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Field Notes

Wiring Systems for Sewage Lift Stations

Skycrane Saves the Day in Alaska

Geotechnical/Materials Personnel

Washington Office News

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CORRECTIONS TO JULY FIELD NOTES

Volume 9, Number 7

COVER

Correct 3rd title to read:

Minimum-Cost Network Design for Timber Transport

CONCRETE "TINKER TOY" BRIDGE

Correct page 2, 2nd paragraph to read:

Fabrication was done at the Hilfiker plant at Eureka, California, and trucked to the jobsite. Site work for the substructure was performed by a three-man crew: one operator and two laborers. A Massey-Ferguson 80 Backhoe Loader was used for the excavation. The precast concrete foundation and abutment panels were placed with an Austin Western 410 Senior Hydraulic Crane having a 60-foot (18.288 m) boom (figure 3). Backfilling was done with the Massey-Ferguson and was compacted with Wacker Tampers.

WASHINGTON OFFICE NEWS (CONSULTATION AND STANDARDS)

Correct page 26, 3rd paragraph to read:

The objectives of this review were:

1. To determine if current direction, established standards, and guidelines for Road and Bridge Preconstruction procedures are adequate to assure that a facility meets resource management objectives; and

2. To develop an action plan which will eliminate or improve deficiencies.

WIRING SYSTEMS FOR SEWAGE LIFT STATIONS

Frank Mutch
Regional Electrical Engineer
Region 1

AUTHOR'S NOTE

The standards described in this article are the minimum recommended.

For the past few years there has been extensive discussion among electrical engineers, technicians, electrical inspectors, and civil and sanitary engineers regarding the proper wiring of submersible pumps and float controls in sewage wet wells designed as lift stations. These installations are becoming prevalent through the Forest Service, since they satisfy two requirements of sewer system design:

1. They can be located where gravity flow of effluent or sewage is impossible or impractical.

2. They provide a reliable and economical system which eliminates the wet well, dry well, turbine-saft pump, or non-positive suction pump installations.

The existence of an explosive atmosphere in the wet well is the complicated issue regarding proper wiring. Any sewage or effluent manhole, trap, wet well, or similar location can easily contain an explosive (and toxic) atmosphere because of the methane, ammonia, and hydrogen sulfide gasses inherent to domestic sewage, and the explosive petroleum products commonly dumped into these sewer systems by people unaware of the danger.

There is general agreement that these locations have Class 1, Division 1 explosive atmospheres as defined in Article 501 of the National Electrical Code, NFPA 70-1975; and must, therefore, be wired with an explosion-proof system.[1]

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[1]*Explosion-proof wiring is designed to contain an electrical arc--preventing an explosion--it is not necessarily gas-tight.*

The problem is to design an electrical installation which is safe, economic, reliable, and does not defeat the intent of the overall sanitary system design.

Many of the presently installed systems have conventional wiring with no provisions to assure complete safety. Others have an extensive special explosion-proof system including a threaded rigid steel conduit to the pump(s). Some of the existing installations include an especially hazardous condition with unsealed conduit rungs from the lift station to a control enclosure.

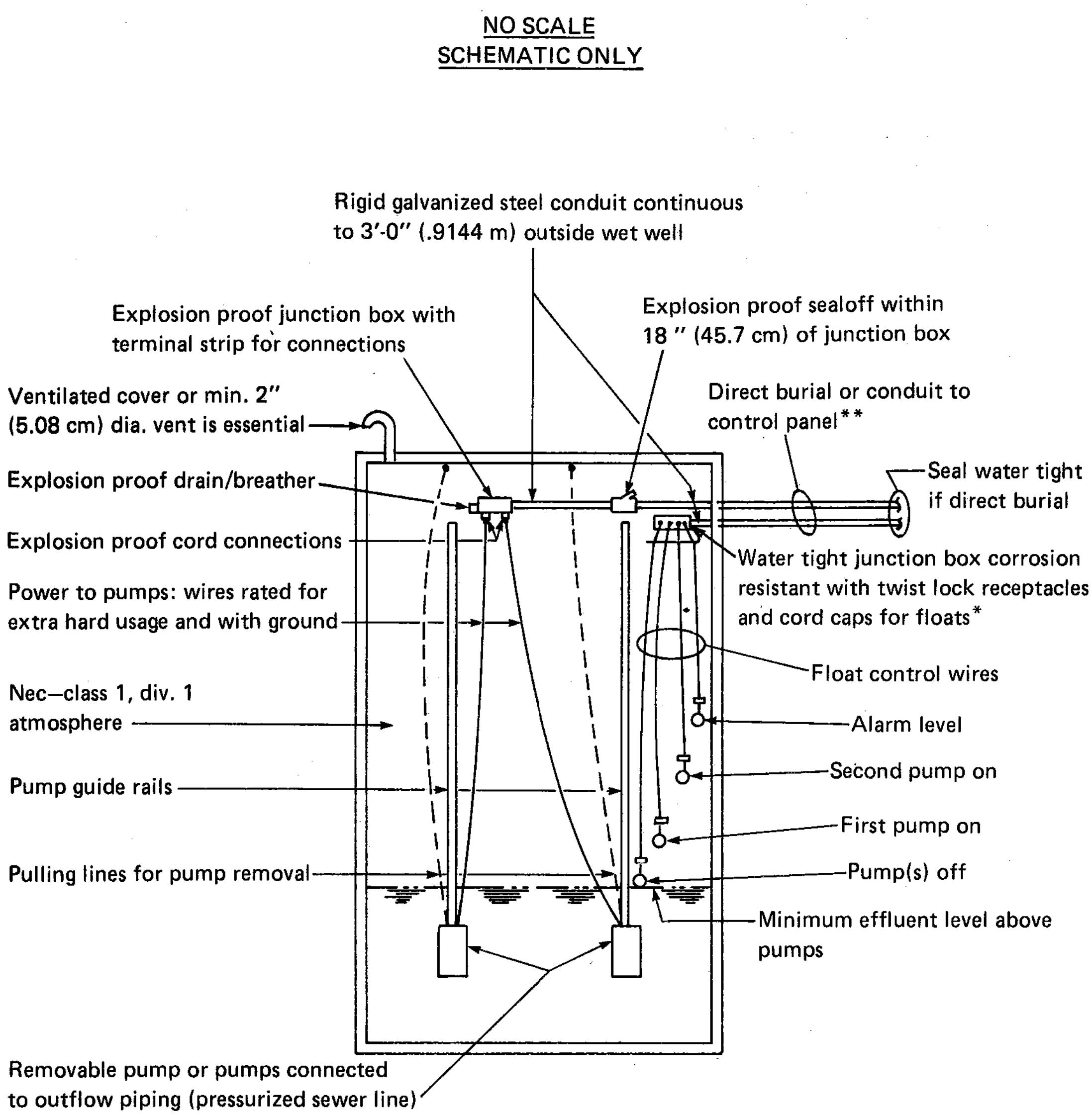
After extensive analysis of the problem, the following recommendations were made:

1. Design adequate ventilation for the lift station. As a minimum, include a well-ventilated lid or at least a 2-inch (5.08 cm) pipe vent. The action of the liquid up and down in the wet well helps to exhaust gases. An air supply blower would improve the situation but is not considered essential. (An exhaust blower is not recommended, as it would have to be explosion-proof.)

2. Install liquid level floats with conventional wiring and include an intrinsically safe relay in the control circuitry for each float. Such a relay is specifically designed for this application and has a solid-state circuit which limits current and voltage in the pilot device (float) circuits to a point where any short circuit would not create an explosion.

3. Install explosion-proof wiring for the pump(s) (as shown in fig. 1) to an explosion-proof junction in the lift station. Connections in the junction box should be made on terminal strips. Use extra, heavy-duty grounded cords to the motors, terminated at the explosion-proof junction box by explosion-proof cord connectors. By proper placement of the low-level pilot device, insure that the pump(s) will always be completely submerged, as the pump motors may not be explosion-proof. An extra, low-level float for double control of the liquid above the pump may be required in some States, but this seems excessive. Each extra control function increases complexity and reduces reliability.

In addition, it is recommended that all existing and new installations of this type throughout the Forest Service conform to this design approach as a minimum standard. This will add roughly $1,000 to the installation costs of new construction. Modification of existing systems will be more costly and must be individually evaluated. Follow appropriate safe work procedures such as proper ventilation, gas testing, two men on-the-job, use of tending lines, and use air-breathing equipment for any work in existing wet wells.



**Control circuits must have intrinsically safe relays. (1-relay per float).*

***Never install continuous run of unsealed conduit from wet well to panel(s). Explosive gases could be vented into panel.*

Designed by:

Frank Mutch—Regional Elec. Engr. R-1

Figure 1. Sewage/effluent lift station electrical details.

Some inspectors may require a rigid conduit to the pumps. This may create a potential hazard, because the wet well environment is extremely corrosive, especially at the liquid-air interface. This could eventually cause the conduit to break, exposing the conductors. In such cases, reevaluation of the total design concept may be warranted. If in doubt about the safety of any proposed electrical system, contact the local electrical inspector, who is the final authority (NEC 90-4).

SKYCRANE SAVES THE DAY IN ALASKA

Russell J. Williams
Construction Inspector

Frank W. Muchmore
Regional Structural Engineer

Gregory L. May
Structural Engineer

Region 10

INTRODUCTION

During the fall of 1975, two long stringer bridges over the Herbert River located along the popular Windfall Lake trail near Juneau were classified as being unsafe. The decision was made to replace the bridges because of heavy year-around trail use. Construction was planned to take place during the 1976 field season, and members of the Youth Conservation Corps (YCC) program were to provide the labor resources. Accessibility to the bridge site was limited to trails; therefore, personnel and materials were to be flown in by helicopter.

DESIGN AND CONTRACT PREPARATION

Heavy ground snow precluded site investigation until late April. Scheduling considerations for the YCC personnel deemed that materials be ordered and construction begun as early as possible. Time for design, therefore, was limited and the engineering staff was able to complete plans and specifications in less than 5 days. The design consisted of four 73-foot, 4-inch (22.351 m) open web steel joists supporting a 4-foot (1.210 m)-wide treated timber deck resting on treated timber post and sill abutments. The supply contract was advertised in mid-May and awarded to Permapost Products of Hillsboro, Oregon, by June 1st. Delivery of materials was scheduled for July 15, but fabrication and shipping delays pushed that date back approximately 3 weeks.

CONSTRUCTION

On August 10 the materials were delivered in Juneau by barge and were trucked to the Herbert River staging area, where a Bell 205 helicopter off-loaded the three-section joists and lifted the wood components and hardware to the bridge sites. Haul distance was 2½ miles (4.023 km) to the lower bridge and an additional 3½ miles (5.632 km) to the upper bridge. By this time the YCC crews had completed construction of abutments and general trail maintenance at the lower bridge site. Since the YCC program expired on August 20, Juneau

Work Center maintenance crews completed abutment construction at the upper site (fig. 1) and assembled and painted the joists at the staging area.

Figure 1. Abutment construction at upper site.

The original construction scheme called for each bridge's four joists to be individually lifted to their respective abutment positions by the Bell 205 (fig. 2). Maintenance crews would bolt them in place and install the wood components. A problem arose after the first joist was set in place--lack of member stiffness and the effect of the helicopter rotor wash made the joist unself-supporting. Attempts to stiffen the members were unsuccessful, and the best solution of bolting two joists together before erection was precluded by the load-lifting limitations of the Bell 205.

Fortunately, a Sikorsky S-64 Skycrane helicopter, under contract to the U.S. Army Corps of Engineers, was working in Juneau at the time and was available for the project if erection could be completed in 10 days.

Successful coordination between the Chatham Area office, Regional Office Engineering and Contracting, enabled an acceptable contract to be negotiated for the services of the Skycrane. The helicopter's 20,000-pound (9072 kg) lifting capacity enabled crews to assemble each bridge structure and to connect deck nailers and joist bracing (fig. 3) in the staging yard. Innovative use of a boom stick, mounted in the bed of a 1½-ton (1360.8 kg) dump truck and used to lift and position joist sections during assembly, eliminated the need for a crane (fig. 4). Because of time constraints, the installation of bridge decking and handrails would be completed after the structures were set in place. By September 8 all was ready for the Skycrane. Generators and tools were lashed to the deck of the upper bridge, and early

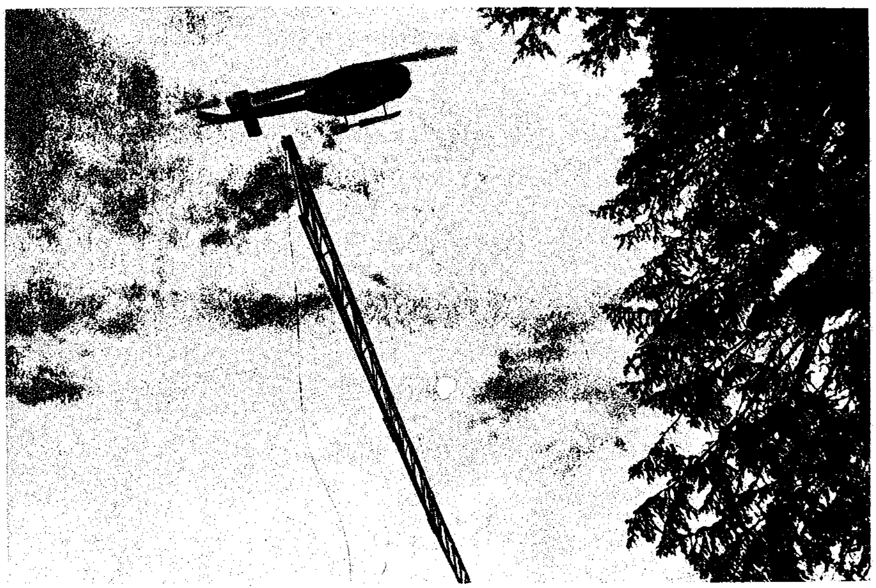


Figure 2. Original attempt to set stringers individually with Bell 205 (Huey):

afternoon weather conditions were favorable for flight. Erection of the 12,000-pound (9072 kg) lower bridge was completed in 12 minutes (fig. 5) and, after a minor correction was made in the support rigging, the upper bridge was set in place in 7 minutes. Precision placing of heavy loads by helicopter is an exacting task, and the unique ability of the Skycrane pilot to hover over the bridge site and control his craft in order to gradually lower the structure into position was most apparent. As further evidence of their skill, this particular Skycrane crew was responsible for the erection of the top-most mast on the Canadian National Tower, the world's tallest free-standing structure, in Toronto, Canada. Installation of bridge decking, rails and posts, and helicopter removal of tools and equipment required 4 days at each site to complete the project (figs. 6 & 7).

PROJECT COSTS

Total project costs were $32,225 for two bridges, or $55 per square foot (0.0929 m). Major items included materials ($11,220), labor ($9,500) and helicopter rental ($10,667). Four different helicopter models were used for activities ranging from site reconnaissance to crew hauling and materials transport. Minor additional materials costs were incurred due to oversights resulting from the compressed design schedule.

SUMMARY

Considering the limited design time available, delays in material delivery, and the relative inexperience of the YCC crews, the project progressed

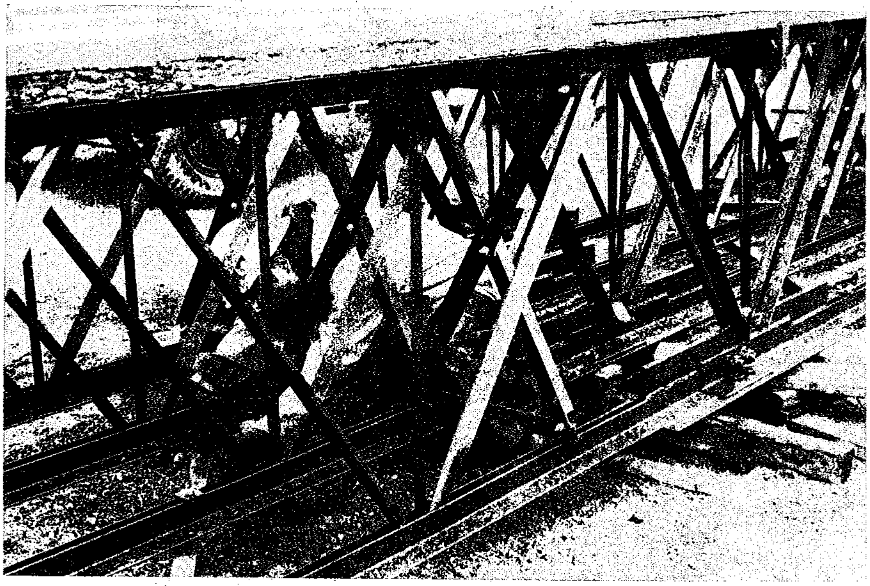


Figure 3. Assembling of trusses and bracing in staging yard.

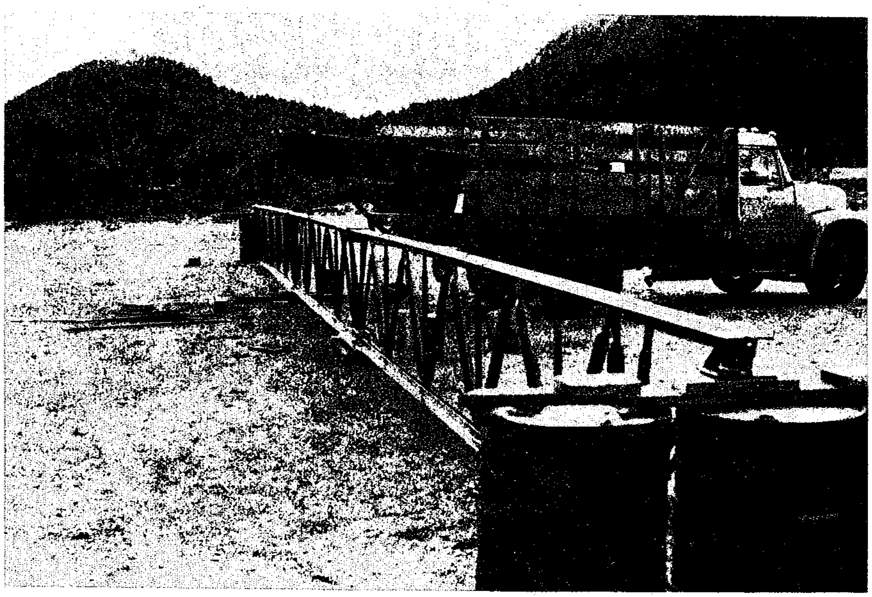


Figure 4. Truck with broomstick used to assemble trusses.

Figure 5. Skycrane placing lower bridge.

exceedingly well and was completed on time. Using the resources of the Youth Conservation Corps not only minimized labor costs, but stressed participation and provided valuable field experience for the corps members. Helicopter operations, although expensive, provided quick access to remote construction sites for personnel and materials. In addition, the heavy lift capability of an aircraft, such as the Skycrane, permitted maximum fabrication at locally accessible staging areas, with minimal erection time required at remote construction sites.

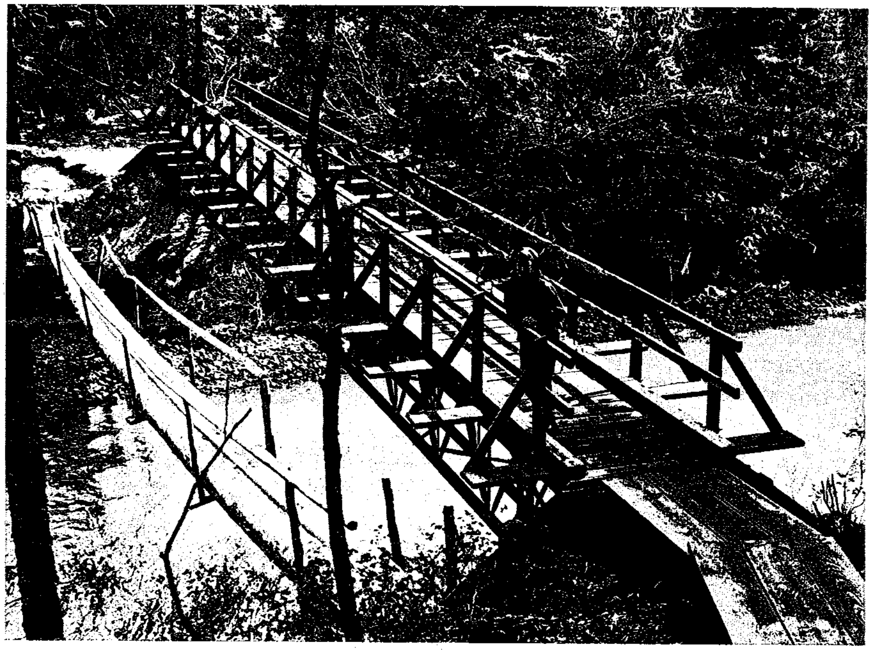


Figure 6. Lower bridge completed.

Figure 7. Upper bridge completed. Log on the right--remains of old bridge.

DIRECTORY
GEOTECHNICAL/MATERIALS PERSONNEL

Geotechnical/Materials Engineering (GME) is a relatively new discipline within the Forest Service. Many of the tasks performed by the GME Units were previously performed by preconstruction and construction personnel. The rapid acceleration of environmental concerns in the late 1960's and 1970's was a major reason for a concentrated effort in ght GME field.

The GME group consists of Civil Engineers, Soils Engineers, Geologists, and technicians. Most of them are assigned to GME Units; however, a few are assigned to Watershed, Lands, Minerals, and other staff areas. The important point is that these people are dedicated to provide the very best in Geotechnical and Materials services.

Because this group is scattered accross functional lines and throughout the organization, the following directory has been provided for your convenience.

GEOTECHNICAL/MATERIALS PERSONNEL

DIRECTORY

June 1977

NAME	JOB	Phone FTS	Phone COM
	REGION 1		
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Clark, Charlie	Engineering Geologist	585-3356	(406) 329-3356
Cramer, William	Materials Technician		
Dickmoni, Lynne	Materials Technician	585-3427	(406) 329-3427
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Hinshaw, Robert F.	Regional Geotechnical & Materials Engineer	585-3357	(406) 329-3357
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Jones, Elmo	Core Drill Operator	585-3426	(406) 329-3426
Monlux, Steve	Materials Engineer	585-3429	(406) 329-3429
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Urguhart, Pascal	Core Drill Operator	585-3426	(406) 329-3426
	NATIONAL FORESTS		
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Kline, Clarence	Laboratory Engineer		(208) 245-2531
Northrup, Jim	Engineering Geologist		(208) 245-2531
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(Vacant)	*Laboratory Technician	588-5339	(801) 524-5339
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	*Laboratory located at Salt Lake City, UT.		
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Shea, Rod	Materials Testing Technician		(415) 825-9800
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	Mendocino, 420 E. Laurel St., Willows, CA 95988		
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	Plumas, 159 Lawrence St., Box 1500, Quincy, CA 95971		
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Morrison, Gary	Geologist	423-3014	(503) 221-3014
Nelson, Eugene	Materials Engineer	423-2097	(503) 221-2097
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O'Connor, Al	Geologist		(206) 247-5441
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Whipple, Ron	Materials Technician		(206) 247-5441
	Malheur, 139 NE. Dayton St., John Day, OR 97845		
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Burgman, Ron	Materials Engineer		(503) 575-1731
Cassaway, Rich	Materials Technician		(503) 575-1547
Duke, James	Materials Technician		(503) 575-1547
Dunham, Jim	Materials Technician		(503) 575-1731
Ivers, Mary	Materials Technician		(503) 575-1731
Kaegler, Steve	Driller		(503) 575-1731
Lysne, Mark	Materials Technician		(503) 575-1547
Peabody, Ed	Driller Helper		(503) 575-1547
Samuelson, Ted	Driller Helper		(503) 575-1547
Swayne, Everett	Materials Technician		(503) 575-1731
Thompson, Gary	Materials Technician		(503) 575-1547
Tuter, Don	Driller		(503) 575-1731
Watterman, Steve	Materials Technician		(503) 575-1731
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Buss, Ken	Soils Engineer	399-0235	(206) 442-0325
Collins, Tom	Geologist	423-3293	(206) 856-1324
Crawford, Neal	Engineering Geologist	423-3292	(206) 825-1621
Diamond, Margie	Geologist	423-3292	(206) 825-1621
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Disbrow, Ernie	Materials Engineer		(503) 667-0511
Henderson, Jim	Driller		(503) 667-0511
Manning, Kathy	Geologist		(503) 667-0511
McLean, Vern	Geologist		(503) 667-0511
Moen, Jim	Driller		(503) 667-0511
Sullivan, Jim	Engineering Geologist		(503) 667-0511
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Ames, Gerald	Materials Technician		(509) 422-2704
Robinson, Charles	Materials Technician		(509) 422-2704
	Olympic, Federal Bldg., Olympia, WA 98501		
Jordan, Rick	Geologist	390-6596	(206) 593-6596
Kock, Greg	Materials Technician	390-6597	(206) 593-6597
Larson, Dennis	Geotechnical Supervisory Engineer	434-9502	(206) 753-9502
Neal, Ken	Geologist	390-6596	(206) 593-6596
Nesbitt, Bob	Materials Engineer	390-6596	(206) 593-6596
Savage, Will	Geologist	390-6596	(206) 593-6596
Schmidt, Al	Materials Technician	390-6597	(206) 593-6597
	Rouge River, Federal Bldg., 333 W. 8th St., Box 520, Medford, OR 97501		
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Hicks, Billie	Materials Engineer, (Geologist)	422-2471	(503) 779-2351
Wilson, Sandra	Geological Engineer	422-2218	(503) 779-2351
	Siskiyou, 1500 NW. 6th St., Grants Pass, OR 97526		
Bartley, Ellis	Materials Technician		(503) 479-6280
Bateman, Dick	Geologist		(503) 247-7026
Branchfield, Paul	Geologist		(503) 247-7026
Cornell III, Josiah	Geologist		(503) 476-8267
Greenway, Daryl	Soils Engineer		(503) 247-7026
Salazar, Ben	Materials Technician		(503) 247-7026
Sellards, Dennis	Materials Technician (Driller)		(503) 479-6280
Vandre, Bruce	Materials Engineer		(503) 479-5301
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Chapman, Ted	Engineering Geologist	420-4478	(503) 757-4478
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	Watershed and Minerals Staff Unit		
Geological Service			
Smallwood, Ken	Geologist	235-8105	(703) 235-8105

CHANGE TO MAY FIELD NOTES

Volume 9, Number 5

AUTHOR'S ALTERATION

A MATHEMATICAL PROGRAMMING APPROACH FOR THE ANALYSIS OF TRANSPORT/ LOGGING SYSTEMS FOR TIMBER SALE

Change page 8, 2nd paragraph, 2nd sentence to read:

However, it was estimated by a hydrologist that the maximum desirable and maximum allowable sediment yield for this area was 15,000 cubic feet (424.8 m^3) and 24,000 cubic feet (679.7 m^3), respectively, during the design life. With an upper bound of 15,000 cubic feet (424.8 m^3) on sediment yield for all periods and with the performance of broadcast burning, the Helicopter Alternative 7 was chosen by the computer program. While the cost was higher, piling and burning produced a smaller amount of sediment yield.

WASHINGTON OFFICE NEWS

CONSULTATION AND STANDARDS

W. Furen
Assistant Director

REPORT ON THE STATUS OF SAFETY DESIGN STANDARDS FOR LOW-VOLUME ROADS

During the past year, the Federal Highway Administration worked to develop safety design standards for low-volume roads, and was assisted by a Federal Agency Advisory Group. The Forest Service representative to the Group was Willard Clementson.

This endeavor was in response to the requirements of Highway Safety Standard 12 for safety design standards for all roads open to public travel.

During the development of the standards, several drafts were prepared and circulated for comment; as a result, it became apparent that the road programs of the various agencies addressed different needs. Accordingly, FHWA made the decision *not* to formally adopt a single set of design standards. Instead, standards will be reviewed as they are submitted by the affected agency, and each submittal will be considered on its own merits.

FHWA sees a continued need for design criteria for low-volume road situations, and is asking to have this specific subject addressed in the current rewrite of the *Policies on Geometric Design of Streets and Highways*, published by the American Association of State Highway and Transportation Officials (AASHTO). Drafts of the work done by the Advisory Group have been provided to the AASHTO committee working on these criteria. Addressing the low-volume road issue in the AASHTO publication will provide guidance to all agencies that might be involved in designing roads of this type.

Even though the AASHTO standards do not have offical FHWA approval, they will serve as a guide to the Forest Service in the review and update of its design standards and manuals.

SIGN SPECIFICATIONS and SIGN CATALOG

It is planned that the Sign Specifications and Sign Catalog will be submitted for printing by the end of the fiscal year. The target date for publication is December 1, 1977.

OPERATIONS

Harold L. Strickland
Assistant Director

STUDY OF SERVICE-WIDE ENGINEERING COMPUTER SYSTEMS

The Engineering Staff is currently studying the management of Service-wide Engineering computer systems. A three-man study team has been assigned, composed of one representative from each of the Assistant Director areas:

Consultation & Standards	Beryl Johnston Transportation Systems Preconstruction
Technological Improvements	John Greenwald Engineering Computer Systems Coordinator
Operations	George Goddard Technical Recruitment and Development Engineer

The team is taking a close look at the need for, use of, and management of Service-wide Engineering computer systems. They are studying the present condition of each existing system, what it does, how well it does it, and what makes up the system. Generally, to receive designation as a Service-wide Engineering computer system, a system must be either utilized or needed by three or more Regions.

A mission statement for Engineering Computer Systems has been developed along with some general goals and specific objectives.

The computer system elements of processes listed below have been agreed upon, and these terms will be used to describe and to communicate concerning the various phases of work:

a. Systems Analysis

   1. Feasibility studies

   2. Definition, analysis, and design

b. Development

   1. Programming, testing, and certification

   2. Pilot testing and evaluation

   3. Development of user guides

c. Operation and Maintenance

   1. Implementation

   2. Operational support

   3. Maintenance

d. Training

   1. Training of Regional Office personnel

   2. Review and evaluation to ensure correction function, use, and need for product improvement

The study team is developing a report with a proposal for the management of Service-wide Engineering computer systems; it will be available in the near future. The report will include a complete listing (by priority) of new computer systems, enhancement of existing computer systems, and the proposed organization of the personnel required to do the work described in the four system elements listed above, as well as a detailed workload for FY 1978.

TECHNOLOGICAL IMPROVEMENTS

Heyward T. Taylor
Assistant Director

FIELD TESTS AT SAN DIMAS EQUIPMENT DEVELOPMENT CENTER

The San Dimas Equipment Development Center (SDEDC) uses the summer field season to go "off post" to test prototype equipment under realistic conditions and obtain immediate on-the-ground user feedback. Thus, data needed to refine equipment under development are gathered efficiently. Plans for field work this summer include the following Equipment Development and Test (ED&T) project activities:

The San Dimas Forestland Residues Machine, designed for precommercial strip thinning and the simultaneous treatment of downed stems, is scheduled for test, using a second-generation prototype reduction head, on the Mount Hood National Forest (R-6). The test objective is to determine, with a specially designed instrumentation mounted on the improved reduction head, the horsepower required by the reduction head as a function of the work attempted in natural stands. This test program will be an important factor to further the production of a commercial machine in thinning and residue reduction.

SDEC engineers have developed a small portable concentrator for use on steep slopes to aid hand crews in concentrating helicopter and skyline logging residues. Field tests are being conducted on the Klamath National Forest (R-5) to determine characteristics unique to the concentrator--including portability, mechanical reliability, and user application as a function of the type of work to be performed.

Another steep-slope device is a puller, which aids in felling trees in a particular direction. A specially designed SDEDC winch with a vertical spool is being tested on the Umpqua National Forest (R-6) to show its praticability, thus encouraging commercial firms to build production models.

A project on slope revegetation equipment for planting seeds, shrubs, or trees at higher production rates and lower costs than manual methods is proceeding into the second-prototype phase. Two devices are being developed--a seeder and a tree/shrub planter--to prevent erosion on roadside cut and fill slopes. The seeder has tines that stir up the soil, electrically driven seed and fertilizer spreaders, and more tines (plus drags and packing wheels) that cover the seed. The latest prototype, now being tested in Region 2 and 6, is a refinement of a first prototype that was tested in late 1976 in Region 4. The tree/shrub planter was also tested in Region 4 and is now undergoing a design change so that it can plant containerized rather than bare-root stock. The device digs a hole, places the tree into the hole, and then fills and compacts the hole.

A single-row interseeder for rocky and brushy areas was completed at SDEDC in April 1977 and shipped to the Utah Division of Wildlife Resources for field evaluation near Ephriam, Utah. This interseeder is designed to plant grass and browse seeds in rocky and brushy terrain which is not negotiable by multi-row planters. Also, the Intermountain Forest and Range Experiment Station in Boise, Idaho, is conducting field tests on two backpack seed collectors, designed and fabricated under SDEDC contract and specification, for the Vegetative Rehabilitation and Equipment Workshop.

Previous demonstrations by SDEDC, and use by various Forests, have shown that a modified Pettibone P-500 Pulverizer can do an excellent job in reducing oversize rock in-place on a road surface. Rocks up to 18 inches (44.72 cm) in diameter, pulled from ditches or exposed in the road surface and which would normally be unusable, can be windrowed and then crushed to less than 3 inches (7.62 cm) by running the Pulverizer along the windrow. A final demonstration and test is being conducted in Region 6. The Pulverizer is being tested on at least three different types of rock, with varying initial gradations. Data on operating costs, production rates, and resulting final gradations are being gathered for inclusion in an ED&T report.

Several tests are planned for this fire season in the area of fire retardant chemicals. Most of the work is on equipment that will make possible the use of fire retardants in ground tankers. A prototype blender for demand mixing liquid concentrate (LC) fire retardants, mounted on a Model 51 tanker, is undergoing its second season of operational tests on the Lassen National Forest (R-5). SDEDC is coordinating expanded testing of the LC blender throughout Region 5, where about 12 other blender-equipped tankers are being tested. The Center is also staying abreast of similar work being performed by the Bureau of Land Management and the California Department of Forestry. Additionally, a new prototype dry powder blender for ground tankers and three newly developed types of nozzles, used to apply fire retardants from ground tankers, are to be operationally tested on the Plumas National Forest (R-5). Further field testing of a new semipermanent fire retardant is also being undertaken. Tests evaluating the retardant and the equipment for mixing and applying it are planned for the Mount Hood National Forest (R-6), Lolo National Forest (R-1), and Angeles National Forest (R-5), plus Forests in Region 9. Finally, a new fire retardant with fugitive (fading) color is being submitted for qualification. If acceptable, field tests will evaluate fading and determine the minimum concentration of the coloring agent. Tests areas will be selected to provide a wide range of fuel types.

Several turbidity meters are currently being tested in independent laboratories to determine their overall accuracy when measuring the turbidity of drinking water. Field tests will then be conducted on the Angeles and San Bernardino National Forests (R-5) to establish applicable operating procedures and to determine operating characteristics unique to each turbidity meter.

Center personnel continue to monitor field installations in Region 5 of sanitary facilities designed to replace the age-old "oneholer" vault toilets. These facilities include oil-recirculating toilets at the Chilao and Mountain Oaks Campgrounds on the Angeles National Forest, at Jenks Lake Campground on the San Bernardino National Forest, and at the San Luis Rey Campground on the Cleveland National Forest. At the Mountain Oaks location, two brands (Sar Industries and Monogram Industries) are being evaluated in a side-by-side comparison, which began Memorial Day 1977. Low-volume, water-flush toilets are being evaluated at the Chilao Campground. A portable, automatic-starting, air-operated system for a low-volume, water-flush toilet is currently being developed for the Center. The system is tentatively scheduled to be installed opposite the El Cariso Ranger Station on the Cleveland National Forest. Two different compost systems (Clivus Multrum and Toa-Throne) are being monitored for a second summer to determine their possible application in back-country installations. A compact, low-volume, water-flush, batch-burning incinerator toilet, installed at the Mt. Baldy Work Center on the Angeles National Forest, is also being monitored. Vault toilets on nearby R-5 Forests have been retrofitted with recently available (mid-July) cross-linked polyethylene risers for immediate evaluation.

During the fall of 1976, sanitary, frostproof hydrants from four manufacturers were installed at the Grout Bay Campground on the San Bernardino National Forest and are still being monitored by Center personnel. Hydrants from one manufacturer were installed at the Oak Creek Campground on the Coconino National Forest (R-3) in the summer of 1976. Center personnel are not actively monitoring these units, but field reports indicate that they are functioning satisfactorily.

The search for commercially available portable field housing has resulted in procurement and placement for evaluation of fiberglass dome-type units and a mobile-type, eight-man work crew unit. Two trial dome units were placed in the Ketchikan Area, Tongass National Forest (R-10), and one dome unit on the Bonners Ferry Ranger District, Idaho Panhandle National Forest (R-1). The Olympic National Forest (R-6) bought an eight-man mobile unit for their Quilcene Ranger District. Since the dome units are fiberglass shells, insulation was added and insulated fiberglass floors were developed for the units being tested.

Molds and tooling for pulaski plastic sheaths have been developed and 3,000 sheaths purchased. The sheaths have been distributed to five areas--Regions 1, 3, 5, 6, and BIFC--for field evaluation and are being used by various crews (such as hot shot, IR, tanker, smokejumpers, etc.) this fire season to determine if they can replace the more expensive leather and metal sheaths.

JOHN STEWARD (R-6) RECEIVES WASHTO AWARD

John Steward, Leader, Engineering Soils and Materials Group (R6), was recently honored with WASHTO's Dr. L.J. Hewes Award. This award was established to perpetuate the name and achievements of Dr. Hewes, former Western Regional Chief of the Bureau of Public Roads. A most distinguished and coveted award, it is granted to an individual "In Recognition of an Outstanding Contribution to the Highway Development Program."

John Steward received the award for his innovative work in the use and evaluation of fabrics for highway purposes. In a congratulatory note to John, the Chief stated, "We are proud of your accomplishments and pleased that you have received this high recognition."

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:

R-1	Melvin Dittmer	R-4	Ted Wood	R-9	Norbert Smith
R-2	Royal M. Ryser	R-5	Jim McCoy	R-10	Frank Muchmore
R-3	Bill Strohschein	R-6	Kjell Bakke	WO	Al Colley
		R-8	Bob Bowers		

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

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