

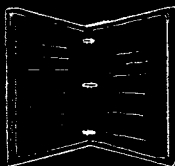
Pubs

**ENGINEERING
TECHNICAL
INFORMATION
SYSTEM**

FIELD NOTES • TECHNICAL REPORTS
DATA RETRIEVAL • MANAGEMENT
PROFESSIONAL DEVELOPMENT

VOLUME 8 NUMBER 9

Field



Notes

**Red Mountain Creek Soil Bridge
Collapse**

**Region 5 Dedicates "Old" Sims
Bridge**

**Flow Capacities of 12- and 24-Inch
Rectangular Overside Drains**

Washington Office News



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FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
Washington, D.C. 20250

RED MOUNTAIN CREEK SOIL BRIDGE COLLAPSE

Martin C. Everitt, P.E.
Materials Engineer
Region 2

An article on the construction of a Soil Bridge on Red Mountain Creek, near Creede, Colorado, appeared in the Field Notes Vol. 7, No. 8, August 1975 (figure 1). On the night of October 11, 1975, the structure collapsed after 1-1/2 years of service (figure 2). There were no witnesses. All indications are that the collapse was very sudden and probably not associated with a passing vehicle. Fortunately, no one crashed into the void.

The wreckage was removed from the stream in April 1976, under a Forest Service contract. All interested parties observed as the steel was uncovered. Many pictures were taken and measurements were made for use in later settlement actions. The configuration of the members was very interesting, and careful analysis of their positions probably could fully describe the nature of the collapse. An Army Bailey Bridge was erected by Forest Service personnel as a temporary crossing, and a permanent conventional bridge will be built later.

Since we have not yet reached a settlement with the parties involved and the matter may go to court, it is not appropriate to discuss possible causes of the collapse at this time.

We do not question the general concept of long-span structures using soil as a structural material. However, because of this incident, we would suggest caution until one or more of the various proprietary designs is fully proven and more is known concerning the various designs.



Figure 1. View of the 50 ft. x 10 ft. soil bridge from upstream in August 1975, after about 15 months of service.

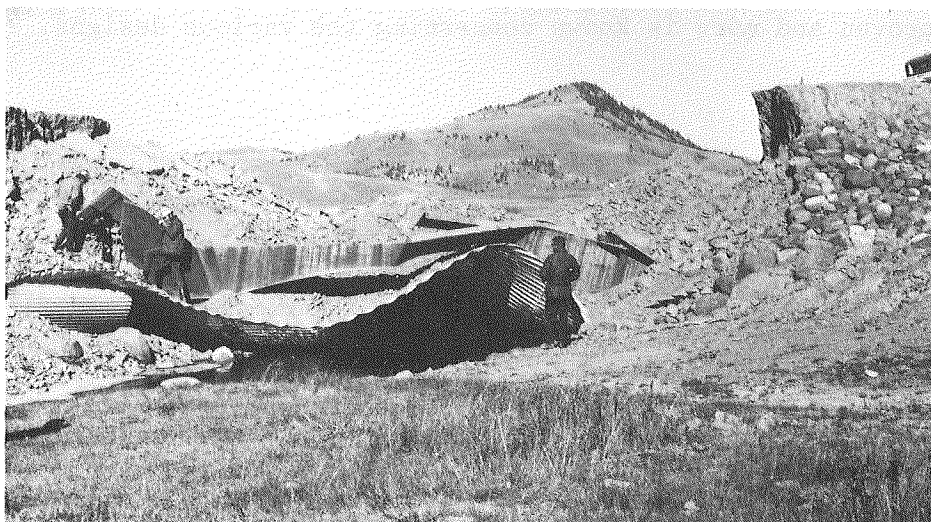


Figure 2. View of structure a few days after collapse. Original road grade can be seen at the edges of the picture.

REGION 5 DEDICATES "OLD" SIMS BRIDGE

Regional D. C. Turner, P.E.
~~Supervisory Civil Engineer~~
Region 5

The "Old" Sims Bridge was constructed in 1933 and was the first major construction project completed by the Civilian Conservation Corps. The Project Engineer was E. Ray Huber, who later served as Regional Engineer in Region 3 until his retirement in 1962. The bridge was Mr. Huber's first Forest Service assignment.

A new bridge to accommodate present-day legal highway loads was constructed in 1974. However, there is a campground adjacent to the bridge on the banks of the Sacramento River and the old bridge has considerable utilitarian value for pedestrian use by fishermen. This, coupled with the historical value of the old structure, prompted Region 5 to dedicate the bridge to Ray Huber and to the thousands of CCC enrollees who did so much good work during the 1930's.

A large number of Forest Service retirees, including Tony Dean and Ray Huber, as well as present-day Forest Service officials, attended a dedication ceremony on June 29. Ray was presented a replica of the plaque which has been mounted on the bridge. The dedication address follows with a facsimile of the plaque.

SIMS BRIDGE DEDICATION

June 29, 1976

D. C. Turner

"Some people demonstrate their love for mankind by writing poetry or stirring narrative tales.

"Some people do this by giving their talent in the visual arts.

"Some people demonstrate their love through the service of healing folks' ills of body or mind.

"Some people inspire us through the performing arts.

"Some people minister to our souls.

"Some people tend the land and produce our food, our clothing and our timber products for beneficial use.

"Still other people combine their engineering intellect and the skill of their hands to the creation of works of benefit to their fellow man.



IN RECOGNITION OF
**E. RAYMOND HUBER AND
THE MEN OF THE CIVILIAN
CONSERVATION CORPS**

FOR THEIR CONSCIENTIOUS & UNTIRING
WORK FOR THE FOREST SERVICE

This suspension bridge, built in 1933 was the first major construction project completed in the U.S. by CCC crews of the 1930's. It is also the first project supervised by Mr. Huber, who later became a Regional Engineer. The Forest Service will retain the bridge for it's historical interest and use by pedestrians...



We are here today to recognize a man who exemplifies the latter. There is also a certain poetry and art to a bridge with graceful lines. Such a structure as this should properly be retained as a cherished heritage.

"I know of no better tribute I could pay to Ray Huber and the thousands of CCC enrollees of the 1930's than to quote some of Ray's own words. Some 10 years ago, Ray wrote the following in his reminiscences:

This project was a fine project to start on. Bridges were good for the CCC boys to build because there was always something visibly accomplished, and it was easy to build up morale and to have good boys and good crews working on such a project.

You must remember that this was depression times and the fact that we all had a job was all that we asked. We enjoyed our work, we had a great deal of fun with it, we worked hard and there was always the thought that we were not going to find anything better. Those of you who did not know the old times should realize that when we were hired we were told that these were three month appointments, and they probably wouldn't be carried beyond that. My temporary appointment lasted from May 15, 1933, until sometime in 1939 . . . of course we never felt that this was insecurity. We thought of it as a job that needed doing and we were having fun doing it. What else could a man ask?

We finally worked our way through and completed our (Sims) bridge in September (1933). This, we understood was the first major project completed by any of the CCC programs throughout the U.S. We were mighty proud of our bridge and, as I look at it today, I still feel the same pride. The old bridge still has its camber and although it's been very badly overloaded it shows no signs of distress and I am sure that any of the fellows who worked on it, and could see it, would feel the same as I do.

"I am sure of that too, Ray and if there were any way to have all of those fellows here today, we would have arranged it. It is impossible for us to fully share your pride in this bridge, because we didn't experience the difficulties and the toil which went into its erection. Therefore, we are paying our tribute as best we can, by this dedication. For you personally, we have a replica of the plaque which has been placed on the bridge. We hope it may serve to remind you of this fine work you did and that the feeling of pride you have in this bridge is fully justified."

FLOW CAPACITIES OF 12- AND 24-INCH
RECTANGULAR OVERSIDE DRAINS

Robert M. Gallup
Staff Engineer - Transportation

San Dimas Equipment Development Center

Ted L. Pickett
Mechanical Engineer

Region 5

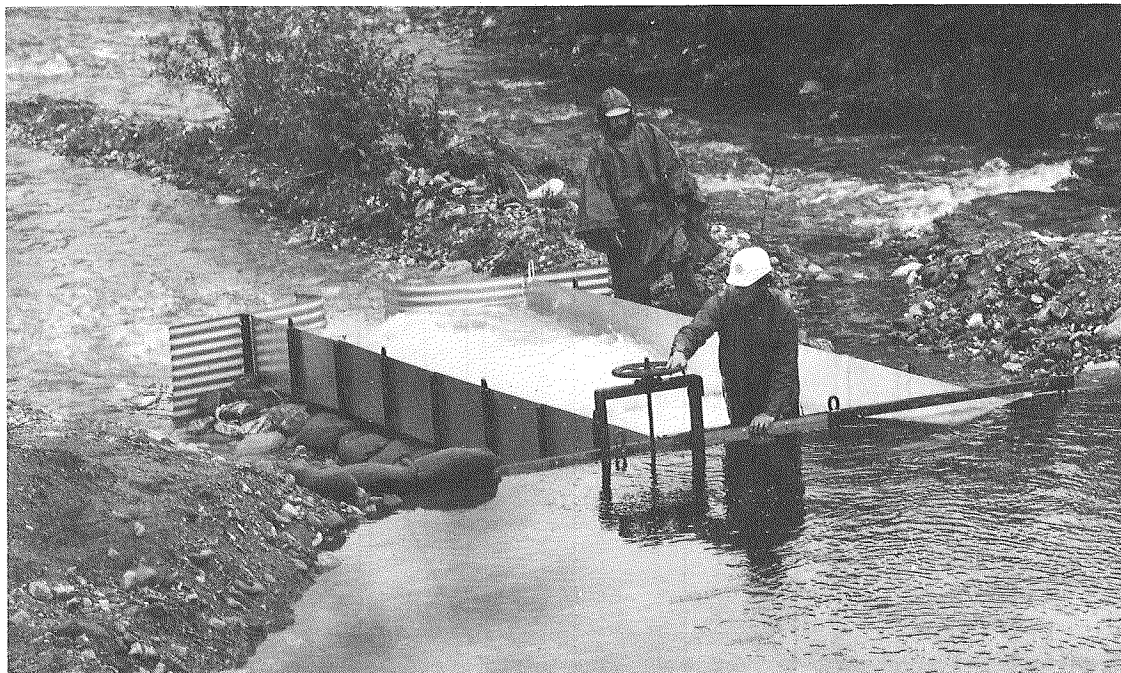
To alleviate both road and surface and across-the-road drainage problems that existed in the San Gabriel Mountains on the Angeles National Forest (Region 5), special rectangular overside drains were developed in 1968 by David D. McCarthy (Field Notes, Vol. 3 No. 12, December 1971). Over 15,000 of these overside drains ("McCarthy inlets") have been installed in the southern California area and have performed excellently (and, presumably, would perform excellently elsewhere too, although other Regions haven't reported using them yet).

In April 1976, engineers from the San Dimas Equipment Development Center conducted flow studies in a controlled full-scale test to determine flow capacities so that road designers might better use these drains in either the 12- or 24-inch size. Sharp-crested weirs were fabricated and set-up on the Angeles National Forest in a specially designed test facility (figures 1a and 1b).

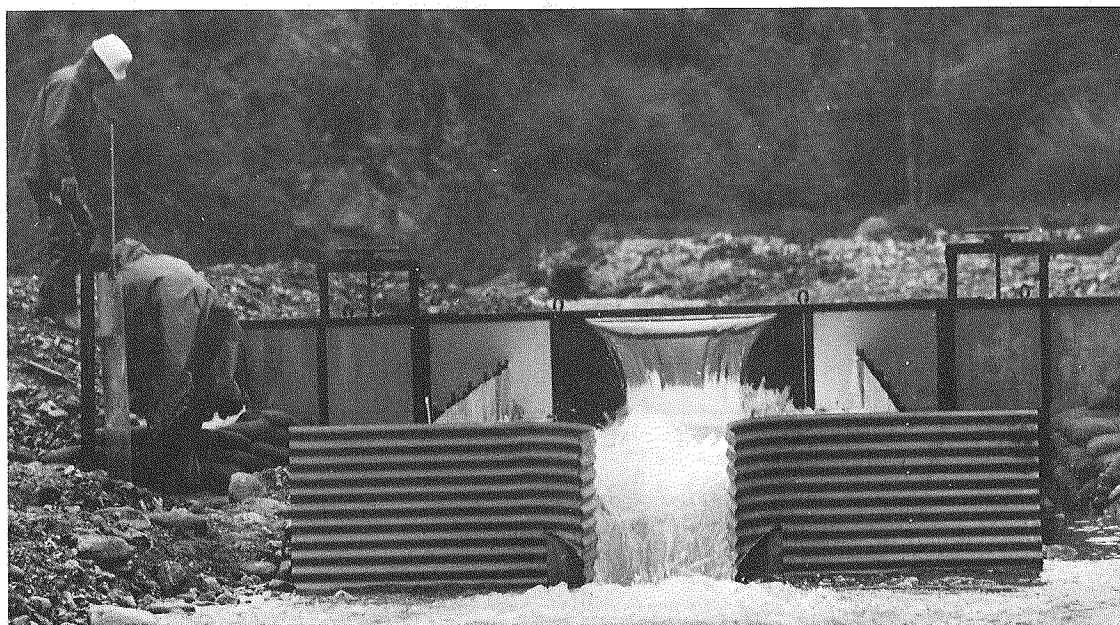
The flow curves for the two different size drains obtained for various depths in the inlet are shown in figures 2 and 3. The flow curves were plotted using equations developed from actual test data, using a regression analysis technique. The depths (d) were measured at the location shown in the elevation view in figure 4.

The maximum flows that 12- and 24-inch rectangular overside drains carry are 9.1 and 22.8 cfs, respectively. These maximum flows occur in normal inlet installations when flows approaching the inlets are at velocities of less than 5 fps. Excessive splashing or overflowing occurred at greater depths than the maximum depths shown in figures 2 and 3 because of turbulence.

The road designer can calculate the expected maximum flow rate from runoff and drainage-area information, and then scale the depth (d in fig. 4). Based on his confidence in the calculated flow rate and the grade and roughness of the channel or roadbed leading to the inlet, he may then want to modify the installation design to provide a safety factor.



1a. Inlet view.



1b. Outlet view.

Figure 1. Weir and inlet test set-up

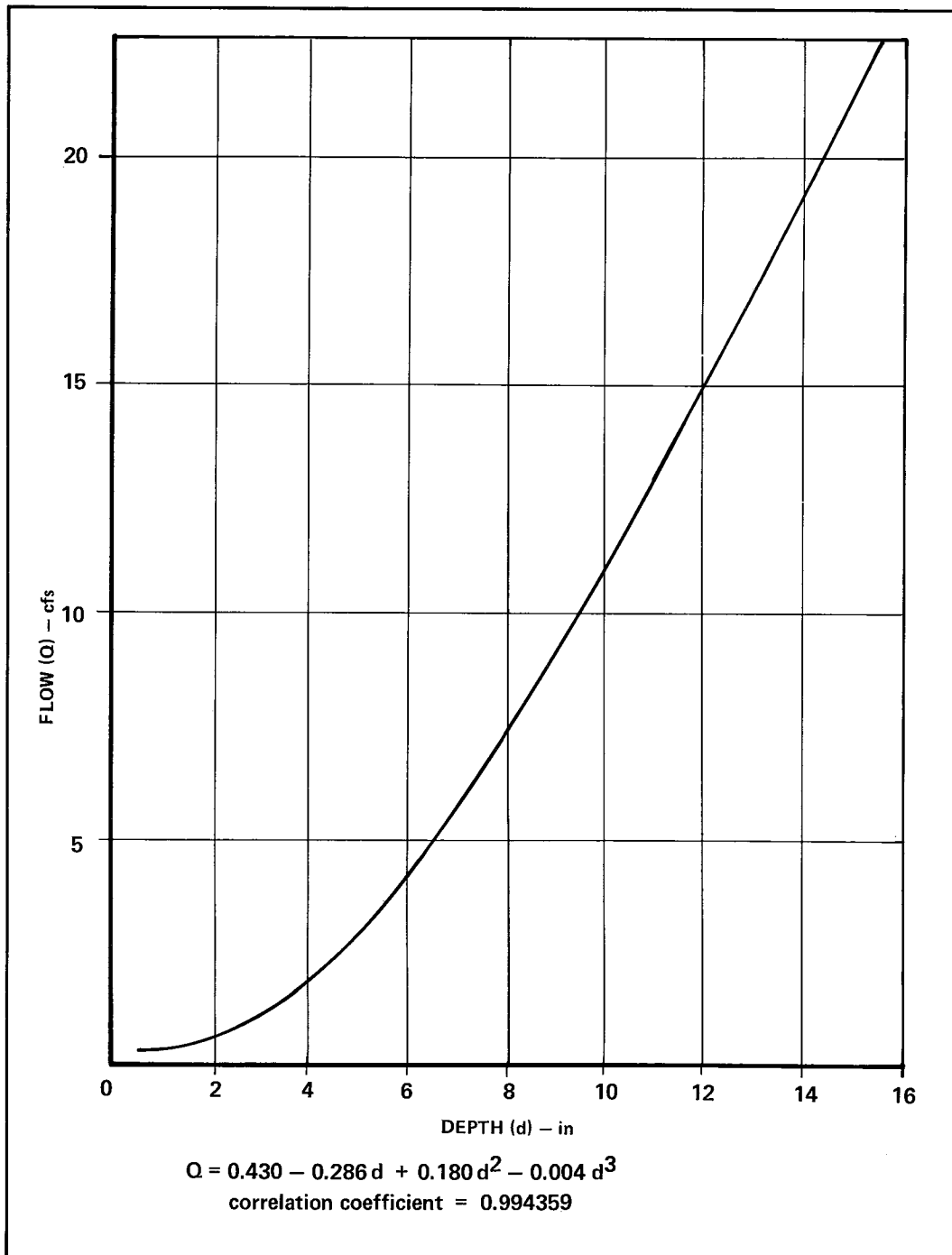


Figure 2. Flow capacity at various depths for 12-inch rectangular overside drain.

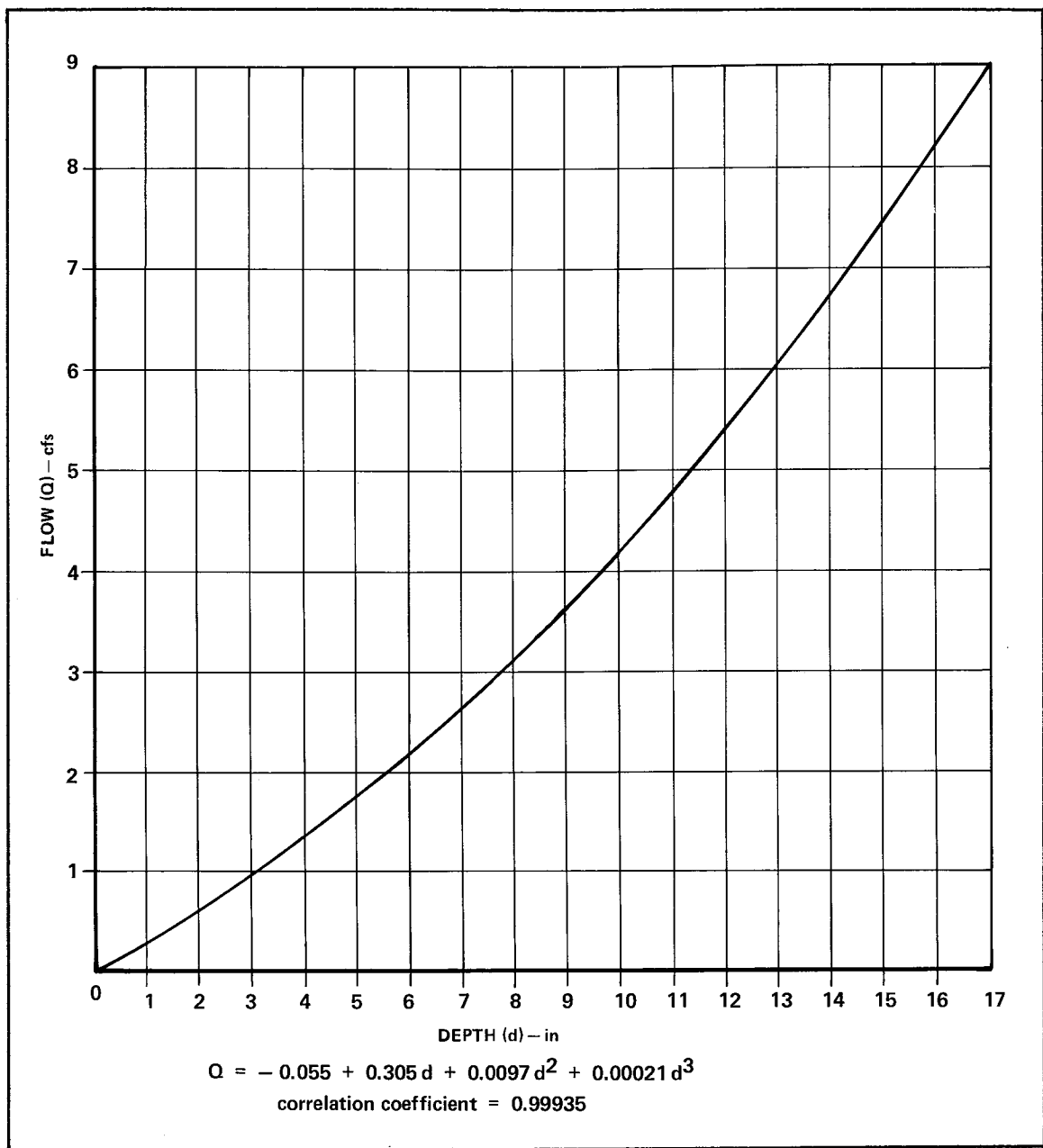


Figure 3. Flow capacity at various depths for 24-inch rectangular overside drain.

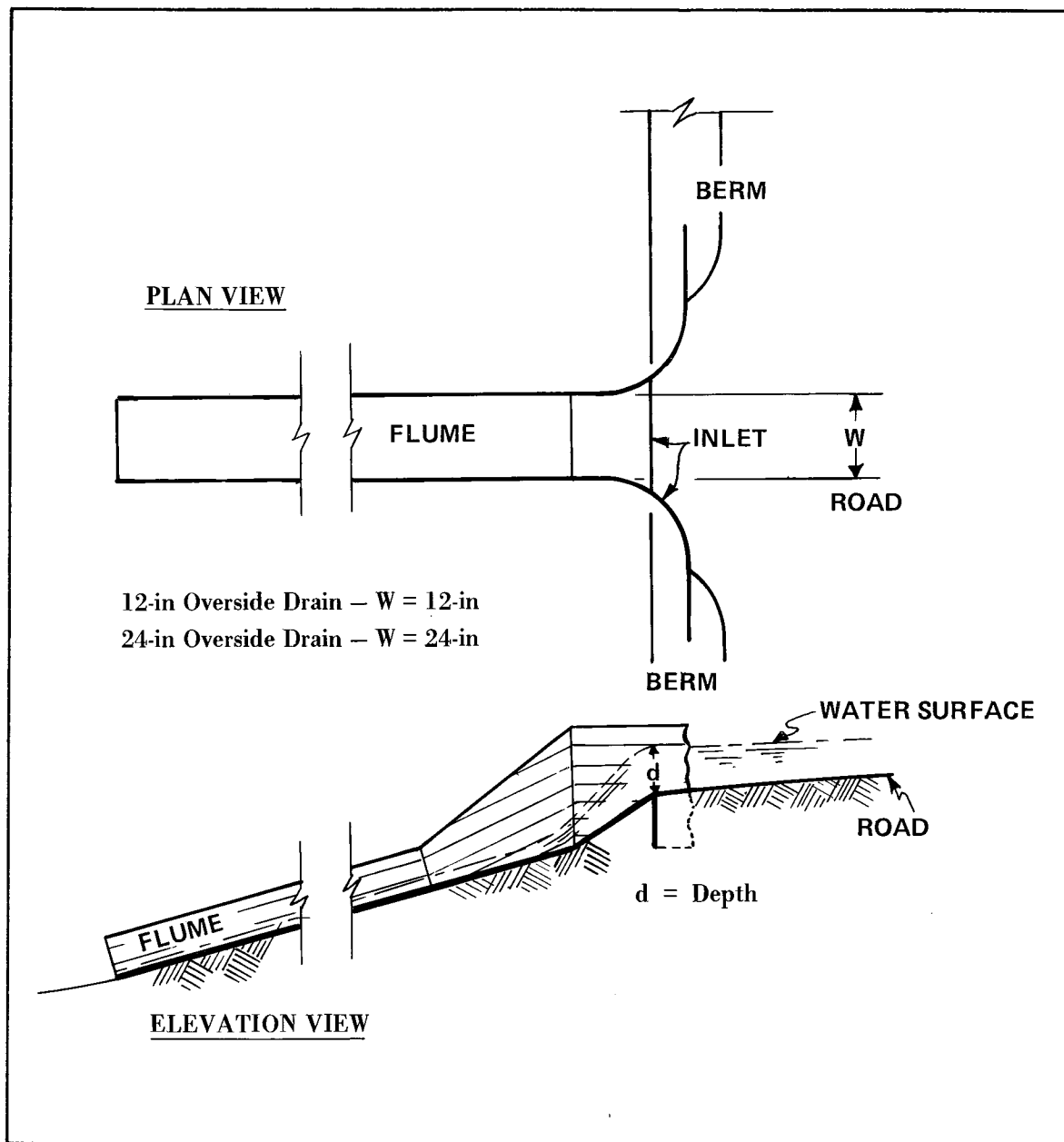


Figure 4. Rectangular roadside drain.

WASHINGTON OFFICE NEWS

TECHNOLOGICAL IMPROVEMENTS

Heyward T. Taylor
Assistant Director

OPTIMUM ROUTE LOCATION

The Optimum Route Location (OPTLOC) system is a set of computer programs designed to aid in the location of rural highways. Its principal function, at the detailed level, is selection of those routes which minimize some combined total of construction and operation costs. The selection is made from all feasible alternatives within a given band of interests.

The selection process, which is based on the use of dynamic programming, generally operates in three dimensions; thus, it results in defining both the horizontal and vertical locations of selected routes.

Within this framework, use of the system may be restricted to the selection of minimum-cost vertical profiles for any given horizontal alignment, or to the evaluation of any route whose location is completely prespecified, should the user so desire.

Analysis of a typical project usually involves several applications of the system. For example, the location engineer may employ the different levels of operation (horizontal or vertical) to compare computer-selected routes with other routes which are selected either fully or partially by manual methods.

Alternatively, the purpose of multiple applications may be to examine the consequences of variations in items or input data, such as the basic cost information, the limiting geometric standards, or the locations of control regions.

Variations in input data may be structured to reflect alternative policy decisions which are available to the highway planners, particularly, those items which place specific restrictions on the feasible locations of routes, and which may be influenced to a greater or lesser extent by environmental, institutional, or other considerations rather than by the purely economic criteria considered by the programs.

We recognize that there are many aspects of the evaluation and selection of highway locations which are not amenable to computer analysis but are best reserved for the judgment of experienced planning and location engineers. Thus, in the broader sense, the function of OPTLOC is to assist the planners' decision-making process by identifying the most economically efficient locations which can be achieved within the limits imposed by each set of decisions and by detailing the quantitative consequences of making alternative decisions.

OPTLOC was originally purchased by the Forest Service in 1970, and was made available on the UNIVAC 1108 at the National Bureau of Standards; however, program limitations made it difficult to use in production. Earlier this year, we purchased some major enhancements to the system. These are presently being loaded and tested at the Fort Collins Computer Center (FCCC) and we hope to have the system available at FCCC for limited use by October 15, 1976. At that time, documentation will be sent to the Regional Offices and copies should be available from them.

CONSULTATION & STANDARDS

Charles R. Weller
Assistant Director

THE HIGHWAY SAFETY PROGRAM

History

The Highway Safety Act (1966) requires that in a federally administered area (where a Federal agency controls highways open to public travel), the controlling agency shall comply with applicable Highway Safety Standards. The responsibility for implementing and administering the safety standards is divided between two agencies within the Department of Transportation (DOT). They are the National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA).

Last October, the Chief signed Memoranda of Understanding with NHSTA and FHWA. These identify the standards applicable to the Forest Service, which are included in FSM 1535, and in "The Proceedings of the National Highway Safety & Signing Meeting," held in Albuquerque, N.M., October 21-24, 1975. You are urged to read the "Proceedings," and if copies are not on the Forest, they can be obtained from your Regional Office.

Current Activities

Much effort is being put into developing Road Design Standards. Last April, a task force met in Denver, Colo. to review FSH 7709.11, Chapter 24, and recommend necessary changes to bring the Forest Service into compliance with Safety Standard #12. The target date for approval and publication of the changes to the handbook is January 1977.

Members of the task force included Lee Landman, R-1; Jim Hogan and Lou Hepfl, R-2; Paul Weaver, R-3; Leon Evans, R-6; Bill Stalcup, R-8; George Scherrer, R-9; Lee Kocmick, R-10; and Willard Clementson and Rich Weller, WO.

In addition to these efforts, the American Association of State Highway and Transportation Officials (AASHTO) is in the process of updating "A Policy on Geometric Design for Rural Highways - 1965 (Blue Book)"; Chapter VIII, Local Roads and Streets, will include standards for low-volume roads. AASHTO requested FHWA to develop the standards to be included in that chapter.

The FHWA appointed a task force to do the work, which in turn created an Advisory Group to assist them. The committee is made up of individuals from other Federal agencies, including the Forest Service. To date, FHWA's Task Force has developed two drafts and presented them to the Advisory Group for review and comments. The Forest Service response to each draft has included input from the Regions. The final draft should be completed by mid-September, and it will then be presented to AASHTO for approval.

This work is of particular interest to the Forest Service, because FHWA intends to use it as a guide for approving Road Design Standards that are submitted by all Federal agencies.

OPERATIONS

Harold L. Strickland
Assistant Director

FOREST HIGHWAYS

Forest highways are an integral and necessary part of National Forest Road Systems. Several actions over the years have diluted the Federal role in planning and developing these highways.

Chief McGuire has expressed the Forest Service concern over the Forest Highway program in several letters to the Federal Highway Administration (FHWA). He recently submitted a staff paper of both background and current concerns with 3 recommendations:

1. Redefine Forest Highways System in line with concepts and criteria of the 1940 regulations and prior legislative history, as extensions of the Federal-Aid system in and adjacent to National Forests.
2. Request new legislation permitting funding of both on- and off-net roads with authorizations adequate to carry out programs for the systematic completion of the system.
3. Implement rules and regulations that provide stronger Federal responsibility and authority in system designation, project selection and programing.

It was suggested that the issue be presented to the Executive Committee of Western Association of State Highway and Transportation Officials (WASHTO) in Seattle at their June meeting. FHWA agreed and the presentation was made, using the following outline:

I. Introduction

A. Forest highway system

A. Recent legislative impacts

- a. 1970 Act - change definition - required FH be on a FA system - 1500 miles of Class 3 FH disappeared.
- b. 1973 Act - functional reclassification - drop minor collectors and local roads - 2000 miles of FH to disappear July 1, 1976.

2. Effect on connectivity

- a. Forest development road system to Federal-Aid system through federally funded roads. Too many gaps.
- b. Avoid appearance of duplication of Federal programs. Too much overlap.
- c. No distinct criteria separating FH from other programs.

B. Program Level

1. Authorizations same since 1960

- a. Total FA program doubled
- b. Inflation has more than halved value of dollar (1975 is 40 percent of 1960)

II. What we propose to do

- A. Redefine system to clearly identify need for continuing a separate and distinct category of funds aimed at meeting need to connect Federal-Aid systems with Forest Development Road System.
- B. Develop cost data to justify funding levels needed for re-defined system.
- C. Suggest legislative changes to accomplish A and B above.

III. What we want from WASHTO States

- A. Assistance in designating the system and developing cost data.
- B. Aid in developing suitable legislation proposal and support for the proposal.

IV. It is our opinion that if we don't modify the Forest Highway program to more adequately accomplish the initial intent of Congress, we could well lose the whole program.

Where we are today:

1. The Administrative Committee of WASHTO has been assigned the task of working with us in reviewing our proposals.
2. The legislative action to amend the Forest Highway definition and apportionment has been submitted in both FHWA and FS 1977 legislative programs.
3. Complete microfilm files and staff paper presentations of the History of Forest Roads and Forest Highways from 1916 to date have been sent to Regional Offices.
4. Information will be furnished on a current basis to Walt Furen, Regional Engineer, R-3, who is a member of the WASHTO Administrative Committee.
5. Legislation is being drafted and regulations are being authorized.
6. Field offices will be asked to define, with States, revised Forest Highway routes in the near future, when legislative action status is assured.

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 engineers Service-wide (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; all illustrations should be original drawings or glossy black and white photos.

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 Information Coordinator to increase the number of copies sent to your office. Copies of back issues are also available from the Washington Office.

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

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