake, Illinois. Its cost is about $185.

. . . .