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This month . . .

Derrick does everything
on Sandpoint Bridge

Batching and placing
cold concrete at Folsom

HEWES AWARD: Radio
control for road repairs

COVER . . . see page 4

DECEMBER 1954

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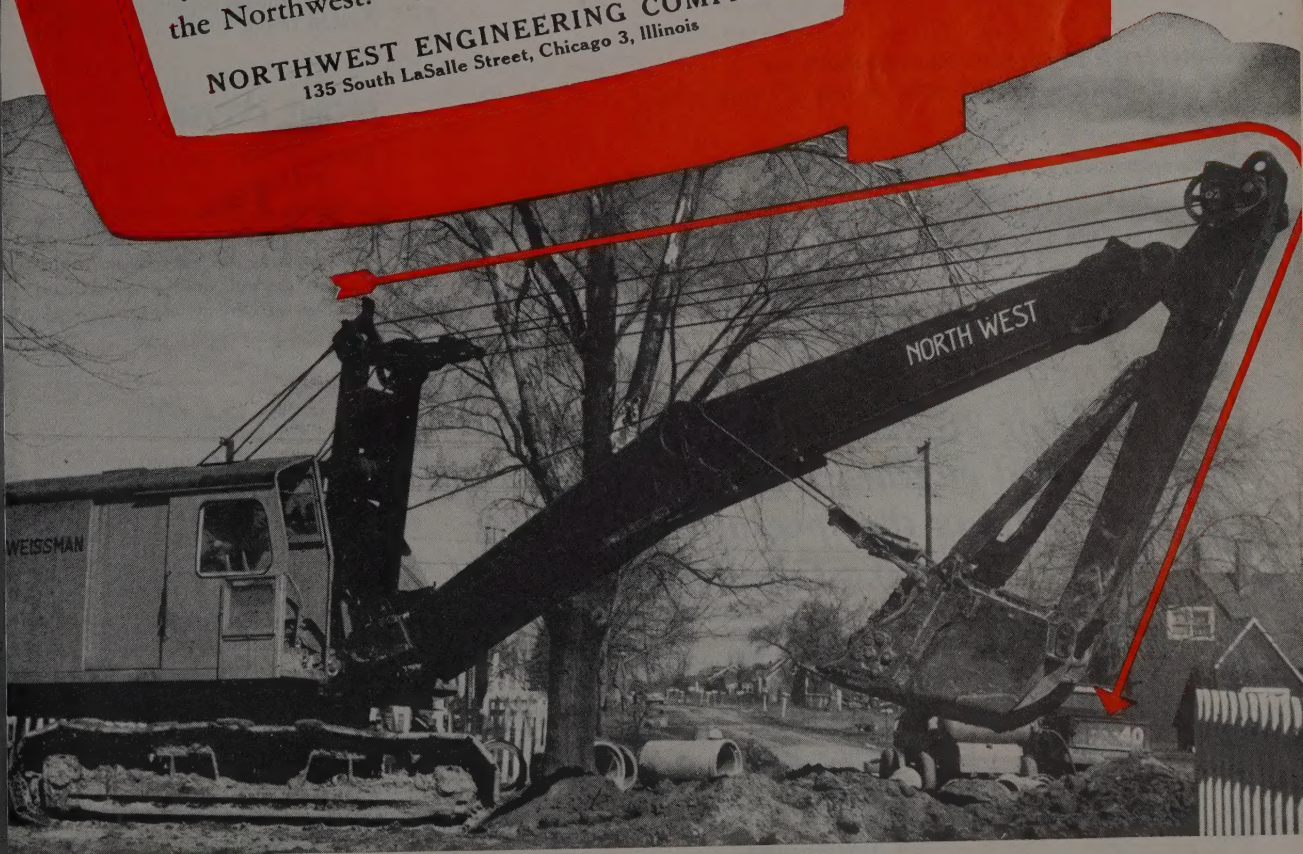
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FRONT COVER

THERE'S NOT MUCH foot room for pile butts working on Idaho's new 6,000-ft. highway bridge across Lake Pend Oreille at Sandpoint. For a look at the "sky hook" holding this bucket over a trestle cap form, turn to the article on page 41.

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NEW YORK—Richard J. Murphy, 107-51 - 131st St.
Richmond Hill, N. Y. Phone JAMAica 9-2651

Published monthly by

KING PUBLICATIONS

Publication office
416 Wall Street
Los Angeles 13, California

Editorial, advertising & circulation office

609 Mission Street
San Francisco 5, California

CIRCULATION

CIRCULATION MANAGER
E. F. Hubbard

ASST. CIRCULATION MANAGER
R. L. von Thurn

For change of address use prepaid rip-out postcard bound in this issue, or write Circulation Dept., 609 Mission St., San Francisco 5, Calif.

Subscription rate is \$4 per year in the U.S. and countries in the Pan American Postal Union. All other countries, \$5 per year. Single copies 35c.

Entered as Second Class Matter at the Post Office in Los Angeles, California, under the Act of March 3, 1879. Postmaster: Please send Notice 3579 to Western Construction, 609 Mission Street, San Francisco 5, California.

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The price tag on engineering

The positive opportunities in highway engineering discussed in the adjoining column are worth no more than the financial rewards that go with them. Bluntly stated, as it often is these days, you cannot eat a blueprint or a set of specifications.

The potentialities are striking in the coming growth of highway engineering. But it will do no good for any branch of the engineering profession to expand without there being a conscious effort to maintain—or regain—professional status.

The new era of highways provides an unmatched opportunity for civil engineers to bring home to the public the nature and value of engineering services. No other branch can so readily be equated to the public interest.

It is not enough to merchandise the science involved in building highways. Science and its miracles are becoming everyday affairs. It is not the application of scientific principles that sets engineering apart as a profession.

Science alone is a matter for technicians. And it carries commensurate rewards. All too many people think of engineers as technicians: given a set of data they will arrive at the same answer. This is not so.

The essence of engineering, and of other professions, is the art of applied judgment.

Engineers in the days to come must merchandise and publicize the art of civil engineering. Only in this way will they come to command the prestige and rewards that belong to professional men. The price tag on an engineer is far higher than the price tag on a technician.

Opportunities in highway engineering

Speculation among engineers has already begun. The President's \$50,000,000,000 highway proposal has developed rapidly, and the speculation centers in the engineering manpower requirements soon to come. This in turn suggests consideration of how the program may be administered. There are two basic alternatives.

One method would be the creation of a federal highway design and construction agency charged strictly with execution of the President's program. The second method would utilize the existing administrative framework for federal aid to highways.

Both these alternatives have precedent. The former is analogous to existing federal construction agencies. The latter hews to a time-tested method for handling the federal interest in highways. Because it represents the status quo and gives greater local freedom and authority, the second choice is strongly favored among highway officials, engineers and contractors.

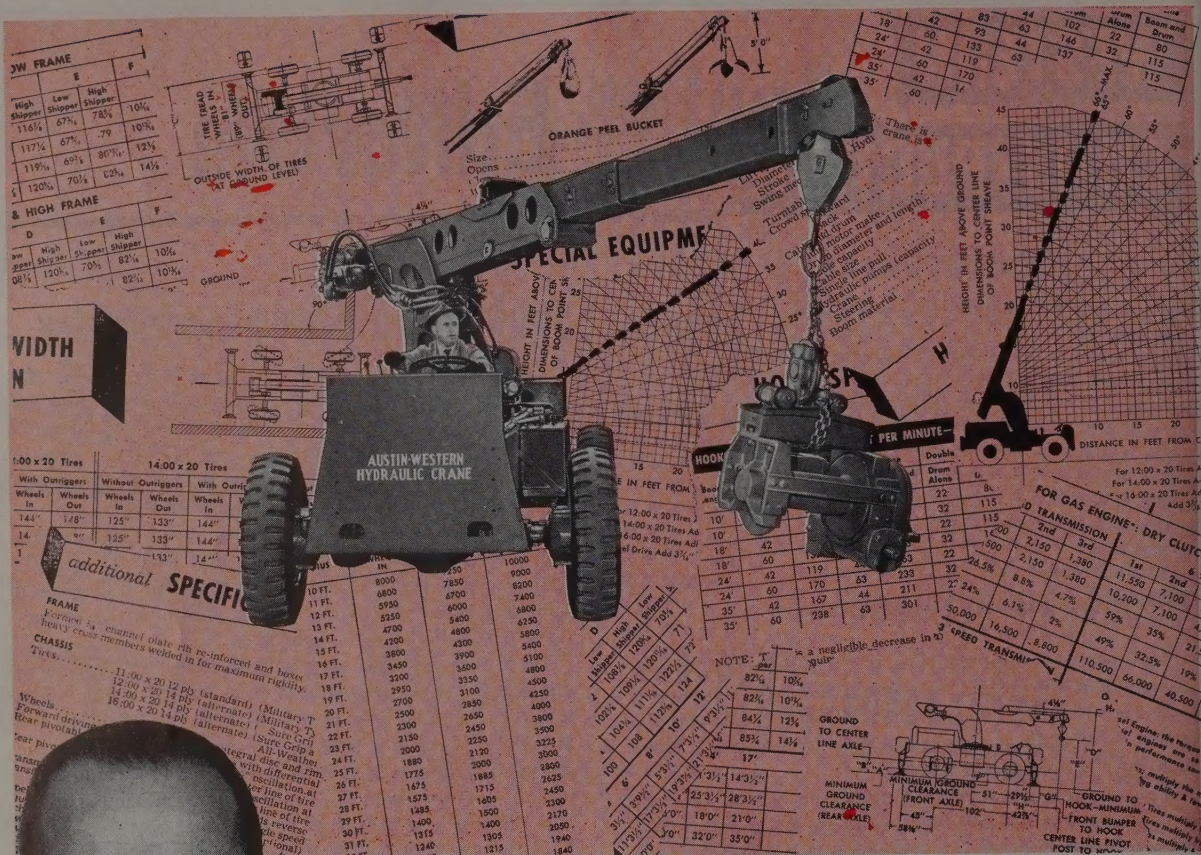
It thereby falls upon the individual states to solve their own aggravated problems in highway construction. And high on the list is the problem of manpower. Where will the needed engineers come from? Low engineering school enrollments are cited here as making the problem insoluble. But there are other answers.

Better use of engineering manpower is one. Highway departments have started looking critically at their personnel methods. And they are finding whole areas of activity well suited to handling by sub-professionals. Trained engineers are being freed for faster training and upgrading to professional duties and responsible charge of work.

Another answer to the manpower problem is found in the experience of industries born and built during the war. Where an opportunity exists, men appear to accept the challenge. For building tomorrow's highways, it is entirely possible that new engineering organizations will come into existence. They will be private consulting firms, bidding persuasively for acceptance in a field that will need their services.

This possibility is intriguing. It is without precedent, yet it has a strong tradition behind it. Relatively little highway engineering, other than isolated examples of large structures, is performed by private organizations these days. At the same time professional practice is in a large sense synonymous with consulting practice.

In summary, the coming era of highway construction offers a sharp challenge to civil engineers, both as individuals and as members of presently constituted highway engineering agencies. All are on their mettle to perform more efficiently, to apply the shrewdest of management and scientific techniques to their tasks.



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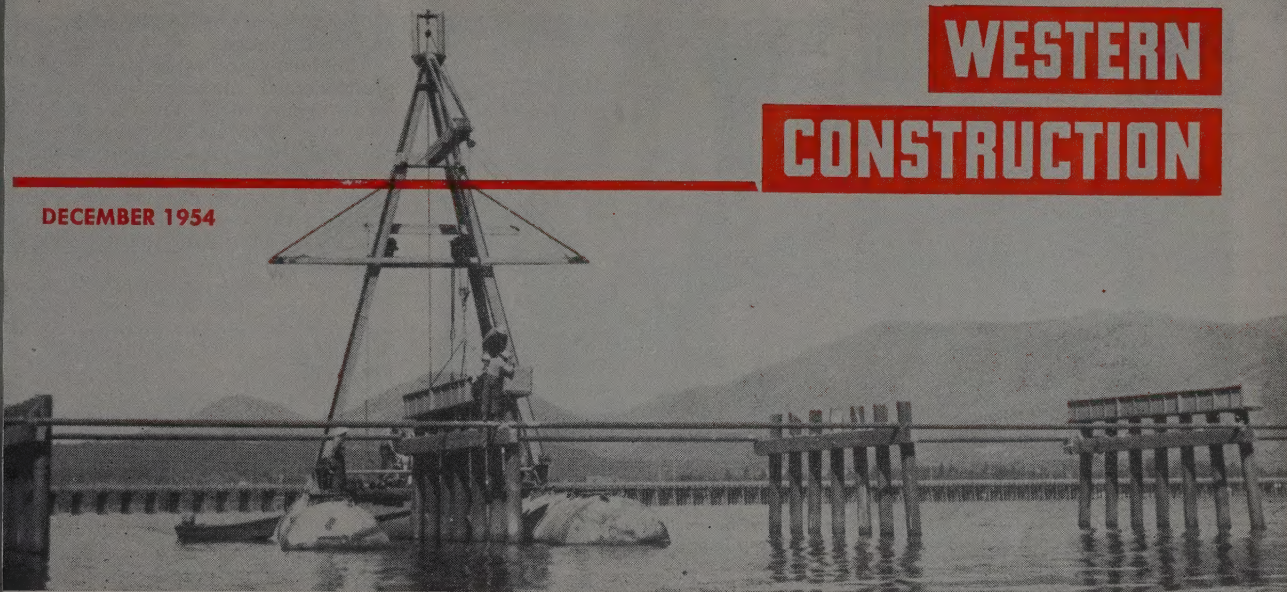
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DECEMBER 1954



THIS RIG CONTROLS the erection sequence for Idaho's new Sandpoint bridge. It sets forms, places concrete, transports and erects 70-ton slab-

and-girder units. The bridge is 6,000 ft. long, and building it is an assembly line business of piles and precast concrete.

35-ft. trestle spans built by the mile

SPECIAL FLOATING EQUIPMENT devised by Peter Kiewit and LeBoeuf Dougherty is making short work of bridge construction across Lake Pend Oreille at Sandpoint, Idaho. It is being used in conjunction with a complete concrete precasting and steam curing set-up on shore. Careful scheduling and attention to barge utilization ties the two widely separate operations together and make for a smooth running project.

The planning and design of this bridge, a 20-yr. proposition, were thoroughly reviewed in **Western Construction** last June, pages 65-67.

Project phases

The first season of activity breaks sharply into three phases: pile driving, concrete cap construction on the completed pile bents, and manufacture ashore of the precast deck units. This article discusses the work in the same order.

Foundation borings and pile tests along the 6,000-ft. over-water portion of the project culminated in design of a basic bent spacing of 35 ft., the bents to be composed of from 5 to 8 piles each. There are variations introduced by the necessity for a 17-ft. span for longitudinal bracing at each 227-ft. interval. Also a navigation span of 82 ft. is provided near the south end of the project.

Since award of the prime contract in April and the beginning of work in May, additional test piles have been placed. Coupled with observations of driving conditions in successive bents, these test piles have permitted

final decisions as to the stationing of changes from 7-pile bents to 6-pile bents, and finally to 5-pile bents. Bents composed of 8 piles will not be necessary.

Foundation conditions over most of the project—the north 4,000 ft.—consist of fine clay overlain by a blanket of sand. Piling in this reach is composite, made up of a 90-ft. timber pile, a 30-in. splice collar and a 38-ft. length of 14-in. steel shell. It was desired to use the **Engineering News-Record** driving bearing formula to govern the pile driving, with load tests to confirm formula results. However, load tests before design and again before construction showed the formulas to be inapplicable, their bearing values varying widely with the size of hammer used. Here is where the load tests proved themselves.

When the composite pile was driven all the way, putting the splice collar connection 10 ft. underground, it represented a bearing value of between 7 and 14 tons, according to formula. But load tests, allowing 48 hr. for the disturbed clay to "set up" around the pile, showed a good margin. The design requirement for a 7-pile bent is 22 tons per pile. The tests requirement was 45 tons, with no more than $\frac{1}{4}$ -in. settlement in 48 hr. The 7-pile bent checked out satisfactorily on the basis of pile tests, and it was therefore adopted for about 100 bents along 3,500 ft. of the project.

As the work progressed southward,

continued checks with the driving bearing formula showed increases in the apparent safe bearing for a given depth. This increase indicated that a switch to a 6-pile bent might be feasible. Again, load tests were employed. This time a 50-ton test with a maximum of $\frac{1}{4}$ -in. settlement in 48 hr. was required. The 6-pile bent incorporates a design load of 25 tons per pile.

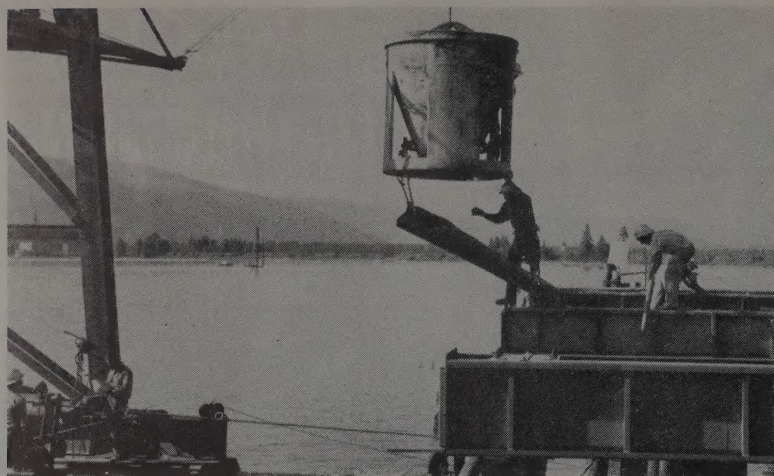
Tests govern sizes

Similar tests and observations governed the change from the 6-pile bent to the 5-pile bent at a point 700 ft. further south. The piles are different too, the 6- and 7-pile bents using composite piles, the 5-pile bents using entirely steel shells ranging from 55 to 76 ft. in length. The formula for steel shells is slightly different, taking into consideration the ratio of the weight of pile to the weight of hammer. On the Idaho work, the value of this ratio is always less than one, and the effect on the computed safe bearing value is negligible.

The change from 6-pile bents to 5-pile bents was found feasible at a point where 65-ton load tests were satisfactory. The 5-pile bent design load is 32 tons per pile.

Foundations for the bridge therefore consist of 97 bents made up of 7 composite piles each, 21 bents of 6 composite piles each, and 65 bents of 5 steel shell piles each.

Two side features of the pile driving operation that are worth special note. One is the splice collar connect-



HITTING a narrow target with 3 yd. of concrete is tricky. Before the first day was done, the contractor had rigged this chute to control the flow into cap forms.

ing the steel shell and timber elements. The timber piles range around 18 in. in diameter; the steel shells are uniformly 14 in. in diameter and 0.188 in. in shell thickness.

To make the connection the hammer is raised from a partially driven timber pile and the pile tapered so that a 30-in. length of shell can be forced down over it. The splice collar is fastened to the steel pile shell by welded straps, but with a 3/4-in. flat circular plate "sandwiched" between the two shell sections. Thus, when driving is commenced again, the splice collar cuts the timber pile, forcing a 14-in. core of timber 30 in. up into the collar until it contacts the plate. Thereafter, the piles are driven until this watertight connection is completely buried in the lake bottom. The method provides a dry shell for concreting later on—1.4 cu. yd. per 38-ft. shell.

Shell damage prevented

The other trick employed in the driving operation takes the form of a special driving head devised for the pile hammer by the contractor superintendent, Josh Pierson. As can be seen from the accompanying photograph, the purpose of the driving head is primarily one of flexibility: no change is necessary when switching from timber to steel shell. Furthermore, the head provides automatic centering of the steel shell under the hammer, with no lateral freedom. This prevents damage to the shell.

Early in the game, a change in hammer rams was made, from a 5,000-lb. to a 6,500-lb. unit. This decreased rebound per blow from as much as 1 1/2 in. to about 3/4 in. And driving time dropped from a maximum of 50 min. to a maximum of 15 min.

The next main step in construction is forming and pouring of reinforced

concrete caps on top of each pile bent. For this purpose the contractor has had 9 reusable steel cap forms fabricated by Berkeley Steel Construction Co., Inc., according to Pierson's design. The forms consist of separate side and end sections connected across the top by 5 spacers. The bottom sections of the forms are plywood panels cut to fit around the steel pile shells. They may be slid back and forth to final position after the piles have been pulled into their

proper relative position by wire rope and hand winches.

The forms are assembled around prefabricated reinforcing steel cages on a working barge. They are placed, and later stripped, by a hand crab powered Jinniwink. In position they are supported by steel hangers which hook the re-steel cage in the form and also the top of the pile shells. The forms hang over the pile shells as much as 6 in.

The caps formed in this manner are 24 in. square and 28 ft. long. Reinforcing is provided in the form of 1/2-in. steel hoops at 15-in. centers, 1/2-in. longitudinal bars at the corners and 6 main reinforcing bars running the full cap length, 3 near the bottom and 3 near the top of the cap. The steel size used here varies from 3/4 in. to 1 in. for the different types of bents involved, depending on where dock stringers cross the cap relative to the position of piles below. Anchor bolts for three stringers complete the steel in each cap.

Derrick uses

In the regular scheme of things the contractor's unique pontoon derrick is not assigned to this operation. It has other work to do — handling buckets of concrete for filling steel shells and pouring caps, and later handling the precast deck sections into place.

The derrick is a big A-frame based on a pair of pontoons each about 8 ft. in diameter and 60 ft. long. Cross connection is provided under the A-frame only. In that way the rig can straddle pile bents and get close to the work. It maneuvers by warping among piles or special anchors offset from the bridge location. Each of the pontoons is divided into 5 watertight compartments, the forward ones being flooded to balance the A-frame weight and also to let the entire rig nose under guy wires and temporary braces used in aligning the bents.

Winch arrangement

The derrick superstructure is straight-forward as shown in accompanying pictures. The horizontal boom projects 18 ft. from the frame at a point about 30 ft. above pontoon level. Its height is fixed, but it has 180 deg. of rotation, with control by wire ropes led to the "yardarm," and from there to winches fixed on a loft platform. These winches, a pair of 5-ton Beebe crabs, are powered by a 3/4-in. Skil electric drill for swinging concrete buckets and short-span 35-ton deck slabs.

Main power for handling loads comes from a Skagit winch with a Chrysler 8 Industrial engine. A 4-speed transmission gives it flexibility in application of 125 hp. In capacity the rig is good for loads to 100 tons.

Stability of the entire derrick is important under the heaviest loads. As built, the rig isn't too wide, with

Driving bearing formulas

For composite piles and single acting hammer:

$$P = \frac{2WH}{S+0.1}$$

Where: P=safe bearing (lb.)

W=weight of hammer (lb.)

H=drop of hammer (ft.)

S=average penetration per blow for the last 10 to 20 blows (in.)

For steel shell piles and single acting hammer:

$$P = \frac{2W_h^2 H}{SW_h + 0.1W_p}$$

$$\text{or } P = \frac{2W_h H}{S+0.1 \frac{W_p}{W_h}}$$

Where: W_h = weight of hammer (lb.)
 W_p = weight of pile (lb.)

NOTE: On the Sandpoint Bridge, the contractor has employed a Vulcan No. 1 single acting steam hammer. Ram weight is 6,500 lb., with a drop of 3 ft.



DRIVING HEAD built for the job speeds pile work. Timber piles bear on the flared skirt. Steel shells are held in the machined recess between the skirt and driving head itself.



TAKING A STRAIN, workman forces pile into exact position under cap form. Note anchor bolt assembly, adjustable plywood panels in bottom of form.



SOFFIT FORMS for precast deck units "break" in the middle. Steel shores make forms rigid for concrete placement.

only 12 ft. separating the two pontoons. At the after end, however, its width is extended and includes a pair of 5x5x7-ft. pontoon outriggers on each side. In addition, two 6-ft. pipes connect the main pontoons beneath the winch. These tanks can be filled with 11 tons of water ballast when handling 70-ton loads.

For concrete in the caps and piles, 3-cu. yd. buckets are used. They are transported in a pair of World War II landing craft. Each boat can carry one bucket. This was learned the hard way, when an attempt to load two buckets capsized a boat early in the work!

The final and major chore of the derrick is placement of the precast concrete deck units. And these are full size—one per span, weighing 74 tons and measuring about 30 ft. wide by 35 ft. long. These deck sections include stringers cast integrally with the deck.

Slabs are lifted by means of 10 Superior coil loops (1¼x15 in.) cast in the longitudinal beams. The lifting jig, 6 tons of welded structural steel beams, is bolted to the coil loops.

Deck placement has gone according to schedule. So far, it takes about 4 hr. per round trip—2 hr. for towing and spotting, 2 hr. for hooking on and lifting and for placing and bolting down. Towing time will decrease as the work continues, getting closer to the south shore.

By and large the handling of these deck units has been routine and easily within the capacity of the floating equipment. The unique feature of the deck units is the plant and procedures set up on shore for their manufacture.

A subcontract held by Seattle Concrete Pipe Co. covers this phase. A feature of the subcontractor's operation is his use of steam curing, which he is applying for the first time on a job out of reach of his home plant. This has meant providing reusable steel forms, extensive steam boxes, and a 100-psi. boiler. With this

set-up the specification-required concrete strength of 3,000 psi. is achieved in 48 hr. The steam curing is commenced when the concrete has taken its initial set about 4 hr. after pouring. Temperature is held at 130 deg. or less.

To do the trick, the prime contractor has provided a pier long enough to take five deck units at one time. The pier is completely sheathed, its deck being set below the gantry rails that travel down each side. In addition, the side of the wharf, caps, and pile tops have an inside covering of aluminum foil, applied by Seattle Concrete Pipe for insulation and protection. The bottom, or floor, was expected to swell and become steam tight when curing operations got under way.

Bridge crane

Steam boxes to set down over the curing units are also lined with aluminum foil. They weigh 5 tons each and are easily handled by the 10-ton capacity bridge crane that travels the length of the wharf.

This crane is only a service unit, for moving steam boxes and re-steel and concrete. It cannot, of course, handle a completed bridge deck unit. This must remain in its original position until picked up by the pontoon derrick and carried out to the job. The erection and precasting operations must be very closely timed.

The deck slabs are cast right side up, with box forms shaping the deck soffit and longitudinal stringers. These forms have a flexible "hinge" and are equipped with jacks to hold them at the proper position. Easing off on the jacks and corresponding bending at the hinge effectively breaks the seal when stripping the forms.

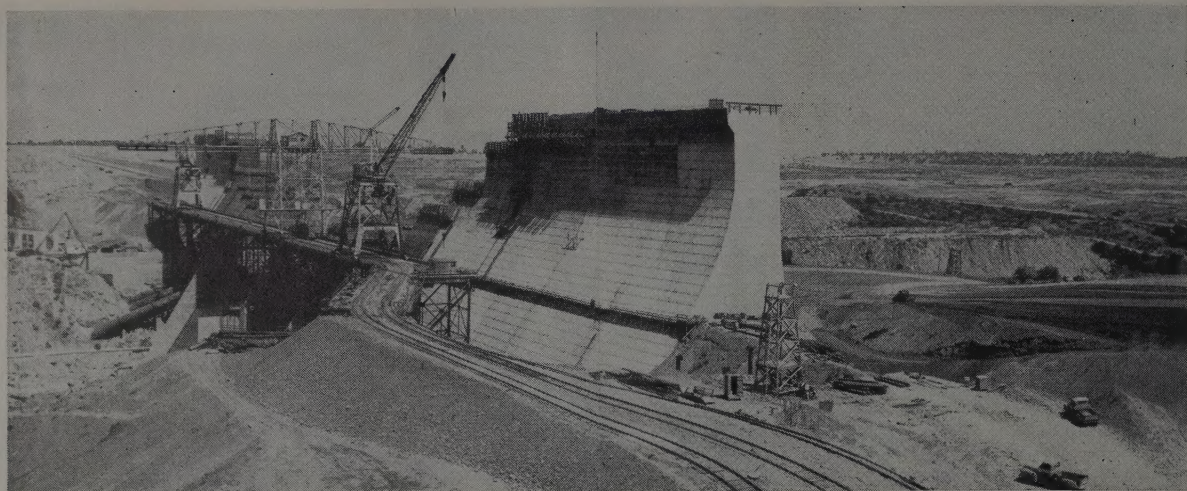
Work on this \$1,135,300 contract began last May. Its conduct has involved good supervision and ingenious methods. At the end of November pile driving was done except for abutments and adjacent bents. Forty deck spans had been placed, and 91 caps of a total of 181 had been poured. Shut down now for the winter, work will begin again in the spring and is expected to be completed by October 1955.

The work is under the jurisdiction of R. M. Parsons, district engineer for the Idaho Department of Highways at Coeur d'Alene, with A. J. Sachse as resident engineer.

Field personnel for the state include Vernoy Olson, chief inspector; Clyde Wood, pile inspector; Al Evans and C. D. Mills, concrete inspectors, Robert Van Alstine, office engineer; and Norman Riffle, instrument man.

The prime contractor on the work is a joint venture of Peter Kiewit Sons' Co. and LeBoeuf Dougherty. J. L. Pierson is superintendent, D. K. Rodgers is project engineer, and George Carlson is office manager. The foreman in the three principal specialties are Owen Barstow on pile driving and Harold Goodwin and Gordon Wiser on concrete.

The operations of Seattle Concrete Pipe Co. are under the supervision of Ralph Simpson.



Over 1,000,000 cu. yd. poured at Folsom Dam with — Cold concrete in 5-ft. lifts

CURRENT BATCHING AND POURING at Folsom Dam presents many interesting features that highlight current Corps of Engineers requirements for mass concrete. With concreting operations now past the 1,000,000-cu. yd. mark and less than 200,000 cu. yd. to go, here is an account of the batch plant setup, the methods of pouring, and the reasons behind the methods.

Briefly, the dam consists of a 1,400-ft. long gravity concrete section flanked by wing walls of earth-fill construction. There are 28 blocks, each 50 ft. wide. The dam has a maximum base thickness of 270 ft. and rises 350 ft. above the river channel.

Concrete aggregates arriving by conveyor at the batch plant, a fully automatic Johnson, are rescreened and chuted to separate bins. Basic sizes are $-6 + 3$ in., $-3 + 1\frac{1}{2}$ in., $-1\frac{1}{2} + \frac{3}{4}$ in., $-\frac{3}{4}$ in., $+ \#4$, and sand. Total bin storage capacity at the plant is 1,100 tons. This is enough for about 5-hr. plant operation if something should happen to the conveyor system. Concrete being placed in the forms is required to range between a minimum of 40 deg. F. and a maximum of 50 deg. F. All items entering the concrete mix except the sand may be cooled by one means or another. To achieve this—the contractor has built the largest refrigeration plant yet used on a dam project for this purpose. The refrigeration plant has four principal functions which will be discussed in turn.

The first of these is the flakeice-making system that can manufacture 235 tons per day. In a typical $2\frac{1}{2}$ -bag, 4-cu. yd. batch of interior mass concrete, about 560-lb. total water is required. Ice will constitute half of this

under normal summer conditions. As high as 375 lb. of ice per 4-cu. yd. batch has been required.

The second basic function is the brine cooling and air handling system. Air is cooled by circulation around brine coils to 35 deg. F. It is then forced up through all of the aggregate bins (except the sand) by two blowers rated at 95,000 cfm. Air leaves the aggregates at 45 to 50 deg. F.

The third refrigeration requirement is to supply chilled water for several processes. One of these is to

cool water before it goes to the ice making machines. Another use for the chilled water is as a cooling medium in four cement coolers. And last is the direct use of the water for batching at a temperature of 31 to 34 deg. F.

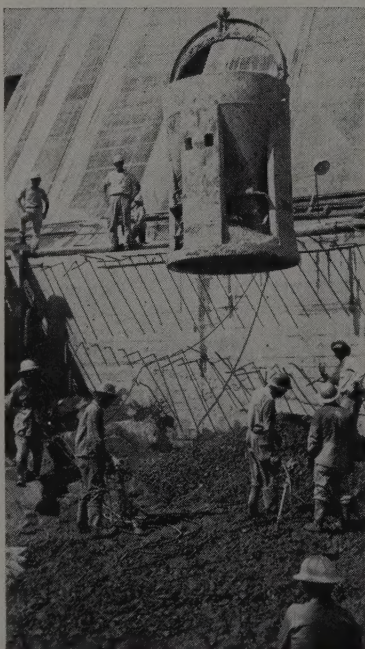
Fourth and last basic refrigeration function is the ice storage and handling system that keeps ice fragments cold while in storage prior to the batching process. The handling system is such that the ice is kept cold while being moved by screw conveyor and bucket elevator from the ice making machines to the storage area. Total rated capacity of the refrigeration plant as a whole is 1,056 tons per hour.

Refrigeration in the winter

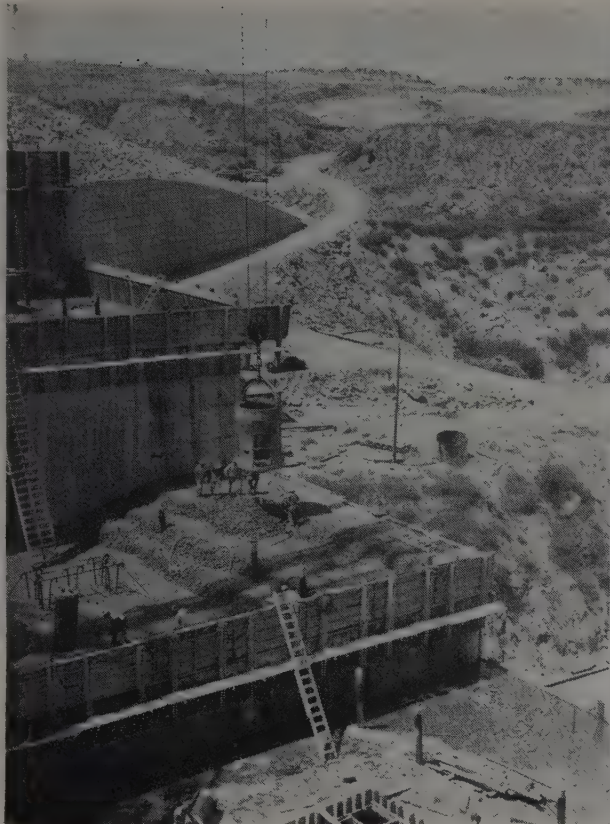
The amount of pre-cooling required to maintain the 40- to 50-deg. concrete placing temperature is less during the winter months, but is manifested only by the elimination of ice to the mix. Air cooling of the aggregates and chilling the mix water must be continued. In a few instances, the ice plant has had to be cranked up when winter air temperatures moderated as they sometimes do in this vicinity.

Bulk cement, Type II, is stored in two 7,000-bbl. silos. Furnished by the Calaveras Cement Co., it is trucked about 110 mi. from the mill to the job site. Normal precautions are taken by the Corps as to the quality of the cement at its source. The National Bureau of Standards conducts qualitative acceptance tests on bins seven days before it is due to be shipped; the bins are then sealed if the cement meets specification requirements.

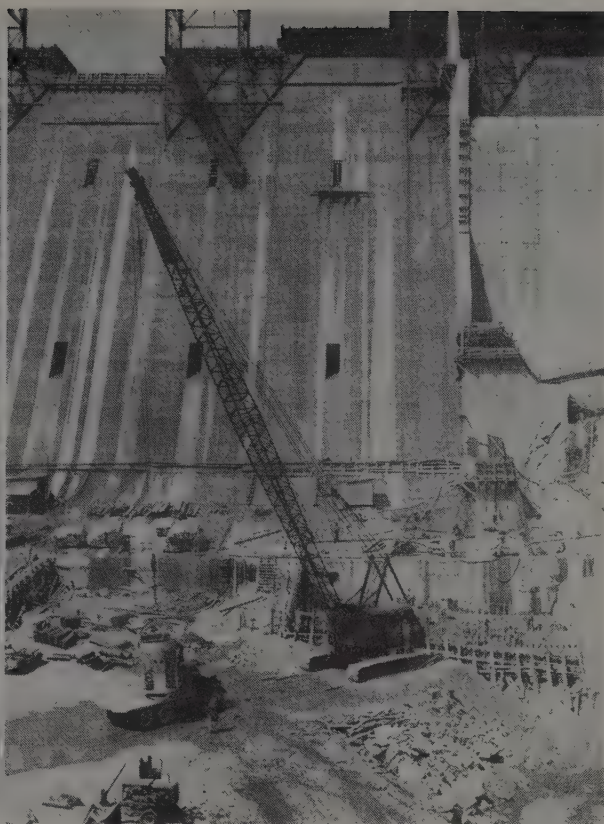
As is required on large Corps of



4 CU. YD. at a time with Gar-Bro buckets and Jackson VS-4 electric vibrators.



THREE 20-IN. LIFTS carried forward two buckets wide make up a 5-ft. lift. Successive lifts have been made every three days in critical areas. Temperature control has been excellent.



AREAS INACCESSIBLE to the whirlies have been reached by trucking the buckets to location such as the stilling basin. This Manitowoc 3900 has handled up to 160 cu. yd. per hour with no difficulty.

Engineers concrete projects, all aggregates, cement, air entraining agent, water, and ice are weighed and automatically recorded for a permanent record. Batch weights for several mixes are established, set into a mechanism in the control room, and then any one mix may be used in a moment by merely changing a selector dial. There is also an automatic compensator, for varying amounts of sand moisture content, that increases or decreases the amount of water batched.

5,000 cu. yd. per day

After weighing, the 4-cu. yd. batch is discharged into one of three Koehring tilting-type mixers. Mixing time is $2\frac{1}{2}$ min. with a minimum of 12 revolutions of the mixer in that time. Discharged from a mixer, the concrete passes to a large conical wet hopper and is ready for further discharge to 4-cu. yd. Gar-Bro bottom dump buckets that are used for all placement. Concrete production has been at the rate of 200 to 225 cu. yd. per hour with the largest single pour being about 2,200 cu. yd.

A steel trestle was erected prior to pouring of the dam that parallels the dam axis. It is 250 ft. above the river channel, but about 90 ft. below the dam crest. Its location is such that

nearly all parts of the dam can be reached by the two whirlies and the hammerhead crane riding the trestle. As succeeding lifts of the dam have been poured, the lower part of the framework supporting the trestle has been embedded in the dam. Two tracks have been laid for the movement of three diesel dinkies that haul 4-cu. yd. buckets at a time.

In sequence of pouring, the blocks at the ends of the dam have been topped out first. This has allowed earth and rock-fill operations on the wings to proceed without being dependent upon concreting operations. Also, the trestle has been relocated further downstream at these two ends so as not to interfere.

As on other Corps of Engineers mass concrete pours in recent years, the height of a concrete lift has been limited to 5 ft. with certain exceptions. One special situation occurred in the early months of 1953. Treatment of a geologic fault discovered beneath the left abutment of the dam had delayed concreting operations on 6 of the total of 28 blocks making up the dam. A project decision was made to use 10-ft. lifts in order to expedite and hasten the rise of those monoliths in the dam influenced by the fault condition. As a general rule, they were used only

until the foundation rock was completely covered and leveled-up on sloping abutment foundation.

Concrete is deposited from the buckets in horizontal layers not over 20 in. in thickness with each layer vibrated into the next. Three such layers make a 5-ft. lift. Prior to pouring a new lift, the old surface is cleaned by air-water cutting and covered with a layer of cement-sand mortar. A 14-day minimum water cure is required on all exposed surfaces.

Standard steel cantilever forms are used on the gravity portion of the dam. They are lined with vertical tongue and groove lumber. The forms are built in 12-ft. long sections and are raised with the whirley cranes or by air-operated A-frames.

No minimum time on lifts

It is interesting to note that Corps of Engineers specifications do not specify any minimum time between successive lifts. They do require that not more than 9 days shall elapse. The primary factor determining the rate of pouring successive lifts on any one block or monolith is the handling of cantilever forms. With the lower end of the forms tied into the lower lift, about three days are required for the concrete there to develop suf-



NERVE CENTER for all operations is the control room of the Johnson automatic batch plant. Merely flicking a dial sets new batch weights for a different mix design. Invaluable is a moisture compensator.



CONVEYOR LEADS in from left to top of tower and 1,100-ton aggregate storage. Two silos this side of tower hold 14,000 bbl. of cement while low building to right houses extensive refrigeration plant.

ficient strength to hold the anchorages. Successive lifts have been placed every 3 to 4 days in critical areas—as was the case on the six delayed blocks over the faulted area. In other less critical areas, 6 to 7 days usually elapse between lifts.

The fault situation required that the specification height differential of 25 ft. between adjacent monoliths be waived on several of them to permit concrete placement to continue. When this situation occurred during summer months, no protective measures were required. When it occurred during winter months, the high bulk-head faces were protected from severe changes in atmospheric temperatures—which could cause cracking—by covering with insulation until adjacent monoliths reduced the differential to the minimum practicable.

The contractor is making good use of Jackson VS-4 electric vibrators, each handled by two men. These vibrators impart at least 4,500 impulses per minute and very satisfactorily compact the low-slump concrete. An article in the November 1953 *Western Construction* told what the contractor has done to assure the fine

continuous performance of these units.

One area not accessible to pouring by use of the whirlies is the stilling basin apron and training walls. In this case the concrete is trucked to location with one 4-cu. yd. bucket each to a conventional flatbed truck. A Manitowoc No. 3900 crane here handled up to 160 cu. yd. per hour on these pours.

Control at the batch plant—and good control it is—assures that all of the concrete placed will be up to the designed standards. However, 10-in. diameter core specimens are removed from random monoliths about every 100,000 cu. yd. Such cores are taken vertically and horizontally and are used to evaluate (a) design characteristics such as unit weight, compressive strength, modulus of elasticity, and (b) physical characteristics such as aggregate distribution, degree of consolidation, evidence of internal bleeding, and overall appearance.

Test results on the core specimens for the 2½-bag interior mix have shown the average unit weight for the mass concrete is about 161 lb. per

cu. ft., and the 60-day compressive strength is about 2,500 psi. Test data from cores can be correlated fairly closely with batch plant operations. The station, elevation and other data are applied against such identification as the date, time of day, and inspector's shift report from the plant.

The entire control program which the Corps exerts over batching and placing of concrete is to insure that low internal temperatures in the mass concrete will result. Low cement content and low placing temperature are steps in that direction. A check on the actual condition has been made by embedding a few Carlson resistance strain meters in the concrete in the fault area. Originally installed to check for possible movement of monoliths near the fault, the meters also permit reading post-placement concrete temperatures—rate of gain, peaks, decline, cooling rate—and they are used as a matter of record. Such readings seem to verify that the predicted 90-deg. peak interior temperature will not be exceeded.

It is anticipated that the contractor, a joint venture of the Merritt-Chapman & Scott Corp. and The Savin Construction Corp. will finish all concreting operations by June 1955. A concrete production rate of 5,000 cu. yd. per day was set as a daily target and almost 500,000 cu. yd. was produced for the period January through June 1954. This means that Merritt-Savin hit it right on the nose.

Key personnel for the Corps of Engineers are Charles F. Beatie, project engineer; S. D. Burks, field engineer for the concrete dam; W. G. Clark, field engineer on the wing dams and dikes. For Merritt-Savin, D. E. Stinson is project manager; L. G. Sumner, project engineer; J. R. Blinn, assistant project engineer; W. W. Bartlett, concrete superintendent; Bob Fowler, batch plant superintendent; F. B. Lichtensten, refrigeration plant superintendent.

FOLSOM PROJECT CONCRETE MIX DESIGN TYPICAL BATCH WEIGHTS

MATERIAL	MIX DESIGNATION		
	Exterior mass concrete, 6-in. max. aggregate (4 cu. yd.)	Interior mass concrete, 6-in. max. aggregate (4 cu. yd.)	Dental and retaining walls, 3-in. max. aggregate (2 cu. yd.)
Cement	1504 lb.	940 lb.	1692 lb.
Sand	2848 "	2856 "	2948 "
No. 4—¾ in.	1888 "	2020 "	3300 "
¾—1 ½ in.	2388 "	2552 "	3568 "
1 ½—3 in.	3728 "	3984 "	4668 "
3—6 in.	4008 "	4286 "	"
Water	700 "	584 "	764 "
Admixture	23 oz.	22 oz.	24 oz.
DESIGN DATA			
C/F (bags per cu. yd.)	4.00	2.50	4.50
W/C (water-cement ratio)	5.25	7.00	5.10
S/A (Sand-agg. ratio %)	20/80	19/81	21/79
% Air	3.5	3.5	3.5

Two-way radio skyway of highway engineering

"Radio control" of highway work is a virtual reality—Technical and legal obstacles beaten down in eight pioneering years—California operations completely linked by voice circuits

By **ARNOLD H. CARVER**

Departmental Communications Engineer
California Division of Highways
(Recipient of the Dr. L. I. Hewes Award
for 1954)

Just how does a radio communication system assist in highway engineering? What problems has it answered for the maintenance or construction engineer? Is such an installation economically justified? What does such a system consist of? These are but a few of the many questions that immediately come to mind. Let's take a good look at them and clear away some of the veil of mystery that presently surrounds this electronic age. Let's look at the problems through the eyes of a highway engineer.

Let us take California as an example and follow the development of this highway communication system. Our story begins in 1937 with one of the major problems and headaches of the maintenance engineer, snow removal. The winter season of 1937 was like many that had preceded it. With the start of the first snows the maintenance engineer had his annual recurring problem of getting sufficient snow equipment to the right places at the right time. As the storms continued and snow depths increased, other questions arose: What were the exact locations of the working snow equipment? Was all this equipment operative? What were the road conditions? Were repair parts or additional equipment needed? Too often a road might have been kept open or, once closed, opened sooner had this information been readily available.

Original trial

It was obvious these problems all had a common denominator, communications—or more especially, lack of communications. So in the winter of 1937-38 a very limited two-way radio communications system was installed in the snow areas of California.

At that time radio communication in highway work was being used by only a few states and on a very minor scale. Existing Federal Communications Commission rules and regula-

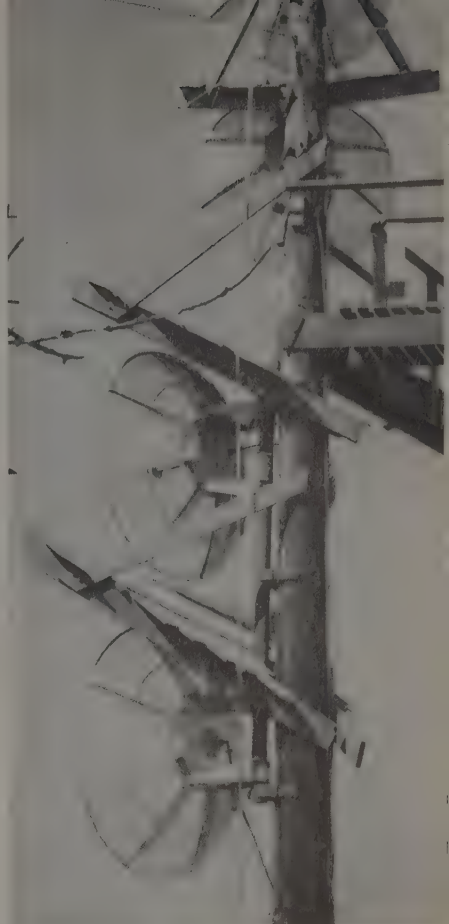
tions did not recognize, or allow, any special radio band for highway work. Use of radio by highway departments could be authorized only as a "special emergency" service, which required sharing a single nationwide radio frequency with other services such as the Red Cross, Emergency Disaster groups and the like. The permissible usage of the facilities, together with the allowable types of communication, was very restrictive. Notwithstanding, an installation of two base stations and nine mobile two-way radio units was made in the heavy snow area of Northern California. The base stations were installed in two critical maintenance stations and the mobile radios in strategic snow removal equipment operating from these maintenance stations.

Results an eyeopener

The results were most satisfactory. For the first time the maintenance superintendent knew of snow removal operations, location of equipment, breakdowns, and road conditions in his area within minutes of their occurrence. As a consequence, radio installations in the following years through 1940 were expanded to cover the majority of the snow areas in California. The initial radio system finally grew to a total of 21 land stations and 38 mobile units.

How the first system worked

It would be well to describe briefly this first radio system and its operation. As previously mentioned, only one frequency was available nationwide to highway departments. This frequency was in the medium frequency band and assigned for AM (amplitude modulation) operation only. This meant that satisfactory operation of the radio system, as contrasted to present FM (frequency modulation) operation, was dependent on atmospheric conditions. A mobile unit or land station whose normal daytime range was 10 to 15 mi. would often be heard hundreds of miles away at night. This caused undue radio interference between snow equipment operating at night in opposite ends of the state. In addition, man-made electrical noises, as well as static resulting from rain and snow, all added to make this early radio sys-



MICROWAVE antenna dishes on Cuyamaca Mountain in San Diego County symbolize the new seven-league boots of highway communications.

tem rather unreliable. Its operation was limited to winter only—when it was truly vital.

During the war tremendous advances were made in electronics, particularly in FM (frequency modulated) radio communication in the very high frequency band. This development was of particular import to the users of two-way radio. In most instances, once an FM radio circuit is established between two points, the circuit will function reliably without being affected by noise and other factors which make AM radio so undependable.

In 1946 the California Division of Highways again focused attention on the possible uses of radio communication. With instantaneous communication between field forces and the district and headquarters offices, all work could be better coordinated. This would assist in relieving shortages of personnel, equipment and material and in over-all coordination of maintenance activities—not just snow removal.

Everybody interested

Radio in traveling mechanics' vehicles to expedite field repair of equipment, portable radio for survey and construction work, radio in bridge maintenance vehicles, in plan-

Portrait of a winner in Western highway development

Winner of the Dr. L. I. Hewes Award in 1954, Arnold H. Carver qualified for the honor by eight years of imaginative work in the development of California's highway radio network. The singular value of his achievement lies in his conception of the function of highway radio. In the words of George T. McCoy, California's State Highway Engineer, Carver's approach "has been that of a highway engineer developing an engineering tool as contrasted to that of a communications engineer providing a traffic system."

Arnold Carver's work has not ceased with initial installation of the California system, which remains under his supervision as Departmental Communications Engineer. And the system, incidentally, is the largest in the country, and probably one of the most comprehensive in its operation. Carver has developed manuals for use by operating personnel in the field. And he has continued his research on the practical aspects of later electronic developments.

He has been chairman of the Committee on Radio of the Western Association of State Highway Officials. He is currently serving



as a member of a similar AASHO committee. Carver expresses the farsighted view of his special field this way: "We in the Western states responsible for communications in highway work are looking to the future. Already tests are being conducted using television and other electronic media to determine their practical application to highway work."—Editor.

ning survey vehicles — new uses for this medium just seemed to increase.

Could radio communications assist the highway engineer? It appeared to be a natural. So the green light was given in 1947: the Division of Highways would construct a state-wide highway radio communication system.

Obstacles loomed ahead

Once direct attention was given to the actual construction of such a radio system, several obstacles loomed ahead. Foremost were the existing—or non-existing—rules, regulations, and radio frequencies for highway work. There were none. As previously mentioned, only one frequency was available nationwide for highway purposes, and this was shared with the "special emergency" users. Full-time unlimited use of radio for highway purposes was not permissible. In fact, its use was limited to those occasions endangering life or property coincident with either outage or non-availability of existing wire-line communications.

So the Committee on Use of Radio of the American Association of State Highway Officials went to work. Working in close cooperation with the Federal Communications Commission and those states interested in highway radio, the efforts of this committee were fully rewarded in

July 1949. The F.C.C. adopted the current Part 10 of their rules and regulations covering the Public Safety Services.

It becomes a reality

Included for the first time was a new service, highway maintenance, with 14 assigned FM frequencies in the 46-47-Mc band. Permissible communications now, in addition to those "directly relating to public safety and the protection of life or property," included "communications essential to official activities directly relating to the maintenance, supervision, and operation of public highways." Radio for normal highway activities was now a reality.

Remaining obstacles now lay in proper system planning, not only to meet present needs of a rapidly expanding highway department but to anticipate future needs and additions. In addition, several technical obstacles were to be overcome.

Immense area coverage

The eventual radio system would encompass some 58 counties covering an area of 158,693 sq. mi. In physical distance California is 824 mi. by 252 mi. at its longest and widest points. Terrain to be covered ranged from desert in the south to rugged mountain terrain in the north.

Field studies for the new radio sys-

tem were started in the summer of 1947. Each of the state's 11 highway districts was individually studied in the field with district highway personnel. By the spring of 1948 all the field studies and preliminary planning had been completed and we knew what the radio system must do. As part of the preliminary planning detailed map studies were also made to ascertain possible locations of radio station sites.

Where to place radio sites?

The actual field radio survey was immediately begun. For this work a special vehicle had been outfitted with a 60-watt FM radio station, together with special radio receivers and test instruments. A gasoline generating plant was towed to provide electric power at isolated or remote locations. Three other cars were outfitted with mobile radio transmitters, receivers, and test equipment. These latter cars were to be used to determine the exact mobile radio coverage. Special antenna supports were also devised so that two men could rapidly erect or dismantle a 50-ft. antenna support at any location.

In determining the locations to be tested for possible radio sites, certain considerations were necessary. First, whatever the location of the actual transmitting station, its operation must be possible from the district office, the superintendents' offices located mostly in the maintenance stations, certain foremen's offices, and other required sites. There was to be no disruption of any highway activity to accommodate the radio system. Second, if any radio site were chosen away from existing highway installations, it must be reachable by wire-line or radio control-link from the operating point. Third, sites so chosen must have access roads and power to be economically feasible to construct. Fourth, the sites should be accessible for radio maintenance during the winter months.

Basic locations determined

With these criteria, the radio field survey of California was made, taking about one year to complete. Nearly every mile of California's 14,000 mi. of state highway was traversed at least once, and many times three or four times to determine the exact radio coverage. The results obtained were most gratifying. In many instances it was possible to locate the radio station right at the maintenance station or district office. Where remote or mountain sites were selected, development of road and power facilities were economically feasible.

Coincident with the start of the radio survey in each district, a qualified radio technician was hired, through civil service procedure, to be responsible for eventual maintenance of the radio system in his district. The

radio technician assisted in the survey, thereby becoming thoroughly familiar with his problems. Upon completion of his survey, he then assisted the district personnel in securing necessary rights-of-way, in the construction of necessary power, road, and building facilities, and all the many details necessary to a large communication system. This procedure saved many months.

Centralized control

Because of the overall size and complexity of the proposed radio system, it was determined to exercise technical control of the system from headquarters at Sacramento. The districts would be individually responsible for the operation and administration of their district radio facilities. This control has remained in effect and proven very successful.

Again, coincident with the actual field radio surveys, specifications were written for the actual radio equipment required. The bulk of the equipment was actually ordered in two segments, half on completion of half of the survey, and the remainder at the conclusion of the survey. All of the radio equipment was purchased through competitive bidding.

Upon completion of a district survey, applications were prepared and forwarded to the Federal Communications Commission for the necessary license and authority to operate the radio stations.

Installation starts

By September 1949 not only had the radio survey been completed but the new FM radio equipment was starting to arrive and radio installations were under way. The full state-wide radio system required three years to complete. The initial estimate to complete this work had been five years. Improvements or additions since have been made to meet changing conditions or new problems. The California Highway Radio System now comprises 78 base stations, 28 fixed relays, 23 control stations, 9 portable stations, 11 microwave stations, and 650 mobile radio stations.

How it all works

It might be well to give a brief description of the operation and maintenance of this system. Basically, it has been designed as a mobile radio system, meaning that its purpose is to provide instantaneous direct communication between the mobile radios of the field forces and their offices. Too often, however, distance or terrain prohibit one unit from reaching another directly. This is overcome by making each transmitter, mobile or fixed, capable of transmitting on either of two pre-selected frequencies. If contact cannot be made directly by a mobile unit, the operator throws a small switch and automatically transmits on a second fre-



REMOTE STATION construction was essential to hurdle California's Sierra Nevada, linking east and west. Here is radio vault on White Mountain, el. 11,000, near Bishop.

quency. This frequency is received by a station, called a fixed relay, on a mountain top which automatically boosts the power of this signal and re-transmits it on another special frequency to the base station or operating point.

Conversely, where the field survey showed the base station could not give adequate radio coverage to the mobile radio units in its area if located at the operating point, it was installed in a remote location on a mountain top. Where distance was short or winter weather conditions permitted, the mountain top station was connected to the operating point by wire-line. When wire-line installation was not feasible, the mountain top base station was operated automatically by radio signals sent out by a transmitter, called a control station, from the operating point.

New special features

Several special technical features were designed by various manufacturers in cooperation with the California Division of Highways to meet our special requirements. Two features are worth mentioning. The first is design of equipment to transmit and receive special tone signals which automatically change frequencies, switch antennas, select receivers, or select one of several stations at the remote mountain top locations. The second is the practical design of an electric generating plant which can be turned on and off by remote radio control. Typically, this plant is located on a mountain top where commercial power is not available. Turned on and off by radio from the operating point, it furnishes primary electric power to the radio equipment.

Maintenance of the radio system is

handled by 15 radio technicians employed by the division. Each has certain assigned areas of responsibility and supervision is provided from Sacramento headquarters. To keep idle time of highway personnel and equipment to a minimum when radio repairs are required, all repairs are handled in the field using the change-out method. The faulty equipment is then repaired at the district radio repair shop. To expedite field repairs a central parts supply is maintained in Sacramento where practically every part used in the radio system is stocked. This method reduces cost by volume purchase and expedites repair by immediate shipment to the field.

Solves all problems

What does all this now mean to the highway superintendent or engineer working in the field? It means he can remain in touch with all his crews wherever they may be and coordinate their work. He can expedite repairs of faulty equipment or order replacements without undue delay to a job. He can order additional materials or equipment from the jobsite when required. He can move his office right into the field without losing contact with his headquarters. These are but a few of the day-to-day operations where radio plays a part.

In winter snow removal operations, he knows the location of his equipment at all times and what the road conditions are at any given moment. He can instantaneously shift men and equipment to meet emergencies. Also, communication is then available right at the scene to expedite the work. In traffic signal repair, in survey work, in construction and bridge work—in every field of highway engineering—radio is proving to be one of the most useful tools added to highway work.



Right down the middle of Cow Canyon in Oregon, scrapers are— **Changing a streambed to a roadbed**

THEY CALL IT "fruit salad curve" on U. S. 97 in north central Oregon. It's on the Cow Canyon grade between Sherman Junction and Willowdale. It got its name from the once-common accidents involving produce trucks that couldn't hold the road.

This piece of bad alignment was partly worked over in 1949. Now, it has become necessary to boost the standards again. The project this time takes in more than just the bad curve. It covers about $8\frac{1}{2}$ mi. of road, all the way down the canyon. J. W. Briggs of Bend has the contract on a bid of about \$699,000, and he is really building a new look into U. S. 97. Doing it requires plenty of machinery and some good planning, especially on the rock excavation.

The present roadway rides the canyon side, in and out of every side gully and ravine. The new road goes right down the bottom of the canyon. The streambed is being pushed from one side to the other. Cuts and fills make the highway straighter than the canyon. And at the bottom it comes out high, jumping out of the stream channel and heading off across the alluvium on a long tangent.

Changing the face of the earth in Cow Canyon means rock work. The Briggs contract includes 158,900 cu. yd. of "A" excavation at \$0.28. This material can be handled by rippers and scrapers—but the ripper teeth

last only about 40 min. The ground is a cemented gravel.

The "B" excavation runs about 325,300 cu. yd. This stuff is called "dice rock" in central Oregon. Briggs is shooting it, loading it out and dumping it into fills for \$0.62 per cu. yd. The shooting is easy enough, but the break is difficult to control. The rock is fractured in well-defined vertical planes; it may break to one plane, or to another three seams farther over.

The character of the rock operation can be described by example—a single shot set off last July. Top of

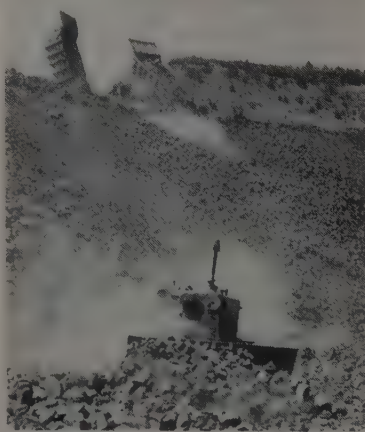
the cut was drilled with down holes about 8 ft. apart and set back for about 12 ft. of burden. Most of the effort was made down at grade—about 75 lifter holes drilled in as deep as 18 ft. This situation took 11 cases of powder—550 lb. of #1 Gelex. The shot pulled about 2,200 cu. yd.

With all the rock involved, this is a 2-yr. job. It started last summer, and this single season has seen most of the grading done. One bad spot is being left until the spring of 1955. This is where the realignment work of 5 yr. ago straightened out "fruit salad curve." The present road goes straight across the canyon dogleg, requiring two fills and a rock cut on the opposite side of the canyon.

The new road will follow the same general course. In fact, the design in this short stretch was compromised just a little to take advantage of the work done 5 yr. ago. As a result, a little change in grade and super, plus some more width is all that is needed. But this involves tearing up the pavement and is being left for next season, so that traffic won't have to travel an unpaved section during the winter months.

Briggs studied this job closely before bidding. It carried an engineer's estimate of around \$800,000, but Briggs beat out more than 25 other bidders and was low by \$13,000 in getting the job at \$699,000.

The work is pretty straightforward, but it takes a lot of machinery



DEEPEST FILL on the job is rock from the cuts, will filter stream flow.

(see box). And some of it is special. Briggs is another of the many contractors who have dreamed up a way to combine a crawler tractor and a drill set-up. This one involves a complicated combination of booms, winches, falls, and brakes, but it works out fine. On this job the rig was good for one 13-ft. hole every 15 min. And this includes moving and set-up time. Steel was 18 ft., with 2½-in. carbide-insert bits.

From an engineering standpoint, drainage provisions are interesting. Up the canyon, where the new work forces the stream back and forth under the fill, 48-in. corrugated metal pipe is being used in the usual manner. But near the canyon mouth, where the road hops the creek twice on high fills to bypass "fruit salad

Equipment

- 1—Northwest 80 shovel
- 4—12-yd. end-dump Euclid trucks
- 3—6-yd. end-dump Diamond T trucks
- 5—D8 Caterpillar tractors
- 3—No. 80 Caterpillar scrapers
- 3—Model C Tournapulls
- 1—Allis-Chalmers HD20 tractor (pusher)
- 1—Caterpillar No. 12 motor grader
- 2—International TD-18 tractors
- 3—Gardner-Denver compressors (500-, 315-, and 105-cfm.)
- 3—Ingersoll-Rand wagon drills
- 1—Gardner-Denver wagon drill

curve," no additional culverts are planned.

Why? The reconstruction already done accounts for most of the embankment. Briggs is only widening and raising it. But the present fill has been filtering all creek flows successfully since it was built. No piping or erosion in the embankment. And no ponding of water up to the tolerable elevation where culverts already are in place. Oregon engineers figure that the new thickness of fill may require more head on the upstream side of the fill. That's fine. Maybe the water will back up to the culvert level now!

For the Oregon Highway Department, this work is being handled out of Division 4, headquarters at Bend. William E. Chandler is the division engineer. Resident engineer for this job, in Madras, is Lowell Stratton. (The project is known as "Briggs & Stratton" occasionally!) And David Glenn is chief inspector.

For Briggs, Al Sackett is superintendent. And he runs the work from his office—a GMC pickup rigged with short-wave radio. With this modern touch he is in constant contact with dirt moving operations several miles apart.

Lawrence Fox is master mechanic. Shifter on the earthmoving is "Smokey" Stover. Art Sabin is powder foreman.



VERSATILE RIG is composed of HD-18 crawler and Ingersoll-Rand drill, with shop-made flexible linkage in between. Two men sink a 13-ft. hole every 15 min.



SHOT BANK is easy loading for Northwest, but a bumpy proposition for traffic. This is almost the only spot on the 7-mi. job where old and new alignments interfere.



LEFT: Riding herd in Cow Canyon for the resident engineer is Dave Glenn (left), chief inspector. With him is Joe Neipling, on surveys. RIGHT: How to doze a cut—that's the talk between superintendent Al Sackett (right) and skinner Calvin Huber.



SUBDIVISIONS: Big construction in the West



Utilities: Digging ditches or grading streets, means —

Wide variety of equipment required

ENOUGH MAJOR EARTHMOVING has been completed for certain areas of the old 1,000-ac. Mills Estate, that the Trousdale Construction Co. has been able to award two contracts for the beginning of utility improvements. The first of these was for \$236,818, awarded to the E. T. Haas Co. of Belmont for work on Units 1 and 2. This contract takes in about 30 ac. of a proposed commercial area.

A second contract for \$766,620 has been awarded to The Lowrie Paving Co., Inc., of San Francisco, for improvements on Units 3 and 4. The area involved here covers over 200 ac. and will have future professional buildings, garden apartments, and a portion of the housing area.

Millions to be spent

Contracts have yet to be let on about 400 ac. of hillside improvements that will be entirely for homes and another 180 ac. that will be devoted to light industry. The two contracts so far awarded amount to over \$1,000,000 for about one-third of the entire area requiring improvements. Several millions will have been spent before full development is completed.

The first contract to Haas is nearing completion. It presents on a smaller scale the many items involved in the more recently let larger contract and for those of the future. Haas began work in August 1954.

Principal items on this first contract are as follows:

- 194,000 sq. ft. 6- and 5-in. crusher run base
- 194,000 sq. ft. 3- and 2-in. plant mixed surfacing
- 11,500 lin. ft. concrete curb and gutter
- 43,500 sq. ft. 4-in. sidewalk, 5 ft. wide
- 17,100 sq. ft. 6-in. thick driveways
- 2,400 lin. ft. 6- to 12-in. reinforced concrete storm sewer

PART 2 OF 4

4,300 lin. ft. 6- to 12-in. vitrified clay or cast iron pipe sanitary sewer
6,400 lin. ft. 6- to 12-in. cast iron water pipe

An additional 300 lin. ft. of large diameter storm sewer was jacked beneath a highway and railroad. Also, about 480 lin. ft. of 24-in. corrugated metal pipe was installed to house either water or sewer pipe that passed beneath the same obstructions.

The biggest item tackled first under the Haas contract was the instal-

lation of the storm sewers. These ran across the area being worked on in such a manner that other operations were tied up a great deal until they were completed. Jacking of the extension of the large sewers into other areas was carried on concurrently with the ditching and installation of the main sections.

Jacking large storm sewers

The method used for jacking was similar for both the 200 lin. ft. of concrete pipe and the 80 lin. ft. of corrugated pipe. A typical example for 60-in. diameter concrete pipe is as follows: A pit 10x25 by 15 ft. deep was necessary for efficient operating room. Guide rails of 4-in. diameter pipe, spaced about 2 ft. apart, were laid on well bedded timbers. The guide pipes were accurately placed for vertical and horizontal alignment of the 8-ft. sections of pipe. Material excavated from the pit was a well compacted dirt that allowed vertical cuts. However, as a safety precaution the banks were braced with 2x8 lumber and held in place with removable 4x4 cross braces. There was no ground water to contend with in the dry summer season.

Two initial sections of pipe were lowered onto the guide rails, followed by placing two 100-ton capacity Rodgers hydraulic jacks in position. These have a 30-in. ram travel and an internal cylinder diameter of 5 in. A hydraulic powered pump was driven by an 8.5-hp. air cooled engine.

Earth was excavated from the facing inside the pipe by two men using an air-operated hand spade. It was hand loaded into a 1½-cu. yd. wagon that was hand pushed on pipe rails out to the open pit and there picked up by crane and dumped. Accurate



FINE GRADING ditch for 72-in. storm drain handled by Cat D4 to within ½ in. of grade.



FOR EQUIPMENT in action at right, pilot hole is drilled with small drill. Larger 24-in. auger is pulled through pilot hole. Holding pieces is G. Mitchell, foreman.

excavation ahead of the pipe was obtained by holding a straight edge against the inside face of the concrete pipe.

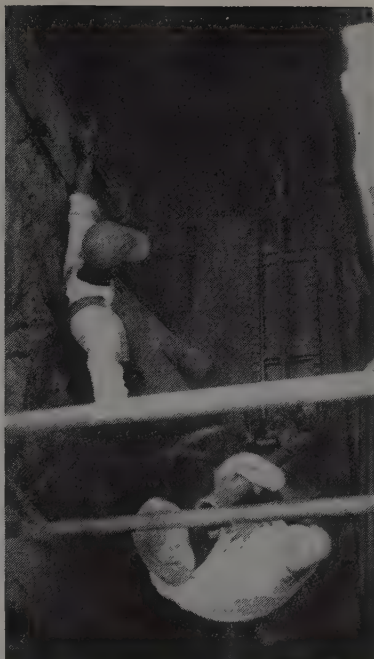
Normally, a distance of 4 ft. was excavated ahead of the leading edge of the pipe and then the pipe jacked ahead to close up the gap. The two jacks were braced against the back of the pit and pushed on an 8x8 timber that in turn rested against the pipe. About 8 ft. per day, or one pipe length, was the average advance. Pressures up to 40 tons were required in pushing the 50-ft. lengths through. The operating open pit was dug at one end only of the pipe. Other contracts would tie into the pipes where they came out on the far side of the road or railroad.

Air for the hand spade was furnished by any one of four wheel-mounted compressors used on the job. Additional use of the compressor starting battery was made by hooking wires to the battery terminals and using this power to light an ordinary automobile seal beam headlight for illumination in the tunnel.

Vertical cuts 15 ft. deep

Trenching for the larger pipe sizes (48- to 72-in. diameter) was done by either a Northwest or Bucyrus-Erie backhoe. Vertical cuts were obtained; trench bracing was necessary. As is commonly done elsewhere for the deeper cuts, a Cat D8 bulldozer cut a trench 3 to 4 ft. deep ahead of the backhoe to decrease the amount of excavation by that means. Fine grading in the trench was well handled by a Cat D4 bulldozer that brought the bottom to within 1/2 in. of grade or better. Hand grading was held to a minimum. Successive 8-ft. long sections of the pipe were lowered into position by a Northwest crane. Ordinary cement mortar joints were used.

Backfilling was required in 4-in. compacted layers on each side of the pipe until at least 1-ft. of cover over the pipe was obtained. Thereafter, the entire trench could be filled in 2-ft. layers and water jetted for compaction where the material was suitable and where none of the pipe lay



LEVERAGE IS APPLIED to pull 24-in. diameter auger under road. Power is from air tugger wrench. Water helps sluice dirt away.

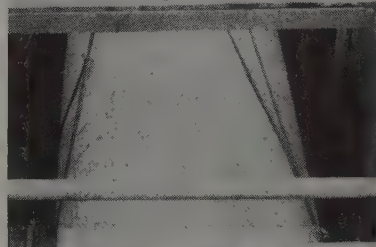
within the street right-of-way. Otherwise, the backfill above the pipe was backfilled in 1-ft. lifts and pneumatically tamped to 95% of the maximum standard AASHO density. Most of the backfilling required this pneumatic tamping.

A Cleveland trencher and a Buckeye trencher were used on the bulk of the remaining trenching for water, sewerage, and drain pipes. A Case tractor with backhoe attachment was used for miscellaneous small excavation where its digging depth of over 8 ft. came in handy. The relatively constricted area for installation of utilities plus the major trenches opened for the storm drains did not allow completion of any one item first, but rather a joint installation of all of them.

Drilling for 24 in. pipe

Both water and sewer pipes (10- to 12-in. diameter) were required to be installed beneath road and railroad tracks. These were encased by a 24-in. diameter corrugated metal culvert installed first by a drilling method. Two pits were dug, one on either side of the road or railroad. From one of the pits, a 1 1/2-in. diameter pilot hole was first drilled through to the other pit.

The equipment for this horizontal drilling consisted of an air-operated tugger wrench mounted on a frame that allowed its forward and backward movement over an 8-ft. distance. Pressure to force the drill forward was provided by a manually operated lever geared to the frame by a ratchet device. When the pilot hole was through, drilling of the larger



TWO 100-ton RODGERS hydraulic jacks press against first two sections of 60-in. drain to go under highway. Heavy timber is placed between jacks and pipe at later stages.

24-in. diameter hole was in the reverse direction of the pilot hole—that is, back toward the power source. An auger was attached to the drill pipe. Water forced through the pipe escaped through holes near the drilling face. This aided in flushing drilled material out and at the same time acted as a jet as the auger was pulled back. A small pump was necessary to remove the accumulating water in the pit. Upon completion of the



SHORING IS NECESSARY to hold large storm drain in place while small sewer pipe is laid in trench next to it.



PNEUMATIC COMPACTION of 1-ft. layers was necessary for most backfilling of trenches. Water jetting was used in good soils.



HAAS CONTRACT called for 2 mi. of curb and gutter such as is being finished here. Techkote membrane curing was used. Ditch to right is for underground electrolier conduit.

drilled hole, the corrugated metal pipe was pulled through with the use of a come-along jack.

Electrical all underground

The entire electrical system for the Mills Estate developed will be underground. It consists of power, telephone, electrolier, and fire alarm conduits. Suitable transformer enclosures, splice boxes, pull boxes, service boxes, and manholes have been designed for this system. Multiple conduit systems of the various types are used where possible and enclosed with a protective concrete jacket. The basis of measurement for payment is the distance along the centerline of this jacket.

Under the Haas contract, either precast concrete manholes or standard brick manholes could have been used. The precast type was chosen and have been installed with a minimum of difficulty.

Curbs, gutter, and sidewalk, as well

as all structural concrete have a minimum 6-sack content per cu. yd. A typical sidewalk is 5 ft. wide, 4 in. thick. Curb and gutter are poured first using wood forms in the case of Haas. Techkote membrane curing is being used.

Equipment List for E. T. Haas Co.

- 1—Northwest crane
- 1—Northwest backhoe
- 1—Bucyrus-Erie backhoe
- 1—Bucyrus-Erie Hydrocrane
- 1—Caterpillar D8 bulldozer
- 2—Caterpillar D4 bulldozers
- 1—Case tractor backhoe
- 1—Hough Payloader
- 1—Cleveland trencher
- 1—Gar Wood Buckeye trencher
- 2—Jaeger air compressors
- 1—Ingersoll-Rand air compressor
- 1—Chicago Pneumatic air compressor
- 2—Rodgers 100-ton hydraulic jacks
- 4—Homelite sump pumps

A high type asphaltic concrete road system is being installed. The subgrade is first scarified 6 in. deep, then bladed, wetted, and harrowed again. It is then rolled thoroughly with a 10-ton roller. For the main streets, a 6-in. crusher run base is used and 5-in. otherwise; maximum size of aggregate is 1½ in. Correspondingly, a 3-in. plant-mixed surfacing placed in two courses is laid on the main streets, and a single 2-in. course on the others. A prime coat of SC-1 is used and a Class "D" seal coat. Wilsey and Ham used the California State Highway as a basis and referral in drawing up the job specifications.

Race against winter rains

The Lowrie Paving Co. contract was awarded in early September this year. Major quantities here are:

- 933,800 sq. ft. 6- and 5-in. crusher run base
- 933,800 sq. ft. 3- and 2-in. plant-mixed surfacing
- 40,700 lin. ft. curb and gutter
- 198,300 sq. ft. 4-in. sidewalk, 5 ft. wide
- 15,800 sq. ft. 6-in. driveway
- 32,400 lin. ft. 4- to 12-in. vitrified clay sanitary sewer
- 28,150 lin. ft. 4- to 12-in. cement lined cast iron water pipe, Class 150
- 10,500 lin. ft. 12- to 72-in. reinforced concrete storm sewer

The specifications for this contract state that "Time is of the essence..." with certain work having priority. One aspect of this is the extension of the major storm sewers of the Haas contract. Major earth moving has removed the original creek beds at the base of the foothills that lie within the Lowrie contract. The storm sewers must be extended to the foothills to intercept the winter rain runoff. A present rapid rate of pipelaying is in progress, and no difficulty is anticipated.

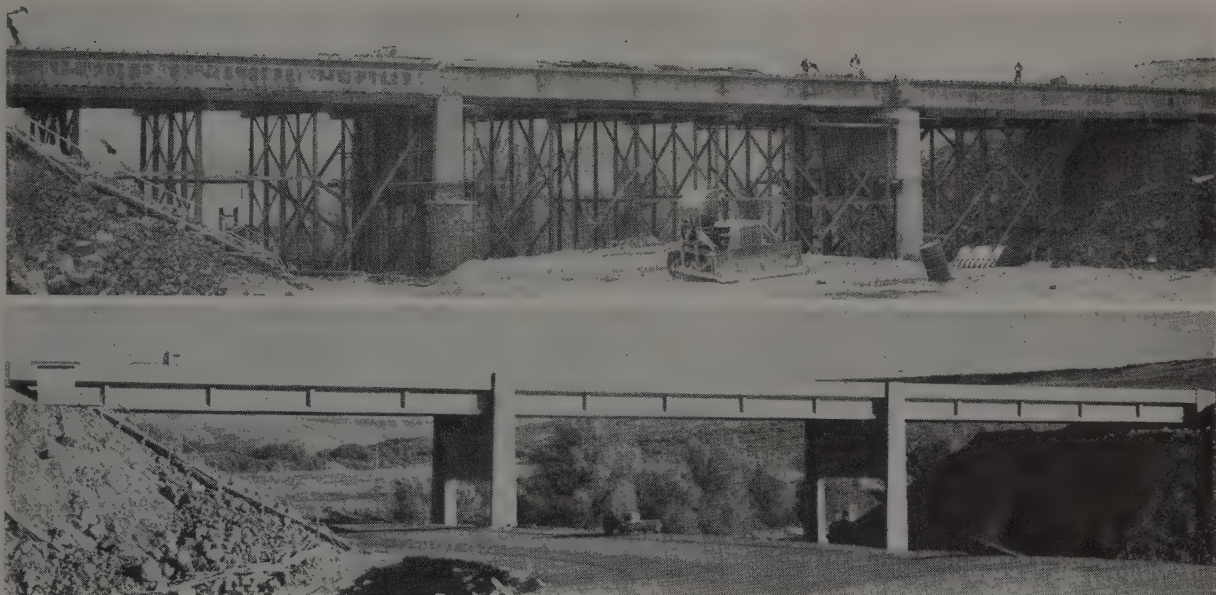
With the major drains out of the way, sewer pipe is laid next, followed by installation of water and electrical.

For both of the improvement contracts, all engineering is being provided by the firm of Wilsey & Ham for both line and grade control of utility location. This arrangement is the same as was described last month for the earthmoving phase of the development.

Personnel

Key personnel for the E. T. Haas Co. are W. Fairley, manager; Hugh McCreath, general superintendent; R. Taylor, purchasing and estimating; Jack Griffin, engineer; George Hillbun, carpenter foreman; D. E. Rosencrans, water and sanitary foreman; G. Mitchell, jacking foreman; R. Brown, storm drain foreman.

For The Lowrie Paving Co., Inc., C. E. Tiffany is manager of the Peninsula operations; D. Cronin, general superintendent; B. Mellor, project superintendent; J. Dovey, engineer, and M. Riedy, foreman.



A prestressed bridge in Oregon

Good design of simple span bridge allowed for foundation settlement. Contractor followed up with good method for forming and positioning the 51-ton beams

By T. G. THOMPSON

Structural Designer
Oregon State Highway Department

HAMILTON & THOMS of Eugene, contractor for the Oregon Highway Department's first prestressed bridge, chose to build falsework under all 15 beams for pour-in-place construction. This is but one of the many decisions the contractor had to make concerning the Willow Creek Bridge—located on the Columbia River Highway in Gilliam County.

The Willow Creek Bridge consists of three simple spans of 98 ft. each, making the structure 294 ft. center line-to-center line of end abutments. The bridge has a 30-ft. roadway, 1-ft. 6-in. safety curbs, and 1-ft. handrails, making the bridge 35 ft. out-to-out of rails.

The substructure consists of two piers approximately 65 and 70 ft. high and two end abutments on fill. Each pier consists of two T-shaped shafts on spread footings with a strut at mid-height and a heavy cross beam or cap at the top for the longitudinal beams to sit on. The abutments are made like cantilever retaining walls with the beam rocker sitting on the abutment footing.

The superstructure is similar for all three spans—all are simple spans consisting of five precast, prestressed concrete beams with poured-in-place deck and diaphragm sections between beams. The center span is

hinged at each end for rotation only, expansion being taken in the pier shafts. The end spans are hinged for rotation at the pier end and hinged for rotation and expansion at the abutment ends.

Advantages of simple spans

Simple spans were selected for this structure for two reasons. First, the approaches to the bridge are on a high fill which will settle. To found the abutments on solid material would require going down 60 to 65 ft. with piling. By using simple spans, the abutment footings could be placed on the fill as settlement of the end supports would not hurt the structure. The ends of the beams can be jacked up and rocker plates reset as required until the fill has stabilized.

Secondly, the structure, at its present elevation, may be covered by backwater from dams on the Columbia River. The simple beam spans can be jacked up to the required elevation, piers extended, new abutments built, and the beams set back down with a minimum of expense.

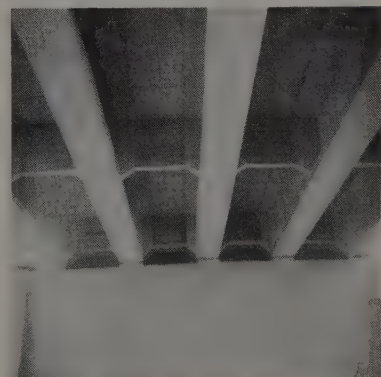
The structure was designed for H20-S16-44 loading using Oregon State Highway specifications. Discussion here will be limited to the superstructure since the substructure consists of conventional reinforced concrete and is of a typical nature. The superstructure, as previously stated, consists of five longitudinal

beams in each span. These beams are of the I-section as shown on these pages. The web is thickened at the ends to 2 ft. 2 in. to accommodate anchorages of the prestressing steel.

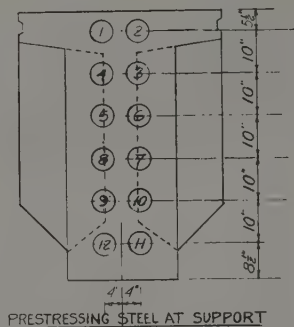
The precast type of beam was selected because of the room required at the ends of the beams for jacking the prestressing wires. This type also allows the contractor the greatest amount of re-use of beam forms and gives him several alternate methods of procedure. He could cast all the beams on the ground in a casting yard and then lift the beams into place; he could build falsework for one beam in each span and slide them into position after prestressing; or, he could build falsework for all the beams.

Contractor's forming problems

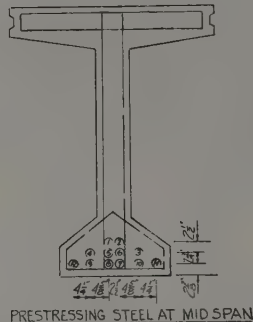
If the contractor chose to build falsework under all the beams, he could cast the beams of the end spans



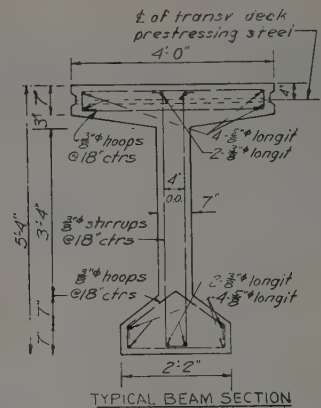
POURED-IN-PLACE section of the deck and the diaphragms are clearly visible between beams.



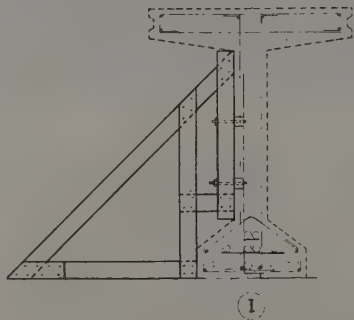
PRESTRESSING STEEL AT SUPPORT



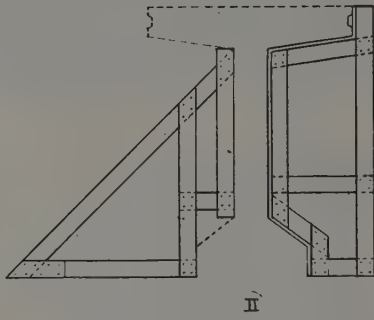
PRESTRESSING STEEL AT MID SPAN



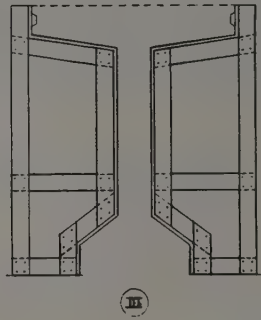
TYPICAL BEAM SECTION



I



II



III

PRESTRESSING STEEL cables indicated above are all Freyssinet. Longitudinal beam cables 1 and 2 are 12/0.196, 3 to 12 are 18/0.196. Each diaphragm is prestressed with two 18/0.196 cables. The deck is prestressed with fifty-six 12/0.196 cables.

BEAM FORMING procedure in lower part of picture is as follows: (1) reinforcing steel and prestressing cables are held in position by frames, (2) first side form is positioned and fastened to steel, (3) second side form positioned and bolted to first side form.

in position and cast the beams of the center span offset between the beams of the end spans. All beams could then be prestressed, and the beams of the center span moved into position. After all the longitudinal beams have been prestressed and placed in position, the deck and diaphragm section between the longitudinal beams would be poured and the structure prestressed transversely. Transverse prestressing was used to eliminate a complicated splicing system of the deck and diaphragm steel between the precast beams and the poured-in-place sections.

Final choice on framing

The contractor elected to build falsework under all the beams. He poured the beams in the two end spans in position and the beams in the center span offset between the beams of the end spans. The contractor considered setting up a casting yard and pouring all the beams on the ground or building falsework for one beam in each span and sliding the beams into position. By making comparative estimates of the different methods, the contractor came to the conclusion that the poured-in-place method was the best. Cost-wise, the casting yard might have a slight edge, but the contractor decided against it

because of the size of the beams (51 tons each) and the added risk in handling the beams.

If a minimum number of bottom forms were laid out, the beams would have to be lifted, after prestressing, and stock-piled and then again lifted into position. The contractor decided the falsework for a single beam in each span method would be too slow. It would be impossible to schedule the work to keep a crew working continuously. They could, with a single set of beam forms, pour a beam about every third day, but they couldn't prestress any beam until it developed its 28-day strength. This would limit them to a beam pour about every nine days. If there had been seven or eight spans, then a schedule might have been worked out so that the cycle would have been continuous.

Construction started with Pier No. 1. The left footing excavation was shallow and was left an open hole. Excavation for the right footing was 10 to 12 ft. and the hole was shored. Pier No. 2 was next, and the footings were about 40 ft. below existing ground line. The first eight feet were mass excavated, which brought the hole down to the original ground line. Individual holes for each footing were then excavated down about 15 ft. in the open and a timber cofferdam

set around the perimeter. A cofferdam of steel sheets was then set inside the first and driven down as the hole was excavated. At the final elevation, the hole was about 32 ft. below the bottom of the mass excavation. As the pier shafts went up, pile falsework for the beams was constructed, and the equipment was moved to the upper level for the rest of the construction. With the piers poured up to and including the cap, the abutment footings were then poured.

The contractor was now ready to start his beam pours.

The contractor had two sets of beam side forms made up, one set for the middle beam of each span and one set for all other beams. It was found that with slight modifications both sets could be used on any of the beams. With two sets of forms, the contractor could pour a beam about every day and a half. The sequence of operations was as follows:

1. Place all the prestressing steel and mild reinforcing in position on the bottom form.
2. Position and bolt together the side forms.
3. Pour the concrete.
4. Strip the forms.

When the forms were stripped from one beam, they were placed around the steel of the next beam,

The Engineer's Report

CASE HISTORY

Chevron Starting Fluid
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Fast starts save 50 man-hours each day!



WITH TEMPERATURES DOWN TO 20 BELOW ZERO for weeks, Chevron Starting Fluid speeds up starts of trucks, tractors and shovels at San Francisco Chemical Co.'s phosphate mine at Leefe, Wyoming. Winter temperatures here sometimes drop to 50 below zero, but even then Chevron Starting Fluid makes it possible to start both diesels and gasoline engines. According to Mr. P. S. Pugmire, General Superintendent, this occasionally saves the mine up to 50 man-hours a day—about 2 hours starting time for drivers of trucks and tractors, also time of other workmen who cannot begin work until equipment is operating. Chevron Starting Fluid is available in 1-pint cans and in 7- and 17-cc gelatin capsules. Your supplier also has the new Chevron Pressure Primer System using safe 9.9-cc pressurized steel bulbs which, when punctured, force priming fuel into air intake system, permitting instant ignition.

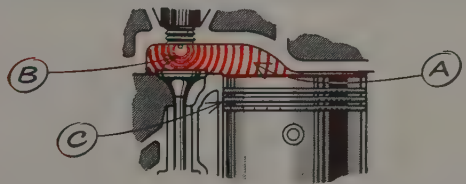
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JUST STARTING the stressing operation on one of the beams, the men are removing the formwork beneath the beam end to free it from any possible stresses resulting from beam camber prestressing.



WITH MANY HANDS in the same place at the same time, teamwork pays off on wedging the wires. Time is nearly constant on actual stressing, thus speed on setting up jack determines rate that work goes.



CABLES are in place followed by workmen placing steel on the support frames. Side forms will be fastened next to the near side.

which had been placed while the first beam was being poured and cured. To hold the beam steel in position before the forms were in place, the contractor had frames which were placed on 8 ft. centers at each cable support stirrup (See Figure 1). All steel was accurately held in position with the frames from one side. Side form was placed on the opposite side from the frames and bolted down (See Figure II). The steel was then tied to the side form and the frames removed. Second side form was positioned and bolted down (See Figure III). Pipe, $\frac{3}{4}$ -in. diameter, was placed inside the flexible conduit for transverse prestressing to keep conduit straight and from being collapsed. The beams were then ready to be poured.

On the first beam, the forms were sprayed with form oil, and considerable trouble was had in removing the forms. On the rest of the beams, the forms were greased with lard, and the forms were removed from the com-

pleted beam with very little difficulty. Some lard did adhere to the concrete which left stains that required steam cleaning to remove. Beam forms were made in panels about 10 ft. long, arranged so that diaphragm beams framed into the middle of a panel instead of at joint between panels.

Prestressing causes camber

Jacking of the prestressing steel in the longitudinal beams proceeded without incident until the outside beam in the center span that was shifted to the outside was stressed. A little less than three-fourths of the end bearing was over the pier cap with the rest on timber falsework. The cables were stressed and the weight of beam shifted to the ends as the beam took its camber from the prestressing force. As the bearing stresses at the ends increased, the beam took on a noticeable list to the outside. This condition was noticed before there was any danger of the beam tipping over and oak wedges driven under the beam to right it and the stressing was continued.

After all the beams had been stressed, the beams of the center span had to be moved into position. Hydraulic jacks were placed under the beams, one beam at a time, on the first falsework bent at each end. Screw jacks were placed on each side of the hydraulic jack and followed the beam up to prevent the beam from tipping. After the beam was jacked up, a $\frac{5}{8}$ -in. steel plate was placed on the pier cap, then a greased oak plank placed

on the plate under the beam, the beam lowered onto the plank, and the beam moved into position. The two beams that were moved to the outside had to be held back due to the crown of the cap. The other three beams were pulled into position with a hand winch at each end. After the beams were moved into position, they were again jacked up. The greased plank and steel plate were removed, and the lower hinge plates were tack welded to the upper plates which were anchored in the beams. Beams were lowered to the correct elevation, and the lower hinge plates were dry packed. Jacks were removed the following day.

Forms for the poured-in-place deck and diaphragm sections were framed up from the girder flanges. After the poured-in-place section had acquired its 28-day strength, the transverse prestressing was done.

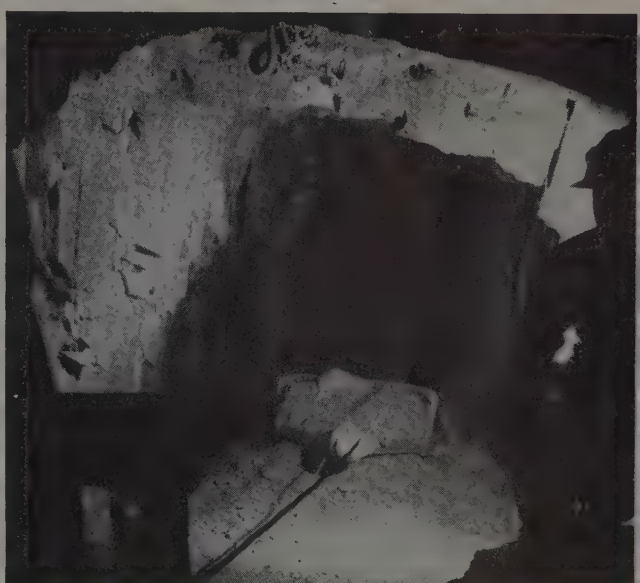
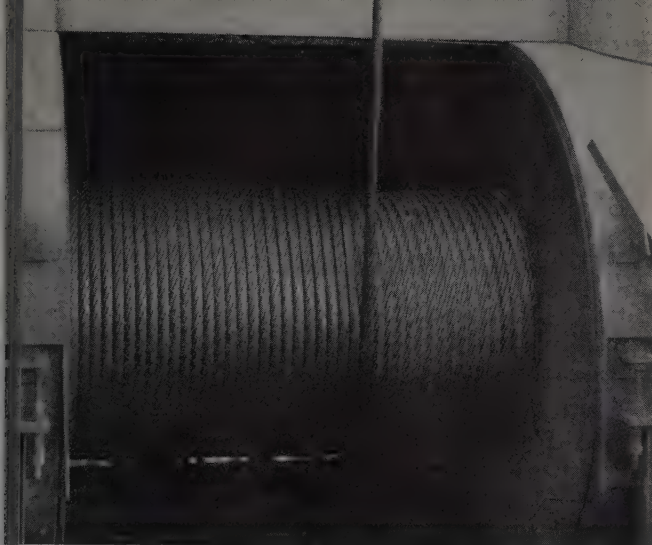
The contractor started construction on August 1, 1953, and completed construction on May 30, 1954. He had a crew working continuously except for two weeks of cold weather. The contractor batch mixed all the concrete at the job.

Personnel

The project was built under the general direction of R. H. Baldock, Oregon state highway engineer. The bridge was designed under G. S. Paxson, assistant state highway engineer, by S. H. Haagenson and T. G. Thompson of the bridge division. Construction was supervised by Harry Teel, resident engineer. Prestressing was supervised by Pierre Courouce of Freyssinet Co. Hamilton & Thoms of Eugene, Oregon, was the contractor. W. T. Peckham was the contractor's superintendent, and R. L. Facer was carpenter foreman. Prestressing wire was furnished by Intercontinental Equipment Co. of New York.

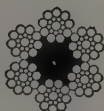
Equipment List

- 1— $\frac{3}{4}$ -cu. yd. Bucyrus Erie 20-B shovel
- 1—Caterpillar D6
- 1—Caterpillar D4 Tracavator
- 1— $1\frac{1}{2}$ -cu. yd. Scoopmobile
- 1—165 Rex mixer
- 1—Winslow Bin-N-Batch
- 1—Ingersoll-Rand 105 air compressor

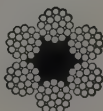


OVERCOMING ABRASION—Wire rope takes a beating on some jobs by abrasion. It is squeezed in multiple layers under tremendous pressure on rotary drilling drums in the Texas oil fields. In the Northwest it drags under heavy logs.

What can you do better with 6x19 Seale Red-Strand?



6 x 19 Seale



6 x 19 Filler Wire

In this Arizona mine it is scraped over rocks to operate a slusher. Everywhere it is rubbed severely on winches that do not wind smooth. Under such conditions Red-Strand 6 x 19 Seale wire rope will last longer and save you money.

6 x 19 Seale has the same strength and weight as the more frequently used 6 x 19 Filler Wire, but the arrangement and size of the wires is different. You can see in the diagrams that the outer wires are fewer in number and larger in size. They provide *high resistance to abrasion* and greater wearing quality with somewhat less flexibility.

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ARIZONA

PHOENIX SUBDIVISION—Alfred Andersen Construction Co. is completing the largest subdivision ever developed within Phoenix city limits. It covers 258 ac. and has 900 homes ranging in value from \$8,000 to \$16,000. The total investment is over \$10,000,000. The project was begun in 1948.

RECENT MAJOR CONTRACT AWARDS and low bids in Arizona include a low bid of \$171,593 submitted by the **Fisher Contracting Co.** of Phoenix for 4.2 mi. grading and surfacing on Route 10 in the Cocino National Forest. **B. L. Gustafson** of Phoenix submitted a low bid of \$150,697 for 35.2 mi. miscellaneous work on the Williams-Grand Canyon highway in Coconino County. **Peter Kiewit Sons' Co.** of Phoenix submitted a low bid of \$219,632 for 3.2 mi. grading and surfacing on Route 6 in Maricopa County.

CALIFORNIA

HIGHWAY PROJECTS totaling more than \$25,000,000 have been approved by the State Highway Com-

mission. Much of the money will be spent in Los Angeles, primarily on a \$5,500,000 8-lane freeway, and grading, paving and structures amounting to, over \$5,000,000 on the Ramona, Sepulveda and Harbor freeways.

CONGRESS has appropriated \$8,000,000 for a 678-bed addition to the Long Beach Veterans Administration Hospital. Construction officials and medical experts will work together to prepare the specifications for the building. It was estimated that final plans will be ready next spring with bids for construction to be invited by June 30, 1955.

SLY PARK DAM—The reservoir behind Sly Park Dam will begin filling with the coming rainy season. The earth-fill structure, to be 183 ft. high and 850 ft. long, is being built near Placerville as a unit of the Central Valley Project. Fredrickson & Watson hold the \$7,000,000 contract.

NEW RAIL LINE—Progress on California's newest rail line, the \$1,500,000 Burney, Shasta County, extension of the McCloud River Railroad is on schedule and completion is expected by late next spring. The line is being constructed to tap the forest reserves in the Burney Basin region.

THE LARGEST STEAM-ELECTRIC generating plant west of the

Mississippi River has been dedicated and put into service at Pittsburg, California, by PG&E. In addition to the \$75,000,000 investment in the generating station itself, the transmission lines and related facilities necessary to handle to 600,000 kw. the plant will produce cost \$5,000,000. Materials in the Pittsburg Steam Plant include 65,400 cu. yd. of concrete, 5,200 tons of reinforcing steel, 360,000 ft. of conduit and 3,100 ft. of wire and cable.

TOPPING OUT CEREMONIES were held atop the framework of the 26-story Equitable Life building in San Francisco as steel erection reached the uppermost level, just 118 days after the first steel column was put in place on May 24. Consolidated Western fabricated and erected 5,300 tons of columns, beams, and other sections for the building. The unique design of the structure places it within the requirements of the stringent earthquake building code adopted in 1948. The design involves the use of uniformly tapered columns and butterfly-shaped spandrel beams in the exterior walls up through the fourteenth floor.

The structure rests on 467 steel pilings which were driven to bed rock at an average depth of 132 ft. below street level. General contractor is Dinwiddie Construction Co.

THE CALIFORNIA MEDICAL FACILITY, the first correctional institution of its type, is nearing completion at Vacaville. The \$18,000,000 institution is being built under the direction of the State Division of Architecture for the Department of Corrections. The building is three stories high and has 11 wings extending from a main corridor. Prisoners with tuberculosis will occupy a large segment of the facility. To be located at the same site is the Northern Reception-Guidance Center presently housed at San Quentin Prison. The architecture division will advertise for bids for this project in January.

FOLSOM DAM is 85% complete, according to a report from the Corps of Engineers, and has reached the point where weather will not affect the work. The project will begin storing water during the winter and power production will be started in the spring. In the 1952 and 1953 winters work was interrupted when



ERECTION OF THE STEEL superstructure for the Freeway approach to the San Francisco Bay Bridge has been completed by Bethlehem Pacific crews. This unit recently won an American Institute of Steel Construction award for aesthetic design. The \$897,090 contract for the superstructure and decking is held by Eaton & Smith.

On the
West Virginia
Turnpike

a D7 with sideboom cuts rocks down to size!



For a tough job on the West Virginia Turnpike, Oman Construction Co., Nashville, Tenn., used a strong-armed Caterpillar team.

The job was to push up a 20-foot-high fill for an underpass. Rock was brought in at the rate of 275 loads a day. But specifications were rigid on the size of rock to be used in the fill.

So Oman put a 5000-pound weight on the sideboom of a pipe layer-equipped CAT* D7 Tractor to break rocks to required size. This is an example of the versatility of these units which can lift many tons with ease. Cat Pipe Layers are essentially mobile cranes which can get in and out of rough ground conditions while carrying loads. There are five models available with lifting capacities up to 83,600 pounds.

In addition to the D7 working with the sideboom unit, Oman had on the job seven DW21s, more than twenty D8s and three No. 12 Motor Graders.

Everywhere along the rugged, mountainous terrain of the 88-mile West Virginia Turnpike contractors had similar Caterpillar-built fleets.

Job-wise contractors know it makes sense to standardize

on Cat equipment. Not only do you have equipment that can handle a variety of jobs without costly down time, but operators and mechanics become familiar with one make. And, of course, you have the advantage of one-stop service from one dealer.

He's the man to see when you have important work coming up. He has field-proven equipment to fit any job. And he'll be happy to prove it—on your job.

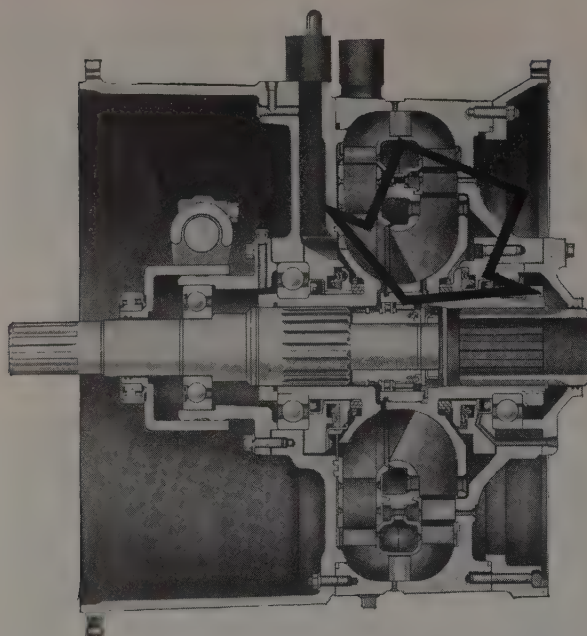
Caterpillar Tractor Co., San Leandro, Calif.;
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Twin Disc free-wheel locks impeller and turbine together to provide absorption of braking horsepower by the converter. In locking the impeller to the turbine, the free-wheel forces the truck's driving axle to turn the converter pump wheel—providing smooth, powerful Hydrodynamic Braking.

The Torque Converter with *Built-in Braking!*



This Dart Model 140 mining truck (above) climbs 15% grades with 22-ton payloads in one gear—comes back down without pedal-braking—by utilizing up-to-6:1 Converter Drive and built-in Hydrodynamic Braking of Twin Disc Model CF Three-Stage Truck-Type Torque Converter (shown above in cut-away). Request Bulletin 501.

complete control all the way down. And by combining built-in Hydrodynamic Braking with friction braking of the engine, Twin Disc offers maximum downhill retarding without shock-loading the transmission.

Add the powerful torque multiplication of Twin Disc Three-Stage design (up to 6:1 at stall, highest in the field) and you have virtual elimination of uphill shifting as well as of downhill pedal-braking . . . providing faster work-cycles with more payloads hauled per day—lower ton-mile costs—and savings on engine, tires, brakes, and drive-line components.

When you specify torque converters for your heavy-duty off-highway trucks, be sure to get the extra advantages of Twin Disc Three-Stage Truck-Type design, with built-in Hydrodynamic Braking at no extra cost.

Pioneered by the Twin Disc Clutch Company, Hydrodynamic Braking in the Model CF Torque Converter is actuated automatically when the operator lets up on the accelerator. No accessory equipment or additional cooling system for braking is required.

Here is the most effective Torque Converter downhill retarding ever developed . . . smooth, effortless braking that gives your operators



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

upstream cofferdams either were topped or broken and water swept into the construction area (**Western Construction**—Feb. 1953, p. 92; March 1953, p. 96). The \$65,000,000 contract is jointly held by Merritt-Chapman & Scott and the Savin Corp.

SHASTA ROAD—The highway commission has allocated \$2,700,000 for the construction of four miles of expressway on US Highway 99 in Shasta County. The project will include grading, surfacing, and installation of structures.

WATER SYSTEM improvements in San Fernando Valley will cost more than \$1,000,000, according to the Los Angeles Department of Water and Power. First on the construction schedule are two pumping plants, to be followed by an enlargement of MacLay reservoir to ten times its present capacity.

RECENT MAJOR CONTRACT AWARDS and low bids in California include a low bid of \$1,791,255 submitted by Gordon H. Ball & San Ramon Valley Land Co. of Danville for 8 mi. grading and paving and construction of five bridges in Tulare County. J. C. Boesflug Construction Co. of Los Angeles submitted a low bid of \$4,213,000 for construction of the Westchester High School in Los Angeles. Cen-Vi-Ro Corp. of Southgate submitted a low bid of \$1,376,755 for construction work on the Friant-Kern Canal of the Central Valley Project. Eichler Homes Co. of Palo Alto will construct a \$3,000,000 160-home tract in San Rafael.

Fredrickson & Watson Construction Co. and M. & K. Corp. of Oakland submitted a low bid of \$5,107,882 for 4.8 mi. grading and paving a 6-lane freeway on US 40 in Contra Costa County. Granite Construction Co. of Watsonville submitted a low bid of \$583,303 for construction of four bridges and approach ramps near Marysville. Harms Brothers of Sacramento submitted a low bid of \$556,629 for 7.3 mi. grading and surfacing on US 395 in Lassen County. Healy Tibbitts Construction Co. of San Francisco submitted a low bid of \$1,124,000 for installation of an out-fall sewer for Los Angeles County Sanitation Dist. No. 2.

Matich Brothers of Colton submitted a low bid of \$183,894 for 1.6 mi. grading and surfacing near Redlands, San Bernardino County. Stolte, Inc. of Oakland received a contract for construction of two steel truss bridges across the Feather River for access to Pacific Gas & Electric Co. projects. J. A. Thompson & Son of Inglewood submitted a low bid of \$374,511 for construction of a welded plate girder bridge overcrossing of the Harbor Freeway in Orange County and another low bid of \$258,-

NON-CORROSIVE



Part of a 13-mile installation of "Century" Pipe, Lakewood Water District, near Tacoma, Wash.

"CENTURY" PIPE

is made of asbestos fiber and portland cement—two practically indestructible materials. It cannot corrode. Therefore, the replacement and maintenance expense necessitated by corrosion and tuberculation, when some other types of pipe are used, is eliminated.

More and more tax-conscious communities are turning to low-cost "CENTURY" Pipe. We will gladly furnish information about its advantages in your specific operation. Write today.

QUALITIES THAT MAKE "CENTURY" PIPE ECONOMICAL, TROUBLE-FREE, LONG-LIVED

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"Century" Pipe meets the A.W.W.A., A.S.T.M. and Federal Specifications for asbestos-cement pressure pipe.

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995 for construction of four bridges and approaches in Banning, Riverside County. **Winston Bros. Co.** of Monrovia submitted a low bid of \$2,812,322 for 4.2 mi. grading and paving and construction of seven bridges on the Ramona Freeway in Los Angeles.

COLORADO

BOULDER BOOM CONTINUES

—Arrangements have been completed for construction of a \$1,000,000, eight-story office building in downtown Boulder. The structure will contain 6,000 sq. ft. of floor space and will be the tallest in town. The Colorado Insurance Group Building Inc. is the builder. The Denver-Boulder turnpike, plus government and business installations are credited with the rapid growth of the city.

RULING HITS DENVER — Denver was dealt a surprising blow by the state supreme court when a vote of 4 to 3 denied them 177,000 ac. ft. of water from the Blue River. Earl Mosley, manager of the Denver water system, said "With no new water, we'll have to halt the metropolitan area's growth and expansion by 1963." Del E. Webb may drop plans for a 6,000 home development costing \$100,000,000 because of the ruling. Colorado Springs was refused 15,000 ac. ft. from the Blue River by the same court action. City officials were expected to file for a rehearing of the case. It was not immediately clear whether any other water sources are available.

THE WORST DROUTH in history is facing Colorado with water storage at 40% of normal. It is estimated that two abnormally wet winters would be necessary to relieve the shortage. Denver, with its municipal reservoirs at their lowest level since 1936, is enforcing strict water sprinkling regulations. In addition, the city water

board authorized a cloud seeding program in an attempt to step up precipitation.

RECENT MAJOR CONTRACT AWARDS and low bids in Colorado include a \$1,000,000 award to **Jack H. Cys Construction Co.** of Denver for construction of an 8-story office building in Denver.

IDAHO

THE IDAHO HIGHWAY COMMISSION has announced a 1955 construction budget calling for 43 primary system projects at a cost of \$15,122,000 and 20 secondary projects costing \$6,034,000. Chairman Roscoe C. Rich said it was "the most energetic highway construction program ever announced by the department." The budget lists work on 197 mi. and 22 bridges on the primary system and 146 and 12 bridges on the secondary system. Rich said the budget was made possible by increased federal aid.

FERTILIZER PLANT — Jefferson Lake Sulphur Co. has announced that it will build a plant costing \$3,000,000 in southeastern Idaho to manufacture fertilizer from the area's phosphate beds. Engineering is nearly complete and construction is scheduled to begin early in 1955. The project will take 10 months to complete. Several sites are under consideration, and exploration of water and power resources is under way.

RECENT MAJOR CONTRACT AWARDS and low bids in Idaho include a low bid of \$258,045 submitted by **Curtis Construction Co.** of Spokane for 11.2 mi. grading on the Priest River road in Bonner County. **Eagle Construction Co.** of Boise received a \$374,224 award for 2.8 mi. surfacing and construction of two bridges on US 30 in Elmore County.

Fife Construction Co. of Brigham City submitted a low bid of \$535,973 for 18.3 mi. surfacing and construction of four concrete bridges in Lemhi County.

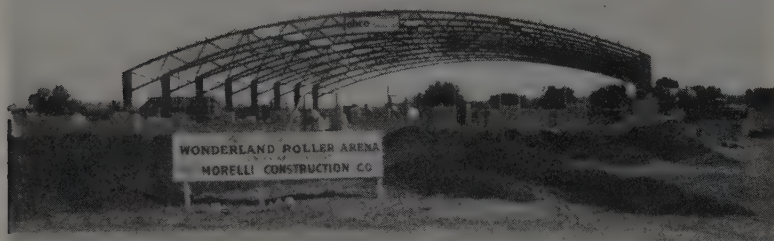
Miller & Strong, Inc., of Eugene submitted a low bid of \$151,340 for 2.4 mi. grading of the Lewis & Clark highway, Flathead County, and another low bid of \$236,241 for 3.8 mi. grading and paving 20 mi. north of McCall. **Morrison-Knudsen Co., Inc.**, of Boise submitted a low bid of \$208,283 for shoulder stabilization at Mountain Home AFB and received a \$561,884 award for 12.3 mi. of road construction on US 93 in Blaine County. **Carl E. Nelson Construction Co.** of Logan received a \$237,075 award for grading and surfacing and construction of three bridges near Jerome. **Osberg Construction Co.** of Seattle received a \$179,255 award for levee repairs at 17 locations along the Kootenai River.

MONTANA

ACCESS ROADS in Kootenai National Forest are being rushed to completion because of the necessity of harvesting infected spruce in the area. It is expected that 70 mi. of road will be completed this season. The roads, begun last fall, are being built at a cost of \$1,886,000 from funds appropriated by Congress. Average cost per mile including supervisory and administrative expenses has run about \$26,900 in the difficult mountain terrain.

FOUNDATION, FLOOR, and wall concrete placement in the construction of the Anaconda Aluminum Co. plant 2 mi. east of Columbia Falls is 80% complete. Concrete placement averaged 500 cu. yd. a day during September. Erection of 12,000 tons of structural steel in the plant is two-thirds complete. The contract is held by American Bridge division of U. S. Steel Corp. and Vinnell, Inc.

RECENT MAJOR CONTRACT AWARDS and low bids in Montana include a low bid of \$218,969 for 7.5 mi. grading and surfacing on the Livingston-Big Timber road, Park and Sweet counties. **Clifton & Applegate** of Yardley submitted a low bid of \$193,759 for 1.9 mi. grading and surfacing in Flathead County and another low bid of \$189,894 for construction of a 482-ft. steel and concrete overpass and approaches in Mineral County. **England & Roth Construction Co.** of Rapid City submitted a low bid of \$680,303 for grading and draining on the Grassrange-Malta road, Fergus County. **Albert Lalonde Co.** of Sidney submitted a low bid of \$516,303 for grading and surfacing 13.7 mi. in Teton County.



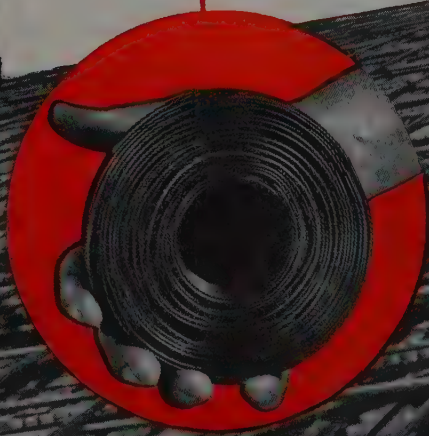
THIS STRUCTURE is being built in Fresno, California, by Morelli Construction Co. at a cost of \$125,000. The arched rigid frames, fabricated by Abco Steel Co., are highly competitive with bowstring trusses. Since the ceiling in this building will be omitted the frames were chosen for their better appearance.

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■ Using CAL-TIE Wire in the aluminum reel dispenser makes the job of tying re-bars safe and easy. There are no heavy shoulder coils to be carried and no free ends to snag in the work or tangle underfoot. CAL-TIE Wire and the reel fit conveniently on the belt and together weigh only seven pounds. They end the wasteful practice of throwing away odd lengths of wire, too.

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The contractor on this job really saved by erecting shoring units with standard Ezebilt steel-panel Scaffold-for-Shoring, then mounted them on adjustable screwjacks (with casters) like this—



After the first concrete slab was poured, (at 21-ft. height) the entire shore-unit was lowered on the casters, then rolled on to the next bay—with the forms intact!



One rolling rig shored 4 slabs, —no tearing-down and re-erecting shoring —no re-handling or re-setting forms—and, Gravity-Lock's "no bolts to master", gave faster, cheaper erection. *You can save on any shoring job with Universal 'Scaffold-for-Shoring', then use the same Panels for your masonry work.*

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PHONE: CApitol 2136

NEVADA

CHILCOTT TUNNEL, on the Western Pacific railroad at Beckwourth Pass, is getting a new fire-proof lining. A temporary concrete plant was built to provide material for the lining. Started in 1953, and now almost complete, the project is costing about \$2,000,000.

RENO HOTEL—A building permit has been issued a corporation headed by William Moore for a 300-room hotel to be built west of Reno. The \$1,021 permit fee for the \$4,000,000 hotel was the largest ever paid in Washoe County.

RECENT MAJOR CONTRACT AWARDS and low bids in Nevada include a \$280,291 award to **Silver State Construction Co.** of Fallon for road construction north of Lovelock, Pershing County. **Thorn Construction Co.** of Springville received a \$1,158,539 award for 9 mi. of road construction that will bypass Bunkerville.

NEW MEXICO

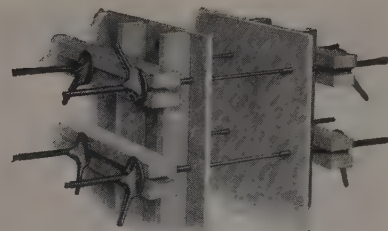
THE 1954 EDITION of Standard Specifications for Road and Bridge Construction is being distributed by the New Mexico Highway Department. The specifications, which will be incorporated into new projects, are contained in a book of 382 pages. The various items of highway construction are more thoroughly covered than in past editions.

NEW PRISON—The new state penitentiary near Santa Fe will cost \$7,000,000 when ready for occupancy, according to architect W. C. Kruger. Foundations are finished and the next phase of the project, which includes fence, towers, armory, utilities, and sewage system will be let to contract soon. Prisoners will move into the prison late in 1955.

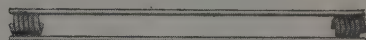
RECENT MAJOR CONTRACT AWARDS and low bids in New Mexico include a \$695,301 award to **Brown Construction Co.** of Albuquerque for grading and paving on SR 422 in Sandoval County. **Daniels Construction Co.** of Albuquerque received a \$683,288 award for 5.4 mi. grading and paving US 550 in San Juan County. **Lowdermilk Brothers** of Espanola received a \$242,066 award for 5.6 mi. grading and paving on SR 38 in Taos County and a \$362,761 award for 7.4 mi. grading and paving SR 121 in Mora County. **Henry Thygesen & Co.** of Albuquerque received a \$342,967 award for 2.7 mi. grading and paving near Santa Fe.

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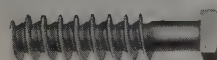
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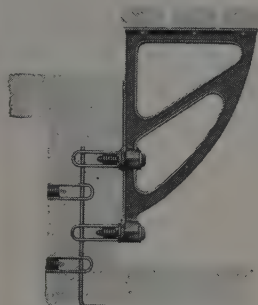
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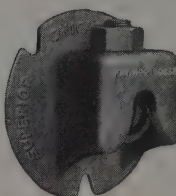
RISERFRAMES



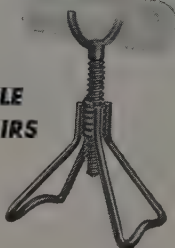
PANEL LOCK BOLTS



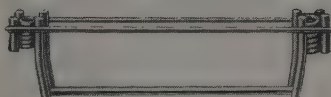
ROD CLAMPS



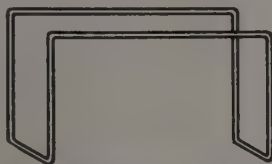
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OREGON

LOGGING TRUCKS have commenced hauling timber for the reservoir area at PGE's Timothy Meadows dam. The access road is 8½-mi. long and cost \$500,000. Land cleared to date represents 25% of 1,400 ac. in the reservoir area. The dam will be of earth-fill construction and when completed will be 100 ft. high, 725 ft. long and 40 ft. thick at the top, with a base width of 600 ft. Morrison-Knudsen is general contractor on the project, scheduled for completion in October 1955.

COUGAR DAM on the McKenzie River will cost \$37,000,000, according to the Portland District, Army Corps of Engineers. Planning for the structure is getting under way. Cougar Dam is proposed as a rock-fill type embankment 1,630 ft. long with a maximum height of 445 ft. Five years would be required for construction.

PHASE II construction of The Dalles Dam will cost more than \$10,000,000, according to Col. J. U. Moorhead, Portland district engineer. The work includes construction of the non-overflow dam between the spillway dam and the powerhouse; the fishway entrance and channel between the spillway and the powerhouse; the fishlock and approaches, and superstructure. The completed cost of the dam, which will begin to operate in 1957, will be \$303,000,000. Some of the contractors on this project are S. A. Healy Co., Guy F. Atkinson Co., Ostrander Construction Co., Donovan Construction Co., and The Dalles Powerhouse Constructors, a group of eight mid-west firms.

THE CONSULTING FIRM of Cornell, Howland, Hayes & Merryfield has been selected to do the bulk of the engineering for Eugene's Water & Electric Board in connection with a proposed hydroelectric development on the headwaters of the McKenzie River. The project, named Beaver Marsh, involves the construction of two dams, one 50 ft. high and 800 ft. long, the other 7 ft. high and 80 ft. long. Estimated cost is \$7,000,000. An application for a license has been filed with the Federal Power Commission.

RECENT MAJOR CONTRACT AWARDS and low bids in Oregon include a low bid of \$247,205 submitted by the Cedar Creek Logging Co. of Sweet Home for 5.8 mi. of grading 22 mi. northeast of Sweet Home in Linn County. J. C. Compton Co. of McMinnville received a \$624,787 award for grading and paving on the Oregon Coast highway in Lincoln County. Durbin Bros. of Eugene

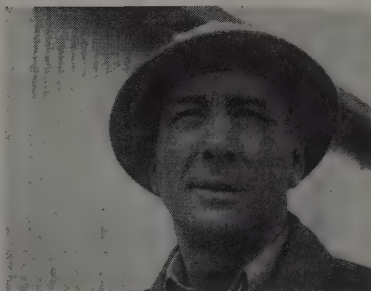


These four Washington Whirley cranes work 'round the clock on The Dalles Dam being built by The Dalles Powerhouse Constructors on the Columbia River. Tiger Brand ropes on these cranes are all in good condition after several months of hard service.

Tiger Brand helps cut costs on The Dalles Dam!



Load lines on the cranes are $\frac{7}{8}$ " Tiger Brand Wire Rope. This one carries $9\frac{1}{2}$ tons of concrete per load. Booms are 150 feet, with an 85-foot gantry and 75 tons of counterweight.



C. W. Bingham, Rigger Supt., says, "I know that the combination of good maintenance and a top-quality rope like Tiger Brand gives me much longer trouble-free service, cuts down costs".

To cut costs on your construction operation, rely on tough American Tiger Brand Wire Rope.

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UNITED STATES STEEL



Fuel line nears completion in Alaska

PIPELINE CREWS working on the final portion of the Haines-to-Fairbanks pipeline have moved to within 10 mi. of Haines. In less than six months two crews, one operating in Alaska and one in Canada, have welded virtually all of the steel pipeline. It is scheduled to be completed and ready for use by the military in September 1955.

In addition to the pipeline, the \$29,000,000 project includes construction of a dock at Haines, pumping sta-

tions, storage and housing facilities. The pipeline is being built under Army Corps of Engineers supervision by a group of Canadian and American firms including Williams Brothers, McLaughlin, Inc., and Marwell Construction Co. Clearing for the 620-mi. long line began last winter as a 50-ft. right-of-way was cut across the frozen tundra. Williams Brothers fabricated a special trencher for use on the frozen soil. Welding began in April.

submitted a low bid of \$222,037 for 10 mi. grading in Lane County. **General Construction Co.** of Portland submitted a low bid of \$413,777 for reposting under Pier 2, Terminal 4, Portland. **Lee Hoffman** of Beaverton submitted a low bid of \$172,921 for paving and construction of one bridge on Pacific West highway in Multnomah County.

Hamilton & Thoms of Eugene submitted a low bid of \$157,410 for construction of four bridges on the Portland-Salem Expressway in Marion County. **Roy L. Houck & Son** of Salem submitted a low bid of \$341,441 for grading and paving on the Pacific East highway in Marion County. **Peter Kiewit Sons' Co.** of Longview received a \$723,731 award for 8.4 mi. grading on the Coast highway in Curry County. **Kuckenburg Construction Co.** of Portland submitted a low bid of \$620,567 for grading and surfacing on Pacific highway in Douglas County.

Tom Lillebo of Reedsport submitted a low bid of \$153,472 for construction of six structures on Pacific highway in Lane County. **Henry M. Mason Co.** of Portland submitted a low bid of \$1,010,310 for construction of a service center for General Electric Co. in Portland. **Rogers Construction Co.** of Portland received a

\$431,215 award for paving on the Old Oregon trail in Umatilla County. **Warren Northwest, Inc.**, of Portland submitted a low bid of \$208,205 for paving in Klamath County. **Porter W. Yett** of Portland submitted a low bid of \$294,286 for grading and paving on the Beaverton-Hillsdale highway, Washington County.

UTAH

SUBDIVISION—Officials of Cannon-Papanikolas Construction Co. and Holmes & Jensen said 300 modern residences will be built in Salt Lake at a cost of \$5,000,000. Cannon-Papanikolas will build a revised edition of their national award winning Holladay house and the new Mt. Olympus house. Holmes & Jensen will construct an enlarged edition of their prize winning "storage wall" house. The homes will be situated on lots 85 x 130 ft.

GROUNDBREAKING ceremonies were to take place soon at the site of the new \$1,000,000 men's dormitory at the University of Utah. The dormitory will contain 300 sleeping units, study facilities and a cafeteria.

RECENT MAJOR CONTRACT AWARDS and low bids in Utah include a low bid of \$3,877,500 submitted by **Plewe Construction Co.** of Salt Lake City for construction of a high school in Provo.

WASHINGTON

PRIEST RAPIDS PERMIT—The Federal Power Commission has issued to Grant County public utility district the long-sought preliminary permit to do engineering on the Priest Rapids power project. The issuance ended the fight which began in July 1954 when the Washington state power commission in a surprise move filed its application for a preliminary permit. The permit authorizes engineering investigation, not actual construction. The project would have initial generating capacity in excess of 1,000,000 kw.

BOX CANYON PROGRESS—The excavation of the upstream apron at Box Canyon Dam (**Western Construction**—Oct. 1954, p. 63-67) is practically complete and the two upstream rows of sheet piling will probably be driven by the time this appears in print. As soon as the extreme upstream row is driven concrete pouring will start in that area, which is practically a dry hole. Excavation is also proceeding for the arch foundations in both abutments. "All unknowns have been uncovered, all design problems have been solved," say engineers H. A. and J. A. Sewell. Morrison-Knudsen holds the \$10,000,000 contract.

KENNEWICK DIVISION of the 500,000-ac. Yakima Project is 44% complete, according to Wilfred Karer, construction engineer for the Bureau of Reclamation. Water for irrigation from the \$13,000,000 development is expected in 1956. The job started in 1952.

GORGE HIGH DAM BIDDING RESET—Bids for construction of the \$17,000,000 Gorge High Dam Project, including a highway and two bridges, were to be opened December 1 by the Seattle Board of Public Works. Bids were originally scheduled to be opened October 6, but this was delayed to October 20, then November 10 and finally December 1. This final date was considered definite. Plans for the 150-ft. high gravity dam were prepared by J. L. Savidge, consulting engineer.

STUDY OF THE PROPOSED Pend Oreille River power development will begin soon. The Seattle City Council has approved a request for \$300,000 for engineering studies of the project. The Board of Public



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Works has authorized the hiring of consultants to make the study.

THE STATE FINANCE COMMITTEE has authorized the issuance of \$13,000,000 in bonds for the Washington emergency school construction fund. The legislature authorized expenditure of \$20,000,000 for the school construction.

RECENT MAJOR CONTRACT AWARDS and low bids in Washington include a \$281,926 award to **Erland & Bickle** of Portland for 2.8 mi. grading and surfacing on SR 12 in Wahkiakum County. **Hugh Govan** submitted a low bid of \$893,180 for 6.9 mi. grading in Olympic National Park. **Henry Hagman** of Cashmere received a \$165,170 award for construction of a grade separation structure in Spokane County.

George B. Henly of Yakima submitted a low bid of \$580,327 for construction of the Naylor siphon, Block 89, Columbia Basin Project. **John P. Hopkins Co.** of Mercer Island submitted a low bid of \$392,169 for construction of a guided missile site at Olalla. **Herman Kathman** of Seattle received a \$422,063 award for 4.5 mi. grading and paving near Kirkland, King County. **Peter Kiewit Sons' Co.** of Longview received a \$665,982 award for construction of the 1st Ave. South bridge and approaches in King County.

Rogers Construction Co. of Portland received a \$268,466 award for grading and paving on the Warm Springs highway in Jefferson County. **Ray Weist** of Yakima received a \$215,748 award for grading and surfacing on SH 3 in Columbia and Garfield counties. **Wilder Construction Co.** of Bellingham received a \$190,503 award for 4.2 mi. grading and surfacing in Island County. **Wick Construction Co.** and **Dahlgren Construction Co.** of Seattle submitted a low bid of \$3,983,010 for construction of 10 barracks and one messhall at Fort Lewis.

WYOMING

MAJOR CONSTRUCTION on the \$52,000,000 Glendo dam will begin in the spring, according to officials of the Bureau of Reclamation. Despite hopes of other Wyoming towns, the construction camp will be located in the town of Glendo. The population of 215 is expected to triple. The project will take seven years to complete.

CONSTRUCTION IN CHEYENNE skyrocketed to near \$1,400,000 during September. City Engineer R. C. Kay said the figure was made up almost entirely of private construction. Excluding the month when a \$1,000,000 permit was issued for the state office building, September saw

the biggest boom ever experienced in Cheyenne.

RECENT MAJOR CONTRACT AWARDS and low bids in Wyoming include a \$336,198 award to **S. Birch & Sons Construction Co.** of Great Falls for 3.5 mi. grading and surfacing on the Rawlins-Medicine Bow road in Carbon County. **England & Roth Construction Co.** of Rapid City received a \$208,208 award for 8 mi. grading and surfacing on the Gillette-Broadus road in Campbell County. **Inland Construction Co.** of Omaha received a \$529,429 award for 2.9 mi. grading and surfacing of the Thermopolis-Shoshoni road in Fremont and Hot Springs counties. **Mullinix Engineering Co.** of Sheridan received a \$207,471 award for 9 mi. grading and surfacing on the South Fork road in Park County.

ALASKA

CONTRACTORS interested in proposed construction which will run into several million dollars for military installations at the isolated points of Galena and Naknek were advised to visit the sites before winter closed in. Invitations to bid on these two projects are to be issued late in December or early in January. Construction will consist of pipelaying, utilities, and structures, to be lumped under one contract for each of the two projects.

RECENT MAJOR CONTRACT AWARDS and low bids in Alaska include a \$689,285 award to **Chris Berg, Inc.**, of Seattle for completion of alert hangars at Elmendorf and Ladd AFB. **Keil & Peterman** of Juneau submitted a low bid of \$731,368 for 4.4 mi. grading and construction of a steel bridge in Tongass National Forest. **Peter Kiewit Sons' Co.** of Seattle received a \$1,353,170 award for construction of a steel pipe water system in Fairbanks. **Manson & Osberg** of Seattle submitted a low bid of \$384,715 for 3 mi. grading on the Sitka highway. **Pacific Alaska Contractors, Inc.**, of Portland received a \$696,517 award for grading and paving and construction of utilities for family housing at Anchorage. **W. L. Wilson** of Anchorage submitted a low bid of \$145,481 for construction of sewers in Anchorage.

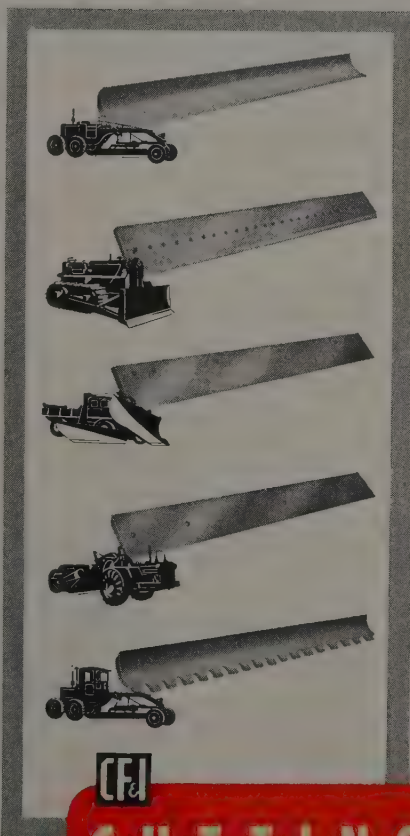
Here and There

DUN AND BRADSTREET, in a recent report, discussed some of the prime factors in the collapse of 1,028 construction companies in the nation in 1954. "Nine times out of ten, a failure can be traced directly to lack of experience or lack of aptitude for running a business," said the report.

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2653

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

OIL IN ALASKA'S FUTURE—Hopeful Alaskans are beginning to place their chips on oil possibilities. Interest in the territory's oil potential is greater now than at any period in history. Eight major companies now are actively interested in seeking out vast petroleum resources believed to be underlying parts of the territory. Expenditures on explorations and surveys are running into the millions of dollars. There is one hitch. Nobody so far has struck a gusher. When and if they do, interest in Alaska oil will increase a hundred-fold.

OIL AND ALASKA ECONOMY—Discovery of oil in Alaska would have a stimulating effect on the economy, now largely dependent on seasonal industry and tapering-off defense construction. Alaskan leaders for a long time have been hoping that some stable industry such as oil would take the squeeze off the economy. Many of these leaders are more than a little concerned about the fact that the curve of defense construction in Alaska is a sharply-decending one. They are afraid that when this prop to the economy is removed it would have a damaging effect on the over-all growth and progress of the territory which has enjoyed boom conditions for more than two decades.

OIL AND CONSTRUCTION—What does the immense interest in Alaska's petroleum development mean to the construction industry? Once active development of Alaska oil fields gets under way, need for major construction projects, including housing, pipelines, roads, and bridges would be stimulated immeasurably. Construction firms now doing business in Alaska would have a sizable stake in such ventures. They would be called on, no doubt on a contract basis, to build facilities to permit oil development in areas now remote and inaccessible. Even at present there has been an increase in the volume of construction work at several sites. And while these are small contracts, they are a portent of the big jobs to come when gushers begin to spout.

OIL AND JOBS—What would an Alaskan oil boom mean to the average construction worker? As a construction worker you could expect a greater demand for your services should the oil picture change from potential to actual. Whatever your skill you could expect employment

for a long period of time at top wages. Incidentally, you would be confronted with rugged conditions at untamed wilderness outposts and the rigors of Alaskan weather. A word of caution. Don't expect an Alaska oil field job to materialize right away. Work now going on is primarily exploratory and major oil firms have so far hired only small crews of highly-skilled technicians including geologists, most of whom were already on the payroll.

URANIUM RUSH—Alaska's legendary bearded prospector, equipped with pack-sack and gold pan, seems to be vanishing from the scene. In his place is a new type of stamper, armed with Geiger counter and a geology degree from a stateside university. The new-fangled uranium prospector has captured the imagination of Alaska's press, which in the past month has devoted countless headlines to his exploits. Most of the excitement was generated by discovery of a new potential uranium area 110 air miles northwest of Anchorage at Shirley Lake. More than 32 claims were filed at this location and for a time a tent city was in existence on the banks of the lake. Until the tents disappeared it was known as "Uranium City."

URANIUM OR NOT?—The question of whether the rugged wilderness northwest of Anchorage actually contains a fabulous uranium treasure is uppermost in the minds of many Alaskans. The question is answered by Territorial Commissioner of Mines, Phil Holdsworth, with another question, "Who Knows?." Holdsworth said, "Only diamond drilling in the Shirley Lake area could tell the true story about the quantity and quality of radioactive minerals there. He said that specimens of ore from Shirley Lake have been sent to the mining laboratory at the University of Alaska for analysis. So far, results of the test are not available. Holdsworth revealed that claims have been filed on two other areas within the Territory but stated he was not permitted to disclose their vicinities. It goes without saying that discovery of uranium in any sizable amount would have the same happy effect on construction in Alaska as would discovery of oil.

BANANA BELT—Weather conditions in southwestern Alaska during most of October and early November have been a source of amazement to construction men. Delighted con-

tractors who had not pulled up stakes because of the onset of winter weather found that outside construction could continue through the entire month, thanks to the weather man. Both outside and inside work was progressing without interruption on a big hospital project at Elmendorf AFB near Anchorage. In downtown Anchorage construction crews were pouring curbs and gutters and many of the men were working in shirtsleeves as late as November 3. It was an unusual spell of "banana belt" weather highly favorable for construction purposes. Reports from the bush country tell of moose going back into the hills and of streams swelling because of sudden thawing of partially frozen lakes. One Kenai trapper reported he saw a flock of wild geese flying over his sourdough cabin in a northerly direction when they should have been going south.

PIPELINE PROGRESS—In less than six months two pipeline crews—one operating in Alaska and the other in Canada—have welded 620 mi. of steel pipeline across rugged terrain. They have constructed several huge tanks along the line to store and control flow of various fuels from the Pacific seaport of Haines to the terminal in Fairbanks. The gigantic construction project is scheduled for completion and use by the military by September of next year. Colonel L. H. Foote, North Pacific engineer for the Army Corps of Engineers, recently made a tour of the entire project. Colonel Foote said, "The Haines-Fairbanks pipeline is a feat which will go down in history as a memorial to the ingenuity and daring of the construction industry in the Arctic."

PIPELINE LESSONS—Nuggets of knowledge concerning Arctic construction methods, which northern contractors learn sooner or later, were brought home with telling force to engineers and construction men on the Haines-Fairbanks pipeline during the past year. They learned for example, that Arctic muskeg forms natural insulation for a tremendous ice field which undelies it and much of the northern terrain. They found that heavy construction equipment, churning up this natural insulation during the long hours of Arctic sunlight, can soon turn a completely dry area into a seemingly bottomless swamp. In this swamp, big dirt-movers at times wallow helplessly like prehistoric animals. In some cases equipment has sunk completely from sight never to be recovered from this strange northern "quicksand." Construction men learned of other hazards too, such as the vampire-like bite of king-sized Arctic mosquitoes and an invisible insect aptly known as "no-see-ums" whose bite is severe enough to swell exposed portions of the body to twice the normal size.

New

MOBILE BATCHING PLANT FOR CONCRETE CONSTRUCTION



The photo below shows the Noble-Mobile Batching Plant ready for transporting between jobs. The compressor, motor control panel board, and batching controls are an integral part of the unit which is moved intact. The trailer dolly is a part of the unit and is within legal limits, without special permit, for travel on highways in most states. The cement elevator and cement receiving hopper, weigh hopper and conveyor section are hauled on a standard flatbed truck or trailer. Assembly and take-down at jobsite is a very simple operation.

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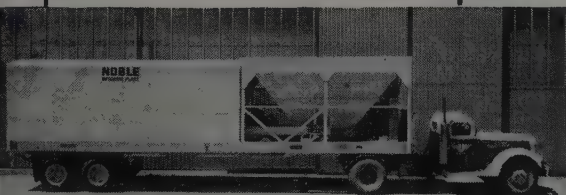
shown in operation, batching concrete right on the job, for a large housing project.

The Mobile Batching Plant is a complete plant in every detail. It features the standard Noble semi-automatic cement and aggregate batching system.

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DEATHS

Clarence Moriarty, well-known civil engineer in Alaska, died Oct. 14 at Ketchikan General Hospital. Moriarty was the first president of the Alaska Branch of the American Society of Civil Engineers, and one of the organizers of Alaska Chapter, Associated General Contractors.

* * *

Dan B. Miller, 68, died on Oct. 22 at Palo Alto, Calif., after a long illness. Retired since 1947, Miller had been managing engineer of the Pacific Coast Division of The Asphalt Institute, between 1931 and 1947.

* * *

Bernard A. Etcheverry, professor emeritus of the University of California at Berkeley, Calif., died Oct. 26 at New Haven, Conn. An expert on irrigation and drainage at U.C. for 45 years, Professor Etcheverry retired in 1953. He had served as a consultant to many California corporations and municipalities, and was a past director of the American Society of Civil Engineers and a member of the California State Water Resources Board.

* * *

Paul B. Lee, 54, former chief, pavements and railroads branch, Engineering Section, Headquarters Sixth Army, San Francisco, died Oct. 1. During the early part of World War II, Lee was principal engineer at Luke Air Force Base, Ariz.

* * *

Philip W. Myers, 48, assistant county engineer of King County, Wash., died recently at Seattle. He had been associated with the county engineer department since 1929.

* * *

Howard E. Gallagher, 55, civil engineer of Grass Valley, Nevada County, Calif., was found dead at his home in Placerville where he had resided for the past four years. Death was due to natural causes.

* * *

Joseph M. Ferretto, 26, Reno, Nev., was killed recently, and Earl Houts, 42, also of Reno, was seriously injured when the wall of a 10-ft. deep storm drain caved in.

CALENDAR

Jan. 10-13—American Road Builders' Association, annual meeting at Roosevelt Hotel, New Orleans, La.

Jan. 23-28—Associated Equipment Distributors, annual meeting, Conrad Hilton Hotel, Chicago.

Feb. 7-9—Association of Asphalt Paving Technologists, annual meeting, Jung Hotel, New Orleans.

Mar. 9-12—American Concrete Pipe Association, annual meeting at Sheraton-Plaza Hotel, Boston.

ENGINEERS on the move

Harvey R. Dodd has been appointed as associate structural engineer in the Seattle city department of buildings. He has been employed by local engineering concerns until his recent appointment.

* * *

J. Eugene Whitten, an employee of the Colorado state engineer's office for 23 years, recently received a provisional appointment as state engineer, filling the vacancy made by the retirement of **M. C. Hinderlider**.

* * *

Arthur G. De Long who had been assistant engineer in the Roswell District office of the New Mexico Highway Department, is now located at Santa Fe as assistant construction engineer.

* * *

Wade E. Peebles recently took over the position of director of public works and city engineer of Inglewood, Calif. He succeeds **Walter E. Kennedy** who retired.

* * *

William W. Brewer announces the opening of offices at 414 Jackson St., San Francisco 11, Calif., for the practice of foundation engineering and applied soil mechanics.

* * *

Mark Nelson, formerly an assistant to the chief of the planning and development division in the Office of the Chief of Engineers, Washington, D. C., has been transferred to the North Pacific Division office in Portland, Ore., as chief of the water control branch. Prior to his Washington assignment, Nelson was chief of the planning branch of the Portland District.

* * *

Robert W. Jennings, Alaskan district manager of the Bureau of Reclamation, has been named regional director of Region 5, with headquarters at Amarillo, Tex. He succeeds **H. E. Robbins**, deceased. Prior to his appointment as Alaskan district manager in August 1953, Jennings was area engineer at Grand Junction, Colo.

* * *

Col. John A. Graf was named district engineer, Corps of Engineers, at San Francisco, Calif., effective Nov. 15. He succeeds **Col. Andrew I. Goodpaster, Jr.**, who was recently named by President Eisenhower as defense liaison officer at the White

House. Until this latest assignment, Colonel Graf was serving as assistant district engineer at Portland, Ore.

* * *

Under a reorganization program proposed by Superintendent Raver of Seattle City Light, **John Nelson** has been appointed executive assistant superintendent, effective Jan. 1, 1955. **Ira Cottom** retains his present title as assistant superintendent in charge of personnel, right-of-way, and property matters. **P. C. Spowart** is assistant superintendent in charge of public relations and commercial activities.

* * *

The retirement of three Portland District, Corps of Engineers, employees with service totaling 58 years was recently announced. **Benjamin A. Eddy**, chief of the Rivers and Harbors Section of the Engineering Division, retired with 21 years of federal service. The other two men are **Thor Ericson**, with 22 years of government service, and **Eugene Lovell**, with 15 years'.

* * *

Col. F. S. (Tom) Tandy, who recently retired as district engineer of

the Walla Walla District (Wash.) Corps of Engineers, has become associated with the Campbell Construction & Equipment Co., and has been appointed manager. The construction firm is located at 1150 Folsom St., San Francisco.

* * *

The appointment of **Lt. Col. David S. Parker** to be executive officer of the Portland District, Corps of Engineers, has been announced. Colonel Parker located in Portland following two years as military assistant to the governor of the Panama Canal Zone. Prior to service in World War II, he was stationed at Fort Ord, California.

MOLES WINNERS

Thomas J. Walsh, board chairman of the Walsh Construction Co., and **Carl B. Jansen** of Pittsburgh were named as the 1955 winners by The Moles for "outstanding achievement in construction." The award is considered the highest recognition that can be accorded service to the American construction industry.

Under the 30-yr. leadership of Walsh, his company has driven more tunnels than any firm in the country. Walsh and Jansen will become the 15th pair of honorees in a series that started in 1941 and numbers among its winners former President Herbert Hoover, Robert Moses, Admiral Ben Moreel, and General Brehon B. Somervell.



TECHNICAL brains were rewarded for special achievement when seven Bureau of Reclamation engineers received cash awards of \$200 each from Assistant Commissioner and Chief Engineer **L. N. McClellan**. The men served on a panel which set up new criteria for designing concrete dams, for economy and efficiency. From left to right: **McClellan**, **L. C. Puls**, **John J. Hammond**, **A. Warren Simonds**, **Robert E. Glover**, **Fairfax D. Kirn**, **E. R. Dexter**, **John J. Parmakian**, and Assistant Chief Engineer **W. E. Blomgren**, who participated in the ceremonies. An eighth member of the panel, **J. M. Raphael**, who is now on the University of California faculty, received the same sum.

SUPERVISING the jobs

Larry Mahan was general superintendent on a surfacing-plantmix, 10.6 mi. job on Highway 93 (West Shore Highway), Polson, Mont., a \$140,000 contract of S. Birch & Sons. Other important personnel on this job, just completed, were **Larry Heilman**, paving foreman; **Bill Ille**, plant foreman; **Ed Gould**, job mechanic, and

Frank Hede, crusher operator. "**Keg**" **Dahl** was in charge of the office. **Bill Hebert** was job engineer.

* * *

Henry Vander Linden is general superintendent on the National Guard Armory going up at Murray, Utah, a \$200,000 contract held by Turner Construction Co. **Gib Kim-**

ball is carpenter foreman, and **Garth Spendlove** is steel foreman. Work is just about drawing to a close.

* * *

Warren E. Gardner as project manager and **Richard L. Gardner** as general superintendent head up a \$956,000 contract held by Gardner Construction Co. for construction of a trout hatchery and rearing station at Rifle Falls, 13 mi. north of Rifle, Colo. **John B. Tipton** is serving as assistant superintendent.

This project, which is being built for the Colorado State Game & Fish Commission, is reputed to be the largest and most modern of its kind in the world. Construction consists of three residences, a hatchery building, food preparation building, garage and shop buildings, rearing ponds, and a main raceway. The job is expected to end far ahead of the 300 days allotted.

* * *

Blaine P. Clyde is supervising the construction of a highway relocation job at Wanship Dam in Utah, for W. W. Clyde & Co., which is doing the work at a cost of \$683,743. Other men in key positions are: **Ray Corless**, **Frank Rigturp**, **Frank Jensen** and **Jack Frances**, grade foremen; **W. O. Graham**, bridge foreman; **Vern Allen**, powder foreman; and **John Smith** and **Sam Fratto**, master mechanics.

* * *

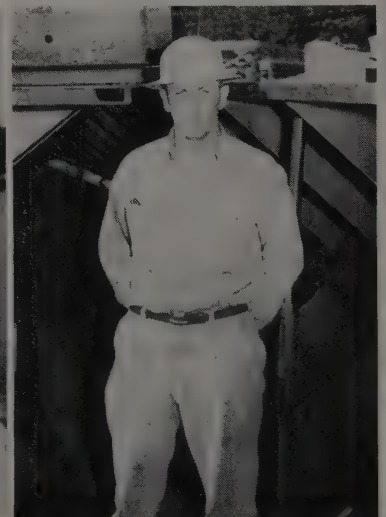
J. (Harry) Williams, project manager (dam), and **H. C. (Duke) Miller**, project manager (tunnel), together with **Claire Banks**, superintendent (dam) and **D. H. (Whitey) Walker** (tunnel) are key men on construction of Wanship Dam, Utah, part of the USBR Weber Basin Project, a \$2,423,004 undertaking of the Utah Construction Co. Other important personnel are **J. D. Davenport**,



RESIDENT ENGINEER at Sandpoint, Idaho, is **Al Sachse** (left) of the state highway department. Here he listens to a report from **Clyde Wood**, pile inspector.



SPORTSMAN OR SUPERINTENDENT? It's **Josh Pierson**, superintendent for Kiewit-LeBoeuf Dougherty on the new bridge at Sandpoint, Idaho. The "sportsman's paradise" in the background is Lake Pend Oreille, and Pierson leaves a long wake behind his outboard so he keeps track of the work



along a 6,000-ft. project. The job is reviewed in a staff article beginning on page 41 this month.

At right is **Ralph Simpson**, superintendent for Seattle Concrete Pipe Co. on manufacture of 180 precast concrete deck units for the job.

project engineer; and **C. L. Eaton** and **Ned McColley**, assistant superintendents; **C. U. (Cad) Shafer**, carpenter superintendent; **E. J. Brelsford**, **Loren Mann** and **Lewis Walker**, shifters; and **Mont Schoenfeld**, master mechanic. In the office, **C. J. Getz** is manager, and **Earl H. Hadley**, paymaster. Work started in early-July and is expected to run for 28 months.

* * *

W. C. Richter, project manager, and **Rudy Steele**, general superintendent, head up the construction crew working on a shopping center project at Thornton, Colo. F & S



Pracht, Richter, and Steele

Construction Co. is the contractor. **Hal W. Pracht** is expeditor on the job, and **Guy O'Brien** is foreman on steel. Job started the middle of October and will probably close the end of February.

* * *

Arthur B. Smith is project manager; **Fred Snow**, job superintendent; and **Carvil Davis**, job engineer on the \$2,500,000 construction of a bank building for the First Security Corp., Salt Lake City, Utah.

American Bridge Co. has the structural steel contract, with **J. H. (Jack) Turnipseed** superintending. Foreman on steel erection is "**Hank**" **Spitler**, and on welding **Pete Neilsen**. **Art Reiff** is office manager.

* * *

A. G. Lane, general superintendent, and "**Babe**" **Austin**, job superintendent, head the construction men working for **Riedesel-Lowe Co.** on the \$922,000 addition to the Memorial Hospital at Casper, Wyo. Foremen are: **John Campbell**, steel; **Michael Stevens**, carpenter; and **Dan Ferguson**, labor.

* * *

Tom Grady is project manager for **Kiely Construction Co.** which has a \$433,321 contract under way at Idaho Forest Highway Project 26-A7, Ketchum-Clayton highway, in Sawtooth National Forest, Idaho. **C. R. Pilcher** is crusher foreman.

* * *

Hans C. Jensen, superintendent, and **Collins Cannon**, engineer, are top supervisory men for **Jensen Construction Co.** which is erecting the \$1,794,492 Union Building at the University of Utah, Salt Lake City. Construction has been under way since

June and a total of about 700 days are needed for completion.

* * *

William Berker is superintendent and **Ben Deibert** is in charge of construction of 400 homes being built by **S. L. Rowland** at a cost of \$5,000,000 in the Southgate area of Tacoma, Wash. Erection is expected to continue at the rate of two units a week for four years.

* * *

Glenn Dusky, general superintendent; **L. W. Minnis**, superintendent; **Dave Minnis**, clearing foreman; and **Russell Dusky**, master mechanic, head the personnel working for **Otis Williams & Co.** on a \$362,760 contract for 6.7 mi. grading and gravel surfacing on the **Ovando-Rogers Pass** road in **Powell** and **Lewis** and **Clark** counties, Mont. These same men are supervising another contract for **Otis Williams** for similar work in the same vicinity, a \$279,919 job.

* * *

Galen Zimmerman, superintendent (road), and **George McGehee**, superintendent (struct.), are directing the work for **Gene Richards, Inc.**, which contractor has a \$561,699 contract for 5 mi. of highway, and two reinforced concrete bridges, near **Los Banos**, **Merced County, Calif.**

* * *

P. H. Prewitt, manager, paving department, and **C. H. Foster**, superintendent, are directing a \$232,493 job for **Morrison-Knudsen Co., Inc.** Work is on **Federal Aid Project No. 3281**, and consists of constructing a roadway and plant-mix bituminous surfacing, **Nampo, Idaho**. Completion date is **July 1, 1955**.

* * *

G. Henry (Hank) Eberhardt is general superintendent and **Fred Singleton** is assistant superintendent on a 2-mi., 4-lane freeway job on



Eberhardt and Singleton

Highway 85 and 87, **Brighton, Colo.**, for **Northwestern Engineering Co.** This \$300,000 job will probably finish by the end of 1954.

* * *

Superintendents for the **Fontana Steel Co.** at **Fontana, Calif.**, under **Paul D. Ware**, in charge of all operations, are: **Art Tramel**, **San Antonio Dam** operation; **Boyd Hall**, **Santa**

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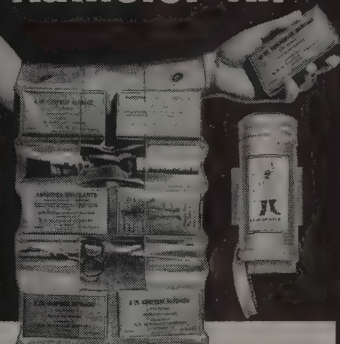
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Raskopf

Subia

Tipton

Wood

Birkes

Nick Kohler, general superintendent; Lewis Chinn, assistant superintendent; Allan Rogers, job engineer, and L. H. Morrison, office manager, are key men on the construction of Boulder Reservoir being built for the city of Boulder, Colo., by Colorado Constructors. Other contractor personnel are Jack Dolan and Ted Erickson, grade foremen; Jack Ro-

mans, labor foreman; Ralph Dunham, master mechanic; Otto Bray and Charles Arnt, heavy duty mechanics; Ralph (Swede) Anderson, Bob Girardin, Carl Firebaugh, mechanics; Gus Radcliffe, welder, and L. J. Dolan, shifter. A. S. Horner Construction Co. is handling the concrete structures under a subcontract, on which Frank Wood is job super-

intendent, and Joe Tipton manages the office. Jim Lyman is ironworker foreman and John Calkins is carpenter foreman. Others among the subcontractor personnel are: Aubrey Payne, carpenter; Henry Raskopf, operating engineer; Rosendo Subia, vibrator operator, and Charles Birkes, ironworker. This reservoir is 18,000 ac. ft.—costing \$800,000.

Felicia Dam; Harold Caress, Whittier Narrows Dam; and Larry Wheeler, Los Angeles operations.

* * *

Emmitt Roetman is mechanical superintendent for Birch, Lytle & Green Construction Co. at Elmendorf AFB, Anchorage, Alaska, where much heavy equipment is being used, including several Cats. Job got under way in May 1954. Work involves the moving of about 1,000,000 cu. yd. of material; construction of taxiways, hardstands, etc., costing about \$8,000,000.

* * *

C. M. (Chuck) Loser, superintendent; Robert W. Tietjen, project office manager; J. C. White and Jack Cato, excavation foremen; J. B. Battensfield, rock foreman; T. M. Heiner, labor foreman, and Austin Tayer, master mechanic, comprise the top personnel for S. Birch & Sons Construction Co., on a highway contract, Wyoming Forest Highway (Project 6-D) located about 13 mi. east of Alpine, Idaho. Weather was expected

to shut the project down about Nov. 1, 1954, at which time all of the 4.4 mi. of excavation was expected to be complete. The remaining work consisting of crushed gravel cushion and road-mix asphalt paving will be done during the 1955 construction season.

* * *

Boyd Christensen, superintendent for Morrison-Knudsen Co., Inc., is heading up a \$561,884 roadway construction on 12.3 mi. of U. S. 93, from Elaine County line south in Idaho. Walter Hooten is handling the clerical end of the job.

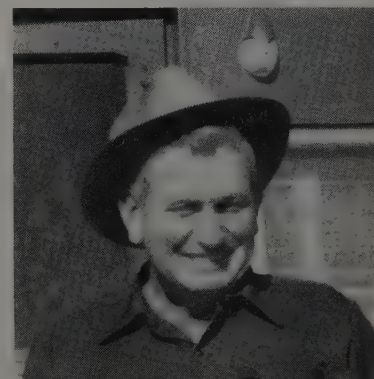
* * *

Lee Clements is superintendent for Tom Lillebo who has a contract for six structures on Pacific Highway (Coast Fork Willamette River divide unit) in Lane County, Ore. Ernest Weizer is foreman. Lillebo got the contract on a bid of \$153,472.

* * *

Cleo Ussery is located at El Sobrante, Calif., as a heavy-duty operator for M. Miller Co., working on

storm drains and pipeline. He operates a machine which is a combina-



Ussery

tion bulldozer, dragline, backhoe, and crane, presently used by Utah Construction Co. on this project.

* * *

Joseph Corrales is superintending the construction of an elementary

Another **BIG OUTPUT** Walking Dragline



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**7-to 9-cu. yd.
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boom and 8-yd. bucket, and 351 feet with the 170-ft. boom and 9-yd. bucket. Digging depths range up to 135 feet.

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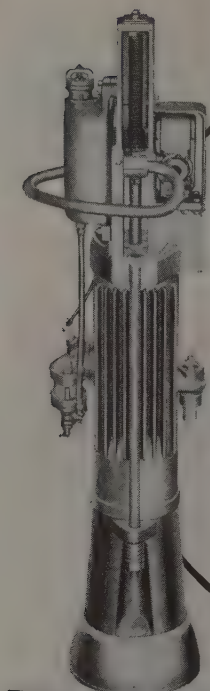
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school at Sunnyvale, Calif., for George Bianchi, contractor on the \$238,000 job. Bill Pollard is carpenter foreman on the work which will soon be completed. Bert L. Smith represents the School District.

* * *

N. V. Raney was recently named utility superintendent and Ernest Kisse, building superintendent, to handle the construction of a reservoir at Fort Richards, Alaska, contract for which was awarded to Lease & Leigland and M-B Contracting Co. at a cost of \$462,426. Other key personnel on the project, which is expected to start in the spring of 1955 and run till the middle of October, are: J. M. Reilly, chief engineer; W. H. (Bill) Bookwalter, master mechanic, and William Neve. Harold Leader is office manager.

* * *

Jack Harlow is construction superintendent for the Eichler Homes Co. which is putting up 160 homes in Terra Linda Tract, San Rafael, Calif. Work on this \$3,000,000 development started about Nov. 1 and is expected to be completed in about four to six months. Al Shapro is doing the purchasing for Eichler.

* * *

Doug Fife, project manager; Lee Monson, superintendent; Steve Smith, assistant superintendent; and Robert E. Lee and Wendell Fife, foremen, compose the supervisory personnel of the Fife Construction Co. which is constructing a roadway and four bridges on 18.3 mi. of S. H. 28 from Lemhi to Leadore in Lemhi County, Idaho. Costing \$535,973, work got under way in mid-October and is expected to finish the middle of next June.

* * *

Jim Foose is superintending the construction of two steel truss bridges across the Feather River in northcentral California for Stolte, Inc. Bill Young is project engineer. Also working on the bridges, one of which is a temporary structure, is Al Williams, crane operator. This construction is part of the Poe hydro-electric project.

* * *

M. D. Russell is job superintendent for Weaver Construction Co. which is putting up a \$500,000 school building in north Denver, Colo., for the Adams County School District. L. J. Watenpaugh is brick foreman on this 2-story brick and glazed tile construction. Job has been under way since August and is expected to be finished about the first of next April.

* * *

Thor O. Thorson, superintendent; Allen Katz, project engineer, and Edward Shapiro, purchasing agent, are among the principal personnel working on construction of the El Monte

(Continued on page 85)

SUPERVISING the jobs

(Continued from page 82)

High School, El Monte, Calif. Crown Construction Co., of which Earl Sherman is a principal, is doing the job at a cost of \$1,037,627.

* * *

John C. Silliman, chief engineer; Fred K. Coleman, project engineer; George Seaburg, project superintendent, and George Heim, project foreman, are key men for American Pipe & Construction Co. on a \$1,295,175 contract recently awarded for expansion of grain elevator terminal No. 4 in Portland, Ore. Work consists of fabricating and erecting 8 large steel grain storage tanks, including conveying equipment, loading, and unloading facilities.

SAFETY

Job accidents take their toll

THESE were the accidents that resulted in death or serious injury on the West's construction jobs during the last reported month.

Charles D. Fiveash, 58, Richmond, Calif., marked the first fatality on the Richmond-San Rafael Bridge which has been under construction since April 1953. Fiveash, a piledriver mechanic, was instantly killed Oct. 18 when he plunged 80 ft. from a small platform on the top of the piledriver, where he was making some adjustments, to the deck of the machine.

Richard F. Dalton, 29, Lovell, Wyo., was electrocuted recently when he touched a wire carrying 33,000 volts while working at a substation of the Pacific Power & Light Co.

Floyd Calkins, 31, of Lodi, Calif., died of injuries received when he was pinned beneath the wheels of a truck which struck him as he was directing the unloading of gravel at a school project in Thornton.

Robert M. Harris, 52, Sacramento, Calif., a mechanic for a construction firm working on the Folsom Dam, was killed when his head was crushed beneath the wheels of a 19-ton dump truck.

Eugene Kress, 39, died recently as a result of injuries sustained when a scaffold on which he was working broke, throwing him 25 ft. to the ground. The accident occurred on a construction job in Portland, Ore.

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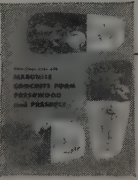
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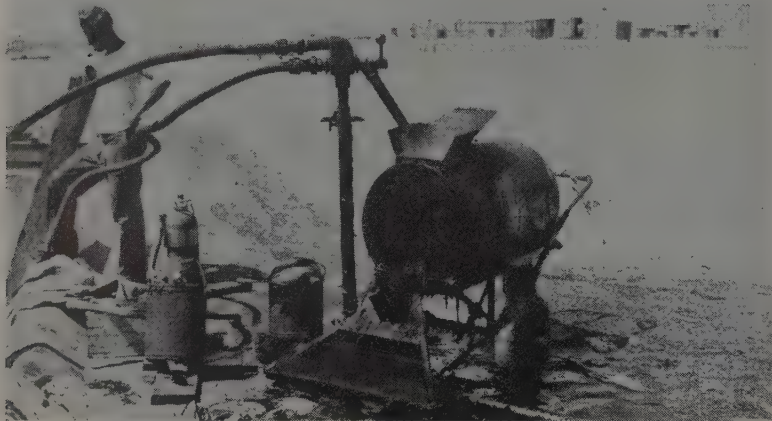
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TRICKS of the TRADES



Hot roofing asphalt trucked 45 mi. to job site

BULK DELIVERY OF ROOFING ASPHALT, plus an ingenious method of application, saved time and money on the job of roofing the Ford Motor Co.'s new 40-acre assembly plant at Milpitas, California.

The roof was built up over a steel decking of box channels. The channels were covered by 3/4-in. fibreglas insulation and three layers of felt. The deck, the insulation, and the felt were treated with a total of 1,200 tons of Petrolastic Asphalt 145, product of American Bitumuls & Asphalt Co.

By bulk handling in insulated tank trucks, package costs were eliminated and heating costs reduced on the daily delivery of 2,000 gal. At the refinery 45 mi. away, asphalt was loaded at about 450 deg. F., then delivered

into 350-gal. heating kettles at the Ford plant. There it was pumped to the roof through two 1/2-in. metal hoses controlled by a 3-way valve.

With over 1,600,000 sq. ft. to cover, the contractor—Alta Roofing Co. of San Francisco—used a 55-gal. drum, mounted on a wheel carriage, in place of conventional spreading mops. Filled from the top, the drum flowed the hot asphalt over a fan-shaped apron controlled by a spigot. This device enabled a single applicator to pull the mobile unit, applying the Petrolastic uniformly in a 3-ft. wide lane, which was then covered with roofers gravel.

This is another example of how a contractor has saved time and money by taking advantage of bulk delivery.

How much salt?

WHAT HAPPENS WHEN EXCESSIVE SWEATING robs the body of salt? The National Safety Council has prepared this diagram showing that when the body does not have its normal supply of salt, the loss causes the blood to thicken, the person gets tired and is an easy victim of heat-fatigue. Unless this lost salt is replaced, heat cramps or even prostration may occur.

Salt and water prevents heat-fag, but not water alone. How much salt

do you need to prevent heat-fag? Light to medium work: 4-6 tablets daily; medium-heavy: 8-10 tablets daily; extra heavy and hot work: 12-15 tablets daily.

Aside from the use of salt, are there any other precautions which should be taken in the hot weather?

1. Don't overeat.
2. Don't exercise just before or after meals.
3. Don't over-indulge in alcoholic drinks.
4. Don't expose yourself to the heat when you don't have to.
5. Don't go out in the hot sunshine without a hat.

6. Don't exercise strenuously in the sun.

7. Don't work if you have been vomiting excessively or have a severe case of diarrhea.

BEAT THE HEAT



Take one salt tablet every hour and prevent heat exhaustion! Have that physical!

Digging the impossible ditch with a Gradall

THE BUILDING CONTRACTOR'S recurring problem of how to excavate speedily and accurately within a few inches of an adjacent property owner's fence without trespassing has been workably solved by a progressive Los Angeles building firm. McDonald Bros. is the imaginative contractor and the taxpayer of Los Angeles is the benefiting client. The job is the \$2,000,000-plus Airport Junior High School in Westchester.

Since one entire side of Airport's future school ground is bordered by an existing fence which could not be removed or damaged, the problem of ditching for a concrete wall within 6 in. of the property line assumed major importance. The proximity of



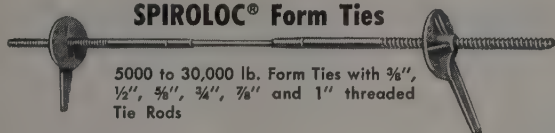
the fence to the property line eliminated any possibility of using ordinary ditchers that require considerable space on each side. Also unde-

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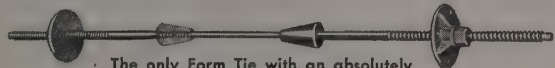
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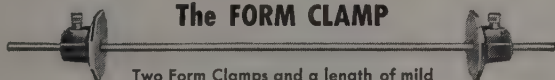
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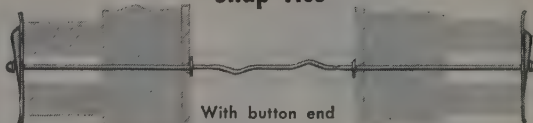
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The FORM CLAMP



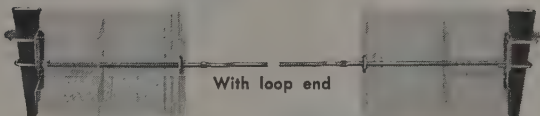
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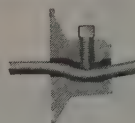


With loop end

For 3000 lb. working loads

The FORM CLAMP SURE GRIP Principle

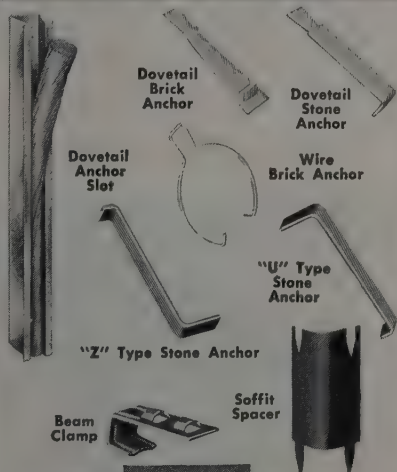
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sirable because of the length of the ditching to be done was the use of slow off-center equipment such as the back-hoe or drag-line.

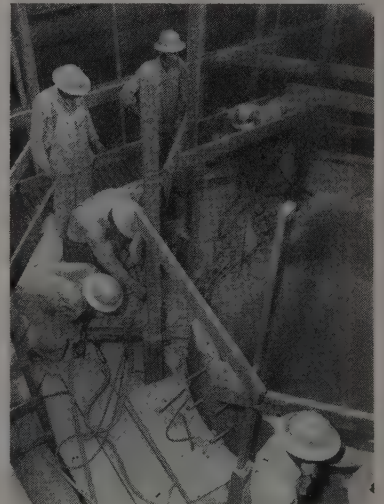
Final solution to the problem was found in putting an existing piece of equipment to a new use. Previous experience of McDonald Bros. with the Gradall had proven its unique adaptability to earth-moving jobs which can only be done off-center or which must be controlled from a distance. Their experience with Gradall's hydraulic controls was that they provided the accuracy and maneuverability which McDonald Bros. needed for this particular job.

Savings of approximately one-half in time and labor were the estimated results, underscoring once again the reputation McDonald Bros. is building for itself.

Expert wreckers

DEMOLISHING A 110-FT. STACK was one of the problems faced by the Kaiser Steel Corp. in expanding its Fontana steel mill. The stack was built in 1942 as part of the original steel mill and was designed to withstand seismic loads. The reinforced concrete shell was 17 in. thick at the bottom, 5 in. thick at the top. The outside diameter tapered from 10 ft. 1 in. at the bottom to 6 ft. 5 in. at the top. The normal procedure of blasting or pulling down the stack was obviously not practical in the midst of other stacks and buildings.

Wrecking this stack was undertaken by Kaiser Engineers. With air



hammers and acetylene torches they started at the top working down in progressive stages to the bottom. The scaffold which provided the working platform was prefabricated in the plant carpenter shop. As the stack was demolished, the rubble dropped down the inside of the stack where it was pulled out from the bottom and carried to the dump. Only nine days were required to complete the job.

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Position _____ Company _____

TOOLS of the TRADES

Use the coupon on page 93 for free information on any of these items

1

WELDING CATALOG—Air Reduction Co. is offering a 52-page catalog that describes and illustrates all of its products regularly used by job shops, maintenance departments and other users of light welding and cutting equipment. The catalog covers gasses, welding, and cutting equipment and accessories, torches, tips, regulators and electrodes. It includes three late developments: Aircospot (inert-gas spot-welding), Easyarc 12 electrode and the new cutting attachments for Airco torches. The catalog is designed to acquaint readers with Airco's line of products, explaining how each item operates and the job to which it is best suited. Complete specifications are included. The publication is fully illustrated and contains many tables and charts.

2

ENGINE KIT—P&G Manufacturing Co. has marketed the Valve-Gapper Overhaul Kit, specifically designed for GM-71 diesel engines. It includes instruments for setting valve clearance, timing fuel injectors, and balancing fuel injector racks. It also provides adaptors for micrometer accurate measurement of height of cylinder liners, uniformity of counterbore, uniformity of cylinder bore, and cylinder liner wear when overhauling or rebuilding GM diesel engines. The kit includes the Model 201 set and is the latest development of the manufacturer. The Model 201 can be used to set clearance on GM 6-110 engines, and adaptors will soon be available for timing injectors and balancing fuel racks on these engines. The kit employs a dial indicator procedure for measuring clearances that can do this job faster than feeler gauge methods.

3

A NEW WELDING MACHINE is now being tested by the Amsco Division of American Brake Shoe Co. The machine attempts to combine the advantages of hand welding and automatic welding, while eliminating most disadvantages encountered with either method. Called the MF welder, it feeds bare wire through a hand-held hopper containing magnetic flux. Flux clings to the wire as it leaves the hopper because of the magnetic field set up by welding current flowing through the wire. Thus the electrode wire, which is fed continuously from a coil, reaches the arc with a flux covering that contributes the advantages of manual electrode coating. The operator can weld steadily for 15 min. if desired; the delay of replacing electrodes and the waste of stub ends are eliminated.

4

CHAIR REPAIR LINKS, designed to enable dragline operators to repair drag chains with greater speed and ease, has been produced by Electric Steel Foundry Co. The new design consists of a change in the method of locking the link connecting pin in place and is

labeled "Spring-Lock" repair link. It is a tightly compressed coil spring that grips the pin, replacing the elliptical collar formerly used. When in service, the spring material acts as a continual grip on the pin and has a tendency to grip harder rather than to loosen under use. No special tools are needed, as links can be installed in a matter of minutes with an ordinary hammer. The abrasion-resistant alloy cast link sections have almost two times the yield strength of manganese, thus assuring less breakage and longer life.

5

A 20-PAGE BOOKLET on "power shop" machines has been published by DeWalt Inc., manufacturers of radial arm type woodworking equipment. The "Power Shop" line consists of four models of multi-purpose woodworking machines, ranging in horsepower from $\frac{1}{2}$ to $1\frac{1}{2}$. They are basically a specialized design of circular saw, but can be quickly converted to other operations such as shaping, sanding, drilling, routing, surfacing, grinding, buffing, and lathe work. Prices range from \$229 to \$398.

6

FLARING, CUTTING, BENDING—Owatonna Tool Co. has announced a set of tools for flaring, cutting, and bending copper tubing from 3/16 in. to 5/8 in. in 7 sizes of standard thin-wall untempered tubing. The set consists of a flaring tool, a tubing cutter and a set of six spring steel coiled sleeves which permit bending copper tubing without collapsing or buckling the tubing. The complete set is contained in a metal case.

7

QUICK ADJUSTING PIPE WRENCHES—A line of pipe wrenches in all standard sizes is now being manufactured by Palsco Manufacturing Co., Ltd. Some of the features of the wrench are: quick setting by use of a lever under the handle, one hand adjustment, and a non-floating hook jaw and floating heel jaw that minimize locking on or flattening pipe.

8

WIRE CONDUCTOR CUTTER—Utica Drop Forge & Tool Corp. is manufacturing a Pocket Armor Cutter which will cut BX and BXL, No. 12 and 14-2/3 wire conductor without any danger to insulation. The jaws cut cleanly, leaving no rough edges. The cutters are 7 in. in length and weigh 8 oz. Although not designed to cut iron or steel wire, metal lath and any light flat metal is easily cut. They can be used to connect up cab boxes, switches, base plugs, and splitting loom. They are equipped with a special feature for crimping overlap of armor down to place.

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22 models —
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NEW LITERATURE

Free copies of any of the literature described in this section may be obtained by using coupon on page 93.

9

Asphalt for flood control

Asphalt Institute has issued an 8-page booklet describing modern methods of flood and erosion control utilizing asphalt. Included in the illustrated discussion are methods for mass dumping asphalt to prevent undercutting, bank paving, sea walls, dam facings, and channel linings.

10

Spiral nail booklet

The Steel Company of Canada, Ltd., has published a 28-page booklet describing its line of spiral nails. The book begins with historical information about nails followed by several pages giving the advantages of using spiral nails rather than common nails. The booklet contains drawings and 8 tables comparing the properties in holding power of spiral nails and common nails. The new nails, called Ardox, are offered in the price field of the common nail.

11

Truck crane bulletin

A new bulletin covering the P&H Model 55 truck crane, the "Miti-Mite," has been published by Harnischfeger Corp. Sixteen illustrated pages report fully on the design and features of this machine. Special attention is given to the full convertibility of the machine for all services—dragline, crane, magnet crane, shovel, trench hoe, and clamshell. A spread is devoted to showing it in service on various types of carriers. Ask for TX-152.

12

P&H long crawler excavator

A bulletin on Model 255 ALC long crawler P&H excavator is now available. Printed in two colors, the 4-page bulletin carries description and illustrations of the complete machine, as well as detailed information on extra-long, wide crawlers. Manufacturer is Harnischfeger Corp.

13

Electric mining machinery catalog

Goodman Manufacturing Co. has issued a catalog describing its line of electric mining machinery. Storage battery locomotives, trolley loco-

motives, and diesel powered locomotives are pictured in the 16-page color catalog. Also described is a roof bolt hole driller and a line of cable reel shuttle cars. Specifications are given on these types of equipment.

14

Power take-off folder

Bulletin No. 506 issued by Twin Disc Clutch Co. gives engineering data on a new twin disc disconnecting fluid power take-off. The bulletin gives performance and capacity charts, and actual applications that have been solved with the installation of this new unit. Included are pictures, text, cutaway drawings, and charts.

15

Snow removal equipment

Baker Manufacturing Co. announced the publication of Bulletin No. 1060 which gives complete specifications for all Baker snow plows, along with design and performance characteristics. Details such as the types of lift, hand-hydraulic, power-hydraulic, sacrificial, or mechanical are covered. The bulletin contains a reference guide for all cities, counties, airports, or any industry that encounters a snow removal problem.

16

New 1½-yd. crane-shovel

A 16-page illustrated catalog has been released by Bay City Shovels, Inc., describing the design and construction features of their new 1½-yd. crane-shovel. The catalog contains many pictures of the machine and its parts. On-the-job photographs and close-ups of many parts accompany the descriptive text.

17

General Motors engine bulletin

A bulletin issued by General Motors Corp. describes improvements recently effected in the cylinder assembly of the Series "71" diesel engines. The improvements include a new cylinder liner, piston and rings and fuel injector. Three tables show how engine performance varies with speed.

18

Pump information

Literature recently produced by the Gorman-Rupp Co. describes a new diaphragm pump which they

claim to be the "best diaphragm pump ever built." Folders and bulletins showing applications and giving performance data and specifications are available.

19

Portable troweler folder

White Manufacturing Co. has issued a folder describing its new portable troweler. Pictures and text describe correct use of the new troweler and technique for disassembling it. Also briefly described are other White products.

20

Snow plowing equipment

Caterpillar Tractor Co. describes its line of snow removal equipment in a booklet titled "Clearing the Way To Lower Costs." This 8-page publication shows how dollars can be stretched to cover the regular work in the emergencies of snow removal. Included are numerous action pictures of the company's line of graders and plows. A double-page spread shows track-type tractors and attachments.

21

Chiksan catalog

Chiksan Company, manufacturers of ball bearing swivel joints for handling air, fuels, oils, water, and other fluids has published a 34-page catalog describing its line. Specifications, drawings, and photographs accompany the descriptive text.

22

Broom and sweeper pamphlet

Van Brush Manufacturing Co., Inc., has issued a pamphlet describing its line of sweepers and brushers. Specifications, illustrations, and a price list accompany the descriptive text.

23

Motor grader catalog

Galion Iron Works and Manufacturing Co. has made available a 28-page catalog on the Model 104, 93-hp. motor grader. All important features of design and construction are illustrated and described, and complete specifications are listed. The advantages of construction of certain features such as the hydraulic control system, constant-mesh transmission, and 4-wheel, all-gear tandem drive, are presented with detailed cross-



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—the season of good cheer is with us once again! So we're taking this opportunity
to extend greetings to you—the truck-users
of the nation. Our wish for the New Year is that we may continue to serve you.*

Season's Greetings from
DODGE "Job-Rated" TRUCKS

A PRODUCT OF CHRYSLER CORPORATION

section views. Many action photos show the machine in various types of maintenance and construction work. Various attachments are described which can further increase its usefulness.

24

Euclid twin-power scraper

Euclid Division of General Motors Corp. has published an 8-page color folder about its twin-power 18-cu. yd. scraper. A full page of specifications is given along with photographs and diagrammatic and exploded drawings.

25

Mining equipment catalog

Atlas-Copco has published a 12-page booklet featuring its line of mining equipment. Pictured and described are the company's rock drills, air pusher legs, drill steels, compressors and other general construction equipment.

26

Concrete vibrator folder

White Manufacturing Co. has published an illustrated folder describing its line of concrete vibrators. Complete specifications are given along with several pictures of the company's asphalt plants and asphalt heaters.

27

Economical rivet sets

"Bearcat Tool Steel Makes Economical Rivet Sets" is the title of a folder describing rivet sets manufactured by Bethlehem Pacific Coast Steel Corp. The folder lists the manufacturer's advantages of Bearcat for rivet sets and general-purpose applications, along with a description of the proper heat treatment. Included are service results in various types of work. Ask for release No. 111-SF.

28

Motor grader booklet

A 22-page illustrated booklet has been released by J. D. Adams Manufacturing Co. describing its new 550 motor grader. The booklet covers the construction of the machine, its operating advantages, and shows its application to a wide variety of work. Cut-away drawings, performance charts, and specifications are given.

29

Rear dump haulers

LeTourneau-Westinghouse has published a 16-page booklet describing the rear dump Tournarocker. The

booklet contains pictures and specifications and testimonials from owners in all parts of the world. The company offers an on-the-job demonstration of the machine.

30

Rotary air drill

Mayhew Supply Co., Inc., has published a folder describing two models of its truck-mounted rotary air drill designed for blast holes in quarries, strip mines, open cut mines and other excavations. The unit is pictured in these applications and specifications for both models are given.

31

New P & H model truck crane

A bulletin on the P & H model 105 TC truck crane is now available from Harnischfeger Corp. Complete details of the crane and carrier are included along with illustrations of the machine at work on a variety of jobs.

32

Specifications for concrete mixer

A specification sheet for the Blue Brute concrete mixer is being offered by Worthington Corp. The single sheet bulletin gives condensed specifications of the mixer, as well as standard and optional equipment available. Dimensions are graphically illustrated by line drawings. Request Bulletin 1240-S4.

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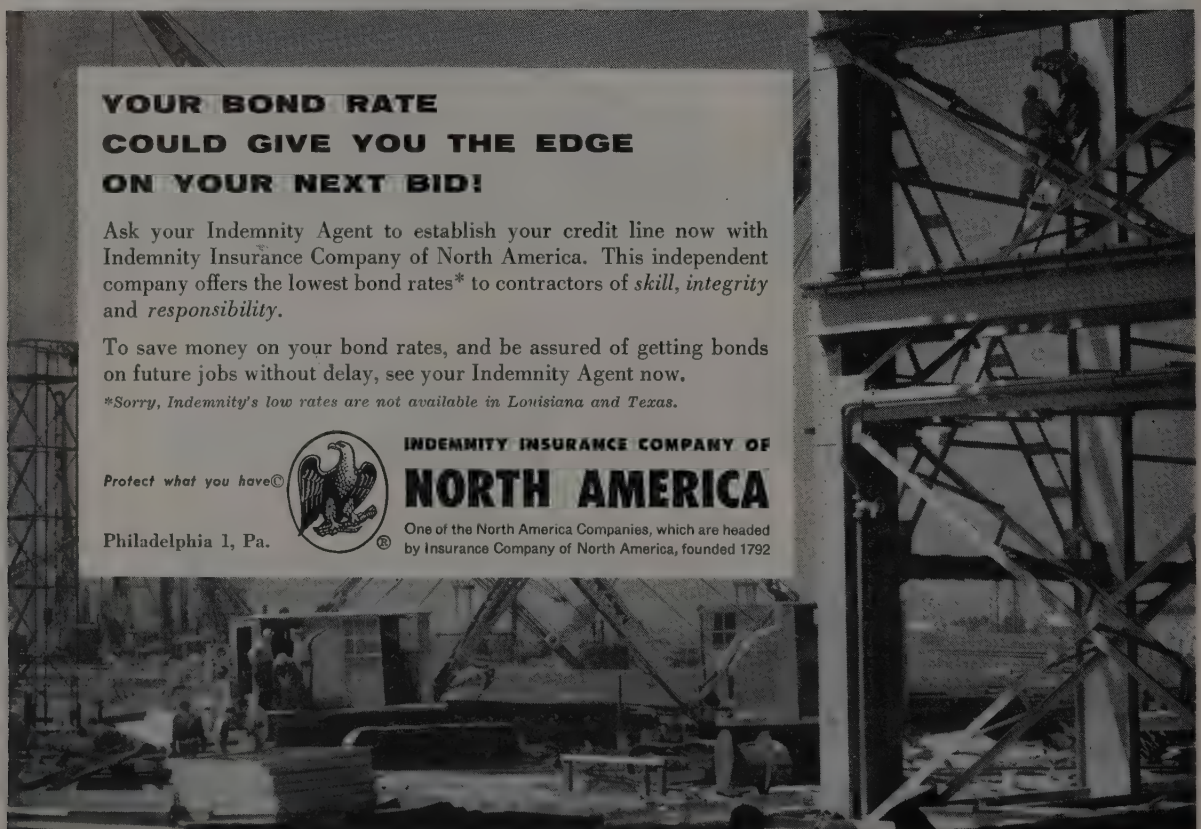
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33

Portable powered core drills

Bulletin 21 published by **Acker Drill Co.** describes the company's line of portable powered core drills. Specifications, pictures, and descriptive text make up the 4-page folder.

34

Dump body and hoist catalog

Publication of a 4-page, 2-color catalog by **Galion Allsteel Body Co.** describes its line of dump bodies and hydraulic hoists. Included are cut-away views, line drawings, and action photos. Complete specifications are given.

35

Booklet on welding problems

"How to Overcome your Welding Problems and Improve your Welding Techniques" is the title of a new 8-page fully illustrated booklet released by **Eutectic Welding Alloys Corp.** Many difficulties the welder has to face are explained and methods indicated whereby they may be avoided or minimized.

36

Crushing plant bulletin

A bulletin published by **Smith Engineering Works** describes its single pass scalping and crushing plant. The

capacity of this plant is 55 to 75 tons per hour. The bulletin contains a diagrammatic drawing along with photographs, dimensions, and specifications.

37

Block catalog

Skookum Company, Inc., has made available a 44-page manual completely describing its line of blocks. Complete specifications are given. Included are several typical boom setups with accompanying loading specifications and suggested sizes for the component parts.

38

Frictionless hook scale

Martin-Decker Corp. has issued bulletin M-25 describing its SU-20 Sensater, a friction-free hydraulic hook scale made in models with capacities up to 20,000 lb.

39

Transits, levels, planimeters

A folder on engineers' and surveyors' transits, levels, and planimeters has been published by **Umeco Optical Division.** The folder gives full details and prices on the company's line of imported instruments.

Literature briefs . . .

40

CATALOG 818, "Hand torches for gas welding and cutting," has been published by **Air Reduction Pacific Co.**

41

ROTARY PORTABLE COMPRESSORS manufactured by **Chicago Pneumatic Tool Co.** are described in Bulletin 734.

42

BULLETIN 353 contains specifications and general information about vibrating conveyors made by **Stephens-Adamson Mfg. Co.**

43

A 32-PAGE BOOKLET has been published by **Moffett Engineering Co.** showing typical crane installations.

44

STEELMAKING at three West Coast plants is described in booklets released by **Bethlehem Pacific Coast Steel Corp.**

45

BULLETIN 101 describes conveyors made by **Kolman Manufacturing Co.**

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NEW EQUIPMENT

More information on any of the products described in this section may be obtained by using the coupon on page 93.

46

Automatic hydraulic adjustment of discharge chute

Automatic adjustment of the discharge chute of mobile truck transit mixers is provided by Dyna-Chute electric hydraulic power control unit, manufacture by **Monarch Road Machinery Co.** One man operates one lever to raise, lower, or hold the chute while materials are flowing. The remote control of the chute provides safety for the operator because there is no need of extra men to adjust pins, ratchets, and bars beneath the mechanism. Available for 6 or 12 volt systems, the Dyna-Chute combines the pump,



motor, valve, oil reservoir, and solenoid in one unit. Also included in the kit is a 15-ft. insulated battery cable, hydraulic ram, flexible hose, and fittings for all average installations. The device is protected from the weather by durable steel hood. The mounting is simple and can be completed with a minimum of time and tools. This is a new application of a proven product since the same basic unit has been used for more than 15 yr. on road machinery, snow plows, farm implements, and material handling devices.

47

Portable lifting and pulling unit

Griphoist Inc. is manufacturing a versatile manually-operated hoisting device. Its light weight, 42 lb., permits the machine to be carried, set up, and operated by one man. Wire rope, $\frac{1}{2}$ in. in diameter, passes through the machine in a straight line and does not reel or spool inside the machine. This feature permits cable of unlimited length to be used. The machine is rated at 3,300 lb. on a single line; by two-parting the line it becomes a 3-ton hoist. With the use of multiplying sheaves, loads of 6 to 10 tons can be handled. The device combines a crank and cam mechanism. Two pair of steel jaws grip and pull the cable. A telescopic handle supplied with the machine slips on the operating levers. Manual power is applied with this handle. At the nominal load of 3,300 lb., a force of 77 lb. is required on the handle. At a full load, speeds of 10 ft. per minute cable travel can be obtained. The load can also be controlled in either direction to thousandths of an inch, an important feature when the machine is

used for machinery erection. The cable gripping jaws have a large bearing area that minimizes cable wear. The hoist, designated Tirfor, is delivered complete with telescopic handle. This unit is especially useful in situations where power hoists are not available.

48

Ripper for Allis-Chalmers tractors

Tractomotive Corp. is now manufacturing the TR-15 hydraulic ripper, designed for the Allis-Chalmers HD-15 tractor. This unit completes the line of rippers available for Allis-Chalmers tractors. According to the manufacturer the use of this ripper results in a 30% increase in production on most excavating jobs. It is particularly effective in hard packed earth, frozen soil, clay, shale, black-top and decomposed limestone. Besides the increase in production the use of this digger results in less wear and tear on the tractor. Maximum penetration is 20 in. and the overall ripping width is 6 ft. $5\frac{3}{4}$ in. Three shanks are provided as standard equipment. They can be easily removed, and holes are provided for two additional shanks. The tool weighs 4,862 lbs.

49

New roller for salvage and compaction

A new roller for salvaging bituminous highways and compacting all types of earth fills has been announced by **Hyster Co.** The newly engineered model permits, when required, rolling of over-optimum fills and wet spots by the addition of a positive-acting cleaner which removes any wet material which may enter the roller. This model, called the Grid Roller, has made possible economical



salvaging of aggregate and binder from asphaltic pavement. It quickly crushes and reduces to size all asphaltic material after ripping. Considerable savings can be realized by re-using the costly material in new highway surfaces. According to the manufacturer, the roller achieves higher densities in fewer passes when compacting. When crushing pit-run material directly on the sub-grade, the roller builds a firm base by crushing and compacting simultaneously. Secondary and farm-to-market roads can therefore be built at lower cost with a firm surface which resists water penetration and erosion. A universal hitch is adaptable to fit draw bar pins and yokes of various dimensions and heights above the ground, and a pivoting tongue is used to change tracking position of the roller behind the towing unit. Net weight of the roller

and frame is 12,400 lb. and gross weight, including ballast and cleaner, is 30,000 lb. Reinforced concrete weights are T-shaped. Drawings for making weights are furnished.

50

Self-contained mobile drilling unit

Gardner-Denver Co. is manufacturing a completely self-contained drilling rig for mine and quarry operations which is claimed to be highly efficient. The outfit consists of rock drills on long feed mountings, hydraulic booms, and air compressor for powering the drills, all mounted on a Caterpillar D8 tractor. The compressor assemblies



are available in capacities of 600 cfm, 500 cfm, 365 cfm, and 315 cfm for direct connection to the rear power take-off of D8 tractors. Hydraulic booms are available in various lengths. A choice of several drill sizes and several types of feed mountings provides the opportunity to have a tractor-mounted unit tailored to individual job requirements. Remote controls, which permit all drilling and positioning operations to be controlled from a central station on the tractor, are also available. Mounting and operating specifications can be obtained.

51

New line of AC welders

A complete new industrial line of high speed AC welders is now available from Air Reduction Co. The new welder is called Bumblebee and is being manufactured in 300, 400 and 500 ampere models. Featured are stepless current control, silicone insulation, and aluminum coil windings. Fingertip current adjustments and quieter operation are made possible by a new feature in which the coil supports the float in a rubber bushing. The new models are claimed to be especially suited for heavy section welding where high current is desirable and when arc blow would otherwise cut welding speed and quality. Literature is available.

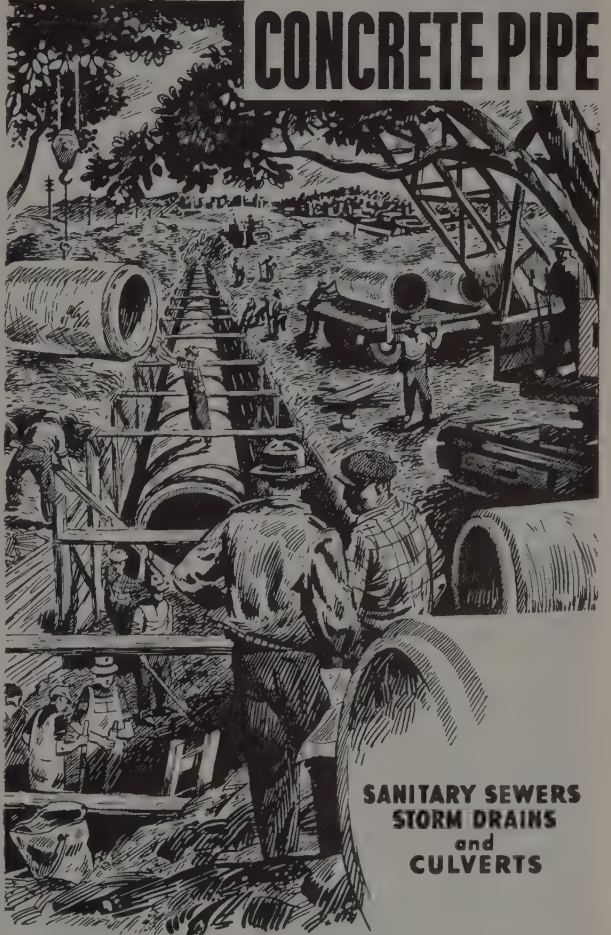
52

New diaphragm pump offered

Essick Manufacturing Co. has announced an improved diaphragm pump. The Model 4D pump has 4-in. suction and 4-in. discharge fittings. It has been thoroughly tested and conforms to the standards established for 4-in. diaphragm pumps by the Contractors Bureau of the Associated General Contractors of America. Improvements in design have greatly reduced the pulsation that has always been an annoyance with this type pump. The reduction gears are totally enclosed to eliminate wear and corrosion of dirt and water. The 4D is furnished with 16-in. steel wheels or 400:8 pneumatic tires. The capacity of this model is 6,000 gal. per hour on a 10-ft. suction lift, or 3,000 gal. per hour on a 20-ft. suction lift. Maximum suction or discharge is 25 ft. When mounted on a steel base, the shipping weight is 493 lb., on pneumatic tires 520 lb., and on steel wheels 530 lb. Further literature is available.

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**SANITARY SEWERS
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● CAPACITY

In sanitary sewers and storm drains of concrete pipe, maximum hydraulic capacity is assured by the smooth interior of both the pipe and the joints, promoting a steady, even, undisturbed flow with a minimum of friction.

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C-6

53

New rotary snow plow

A rotary snow plow that mounts easily on most wheel-type tractor front end loaders replacing the loader bucket and using the same pins has been introduced by the Wm. Bros Boiler and Manufacturing Co. Known as the Bros Series "A" Rotary, the plow operates on 30 hp. and is capable of plowing deeper snow



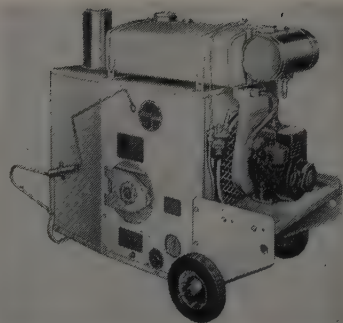
than expensive 300-hp. rotaries, says the manufacturer. The plow casts snow at a rate of 3 to 4 tons per minute and can load a 5-cu. yd. dump truck in 30 sec. The slit-spiral design of the rotor slots makes it possible to handle wet, or hard-packed snow. A casting chute extension makes truck loading a simple operation and because the operator can rotate the chute at 180 deg., trucks can be loaded on either side or dead ahead of the plow. This latter method,

known as "single lane," is said to be ideal for narrow streets or congested areas.

54

Dart truck hauls transit-mixer

Dart Truck Co. has announced its new Model 15-DT, a new double tandem type chassis designed to increase transit mixer haulage capacity. The unit weighs 15,000 lb. and can carry a 45,000-lb. payload. Optional features include a choice of 178 or 200-hp. engine, air or hydraulic brakes, tire size, and availability with front axle drive. The truck is particularly adaptable to off-highway work, the manufacturer says, and while it was designed especially for transit mixer work, it can be used for flat bed mounting to haul other types of materials.



supplied by the heater. It is an entirely self-contained unit with no ignition electrodes, transformers or relays. Heat output may be regulated.

56

Heavy duty hose coupling

Titeflex, Inc., announces that its new hose coupling is now available in heavy-duty models for high-pressure, heavy-flow applications in the construction industries. The coupling is based on a simple principle which makes the hose line leak proof the moment the nipple is seated in the coupling body, and seals it tighter the higher the pressure builds up. The coupling has a full-swiveling feature that prevents hose kinking, thereby increasing hose life and permitting rapid hose attachment.

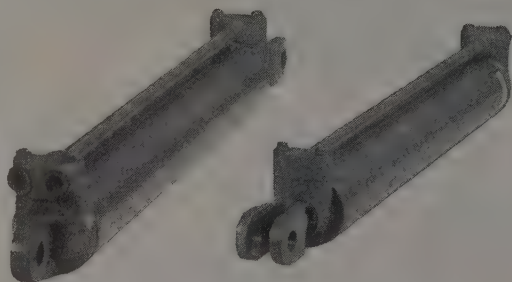
The quick seal coupling is available

55

New portable air heater

A portable air heater manufactured by American Air Filter Co. is now on the market. A special conversion kit allows the electric motor to be replaced with a gasoline engine whenever the operator wishes to change. This model is particularly well suited to construction work, according to the manufacturer. If gasoline fired, fumes can be vented outside the work area. It may be operated indoors without danger of fire. From 75,000 to 425,000 BTU of heater air can be

H-S ENGINE COMPANY



HYDRAULIC CYLINDERS

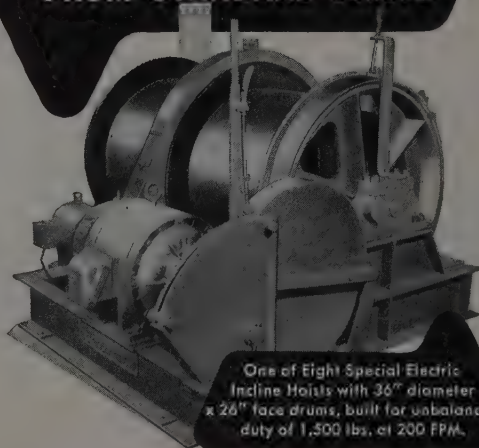
- in bore sizes 1 1/2", 2 1/2", 3", 4", and 5"
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- with chrome-plated rod and bore—quality where quality counts
- with optional cylinder manifolds (M-type illustrated) to improve the appearance and performance of YOUR equipment
- of quality construction—all steel and alloy iron
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Special Hoists FROM STANDARD PARTS



One of Eight Special Electric Incline Hoists with 36" diameter x 26" face drums, built for unbalanced duty of 1,500 lbs. at 200 FPM.

- By modifying and re-combining our standard parts, Superior-Lidgerwood-Mundy can engineer hoists to meet your specific requirements at the lowest possible cost.

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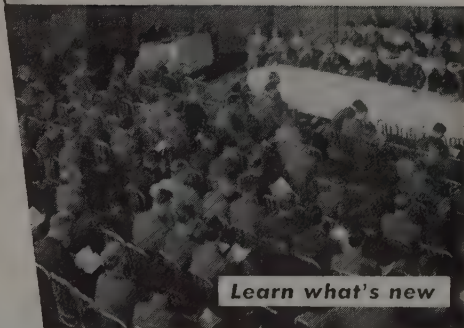
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CONSTRUCTION IDEA CUTS STEEL COSTS \$15 TO \$20 A TON



Fig. 1. 440' x 440' all welded framework for American Sterilizer Company, Erie, Pa. On-the-site fabrication cuts steel handling costs, saving an estimated, \$15 to \$20 a ton.

ON-THE-JOB fabrication of this 190-ton framework has saved \$15 to \$20 a ton compared to buying certain structural numbers already fabricated.

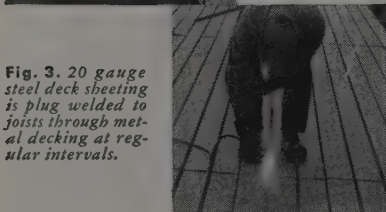
Standard structural members are cut to size with torches. Clips and base plates are then welded to columns with Lincoln "Fleetweld 5" electrodes using Lincoln "Shield-Arc" DC engine-driven welders.

Principal steel members are 24 inch 110 pound, wide flange beams 39 feet 3 inches long and 8 inch 31 pound columns. The members are put up with erection bolts and are field welded.

Forty-foot clear-span joists are used, welded on 6 foot 8 inch centers. Roofing is steel deck plug welded to roof joists.



Fig. 2. Welding window frame on fixture made from 24" I beam. Framing is simply laced to fixture before final assembly by welding.



THE LINCOLN ELECTRIC COMPANY
Dept. 4306, Cleveland 17, Ohio
THE WORLD'S LARGEST MANUFACTURER
OF ARC WELDING EQUIPMENT

in a complete range of sizes up to 12 in. that can be obtained in aluminum, brass, stainless steel and other alloys on request. This line is also available with built-in single or double check valves.

57

New 4½-cu. yd. truck mixer

Blaw-Knox Co. announces that a 4½-cu. yd. truck mixer, the Model M, is now in full production. The Model M is also made in 5½- and 6½-cu. yd. sizes. The units have been designed to make a compact yet acces-



sible mixer agitator that will give users the maximum pay load at minimum weight on the shortest possible wheel base.

Wear resistant Manten steel is used for the mixer shell and blades with thicker plates in front sections of the drum where the greatest wear occurs. Spillage of concrete on steep grades is prevented by a drip shield on the charging hopper as the spiral blades dam the opening between the charging cone and the drum shell. The distributing chute is made in two pieces with a total length of 10 ft. The upper end is pivot mounted and is supported by an adjustable strut, to vary the slope of the chute. Information on the Model M is contained in bulletin No. 2478.

58

Gasoline-powered electric plant

A 15-kw. gasoline-powered AC electric plant has been put into production by Kohler Co. Available in six different models with remote control or stand-by starting, and with varying voltage outputs, the new plant is water cooled with a large ra-

diator, belt-driven centrifugal pumps and blower fan. It features an adjustable jet carburetor with automatic choke and a mechanical fuel pump with oil bath air filter. A carburetor and valve kit for converting the fuel supply to natural or artificial gas is available. The six cylinder engine produces 51 hp. at 1,800 rpm. Six models are available with either remote starting or stand-by starting. The weight varies from 1,285 lb. to 1,325 lb.

59

Sectional belt conveyor

Stephens-Adamson Manufacturing Co. is offering a complete set of belt conveyor components pre-engineered for customer assembly. Units are designed for lengths up to 50 ft. and from 51 ft. through 100 ft. in both 18- and 24-in. belt widths. Limiting capacity for 18-in. belts is 150 tons per hour and for 24-in. belts 250 tons per hour. All conveyor components can be purchased as a package unit for a complete belt conveyor installation or as repair or replacement units on existing conveyors. A descriptive bulletin is available.

60

Bituminous paver

A new bituminous paver and finisher is being manufactured by Foote Construction Equipment Division of Blaw-Knox Co. Design features of the new machine are rubber mount-



ing, with four pneumatic traction wheels, solid rubber steering wheels for dual controls, long wheel base for

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Less initial cost—Lower upkeep

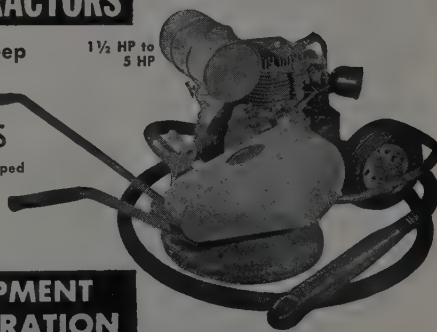
MARVEL CONCRETE VIBRATORS

GV-1, GV-2 & GV-3 Models Now Equipped
with Automatic Centrifugal Clutch as
Standard Equipment.
Interchangeable Flexible Shafts.

Write for full information

MARVEL EQUIPMENT CORPORATION
215-217 EAGLE ST. • B'KLYN 22, N. Y.

1½ HP to
5 HP

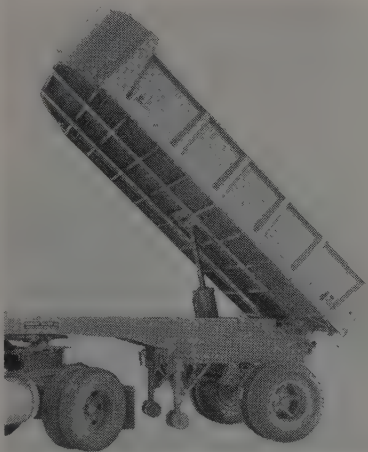


a better leveling action, floating screed regulation by adjusting screws on either side, two vibrating tamper bars and a 4-cu. yd. hopper. Controls for steering, brakes on drive wheels, and screed lifting are hydraulic.

61

Single and tandem axle dump trail

Transport Trailers, Inc., has announced a new complete line of single and tandem axle dump trailers in a full range of capacities. The units



are available in either single hydraulic cylinder hoists or twin telescopic hydraulic hoist arrangements,

providing for a 45-deg. dumping angle for positive clean discharge of sticky loads. These dumps are designed for maximum legal load limits and for ease of operation over all type of terrain.

62

New speaker for 2-way radio

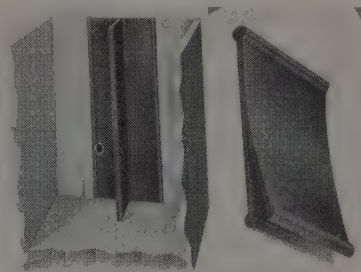
Motorola is now manufacturing a new inverted cone speaker claimed to provide clear messages. Messages from feminine or male dispatchers with unique voice characteristics will be easier to understand by using this speaker because the entire voice range transmitted is more uniformly reproduced without excessive dampening of particular voice frequencies. Advantages of this speaker will be especially apparent in fringe reception areas and where surrounding noise levels are high. Because of the universal trunnion mounting used, this speaker also solves many of the mounting problems met as a result of the limited space available on vehicle firewalls.

63

Rubber device ends slotting or split-bulkheading

A new split type Dumbbell rubber waterstop which eliminates the need for slotting or split-bulkheading when forming structures or walls where hydrostatic water pressure is

involved, recently was introduced by Serviced Products Corp. The device is supplied with one-half of the



width split so that it may be fastened or nailed to the inside of the bulkhead in such a manner as to form a "T." This eliminates the necessity of sliding or splitting the bulkhead saving time and labor. After the section has been poured, the bulkhead is stripped and the two divided sections are joined to the other with rubber cement or by stapling. The waterstop is available in 6- and 9-in. widths.

64

Electrode designed for heavy use

A new hard-surfacing electrode now being manufactured by All-State Welding Alloys Co., Inc., becomes almost twice as hard and consequently twice as wear-resistant when the equipment on which it is applied



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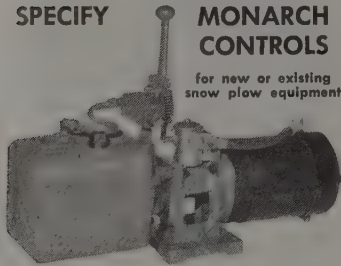
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GRAND RAPIDS, MICHIGAN



is put to work. Deposits from this electrode work-harden to 48-50 Rockwell C. This electrode is an alloy of chromium, manganese, and nickel and is applicable with AC or DC welders. It is particularly designed for both abrasion and impact wear resistance on manganese steels and high carbon steels. It can be used as a base for hard-facing alloys, or can be applied directly as a work-hardenable, wear-resistant overlay. Typical uses are on rail ends, heavy construction equipment, bearing journals and other severely punished parts made of carbon steels where the problem is abrasion or impact.

65

Versatile screw piling

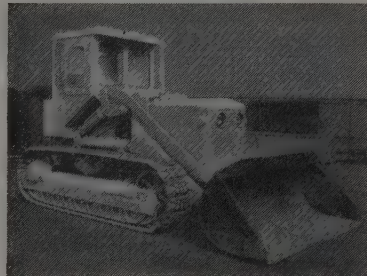
Van Dyke Industries has marketed an easily installed screw piling called the Ezy pier-anchor. Installations, either permanent or temporary, require only a few minutes and offer high load resistance to both tension and compression. The device is of great value in reinforcing foundations where fill conditions are encountered as well as tie-downs of any nature. Guying of structures is simplified such as outside elevators and all types of scaffolding. Equipped with a pointed steel body with tapered flanges, it pulls itself into position when turned and locks itself to the earth. The holding power is increased by the screw's action of pack-

ing soil tightly around the blade as it descends. Design of the blades does not allow any upward movement of soil but instead it is compressed to the sides and between the blades. It is made in a wide range of sizes and can be turned to desired depth by adding extensions. For the average installation only 15 to 20 turns are required, the operation taking only 5 to 10 min. Further data is available.

66

Cabs for Caterpillar

Crenlo, Inc., is manufacturing reinforced cabs for Caterpillar No. 6 shovels. This is in addition to the company's line of heavy duty cabs and accessories for power machines. The cab width extends beyond hydraulic controls on the right side to



provide easy operation of the shovel, and the front end extends over the starting engine control, so all starting operations can be performed from the operator's seat. Two doors allow easy entrance and exit from either side. Installations can be made without disconnecting any hydraulic lines or altering the tractor. The rear window is hinged and can be swung open for ventilation. Optional equipment includes electric or air windshield wipers and tinted glass. The cab weighs 725 lb. Additional information on prices are available on request.

67

Replaceable bulldozer end bit

A new type of replaceable bulldozer end bit has been developed by Lillengreen & Co. With this end bit dozer blade points can be changed in five minutes instead of the usual 2 or more hours. It is only necessary to tap a lock-pin out with a hammer and the dull point falls off. Then a sharp point is slid back on the adapter, the lock-pin is tapped in again and the new or sharpened point is locked on. It means less down-time as well as more yardage between point changes. Further literature is available.

68

Caterpillar motor grader improved

Increased horsepower is one of the several improvements in the No. 12 motor grader manufactured by Caterpillar Tractor Co. The improved

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model utilizes 115 hp. In addition, the clutch and transmission have increased capacity to match the greater horsepower. In both the Cat No. 12 and No. 112 convenient one lever starting is now available. The No. 12 and No. 112 are also equipped with accelerator-decelerator pedals that permit changing speeds without changing the throttle setting. The new throttle is a free moving non-ratchet type and the instrument panel is located to the right of the operator for greater visibility.

69

Fork lift for Ford tractors

Sherman Products, Inc., has marketed a fork lift attachment for Ford tractors for material handling on off-pavement surfaces. The hydraulically operated attachment was designed especially for use on rough terrain. It will lift a load up to 4,000 lb., 10 ft. into the air. Power steering is provided as a standard feature. Attachment changes can be made in 5 min. or less. Further literature is available.

70

Imported lightweight transit

Availability of an imported lightweight 5½-in. survey transit has been announced by Umeco Optical Division. The instrument weighs only 13½ lb., but has a high powered 9½-

in. long telescope with coated lenses. The horizontal circle is 5½ in. in diameter with graduations reading to 20 seconds on the vernier scale. The vertical circle is 4½ in. in diameter with the vernier reading to one minute. The instrument is made in Japan to American specifications. Accessories and parts are readily available and interchangeable with those made in America. List price is \$395.00.

71

Portable heater needs no vent

Master Vibrator Co. is manufacturing a portable space heater which needs no vent because totally enclosed combustion chamber eliminates all gasses. It will heat for a minimum of 12 hr. without refueling and creates 160,000 BTU's of forced air heat per hour. The heater

has a solenoid on the pump for instant flow and cut-off of fuel, fuel tank control to shut off burner when fuel supply is used up, and a thermostat for temperature control. It will burn kerosene, #1 or #2 fuel oil. A 400,000 BTU model is also available.

72

Conveyor for truck-mounted loader

Eagle Crusher Co. is now manufacturing a 15-ft. powered conveyor which can be raised or lowered hydraulically. According to the manufacturer the discharged material can be more accurately placed on the dump truck and will reach higher trucks. The greater length is useful where the truck travels directly ahead of the loader. The extra length conveyor and the hydraulic control are both optional features at extra cost.



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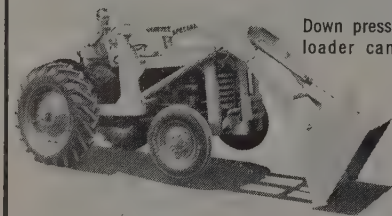
WITH
SMOOTH OPERATING
**SHAWNEE
EQUIPMENT**



SCOUT DITCHER

Digs 12 ft. deep. Various bucket sizes available. Digs under 8 ft. ceiling. Operation smooth and powerful. Easy to install on most all tractors. Removes from tractor in minutes.

Shawnee "SPECIAL" Loader



Down pressure so great, this loader can even lift front wheels off the ground. Removes in ten minutes. Lifts 2,000 lbs. to 9 ft.

Shawnee "LOADMASTER"

with HYDRO-CLAM—One Tractor, Many Uses

Heavy duty, industrial type loader with double bucket cylinders. All welded construction. Easily installed or removed. Working in combination with Hydro-Clam for digging spot excavations, the unit performs many labor saving jobs. Down pressure.

FOR SNOW REMOVAL

¾ Cu. Yd. snow bucket (66" wide) available for Shawnee "SPECIAL" Loader. 1 Cu. Yd. snow bucket (76" wide) available for the "LOADMASTER". Bucket clears wheels for street clean-up.



Ad No. 491-C

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FARM AID EQUIP. CO.

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SPOKANE, WASHINGTON

H. B. EQUIPMENT CO.

18912 S. NORMANDIE
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Manufactured by

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UNIT PRICES

Selected abstracts for Western projects

HIGHWAY—64 mi. of seal coating in New Mexico

New Mexico—Lea County—State. D. D. Skousen & Son of Albuquerque received an award of \$57,639 for 64.3 mi. of seal coating on U.S. 180-62 and S.R. 18, 83, 132, 135 in the vicinity of Hobbs and Lovington.

(1) D. D. Skousen & Son.....	\$57,639
(2) Leslie Wheeler.....	62,012
Armstrong & Armstrong.....	68,855
Allison & Haney.....	73,585

	(1)	(2)
1,055 hour Rolling-steel tired roller.....	\$2.50	\$3.00
1,055 hour Rolling-pneumatic tired roller.....	2.00	2.00
5,815 bbl. 120-150 penetration asphalt.....	5.20	5.75
12,945 cu. yd. Hauling and placing cover material.....	1.75	1.80

IRRIGATION—Siphon construction in Washington

Washington—Columbia Basin Project—Bur. of Recl. Henly Construction Co. of Yakima submitted a low bid of \$580,327 on Schedule 1 for construction of the Naylor siphon in Block 89. Schedule 1 called for monolithic concrete and Schedule 2 called for precast concrete pipe.

	Schedule 1	Schedule 2
(1) Henly Construction Co.....	\$580,327	
(2) Chief Brothers, Inc. and Sandkay Contractors, Inc.....	686,574	\$627,102
Long Construction Co., Inc.....	648,807	667,431
Otis Williams & Co.....	643,229	643,229
Buchanan, Sather and DeRycke.....	673,027	628,790
Osberg Construction Co.....	697,986	
H. C. Werner, Inc.....	687,000	701,650
Lord Brothers.....	732,240	817,185
S. S. Mullen, Inc.....	742,810	
Lee Hoffman.....	768,319	893,953
Lewis Hopkins Co.....		653,025
Morrison-Knudsen Co., Inc.....		729,916
Carl M. Halvorsen, Inc.....		767,074
Scheumann & Johnson.....		815,445

Schedule No. 1

	(1)	(2)
1,000 cu. yd. Excavation, com. for lateral...	\$ 2.00	\$ 0.32
5,000 cu. yd. Excavation, rock, for lateral...	2.00	1.90
200 cu. yd. Excavation from borrow.....	.40	.47
1,000 mi. Overhaul.....	.40	.47
60,000 cu. yd. Excav., com., for structures.....	2.00	.41
12,000 cu. yd. Excav., rock, for structures.....	2.00	1.85
500 cu. yd. Compacting embankments.....	.40	.47
57,000 cu. yd. Backfill about structures.....	.24	.23
2,000 cu. yd. Compact, backfill about struct.	2.00	2.00
7,480 cu. yd. Concrete in structures.....	22.00	31.00
60 cu. yd. Conc. in reinf.-con. lat. lining	30.00	40.00
100 cu. yd. Con. in unreinf.-con. lat. lining	30.00	40.00
11,000 bbl. Furnishing and handling cem.	5.00	5.90
1,600,000 lb. Furn. & placing reinf' ment bars	.10	.114
900 sq. yd. Prep. rock founda. for con. lin.	1.30	1.33
400 sq. yd. Trim, earth founda. for con. lin.	1.00	1.33
90 cu. yd. Fill at top of lateral lining.....	.60	1.20
45 fbm. Furn. and erect. tim. in struct.	.20	.30
210 lin. ft. Furnishing and placing 4 and ½ in. type "G" rub. water-stop.....	1.00	2.80
9,420 lin. ft. Furnishing and placing 9-inch type "A" rubber waterstop.....	1.50	1.60
326 lb. Furnishing and installing steel sleeve, nozzle and cover.....	1.00	.96
2,410 lb. Furnishing and installing misc. metalwork.....	.50	.54
Lump sum Furnishing and installing metal pipe, fittings and valves less than 6 in. in diameter.....	Lump sum	Lump sum
Lump sum Furnishing and installing metal pipe, fittings and valves 6 in. in diameter and larger.....	Lump sum	Lump sum
Total For Schedule No. 1		

Schedule No. 2

All work utilizing precast-concrete pipe in siphon		\$.30
1,000 cu. yd. Excavation, com., for lateral.....		1.80
5,000 cu. yd. Excavation, rock, for lateral.....		.45
280 cu. yd. Excavation from borrow.....		.45
1,000 mi. Overhaul.....		.45
46,000 cu. yd. Excava., com., for structures.....		.28
9,500 cu. yd. Excava., rock, for structures.....		1.80
500 cu. yd. Compacting embankments.....		.45
40,000 cu. yd. Backfill about structures.....		.22
1,400 cu. yd. Comp. backfill about struct.....		1.88
10,700 cu. yd. Consol. backfill in pipe trench		1.40
250 cu. yd. Concrete in structures.....		79.00
60 cu. yd. Conc. in reinf.-con. lat. lining		39.00
100 cu. yd. Con. in unreinf.-con. lat. lining		39.00
600 bbl. Furnishing and handling cem.		5.50
32,800 lb. Furn. and placing reinf. bars.....		.14
900 sq. yd. Prep. rock founda. for con. lin.		1.27
400 sq. yd. Trim. earth found. for con. lin.		1.27
90 cu. yd. Fill at top of lateral lining.....		1.13
45 fbm. Furn. and erect. tim. in struct.		.30

210	lin. ft.	Furnishing and placing 4 and 1/2-in. type "O" rub. water-stop.....	2.65		
180	lin. ft.	Furnishing and placing 9-inch type "A" rubber waterstop.....	3.20		
269	lin. ft.	Furnishing and laying concrete pipe symbol A102MC26....	62.61		
4,750	lin. ft.	Furnishing and laying concrete pipe symbol A102NC50....	65.56		
2,308	lin. ft.	Furnishing and laying concrete pipe symbol A102NC75....	68.51		
280	lin. ft.	Furnishing and laying concrete pipe symbol B102NC75....	71.20		
150	lin. ft.	Furnishing and laying concrete pipe symbol K102NC50....	79.92		
326	lb.	Furnishing and installing steel sleeve, nozzle and cover....	.89		
2,410	lb.	Furnishing and installing misc. metalwork.....	.60		
		Lump sum Furnishing and installing metal pipe, fittings and valves less than 6 in. in diameter.....		Lump sum	Lump sum
		Lump sum Furnishing and installing metal pipe, fittings and valves 6 in. in diameter and larger....		Lump sum	Lump sum

HIGHWAY—Joint sealing in Washington

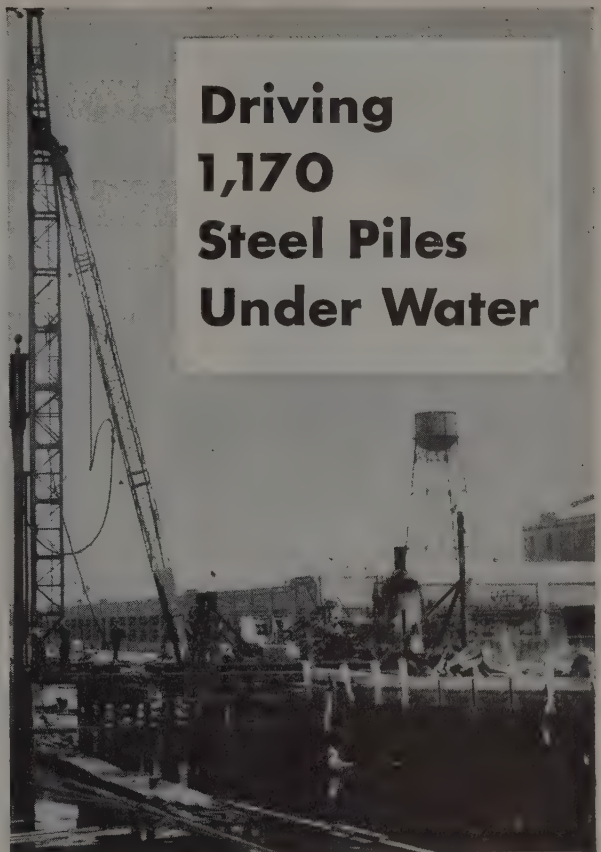
Washington—Clark and Cowlitz Counties—State. Chas. R. Watts & Co. of Seattle received a \$9,555 award for sealing joints on the Ridgefield Junction to Kalama section of state highway No. 1.

(1) Chas. R. Watts & Co.....	\$ 9,555		
(2) Erland & Blickle.....	17,000		
D-H Paving Co.....	17,350		
	(1)	(2)	
65,000 lin. ft. Sealing joints.....	\$.075	\$.20	
10 ton Joint sealing compound.....	468.00	400	

HIGHWAY—Grading, surfacing and a reinforced concrete bridge to be constructed in California

California—Napa County—State. Arthur B. Siri, Inc., submitted a low bid of \$378,743 for 2.7 mi. of grading and surfacing with plant-mixed surfacing on untreated rock base and existing pavement, located between 2.1 mi. east of the Sonoma County line and 2.2 mi. east of the Corneras School. A reinforced concrete bridge is to be constructed. Unit prices were as follows:

1) Arthur B. Siri, Inc.....	\$ 378,743		
2) Harms Brothers.....	378,759		
Frederickson Brothers.....	399,759		
Joseph McFadden & Son, Inc.....	410,184		
A. G. Raish Co.....	412,689		
McGuire & Hester.....	414,346		
Brown Ely Co., Contractors and W. H. Darrough & Sons.....	419,031		
Parish Brothers.....	419,690		
Baldwin Contracting Co., Inc.....	424,713		
Lord & Bishop and M. J. B. Construction Co.....	426,864		
J. Henry Harris.....	429,522		
Elmer J. Warner.....	430,501		
Granite Construction Co.....	432,732		
O. C. Jones & Sons.....	437,085		
	(1)	(2)	
2,500 cu. yd. Remov. pavement.....	\$ 2.00	\$ 2.00	
36 cu. yd. Remov. concrete.....	15.00	8.00	
Clear & grubbing.....	11,500.00	10,000.00	
131,000 cu. yd. Rdwy. exc.....	.54	.37	
1,700 Struct. exc.....	2.25	1.50	
920 cu. yd. Struct. backfill.....	2.75	3.00	
1,100 cu. yd. Ditch & channel exc.....	2.00	2.00	
41,000 sq. yd. Compact original ground.....	.06	.04	
3,000,000 sta. yd. Overhaul.....	.003	.003	
36,000 ton Imported subbase material.....	1.65	1.75	
Dev. wat. sup. & furn. wat. equip.....	10,000.00	5,000.00	
6,800 M gal. Apply water.....	1.50	1.50	
144 sta. Finish rdwy.....	10.00	12.00	
23,000 ton U. R. B.....	1.65	2.30	
100 ton Lig. asph. SC-1 (pen. tr. & pr. ct.).....	30.00	32.00	
45 ton Asph. emul. (Cl. C-Med. sl. ct., Cl. "D" sl. ct. pt. bdr.).....	35.00	35.00	
360 ton Screen (Cl. "C-Med" sl. ct. Mineral aggr. (P.M.S.)).....	5.00	6.00	
12,000 ton Paving asphalt (P.M.S.).....	5.50	5.50	
550 ton Cl "A" P.C.C. (struct.).....	6.00	6.00	
650 cu. yd. Furn. concrete piling.....	48.00	53.00	
676 lin. ft. Driving piles.....	3.00	3.50	
32 ea. Sacked concrete riprap.....	143.00	120.00	
11 cu. yd. R/w monuments.....	30.00	50.00	
127 ea. Survey monuments.....	6.00	8.00	
14 ea. Metal plate guard railing.....	19.00	15.00	
108 lin. ft. Corrugated metal bridge railing.....	3.10	4.00	
206 lin. ft. Marker and guide posts.....	4.85	5.00	
140 ea. New property fence.....	5.50	7.00	
42 mi. 48" Chain link fence.....	1800.00	2000.00	
2,800 lin. ft. Salv. & reconstr. property fence.....	.96	1.25	
1.3 mi. 12" R.C.P.....	1,050.00	1,000.00	
308 lin. ft. 18" R.C.P.....	2.25	2.50	
40 lin. ft. 24" R.C.P.....	3.00	4.50	
462 lin. ft. 42" R.C.P.....	5.00	6.00	
64 lin. ft. 48" R.C.P.....	11.00	14.00	
200 lin. ft. 12" C.M.P. (6 ga.).....	12.00	18.00	
32 lin. ft. 84" C.M.P. (8 ga.).....	2.25	3.00	
30 lin. ft. Salv. exist. 90' field assembled plate culv.....	40.00	40.00	
90,000 lb. Bar reinforcing steel.....	3.50	15.00	
30 ea. Salv. & resetting mail boxes.....	.105	.11	
	6.00	10.00	



Driving 1,170 Steel Piles Under Water

390 Steel piles were driven 85 feet into unstable soil below the surface of the water, in addition to 780 shorter piles, for the lift span piers of the longest, highest vertical-lift bridge on the Pacific Coast.

Proctor & Kuhn, sub-contractors to United Concrete Pipe Corp. selected a McKiernan-Terry 11B3 Double-Acting Pile Hammer for this link in the Terminal Island Access Freeway because of the proven dependability of these hammers on underwater pile driving.

Whatever your pile-driving operations may be, you can depend upon McKiernan-Terry Hammers for best results.

Write for Bulletin.

McKIERNAN-TERRY CORPORATION Manufacturing Engineers

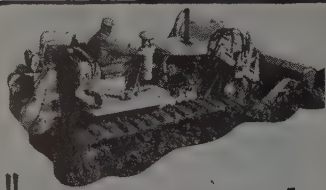
Also manufacturers of Coal and Ore Unloaders and Bridges, Grab Buckets and Special Machinery

16 PARK ROW, NEW YORK 38, N. Y.

Seattle and Spokane: Star Machinery Co.; Portland, Ore.: Cramer Machinery Co.; San Francisco: Edward R. Bacon & Co.; Los Angeles: Garlinghouse Brothers; Salt Lake City: C. H. Jones Equipment Co.; Denver: Mine & Smelter Supply Co.; Albuquerque, N. Mex.: R. L. Harrison & Co.

McKIERNAN TERRY

11B3 Double-Acting Pile Hammer, included in the McKiernan-Terry line of 16 sizes of double-acting and single-acting hammers and 2 sizes of double-acting extractors.



**"THIS LUBRICANT
KEPT 'EM ROLLING
IN MUD, MUCK
AND WATER"**

—says J. O. ARCHIBALD
of Redwood City, California

The job was clearing 500 acres of salt marsh for crystallizing ponds. To quote, "We selected LUBRIPLATE No. 107 for track and general lubrication and LUBRIPLATE APG-140 for transmissions and final drives. During the entire job there was no replacements of track rollers nor any tie-ups of equipment due to parts replacement or breakage!"

**REGARDLESS OF THE SIZE AND
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REDUCE MAINTENANCE COSTS.**



LUBRIPLATE is available in grease and fluid densities for every lubricating need. LUBRIPLATE H.D.S. MOTOR OIL meets every requirement for gasoline and diesel engines.

LUBRIPLATE DIVISION, Fiske Brothers Refining Co.
Newark 5, N. J. or Toledo 5, Ohio.

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Nott-Atwater Company, Spokane, Wash.
Goodyear Rubber & Asbestos Co., Portland, Ore.
Moly & Van Dyke, Inc., Klamath Falls, Ore.
Hendrie & Bolthoff Co., Denver, Colo.
Garlinghouse Brothers, Los Angeles, Calif.
Industrial Supply Co., Billings, Mont.
Fleck Brothers, Ltd., Vancouver, B. C., Canada
Campbell Industrial Supply Co., Tacoma, Wash.
Dodge-Yakima Supply Co., Yakima, Wash.
Industrial Lubrication Supply Co., Eugene, Ore.
Miller & Stern Supply Co., San Francisco, Calif.
Degen-Flege Co., Los Angeles, Calif.
Hudson Corporation, San Diego, Calif.
Sawtooth Company, Boise, Ida.
Wilkinson & McClean, Ltd., Calgary, Alberta, Can.
Bart-Sayer Co., El Centro, Calif.

News of DISTRIBUTORS

Columbia Tractor adds wire rope line

Columbia Tractor Co., with headquarters in Wenatchee, Wash., was recently named a wire rope distributor for Bethlehem Pacific Coast Steel Corp.'s "Purple Strand" brand which will be sold by all three of Columbia's stores in Wenatchee, Okanogan, and Ephrata. Elmer Sweet, sales manager; Chet Armour, Okanogan store manager; and Pat Grewell, Ephrata store manager, are now well equipped to serve contracting, logging, and other wire rope needs in the north central Washington area. Columbia Tractor Co. has been a distributor of Caterpillar tractors and John Deere machinery since the company was established in Wenatchee in 1951.

Western regional manager named

Robert Hoffman has been named Western regional manager for the Electro Dynamic Motor and Generator Division of General Dynamic Corp., Bayonne, New Jersey. Hoffman's experience in electric motors totals seven years.

New Bucyrus-Erie distributor for No. Calif.

West Coast Engine & Equipment Co., Berkeley, Calif., has been appointed distributor in Northern California for Bucyrus-Erie Co. The firm now offers sales and service on Bucyrus-Erie general purpose shovels, cranes, and draglines, equipped with gasoline, diesel, or single-motor electric power units. Serving all or portions of 42 counties, the newly

appointed distributor has affiliated sales and service establishments in Sacramento, Stockton and Fresno, thus rounding out its coverage.

George Cruden dies; Strother succeeds him

George E. Cruden, manager of the San Francisco branch of The White Motor Co. for the past 14 years, died recently at the age of 64 after a brief



Howard P.
Strother

illness. Cruden joined the sales force of the White company in 1919 and was well known in the trucking industry all along the Pacific coast. Howard P. Strother, who has been with the company nearly 10 years, most of that time on the West Coast, has been appointed to succeed him. Most recently he has been manager of the Oakland Branch, and now will make his headquarters at San Francisco.

Thor appoints service engineer

William R. Gahagan was recently appointed service engineer for the Thor Power Tool Co. in Seattle.



H. W. Moore Equipment Company has new home in Denver

Construction of the new plant of H. W. Moore Equipment Co. was recently completed at 5990 Colorado Blvd., Denver, Colo. The company has nearly 15 acres of land, and the all-concrete building gives them 50,000 sq. ft. of floor space.

Moore distributes such well known

lines as, International Harvester Co., Galion Iron Works, Iowa Mfg. Co., Quick-Way Truck Shovel Co., Frank G. Hough Co., Pettibone-Wood Co., Roscoe Mfg. Co., Cleaver-Brooks Co., Schramm, Inc., Link-Belt Speeder Corp., Cleveland Trencher Co., and many others.

New dealership news

Honnen Machinery Co., new dealership of Blythe, Calif., replacing Hartnett Machinery Co., has announced some changes in its managerial personnel. Hugh H. Honnen heads the firm as president; Perry C. Moore is sales manager; Ken Weyrauch, parts manager; Elwin Hanna, service manager; and Wylie Simmons, secretary-treasurer. Among the equipment represented by the firm is Caterpillar, John Deere, Be-Ge, Atlas, Fleco, Construction Machinery Corp., Austin, Marvin Land Plane, Hyster, Athens, Sierra, Kono Mfg. Co., and Preco.

New Euclid dealer in Arizona

V. L. Snow, director of sales for Euclid Division of General Motors Corp., recently announced the appointment of Min-A-Con Equipment Co. as Arizona dealer. Located in Phoenix, Min-A-Con will represent Euclid in the entire state except Apache and Mohave counties. Leonard Beck is president of the new dealership and other principals are Harold Hall and Charles Sons, all with many years of experience in the construction equipment industry.

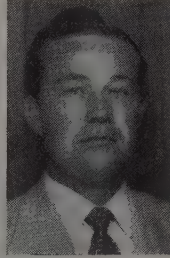
New distributorship

The Lang Company, Salt Lake City, Utah, has been appointed sales

distributor by White Manufacturing Co. for Utah state and southwestern Wyoming. Lang will have exclusive sale in that area for White concrete vibrators, concrete trowelers, asphalt plants, and asphalt heating kettles.

Schramm appoints

Harlan K. Knudson, sales engineer for the past two years out of the Los Angeles branch of Schramm, Inc.,



**J. E.
Bjerke**

has been promoted to manager of the Northern territory, with headquarters in Portland, Ore. He will cover the territories of Washington, Oregon, Idaho, Montana, and Utah. Jeroy (Jerry) E. Bjerke has been added at the Los Angeles office as sales engineer. A newcomer to southern California, Bjerke will specialize in all types of pneumatic engineering installations.

Two moves for Lincoln

The Lincoln Electric Co. as of

October 1 moved its Portland branch office and warehouse to 1034 N.E. Russet St. The Seattle branch office and warehouse will be moved to 543 West Nevada St. in mid-November. At both locations floor area is more than double that of the old locations, making available additional space for the handling of the company's products in the arc welding field, as well as new products including battery chargers for electric trucks and electric motors.

J. I. Case appoints dealers

J. I. Case Company, Oakland, recently announced the following new dealers in California: Island Equipment Co., Sacramento; Farmers Hardware & Equip. Co., San Luis Obispo; Heinrichs Equipment, Santa Maria; and Hassard Equipment Co., Chula Vista.

Galion appoints Pac. Northwest rep

The Galion Iron Works & Mfg. Co. announces the appointment of Robert N. Shears as district representative in the Pacific Northwest. His territory includes Washington, Oregon, Idaho, Montana, Utah, and Wyoming. Shears replaces Charles O. Evans who has been transferred as a district representative elsewhere. Shears' headquarters will be at 3902 N.E. 36th Ave., Portland, Ore.



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BARNES PUMPS HELP HANDLE SEEPAGE ON GIANT CANADIAN HYDRO PROJECT!



Barnes 90M Self-Priming Centrifugal Pumps operate 24 hours a day in helping to control surface and seepage water in the Canal Section of the vast \$300,000,000 Hydro-Electric Power Commission's "Sir Adam Beck-Niagara" Generating Station No. 2 now under construction at Niagara Falls, Ontario, Canada. . . Barnes could ask for no greater privilege than to put its pumps in action on your own projects. See your distributor today!

Distributors:

Central Equipment Co., Berkeley, Calif.
P. L. Cooks Co., Portland, Oregon
R. L. Harrison Co., Inc., Albuquerque, New Mexico
The C. H. Jones Equipment Co., Salt Lake City, Utah
H. W. Moore Equipment Co., Denver, Colorado
The Rix Company, Inc., San Francisco, Calif.
Universal Equipment Company, Seattle, Wash.

BARNES MANUFACTURING CO., Mansfield, Ohio; Oakland 21, Calif.

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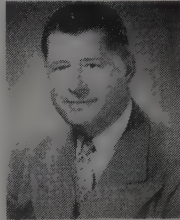
Name.....
Address.....
City.....State.....
Position.....Company.....

Marin Co. distributes Carco midget

The Marin Company, Los Angeles, has been appointed a national distributor for the Carco midget sand blast gun. Used for fast, efficient sand blast, air or liquid cleaning of small parts and surfaces, the gun has many applications, and comes in a complete kit selling for \$16.50.

Changes at White Motor

Important personnel changes, due to recent expansion of the Pacific Coast region to include the entire West, have been announced by Wilson D. Patterson, Pacific Coast re-



L. A.
Fleener



R. W.
Cochran

W. D. Patterson

gional manager of The White Motor Co. R. W. Cochran who has been manager of the Los Angeles branch has been transferred to the factory branch in Denver, Colo. Also transferred to Denver is Fred Ragen, wholesale manager, who was formerly stationed at Salt Lake City. He will direct sales and service for the Rocky Mountain area. L. A. Fleener has been appointed manager of the Los Angeles branch, replacing Cochran.

Gardner-Denver sales personnel

Jim McGovern was recently appointed salesman at the Seattle, Wash., branch of Gardner-Denver Co. to handle western Washington, replacing Don Heinze, now resident salesman in Portland covering the Oregon territory.

Broderick-Bascom expansion

As of November 1, Broderick & Bascom Rope Co. moves into new enlarged headquarters at 44 Potrero Ave., San Francisco. The new building engineered for Speedi-Service will enable the customer to pick up his material with maximum speed as new equipment and facilities are be-

ing installed. In addition, customer parking space and a loading ramp will be included in the new headquarters.

Nordberg transfers Friend to West Coast

Nordberg Manufacturing Co. announces the transfer of Peter C. Friend, sales engineer, to the San Francisco district office. He had been sales engineer in the crusher division, Milwaukee, since 1953. In his newest assignment, Friend will assist T. D. Davis, Western branch manager, serving customers and prospects for Symons crushers and screens, and the complete line of Nordberg machinery in the West.

MANUFACTURERS

American Tractor Equipment expands plant

According to Mack Wooldridge, president of American Tractor Equipment Corp., his company has under way an extensive plant expansion and additional tooling. A total of \$110,000 has been invested in a 12,000-sq. ft. new plant shop and a 7,000-sq. ft. extension to the present fabricating shop at San Leandro, Calif. All burning, shearing, and forming operations will be done in the new 100x120-ft., all-steel, clear-span design, plate shop. A 15-ton overhead crane serves the entire operating area and the rail and truck loading docks. The fabricating shop has been extended 7,000 sq. ft. and a 1,700-sq. ft. addition has been made to the machine and welding shop.

J. W. Bloomquist is Euclid sales mgr.

J. W. Bloomquist was recently appointed to the position of domestic sales manager for the Euclid Division of General Motors Corp. He joined the Euclid organization in 1945 as a district sales representative.

Coulter takes on Timken line

The Timken Roller Bearing Co., Steel & Tube Division, announces the appointment of Coulter Steel & Forge Co. as distributor for graphitic tool steels in the Southern California territory. The Coulter company, with its main office in Oakland, Calif., and warehouses in Seattle, Wash., and Salt Lake City, Utah, is opening an office and warehouse at 5394 Alhambra Ave., Los Angeles, from which to service Southern California.

Appointments at Sylvania

The appointment of Robert C. Harper of Los Angeles as Western regional sales manager for lighting of Sylvania Electric Products, Inc., was recently made known. His new headquarters will be in San Francisco. The move is accompanied by

the transfer from Emeryville, Calif., of William L. Friend to Los Angeles as district sales manager. Friend's position as district sales manager for San Francisco is being filled by Robert W. Thunen, district engineer in Emeryville.

Galion appointment

Galion Allsteel Body Co. announces the appointment of George J. Bockmann as Northwestern regional sales manager. His headquarters will be in Omaha, Neb.

Joe Wicke promoted by Iowa Mfg. Co.

The promotion of Joe A. Wicke to the position of advertising manager has been announced by Kenneth Lindsay, executive vice president and director of sales and advertising of Iowa Manufacturing Co., maker of Cedarapids aggregate producing



Joe A. Wicke

equipment, bituminous mixing plants and vibratory compaction units. Wicke joined the engineering department of Iowa in 1942. His service with the company was interrupted by three years in the Air Force during World War II. He resumed employment at Iowa after his discharge, and was made assistant advertising manager in 1950. William E. Yount, Jr., has been advanced to the position of assistant advertising manager. Yount joined the advertising staff in 1953.

Kaiser opens Phoenix office

Establishment of a sales office in Phoenix, Ariz., for Kaiser Steel Corp. was recently announced. John C. Mackey has been chosen as sales representative, with offices at 213 North First Ave. Mackey, prior to his newest assignment, was sales representative in the steel company's district office in Los Angeles.

New official at Blaw-Knox

E. C. Rook has been appointed vice president and general manager of the Blaw-Knox equipment division. Rook, recently retired as a captain in the U. S. Navy, succeeds G. L. Dirks, who resigned. The new official immediately assumes the management of the company's largest fabricating unit which has its main plant at Blawnox, Pa., and a branch at Elyria, Ohio.

Caterpillar promotes Lee Morgan

Lee L. Morgan of the Caterpillar Tractor Co. was recently appointed manager of the sales development division. He was promoted from assistant sales manager of the plains division. Morgan has been a member of the Caterpillar organization since 1946.

LeTourneau's new steel products div.

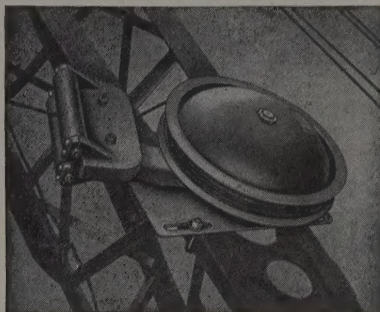
To coincide with the formation of a new steel products division of R. G. LeTourneau, Inc., at Longview, Tex., James M. Molpus was recently transferred there as general manager of the Texas Division. Ben W. LeTourneau takes over Molpus' former assignment as general manager of a southern division. Harry S. Clark, formerly Texas division general manager, has been named general manager of the newly created steel products division.

Republic execs. appointed vice presidents

The appointment of three new vice presidents and directors was recently announced by The Republic Supply Co. of California. All are company executives and include Elton E. Davison, Glenn E. Pitts, and Richard M. Chewning.

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UNIFORM TENSION at any pay-out



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FAIRLEAD ROLLERS — Save needless line wear.

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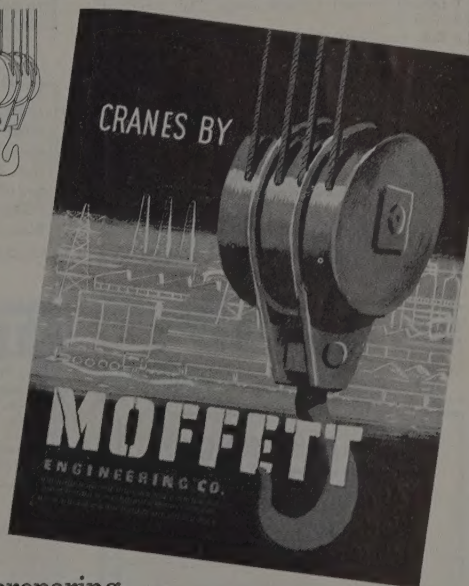
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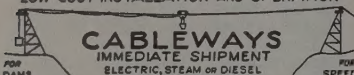
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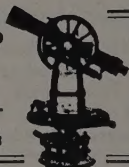
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SOLD RENTED REPAIRED

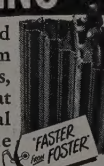
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Lost and found department

Road maintenance took on a new twist recently when a county road department employee bulldozed a safe into the open. The safe, missing for two years, was brought to light from the side of a road embankment near Truckee, California.

The owners, operators of a nearby market, were glad to have it back with all of the original papers intact. Still missing was \$700 that had also been in it.

What next for operators?

When President Eisenhower waved a radio-active wand in Denver, last September 6, and set into motion a tractor-shovel 1,300 mi. away at Shippingport, Pa., he may very well have started the end for the rugged human operator we know today. His wand moved near a Geiger counter which activated a pointer on a meter scale. Near the extreme right of its travel it actuated an electrical signal that was transmitted by interrupting a 400 cycle carrier on dual telephone circuits.

This in turn operated a relay which started an electrical sequencing switch mounted on the Cat No. 6 shovel. The sequencing switch activated solenoid valves controlling the

hydraulic cylinders connected to the operating levers of the shovel. Hydraulic supply for the operating cylinders was from an air tank mounted on the back of the shovel.

What would the president have done next had this shovel neared the edge of a cliff? Long live the equipment operator!

White striping shoulders

After a six-month study of the effect of having an additional white stripe on the shoulders of a 4-mi. road stretch in Connecticut, the decision by that highway department has been to paint an additional 70 mi. It has long been considered an unnecessary touch to a perfect road, particularly when expense obtruded as an overriding factor. Missing until this study was a thorough engineering testing to determine whether such a line did anything more than pretty up a roadway and possibly confuse pedestrians.

The Dorr Foundation, of which Dr. J. V. N. Dorr is chairman of the board of trustees, was largely responsible for the Connecticut experiment being undertaken. At the conclusion of their extensive tests, Connecticut engineers reported that "Lateral position and speed of vehicles on bituminous surfaced roads with similar type shoulders are defi-

Twenty-five years ago in *Western Construction*

"The board of consulting engineers and geologists appointed by Edward Hyatt, Jr., state engineer of California, to examine the **San Gabriel Dam** under construction by the Los Angeles County Flood Control District, has reported unfavorably on the site and the present dam has been condemned by Hyatt."

* * *

"The **Caterpillar Tractor Co.** announced price reductions on every major item of machinery it makes—for farming, road building, logging and construction—on December 11 . . . The Caterpillar '60' now lists at \$4,175."

nately affected by the presence of a continuous shoulder line, whether it be located at the edge of the pavement or as much as 18 in. back of same.

The report further stated that the line 18 in. off the pavement caused the most constant pattern compared to 1½ to 2½ ft. It gave the motorists a sense of security and they drove closer to the outer edge of the pavement.

... The Editors

NEXT MONTH — an issue you'll want to keep all year

It's no secret now. We've been planning and working all year, in between other duties, toward providing you with a big and useful surprise package shortly after New Year's Day.

The January 1955 **Western Construction** will actually be a two-part package. Here's a quick review of the contents:

PART 1—CONSTRUCTION OUTLOOK IN THE WEST. Here, you'll get first look at a coming \$5,000,000,000 construction year in the West, biggest of all time.

In a new format, you'll find a separate article on the construction plans, projects, and economy of every Western state and Alaska. Especially designed to fit your "geographical taste," these articles will chart the immediate past and 1955 expectations, area by area, for all the major types of heavy construction—highways, buildings, dams, canals, industrial construction, bridges, railroads, etc.

Also in Part 1 there'll be an introductory article giving you an editor's-eye view of significant trends in Western construction methods and types of construction.

PART 2—THE 1955 WESTERN CONSTRUCTION HANDBOOK. In January, for the first time, this big reference directory telling the "who," "what"

and "where" of construction equipment in the West will be bound into a regular issue.

This is the same WC Handbook that previously, through five annual editions, sold at \$5.00 per copy. Unchanged, and actually expanded, it will be part of your January **Western Construction**, representing an additional no-added-cost service to you as a **Western Construction** subscriber.

The Handbook section of the issue, covering about 128 pages, will break down like this: (1) A list of construction equipment manufacturers, arranged alphabetically, along with their products, branch offices, key Western personnel, and their distributors in the 11 Western States and Alaska. (2) Distributors in the West and Alaska listed by states and cities, with their addresses, personnel, phone numbers, branch offices, and lines sold and serviced. (3) An alphabetical listing of construction equipment, and products, with the manufacturers for each. (4) An extensive trade names identification section. (5) Indexes for the manufacturer and distributor section to speed reference to these listings.

Altogether, the January 1955 issue will be the biggest, thickest package you have ever received in the **Western Construction** mailing wrapper. And we believe its usefulness to you for reference throughout 1955 will be in proportion to its husky size.