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## This month . . .

Nimbus Dam builders  
beat seepage and floods

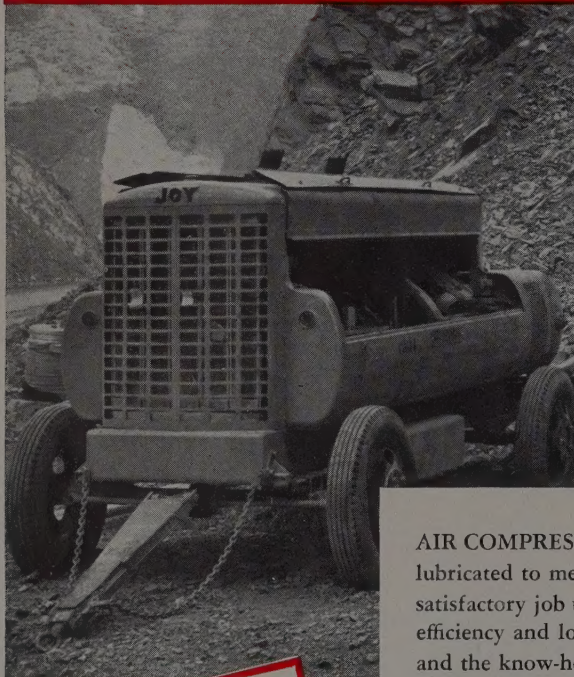
Anti-stripping additives:  
Record proves they work

Are graduate engineers  
trained for construction?

COVER . . . . . see page 4

## MARCH 1954

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## FRONT COVER

**DRAFT TUBE THROAT** form is a fine example of carpentry in heavy construction. This one at Nimbus Dam breaks into 7 pieces, which meant special attention to framing and connections. Plywood sheathing meant fancy tailoring. Steam made bends possible, and craftsman's eye then decided where to rip or slash.

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Published monthly by

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**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 35¢.

**For change of address** use rip-out postcard bound into this issue (or send your new address along with old address, enclosing if possible your address label, to Circulation Dept., Western Construction, 609 Mission St., San Francisco 5, Calif.)

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### When is a contractor?

The word *contractor* is a functional one, with completely logical application to many business enterprises. Contracts themselves are the essence of business in all its forms. But nowhere else has the word taken the particular significance that it has in connection with construction of engineering works. Certainly within the construction industry, and even among "civilians," the word *contractor* pretty much stands alone. It means the man who builds, and only incidentally has reference to the business procedure under which he operates.

This background of lay understanding is a certainty in the West. The region is still building, and construction contractors mean a lot to the West and to Westerners. Many contracting names are familiar to many people. The names are not all Western contractors. Some are from other regions, but they become more widely known here, where construction is something far more than mere maintenance. It is the business of building the West.

In view of such general and generously accorded recognition to construction contracting, a Western newspaper headline of recent date was almost unexplainable: "Contractor a Suicide . . ." Now, this headline was literally true, and to that extent it was explainable. But one wonders how many construction engineering and contracting people were falsely disturbed in this instance. How many morning cups of coffee were upset; how many eyebrows raised or hearts quickened . . . before further reading showed that the deceased had been contracting in another field entirely?

Apparently the copy desk crew of the offending newspaper includes a master of literal English, but one who has never heard of contracting! Building the West, that is.

### One foundation is many problems

Introduction of a new concept is always followed by a period of dissension. And exponents of the new school are apt to be as much at odds with each other as with those of traditional thought. Eventually some general agreement as to principles is reached, and the violent controversy subsides. A little lively argument always remains, but this is good. It is as healthy for the practice of civil engineering as for any endeavor.

For several years one of the "new" engineering specialties has been the increasingly precise study of soil mechanics, especially the practice of foundation engineering that has sprung from it. Naturally, all early theories did not immediately become settled matters, and many of them still have not.

Some engineers say that agreement, on whatever arbitrary basis, is now paramount. A foundation contractor, himself a civil engineer, nods assent: "This business of soils has got to agree some day—so that any four or five men studying the same problem will come up with something like the same answer! If not, they're going to lose the faith of their clients."

This is something of an ultimatum, but a reputable Western foundation engineer has a tempering view. He wonders if it is proper in the first place to assume that a given situation presents identical problems to "any four or five men." All begin with the same superficial problem, but their latitude thereafter is considerable.

Most structural materials have fairly constant physical properties. Soils do not. Soil strength, for example, may be strikingly affected by the building that is proposed for construction. The shape, size and type; the construction sequence and speed—all these enter the foundation engineer's considerations, and all are reflected in his recommendations that follow. Depending on what he is allowed or assumes for each of the foregoing parameters, the overall problem may be changed. Thus, "any four or five men" are not apt to produce identical solutions. They haven't even solved the same problem.

Foundation engineering is something more than an answer to the question "What bearing pressure can we use?" It is each engineer's correct solution to the problem he has delineated. And he must exercise his entire fund of talents and his best judgment in arriving at that solution. Thus, insofar as the total of his education, experience, judgment and imagination differs in quantity—or in quality—from that of his colleagues in foundation engineering, so do the problem analyses and designs that he originates.

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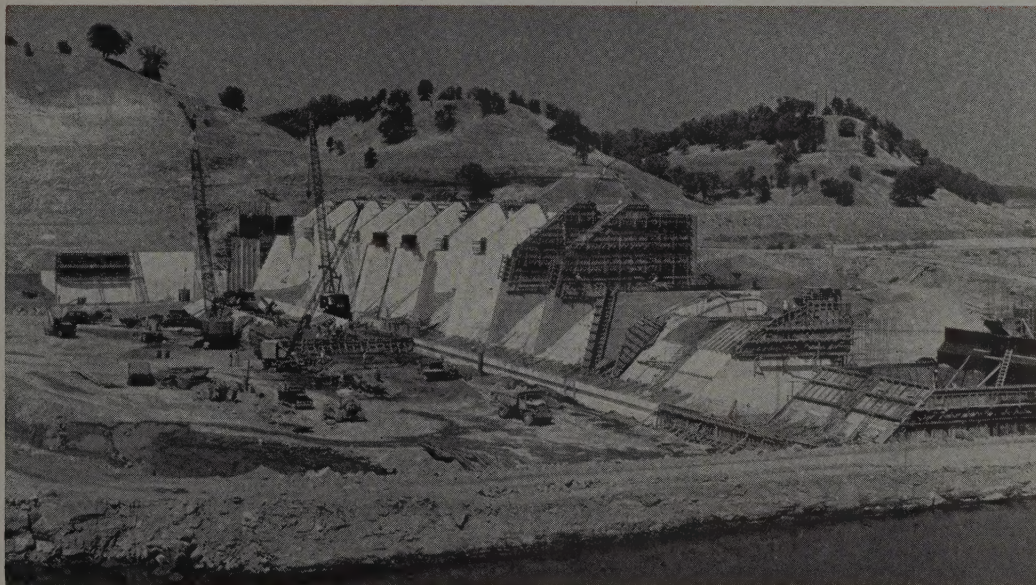
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MARCH 1954



## Nimbus Dam nears completion

*Winston-Johnson operations have come a long way since this picture last summer—Three flood delays of 1953 are long past, and final season starts with only two monoliths to go—Construction of cutoff and drainage facilities are major project feature—Contractor's innovations show smart planning*

**N**IMBUS DAM, re-regulating and diversion structure for the Folsom Project on the American River in California, has been a job of water regulation during the course of its own construction. Founded primarily on interbedded siltstones, claystones and sandstones, the dam was designed with elaborate cutoff and drainage features. Construction of these has posed problems for Winston Bros. Company and Al Johnson Construction Co., co-venturers on the \$6,067,400 job.

Nimbus is a concrete gravity structure, actually a weir controlled by 18

radial gates, each 40 ft. wide by 24 ft. high, giving an effective crest length of 720 ft. Lowest design elevation for dam foundation concrete is el. 56. (Streambed is at el. 80.) From its foundation the dam rises 46 ft. to a crest at el. 102. Gate piers 5½ ft. thick rise above this to el. 132, level of the service bridge and operating deck and top of abutments. The powerhouse lies in line with the dam, connecting the weir section to the right abutment.

The abutment section of the dam on the right side of the river is of wing wall construction. That is, it is

formed of hollow cells with exterior walls tapering from 4 ft. to 2 ft. in thickness. Added strength is gained from interior diaphragms 18 in. thick running between upstream and downstream walls. Impervious fill has been compacted against the inside of the upstream wall on a 1:1 slope and the remaining volume backfilled with free draining material. The abutment section on the left end is of massive gravity wall construction, with similar impervious and free draining backfill sections.

The dam is flanked on the upstream side by a concrete apron 120 ft. wide and 1 ft. thick. A similar apron, but 6 ft. thick, extends 60 ft. downstream. Cutoffs, variously timber and concrete, are located at the extreme edges of the aprons and beneath the upstream face of the dam itself.

### Pumps

For foundation and cutoff construction within the cofferdams, the manner of handling infiltrating water was important. Wellpoints were out of the question in the opinion of Winston-Johnson, since the siltstone, al-

## The last year and a half...



FIRST OF THREE floods came in January 1953. Work concentrated on left abutment during following winter months, using natural left bank for cofferdam, as shown here.

NIMBUS DAM and power plant are located about 14 mi. northeast of Sacramento and 6 mi. downstream from Folsom Dam. Work by Winston-Johnson began in July 1952 and since then has been punctuated by periods of startling progress and by equally startling setbacks caused by the "sensitive" American River.

With its large watershed but relatively short length, the river responds rapidly to upstream rainfall. Tributaries empty their peaks in quick succession, and the result is a fast change of conditions in the Folsom-Nimbus area. Floods last winter and spring were especially troublesome for Winston-Johnson, once being "natural" and twice the result of cofferdam failures at Folsom. In all instances, Nimbus operations had to be changed on short notice and for extended periods until river control could again be established.

### Cofferdams

Even without these somewhat seasonal problems, Winston-Johnson has had to devote special attention to water. The job has required three cofferdam stages of its own, not counting rebuilding efforts last year and modifications of the second-stage cofferdam. And construction of cutoff elements of the dam itself has required excavation of open trenches at three locations

across the site. These are described in the accompanying article.

Specifications of the Bureau of Reclamation called for first work to be performed in the powerhouse area near the right bank. Therefore, the first-stage cofferdam was built to isolate the river from an area containing the powerhouse and five monoliths of the dam. During the first six months of construction, foundation excavation was completed in this area and essentially all concreting done for four blocks. The work also included some powerhouse concrete when the first major river rise of the 1952-53 season took place on January 9, washing out the cofferdam at Folsom upstream and, similarly, overtopping the first-stage cofferdam at Nimbus.

Operations at this time were shifted to the left bank and, using the natural left bank for a cofferdam, abutment excavation and excavation for Blocks 17 and 18 were commenced. During succeeding winter months it was possible to repair the first-stage cofferdam and dry out the powerhouse area. In the meantime some work had continued there, with ironworkers going to and from the existing blocks by rowboat!

The cofferdam was lost again on April 27, 1953, and the major scene of work again moved across the river. A predicted peak of 15,000

cfs. finally developed to be 53,000 cfs. Winston-Johnson fought the river for several hours, but abandoned efforts when the flow was about 40,000 cfs. and rising faster than embankment could be placed. Although short, notice of the flooding was enough to get all machinery out of the hole except for a few pumps.

### Court action

After rebuilding, an unexpected final flood, again the result of a failure upstream, caused a third loss on May 20. This river peak passed quickly, the cofferdam was repaired, and during the summer and fall of 1953 construction progress at Nimbus Dam reached its highest rate, with essential completion of Blocks 1 through 14, including radial gates, and also Blocks 17 and 18. The river now passes between Blocks 14 and 17, and it is planned to re-divert the river in coming months through blockouts left below the radial gates in Blocks 1 and 2.

A recent development in connection with last winter's floods has been the filing of a suit by Winston-Johnson against Merritt-Chapman Scott Corp. and The Savin Construction Corp., contractors at Folsom Dam. Damages of \$275,725 are sought, including costs to Winston-Johnson on the two occasions when their work was flooded as a result of cofferdam failures at Folsom.

### Complaint allegations

The complaint alleges that 90 days of idleness on main dam construction at Nimbus resulted from the January 9 flood. Specific counts charge that the cofferdams which failed at Folsom were in both cases "planned, constructed and maintained . . . in a careless and negligent manner," that the defendants' designs "were inadequate and defective," and that "the materials used by defendants in the construction . . . were improper, unsuitable, and inadequate." In particular, inadequate provision of spillways or escape flumes is charged. Water ponded behind the cofferdams before the failures, and suddenly released on top of the natural river flow, was the cause of damage downstream.

though permeable, does not drain freely. As a result, trenching operations were dewatered by constant pumping. For the most part, pumps drew directly from the excavations. In places, however, additional excavation was performed to carry water off to sumps. The contractor had as

many as 30 assorted pumps scattered through the work area.

A cutoff trench 24 ft. deep borders the edge of the concrete apron upstream from the dam. With side slopes of 1:1, the trench terminates with a bottom width of 7 ft. at el. 56. The contractor's principal means of

excavation was a dragline loading into 8-yd. end-dump trucks. Wagon drills also came into play, with holes from 6 to 12 ft. deep being drilled on 6-ft. centers both ways. Jackhammers were used for shallow drilling on the side slopes. A Caterpillar D2 was used to clean up the final grade.

Since this cutoff, except near the abutments, is to be entirely immersed at all times, it was specified for timber construction. As among redwood, southern yellow pine, and Douglas fir, the contractor chose fir, building a wall 25 ft. high composed of two overlapping layers of 3 x 12-in. timbers. Horizontal wales of 6 x 6-in. fir were bolted on both sides at top, bottom and middle, completing the construction. The membrane was constructed as a free standing element supported only by shores which were removed as impervious material was placed and compacted up to stream-bed elevation. Top of the wall was later capped by the apron concrete.

Excavation for a cutoff below the monoliths of the dam, and for the powerhouse foundation adjoining it, was not so simple. An extreme bottom elevation of 33 ft. was reached for the powerhouse, and it was necessary to drill and shoot the material below about el. 80, a total volume of 20,000 cu. yd.

The configuration of cutoffs, foundations, and other elements is generally somewhat different in the powerhouse area. First, the upstream cutoff is constructed of concrete. It

is a continuation of the timber cutoff, but it carries up the sloping abutment to elevations within the reservoir surface fluctuation range, where it may be alternately wet and dry. Another feature above the powerhouse is a stilling basin, bounded by a concrete wall 25 ft. high and located 90 ft. upstream from the intake. The apron inside the stilling basin coincides with the powerhouse intake invert elevation of 79 ft.

Downstream from the powerhouse a tailrace channel replaces the apron called for elsewhere along the overflow section of the dam. Tailrace concrete slopes 6:1 from the draft tube invert at el. 50 to a terminal invert elevation of 70 ft. at a point 120 ft. downstream. A training wall separates the tailrace channel from the overflow section. Also, special slope treatment of the right bank adjacent to the tailrace includes a layer of riprap (minimum size 1 cu. yd.) overlain with chinking material.

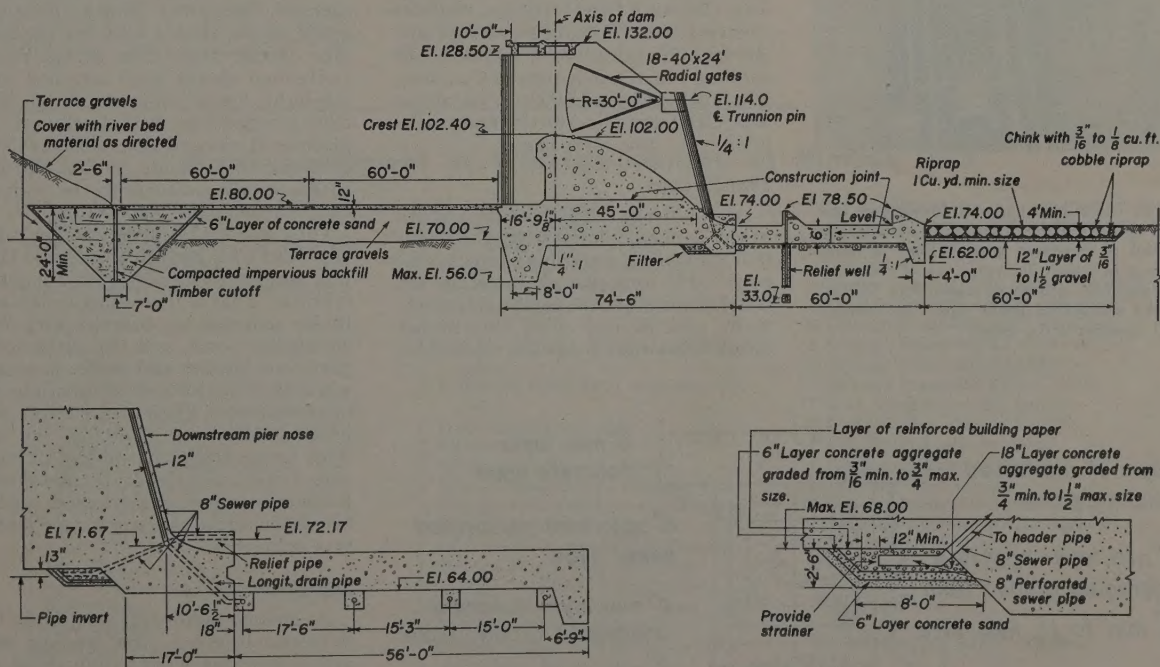
Underneath the overflow structure, foundation and cutoff excavation terminated generally at el. 56, except in a former location of the main stream channel discovered near the powerhouse, where suitable foundation material lay at el. 45. The upstream dam cutoff was excavated with  $\frac{3}{4}$ :1 side

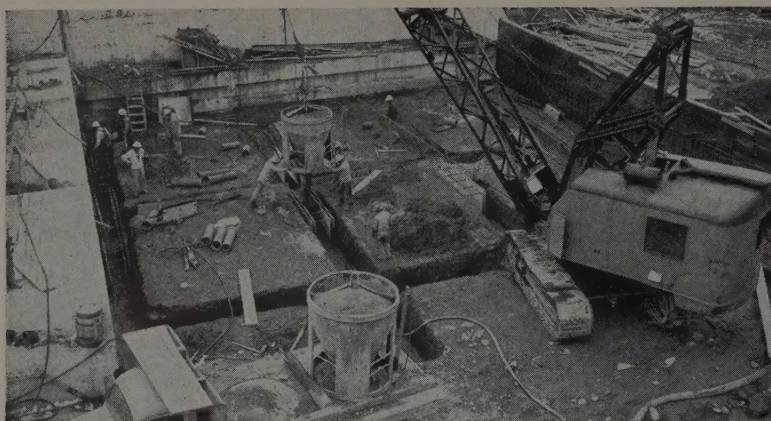
From this cutoff the dam extends 75 ft. downstream (the base thickness) and connects to the downstream apron of concrete. Drainage facilities are the most elaborate beneath the downstream portion of the structure to insure stability at the downstream toe of the dam.

Over the entire area of the downstream apron a rectangular grid totaling 6,000 lin. ft. of 3-ft. square trenches was excavated, located 22 $\frac{1}{2}$  ft. on centers longitudinally, and between 15 and 20 ft. on centers transversely. A similar grid, with slightly different dimensions, underlies the tailrace. Perforated sewer pipe 8 in. in diameter was laid with open joints in these trenches, with three circumferential graded layers of filter backfill. Winston-Johnson's means of completing these installations is illustrated by accompanying photographs. The pipe was connected at frequent intervals to a header em-

**SECTION** through overflow section of Nimbus Dam shows arrangement of timber cutoff, cutoff beneath dam, concrete aprons, relief wells and filter trenches. Detail at lower left reveals operation of filter trenches and connecting drains. Elaborate filter under downstream

toe is shown in section at lower right. Nimbus Dam is designed to pass 150,000 cfs. with gates open, reservoir at el. 117.6 and tailwater at el. 109. Maximum and minimum operating water surface elevations are 118.5 and 125 ft.





**FILTER TRENCHES** underlie downstream concrete apron. General view shows pattern, also method of handling graded filter material. Closeup of trench illustrates use of templates to place three grades of material in "circles" around perforated sewer pipe. The problem itself appears in the detail.

bedded in the concrete toe of the dam. Additional drainage facilities under the toe itself also connect to this header, which discharges through chute blocks on the downstream face of the weir, as indicated on accompanying details. Relief wells as much as 35 ft. deep were also drilled beneath the apron downstream from each monolith to relieve pressures in lower strata. The wells were fitted with slotted wood stave casings surrounded by two layers of graded filter material. The wells were capped with 6-in. clay pipe passing through the apron slab and discharging from individual apron baffle blocks.

The downstream edge of the concrete apron terminates in a thickened section extending down to el. 62. The final feature of the design insuring stability of strata below the dam—and of the downstream apron itself—is a layer of riprap placed in a 60-ft. width beyond the apron. This rip-rap was obtained from tailrace channel excavation for Folsom Dam 6 mi. upstream. The latter work was done, in part, by Morrison-Knudsen Co., Inc., who hauled about 12,000 cu. yd. of the material to the Nimbus site and stockpiled it for this later use.

#### Trench core

An additional construction feature of the dam calculated to limit or control infiltrating water is an impervious core 700 ft. long placed across the flat flood plain adjacent to the left abutment and in line with the timber cutoff upstream from the dam. This

trench has been excavated by tractor-scraper combinations to a bottom width of about 40 ft. Depth of the trench is not intended to match that of the cutoff wall in the river channel. Instead, invert of this core varies, but is at about el. 106, whereas the ground surface is about el. 128. The criterion for its excavation is that it shall be carried down through the gold dredger tailings that cover the flood plain, and shall penetrate at least 5 ft. into the underlying terrace formation. Impervious compacted fill is then placed with 1:1 side slopes, terminating with a 10-ft. top width at the original ground surface elevation.

The main reason for providing this core is that the Folsom South Canal, an irrigation feature of the entire project, will eventually divert from Nimbus reservoir, and the intake structure for this canal will be located only slightly upstream from the impervious core at the head of a long neck, or bay, to be excavated into the bank from the natural river channel. This will insure a supply of water to the canal even when the reservoir level is low. The canal itself will cut through the impervious core as it proceeds from the reservoir site.

Several points in Winston-Johnson's operations are worthy of note, and two are illustrated with this article. One is the template for backfilling filter trenches. Another is the formwork done for powerhouse inlet and outlet passages.

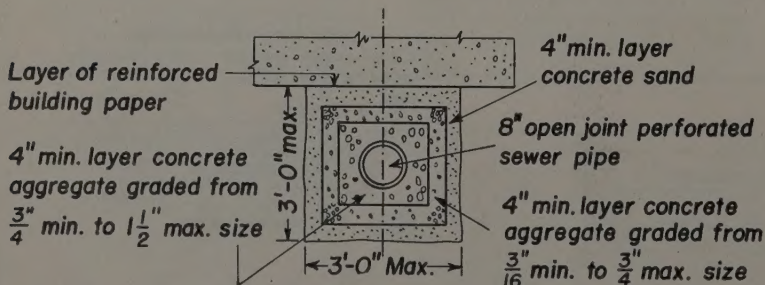
#### Forms

The approach to construction of these intricate forms was somewhat unusual, terminating in the design of form elements that were made reusable by extra sturdy construction and specially designed joints. Exterior grade plywood was used for the surface of the draft tube throat form. Individual sheets were steamed in a job-built "sink" supported on legs over a wood fire. Initial attempts at placement showed where slashes and cuts had to be made so that the flat sheets would conform to the warped form surfaces for final nailing.

Only one set of forms was built for any pour of a hydraulic passage that was duplicated elsewhere in the powerhouse. That is, two draft tubes are to be successively formed with one collapsible form, and the three-compartment intakes and outlet passages were likewise formed by a single set of three boxes. Each of the latter was broken into four elements, the cut lines being along the middle of each side. Division of the draft tube throat form was more complicated, but a breakdown into seven separate pieces was achieved.

#### Slipform

A special slipform was built by Winston-Johnson for paving the apron sections where they slope up the abutments. This form had a vi-



brating screed built into it; the whole thing was drawn up the slope by a truck-mounted winch, completing a 20-ft. width with each pass. The sloped apron sections required special preparation, including excavation to rock and replacement with compacted impervious material. This was necessary to provide a seal against seepage of water into the free draining backfill of the abutment sections of the dam itself.

### No falsework

Another trick involving forms actually demonstrated ingenuity in the design of falsework—or a lack of it. For pouring service bridge and operating deck spans between gate piers, three sets of forms were built, this number being dictated by time requirements for form placement, concrete pouring, and a 10-day delay before stripping.

To seat the forms, Winston-Johnson elected to cast three sets of screw anchors into the side of each gate pier, to which brackets were later fixed. For a typical span, jacks were placed on each of the six brackets and the 40-ft. bay bridged by 27WF94 beams resting on the jacks. Adjustment of the jacks brought the beams to proper elevation for supporting the forms, which could then be placed and readied for the pour.

### Trunnion anchorage

One of the most heavily reinforced sections of a dam of this design is the pier nose in the vicinity of the radial gate trunnions. Trunnions for adjacent gates are anchored to a trunnion girder cast into the concrete of the pier nose between them. The girder, in turn, is firmly secured by 8 anchor bolts, each 3¾ in. in diameter and extending 15 ft. into the pier nose. Winston-Johnson fabricated these bolt

## Pumps at Nimbus Dam

- 1 10-in. Pomona
- 1 10-in. Pomona deep well turbine
- 1 8-in. Gardner-Denver B415
- 2 8-in. Gardner-Denver BE
- 2 8-in. Gorman Rupp 3801
- 2 6-in. Gorman Rupp 3601
- 5 4-in. Gorman Rupp 3402
- 3 Chicago Pneumatic #20 sump
- 2 6-in. Carver 6113
- 1 3-in. Fairbanks-Morse QZK
- 1 1½-in. Fairbanks-Morse 5554
- 1 2-in. Marlow
- 1 Homart cellar drainer
- 2 1½-in. Bilton TLH
- 1 2-in. Trench & Marin
- 4 10-in. wellpoint (rented)

assemblies in the shop, complete with a template which served both to space the bolts and act as an exterior form for the pier nose at the bench left in the pier to seat the trunnion girders. The completed assemblies each made a full load for a truck transporting them to the dam. Placement was by crane. Installation of radial gates themselves was handled by Bigge Drayage Co.

At the office level, but with field operations definitely in mind, Winston-Johnson has a system of producing construction drawings that leaves little to be desired. The contractor terms these "placement drawings," and their number and extent varies from job to job depending on the form in which engineering drawings have been provided with the specifications.

### Double check by drawing

Winston-Johnson's scheme is to produce a separate drawing for each concrete placement, or element. Essentially this drawing is a plan of the

area covered by one pour, and it is surrounded by four elevations. On this drawing it is possible to pick up all details of dimensions, inserts, blockouts, piping, utilities, elevations, procedural requirements, joint provisions, miscellaneous hardware, etc. The making of these drawings sometimes uncovers mistakes by the engineers early enough to remedy them without delaying operations. Also, the procedure provides a double check for supplies and embedded material that will be needed for each placement. Copies are freely produced and become a convenient field reference for all supervisory personnel and for individuals of various construction crafts. They are a lot handier than the many sheets of engineering drawings otherwise required.

### Accounting aid

The placement drawings serve another purpose also. In connection with cost accounting, each drawing provides a simple, logical and unified means for evaluating progress on the various accounts involved in a particular placement. A summation of account quantities in all placements worked during a given period assures complete and accurate coverage of the work. Concrete volumes, areas of forms, sandblasting, finishing and curing, and many other quantities are all obtained from placement drawings. Generally, a placement is small enough that 100% of the work involved on a particular account can be recorded on a single day. That is, progress on forming of a placement is not recorded in increments, day by day as it takes place. Instead, it is all recorded on the day of the concrete pour. On a big job involving many placements and, consequently, drawings, the increment of one account involved in a single placement is not

## Major equipment of Winston-Johnson at Nimbus Dam

- |                                                                |                                                |                                          |
|----------------------------------------------------------------|------------------------------------------------|------------------------------------------|
| 1 3-yd. Link-Belt K-585 crane (100-ft. boom, 20-ft. jib)       | 1 Jenny steam cleaner                          | 2 Barco BR5 tampers                      |
| 1 25-ton Link-Belt HC-90 truck crane (70-ft. boom, 20-ft. jib) | 1 Conveyor Co. batch plant                     | 4 Chicago Pneumatic #59 jackhammers      |
| 1 2-yd. Bucyrus-Erie 51B crane (90-ft. boom)                   | 2 2-yd. Smith concrete mixers                  | 3 Chicago Pneumatic #117 paving breakers |
| 1 2½-yd. Northwest 80D crane (70-ft. boom)                     | Concrete Accessories form ties                 | 2 Master Electric VS-20 screed vibrators |
| 1 Manitowoc 3500 (rented)                                      | 1 105-cfm. Le Roi Tractair                     | 3 Chicago Pneumatic #417 vibrators       |
| 1 Caterpillar Model 12 motor grader                            | 1 600-cfm. Ingersoll-Rand 600 compressor       | 4 Chicago Pneumatic #325 vibrators       |
| 3 19-yd. LeTourneau W carryall scrapers                        | 1 600-cfm. Chicago Pneumatic YCB compressor    | 2 Chicago Pneumatic #2 vibrators         |
| 7 8-yd. Euclid 27 FD end-dump trucks                           | 1 1,100-cfm. Fuller C200 stationary compressor | 2 Chicago Pneumatic #4 vibrators         |
| 6 Caterpillar D8 tractors                                      | 1 Westinghouse arc welder                      | 1 Chicago Pneumatic #518 vibrator        |
| 1 Caterpillar D2 tractor                                       | 1 300-amp. P&H welder                          | 1 1-yd. GarBro concrete bucket           |
| 1 Ford F8 grease truck                                         | 1 300-amp. Lincoln arc welder                  | 8 2-yd. GarBro concrete buckets          |
| 1 Ford F7 water truck (2,700 gal.)                             | 2 Chicago Pneumatic #2 chipping guns           | 4 6-ft. GarBro concrete carts            |
| 4 Ford F8 dump trucks                                          | 2 Chicago Pneumatic impact wrenches            | 1 GarBro concrete hopper                 |
| 4 Ford F8 flat bed trucks                                      | 1 8-in. Skil bench grinder                     | 1 Techkote 100-S sprayer                 |
| 2 Ford F6 stake body trucks                                    | 2 Chicago Pneumatic #3 clay diggers            | 4 Chicago Pneumatic wagon drills         |
| 1 Ford F8 tractor and Fruehauf trailer                         | 2 Chicago Pneumatic #387 tampers               | 3 Sanstorm AHW sandblast machines        |
| 4 Ford pickups                                                 | 2 Chicago Pneumatic triplex tampers            | 22 Duff Norton 2510 jacks                |
| 2 GMC pickups                                                  | 2 Gardner-Denver triplex tampers               | 1 Duff Norton 1528 jack                  |
| 1 Buck Forte roofer                                            | 1 Southwest sheepfoot tamper                   | 10 Screw jacks                           |
|                                                                | 1 Chicago Pneumatic #487 triplex tamper        | 1 Hydraulic jack                         |
|                                                                |                                                | 3 Aahein Werner jacks                    |
|                                                                |                                                | 1 K & E Paragon transit and level        |



**DRAFT TUBE THROAT FORM** (left) is built in one piece, but designed for cutting into 7 pieces. One cut can be seen in this interior view, beginning at lower right and curving into the background at top center. Bolted timber members bridge cuts so that form can be handled intact for initial placement.

**OPENING** between Blocks 14 and 17 (above) is location of principal remaining work on over-flow section. Each monolith is 45½ ft. wide, including one gate pier and spanning between midpoints of adjacent bays. Eight pours totaling about 3,370 cu. yd. (the largest is 710 yd.) are required for each monolith. Wagon drills in foreground are set up on alignment of cut leading to intake for Folsom South Canal in left bank.

great, and no significant distortion of the contractor's records thereby results.

#### More work

Winston-Johnson's work at Nimbus Dam will be completed in the fall of 1954 and will be followed by separate contracts for final powerhouse work and for construction of the Folsom South Canal. Thereafter, when Folsom Dam is also complete, Nimbus Dam will serve primarily to regulate releases from the Folsom power plant. Secondly it will generate an additional 13,500 kw. through two powerhouse units, and it will serve as a diversion dam for the canal.

#### Bureau personnel

For the Bureau of Reclamation, G. R. Rollin is construction engineer on the American River Division, which includes the Nimbus work in addition to Folsom Powerhouse and Sly Park Dam and appurtenant works. He replaced H. F. Bahmeier, who has been reassigned to the Snowy Mountain hydroelectric project in Australia. Resident engineer for Nimbus Dam is R. A. Young. His field engineer is W. M. Biggs. Joe Parks is concrete inspector, Lee Bohler is mechanical inspector, and Hugh Devlin is earthwork inspector. R. H. Smythe is chief of surveys.

#### Contractor personnel

For the contractor, Abner T. Evans is project manager and E. W. Danielson is general superintendent, having replaced Robert T. Hayden in January. John Fondahl is project engineer, and Louis K. Foster is field engineer. Jay C. Munson is draftsman, and still turning out placement drawings for

work yet to be done!

Eldor C. Danielson, in his earlier capacity as carpenter superintendent, was responsible for much of the intricate powerhouse forming. He was assisted by two carpenter foremen, Stan Sorensen and L. E. Walter.

E. C. Larsen is earthmoving super-

intendent, Chris Veasman is master mechanic, D. V. Brinlee is labor foreman, and Harry L. Steward is batch plant man, T. E. Darden is drill foreman, foreman. Office manager for Winston-Johnson is Charles W. Wilkens, and James H. Reynolds is paymaster and purchasing agent all rolled into one!

## Old powerhouse replaced by modern namesake

THE OLD Murphys powerhouse, whose generators have provided power for California's Calaveras County area since 1899, is spinning its last. Made of native stone and looking like an early-day mill for grinding grain, the old structure was built by the Utica Mining Co. for mine power and had a generating capacity of 1,900 kw. Pacific Gas & Electric Co. acquired the obsolescent plant in 1946 and now has replaced it with a new one, of 3,800-kw. capacity, at a cost of \$1,335,000.

The new plant is ½ mi. downstream from the old. Two earthfill dams high above the powerhouse create a new forebay reservoir on the Utica ditch, from which water diverted from the Stanislaus River drops through a 4,000-ft. penstock to the plant.

Another earthfill dam across Angels Creek below the plant creates a regulating afterbay reservoir.

The old Murphys was one of the earliest hydroelectric powerhouses in California and one of the oldest still operating. The modern Murphys still is small; however, it is one of the newest in design. Mounting of its single generator is above the waterwheel on a vertical shaft. This is a new design for the impulse waterwheel, a type developed in California's gold rush days. Interconnected with the P. G. & E. electric system, the new Murphys powerhouse will operate automatically, or it can be switched to remote control by personnel stationed at the company's Stanislaus powerhouse, on the Stanislaus River.

## Strength calculation guide available

**CHARTS AND RELATIONS** useful in making strength calculations for machine parts and structural elements are contained in a 150-page book, "Stress Concentration Design Factors," written by R. E. Peterson, manager of the mechanics department, Research Laboratories, Westinghouse Electric Corp. The book, intended to be a working tool for de-

signers, is concerned with the improvement of design calculations that will result in better-balanced plans and ultimately reduce operating failure. It contains a clear thumb-index, 8 x 10-in. full-grid charts, and voluminous appendices. Available for \$8.50 from John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Do not write *Western Construction*.

# ANTI-STRIPPING ADDITIVES

*—Do they have a place in bituminous construction and maintenance work? There are good arguments on both sides of this question, but the weight of presently available evidence points to positive benefits by their use as highway engineering research continues*

**A**NTI-STRIPPING additives used in all phases of bituminous construction and maintenance work have been described many times in recent years. This presentation is an attempt to provide some factual information regarding the use and benefits of some additives and to discuss the pros and cons involved in this controversial subject.

Generally additives, or wetting agents, coating aids, chemical admixtures, or fortifying agents, as they are variously called, are liquid compounds which are added to and blended with asphalt, asphalt cutbacks, emulsions, and road oils to improve adhesion under adverse moisture conditions and to increase the resistance of bituminous films in asphaltic mixtures to stripping in the presence of moisture.

The addition of an anti-stripping additive to bituminous materials provides protection by preventing stripping of the bituminous films from the aggregates by rainfall occurring during or after construction. The stability and durability of the bituminous pavement structure is increased because water and moisture vapor is prevented from entering the mixture, thereby destroying adhesion and cohesion over a period of time.

## Hydrophilic aggregates

Certain aggregates offer resistance to coating with asphaltic materials, or will lose an asphaltic coating in a short time in the presence of water. These aggregates are generally known as hydrophilic. This term, as applied to mineral aggregates, means having a decidedly greater affinity for water than for asphalt. Highway departments and other public agencies using bituminous materials in paving usually have some test to determine whether an aggregate is hydrophilic or not. If the aggregate in question proves to be hydrophilic, specifications usually state that the aggregate shall be rejected or an approved method of treatment used.

The American Association of State Highway Officials recognized the problem of hydrophilic aggregate and that it was the cause of many pavement failures in bituminous work some years ago. Their specifications for construction of bituminous surfacing, approved June 15, 1947, deal

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with the problem of aggregate characteristics: "All mineral aggregate shall be of such nature that a thorough coating of the bituminous material to be used in the work, when applied to the aggregate, will not slough off under contact with water. Mineral aggregates that have a hydrophilic characteristic may be approved for use in bituminous concrete mixtures, provided a satisfactory additive or wetting agent is used to provide a water-resistant film."

Additives for bituminous materials were developed in the East about 1935 to promote the adhesion of liquid asphalt to wet aggregates. These original compounds were in semi-solid form that often became a solid several weeks after manufacture, making it difficult to proportion them properly and to blend in the asphalt. Furthermore, they accelerated the oxidation of asphalt.

## High temperatures hurt

Some of the early additives required the addition of powdered lime in the mix, which was a costly and time-consuming operation for the mix plant. Many of these additives would settle out of the bituminous material after blending, and all of them were detrimentally affected by the high temperatures required when using paving grades of asphalt in hot asphaltic-concrete plant mix. Continued and extensive research on additive materials has overcome these early disadvantages.

In addition to research work carried on by the manufacturers of additives, the highway departments of such states as New York, Virginia, Pennsylvania, Ohio, and others followed their laboratory investigations with actual tests in the field to ascertain the benefits of additives, and to

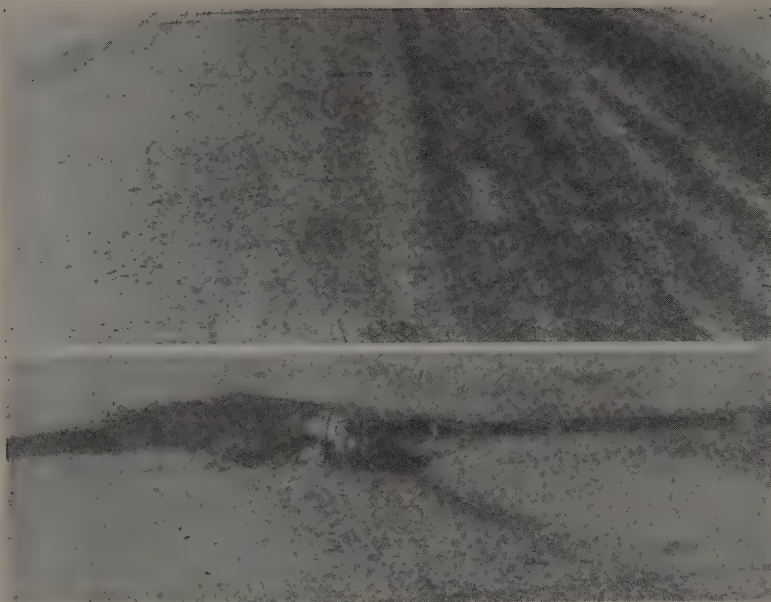
correlate laboratory results with those obtained in the field. Some of this research disclosed that additive-treated asphalts would produce a water-resistant film of bitumin or hydrophilic aggregate, whether the aggregate was wet or dry. This discovery enabled agencies to use locally available hydrophilic aggregate that normally could not or should not be used in bituminous work.

## Field test results

Some of the early treated-asphalt field test results were discussed during the meeting of the Committee on Maintenance and Equipment of the American Association of State Highway Officials<sup>1</sup> at Los Angeles, Calif., in 1946. During this forum various state highway maintenance engineers discussed several years' experience with additives prior to 1946. Some typical comments were: "Additives are beneficial in coating wet aggregates," "Good results obtained in patch work during wet weather," "Good insurance against wet-weather delays which are so destructive to the surface treatment schedule," "Good results on adhesion," and "Some engineers still don't believe in the use of additives." C. L. Motl,<sup>1</sup> Minnesota highway maintenance engineer, seems to have summarized their use aptly when he said: "Additives do have a beneficial effect. It is not a cure-all. There may be some mistakes."

Many short-time accelerated tests have been devised for evaluating the benefits of additives. For example, conclusions reported by the Public Roads Administration<sup>2</sup> in September 1945 were based on an immersion-compression test which gives an indication of the stability of a bituminous mixture, particularly in the presence of water.

Most state highway departments, the U. S. Navy, the Corps of Engineers, and other agencies use a stripping test of some type which subjects the asphaltic mixture to immersion in water. The term "stripping" applies to the bituminous film on the aggregate not sticking to the aggregate after immersion in water. For example, if an asphaltic mixture has 75% of the aggregate still coated with asphalt film, then the test has determined that the mixture has stripped 25%. According



FIELD TEST of additive-treated SC-6 (upper picture, left side) and untreated SC-6 (right side) seal coat took place in Los Angeles County, California. Photo taken two months after application shows that about 80% of cover stone remains on additive-treated surface. In another test section (lower picture) near Van Nuys, Calif., Darakote anti-stripping additive was placed on right side of road while untreated asphaltic concrete was placed on the left side of the dividing line at an intersection subject to constant water drainage. Photo taken after nine months shows additive-treated section in perfect condition while untreated section shows considerable raveling.

to most specifications, this amount of stripping is detrimental and the aggregate is hydrophilic.

### Stripping tests

Stripping tests for bituminous mixtures vary from a static immersion type of test to a test which involves agitating the mixture in water. The water temperature also is variable and ranges from 77 deg. F. to the boiling point itself. The lack of a universally accepted stripping test method has resulted in disagreement among materials engineers, asphalt and materials laboratories, and asphalt technologists as to the effectiveness of anti-stripping additives and the need for them in bituminous work.

It is not within the scope of this article to discuss the enormous amount of technical data on additives developed in the laboratory and obtained from actual use in the field over the years. Tests to determine if an aggregate is hydrophilic or if asphalt from a particular source has proper adhesive qualities may not be standardized and universally accepted for years to come.

The many test methods used by various agencies to determine if an aggregate is hydrophilic are controversial in themselves, and there is still some question as to whether hydrophilic aggregate is detrimental if used in bituminous paving. One major cause of contention is the claim that anti-stripping additives are not necessary, not beneficial under certain conditions, and not permanent.

Some state highway engineers, public agencies, and asphalt chemists have definite and individual ideas regarding tests for materials, materials specifications, and bituminous practices in maintenance and construction. There are many different opinions on the method of test just to determine if an aggregate is hydrophilic. Consequently, tests for determining the benefit of an anti-stripping additive have sometimes been rejected by engineers because they will not recognize the fact that hydrophilic aggregate is a major cause of bituminous pavement failure to begin with and place little importance on stripping tests.

There have been instances where an aggregate accepted for use by a state highway department as a result of a stripping test has been rejected as hydrophilic by another agency on the basis of another test procedure which is more severe. In such instances, it becomes necessary for the contractor to find another source of aggregate or use an improved additive to treat the asphalt. It has generally been assumed that the aggregate is at fault, but it is now being recognized, to a limited degree, that there are definite differences in asphalt which have a bearing on stripping tendencies. Lack of a standardized test procedure also contributes to the present confusion regarding stripping or adhesive characteristics of asphalts.

However, committees of the ASTM have had this problem under consideration for some years and are en-

deavoring to develop a standard method of determining stripping of bituminous-aggregate mixtures.

Acceptance of an additive entails tests in the field in most cases, plus having highway departments, counties, and cities put in test sections of paving with and without the anti-stripping additive. The additive must prove itself, and it is a matter of waiting for six months to a year or two for it to do so. This has been the method used by state highway departments and other agencies presently specifying treated asphalts and road oils in their construction and maintenance programs.

### Treated cutback asphalts

An important phase in the use of additives is in treated cutback asphalts and road oils in road-mix or blade-mix work during wet weather. Treated cutback asphalts and road oils will coat wet aggregate, insuring 100% coating in rainy or cool weather. There is no record of treated cutback asphalt or road oil with a reliable and proven additive ever having failed to perform satisfactorily in coating wet aggregate in road-mix work. This use of additives is important in states which allow a contractor to place road-mix in wet weather with treated bituminous materials. This enables the contractor to keep his crews and equipment going even though the mix cannot be laid until the moisture content meets specifications. Under these conditions the small additional cost of treated asphalt is justified.

### Some additives specified

Some highway departments specify an additive in certain contract work that is to be done late in the work year or in areas that are subject to sudden rainfall. Many also use treated asphalt and road oil in maintenance and contract seal-coat work in spring and fall months to insure against loss of the cover stone during or immediately following the application. Some highway departments have found that they get a higher percentage of cover stone retained on the surface in seal coat work under dry conditions as well.

In 1952, the Virginia Council of Highway Investigation and Research<sup>a</sup> reported asphaltic concrete paving field tests, made over a 5-yr. period with four different commercial additives: "After exposure of the test sections to traffic and weather for 5 yr., the data collected indicated that the detrimental hardening was lessened where certain admixtures have been used." The savings effected dollarwise, by the use of an additive in bituminous paving to reduce maintenance costs, over a period of years is illustrated in the Virginia Council's report, which also stated, "The problem of providing better adhesion between asphalt and aggregate, which greatly affects durability, is one demanding much attention. A saving of

millions of dollars annually would result if brittleness of bitumen through hardening could be prevented or lessened."

Some public agencies have recently changed their specifications for paving grade asphalts in an effort to increase the durability of asphalt by reducing brittleness through hardening, and a number of state highway departments are presently considering similar changes in specifications. The Bureau of Public Roads<sup>4</sup> in August 1953 reported results of "Studies of the Hardening Properties of Asphaltic Materials," indicating that this is not a local problem but one of growing national importance. Recent data and developments indicate that anti-stripping additives could be as necessary to the asphalt field as engine oil additives are to proper lubrication and anti-knock admixtures are to high-test gasoline.

A comprehensive report on "Additives for Bituminous Materials," issued by the Public Roads Administration<sup>2</sup> in September 1945, created universal interest by stating: "(1) Aggregates vary considerably in their resistance to coating with bituminous materials and in their resistance to the loss of such coating in the presence of moisture. (2) These variations are due to the character of the aggregates and the bituminous materials. (3) Chemical agents can be used to obtain a coating of bitumen and to increase its resistance to stripping."

In December 1948, *Public Roads*<sup>5</sup> reported further developments and stated, "The beneficial effect of certain additives would appear to be fairly permanent." They concluded that, "The use of inferior aggregates is not necessarily the cause of stripping failures. Many failures are probably caused by asphalts having inferior adhesive qualities. Asphalts of the same grade from different sources may vary widely in their resistance to the action of water."

Additives are not cure-alls, since there are isolated instances where an additive will not correct a particular hydrophilic aggregate. Under certain conditions, some additives may impart little or no anti-stripping benefits to the bituminous mix. For example, there are certain types of additives that will work only with acidic (silicious) aggregates, and others will only work with basic (calcareous) types of paving aggregates. Some additives will work with both types.

#### Research and testing

The fact that an additive is a good wetting agent is only the first requirement of an effective product. The additive should have extensive chemical research and responsible field testing behind it. Laboratory testing should be correlated with thorough testing in the field over a sufficient number of years so as to demonstrate adequately that the bituminous material is not detrimentally

affected and that the additive has permanent anti-stripping properties. This is necessary because some additives affect adversely the inherent desirable properties of the mix. Continued research is being carried on to develop an additive that will benefit all types of aggregates and can be called a cure-all.

Additives are normally marketed in two grades. The concentrated grade is designed for refinery use, where there are facilities for proper proportioning and handling of the material. The commercial grade is designed for addition to the asphalt storage tank at the mix plant or to the asphalt distributor at the job site. Blending is accomplished by recirculation or by rolling with compressed air.

The amount of additive required for a given job, such as road mixing in wet weather or with hydrophilic aggregate, depends on a number of variables. These variables include the stripping tendencies of the aggregate, the grading and the amount of moisture present in the aggregate, the additive which is to be used, and the asphalt or road oil that is to be treated. In general, the amount of additive used varies between 0.5% and 1.0% of the concentrate grade by weight of the bituminous material. In the absence of previous field experience with anti-stripping additives, it is recommended that laboratory tests be made using samples of the aggregate and bituminous material that will actually be used in the field in order to determine the proper amount of additive to be used.

#### Summary

Highway materials and testing engineers, asphalt chemists, and asphalt paving technologists are recognizing the need for standardized tests to determine the stripping tendencies of an aggregate, the amount of stripping which determines that an aggregate is hydrophilic, and the durability of bituminous mixtures.

Field and laboratory tests have shown in the majority of cases that a reliable and proven anti-stripping additive under adverse moisture conditions will promote better coating, improve adhesion between the asphalt and aggregate, maintain workability of stockpile maintenance patch mix, produce better patches in wet and cold weather, and increase stability of the mix.

Field tests indicate that some anti-stripping additives reduce the tendency of asphalt mixtures to become brittle from a hardening action and oxidation.

Anti-stripping additives will permit the use of many sound aggregates that could not otherwise be used because of their hydrophilic characteristics, and the ever-growing use of anti-stripping additives indicates that they have a place in quality bituminous maintenance and construction work.

As the major portion of highway funds are being spent for new highway construction in an ever increasing program of expansion, the fact that additives increase the durability of bituminous pavement is good reason for using additive treated bituminous material in today's maintenance and construction work in an effort to reduce future maintenance costs. Over the years, this accumulative saving of maintenance funds can be diverted to construction in the expansion program.

<sup>1</sup>Papers and Discussions, Page 70, American Association of State Highway Officials, Los Angeles, California, 1946.

<sup>2</sup>Public Roads, Vol. 24, No. 5, Sept. 1945, "Additives for Bituminous Materials," reported by Paul F. Critz, Sr. Highway Engineer, and Joseph F. Goode, Associate Highway Engineer.

<sup>3</sup>Highway Research for Virginia Bulletin, by Virginia Council of Highway Investigation and Research, 1952.

<sup>4</sup>Public Roads, Vol. 27, No. 9, August, 1953, "Studies of Hardening Properties of Asphaltic Materials," reported by Jarl T. Pauls, Chief, Bituminous Section, and J. York Welborn, Highway Physical Research Engineer.

<sup>5</sup>Public Roads, Vol. 25, No. 6, December, 1948, "Further Developments and Application of the Immersion-Compression Test," reported by J. T. Pauls, Principal Highway Engineer, and Joseph F. Goode, Highway Research Engineer.

#### STEEL RIBS SUPPORT HOSPITAL

It took more than 1,100 tons of structural steel to erect the framework of the University of Oregon's new 14-story, \$5,000,000 teaching hospital in Portland. Donald M. Drake Co., the general contractor, excavated 57,000 cu. yd. of rock and dirt before erection by Bethlehem Pacific Coast Steel Corp. started. Cooper and Rose, structural engineers, were credited with a substantial saving in steel by using semi-continuous framing fastened with high-tensile bolts to reduce the weight of sections to 9½ lb. per ft. Completion is set for the fall of 1955.



# Is the graduate engineer trained for construction?

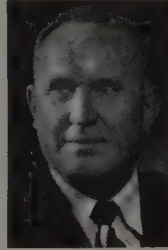
**Contractors want university-trained men; they have assisted civil engineering schools and encouraged teaching "the construction option"—But they wonder if professional education is at the same time good training for a construction career**

**S**MOKY WOOD and Chuck McMahon are graduate engineers who have become well-known in the construction industry as project superintendents. Articles by these men appeared in *Western Construction* during 1953 and should be given particularly close attention, both by the engineering profession and by the construction industry. In these articles, "So you want to be a superintendent" (February 1953) and "Supervising for profits on major building jobs" (November 1953), were expressed the ideas of a type of man who is more and more in demand and is becoming an integral part of successful contracting operations. Perhaps by something more than chance, the two authors are graduates of Colorado University and Colorado A & M. The writer knows by prior contact that

By

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these institutions are both very fundamental in their engineering training.

In reading the articles by C. A. McMahon and C. W. Wood, or in reviewing their accomplishments on actual construction projects, one may wonder just where construction experience leaves off and engineering

education takes over (or vice versa) in handling a particular situation. Other articles, however, also appearing in this publication during 1953, review subjects that bear more directly on the professional and business aspects of contracting and, therefore, on the question of whether the graduate engineer is trained for construction. Among the articles were "AGC invests in education: college engineers pay off," "Bank credit for contractors depends upon past performance," "Rental-purchase agreements," and "Public relations for the contractor." Taken together, these articles indicate a wide range of interest in and growing concern over what makes the construction industry tick.

## Sizeable work backlog

Another fact is significant in determining the value of the graduate engineer to the construction industry. Business reports have shown that contractor capacity for heavy construction is now about 50% greater than it was in 1949. At the same time there is a general increase of contractor failures, both in number and size, reported in current engineering and construction publications. It is also reported that a sizeable backlog of continuing and prospective work makes 1954 an excellent year for the construction West.

The plain fact is that the construction industry has come of age. Its very size and nature, second only to agriculture in the use of manpower, its dollar expenditures, and its return upon investment are such that primitive methods must give way. Today, all of the principles of effective management, economics, engineering science, cost accounting, labor and industrial and personnel relations, production techniques both for machines and for men, and adequate financing must be more generally applied if the construction industry is to continue to grow. This is a big order, for these principles cover an extremely broad field. It is therefore important for the construction industry to know the thinking of civil engineering educators. The answer, in short, will tell the contractor what he is getting when he hires a civil engineer.

## Experience needed too

It was brought out in the articles by Wood and McMahon that ability to "think on his feet" is an important part of an engineer's acumen. In fact, the point was emphasized at some length. But on the other side of the coin, experience was stressed as an equally large factor in the working capital of a good superintendent. Young engineers, it was stated, must be willing to acquire experience by

## ABOUT THE QUESTION . . . AND THE AUTHOR

THE QUESTION asked in the title to this article is an important one today. More and more civil engineers graduating from Western universities are finding employment in construction contracting. And in several instances young engineers—with only two or three years of experience—have organized their own contracting firms and developed them successfully.

Despite these successes, which result from proper and thoughtful utilization of civil engineers by the contracting industry, there remains a group that thinks of engineers only as highly developed technologists who can, with little office training, be made into competent estimators.

A broader view, a long range view that more completely reveals the potentialities of civil engineers for the construction industry, is presented in Professor Keim's article. Keim is well qualified to speak on the subject, for his own career in civil engineering has been a highly varied one, culminating a year and

a half ago with his appointment to the faculty of the University of California as Professor of Civil Engineering.

Prior to his present work, Keim was associated with Knappen Tippetts Abbett McCarthy Engineers of New York and San Francisco; the Pierce Management Co. of Scranton, Pa.; the U. S. Department of State, as consulting engineer to the economic mission to Liberia; the Federal Power Commission, as head of the River Basin Plans and Estimates Section; the U. S. Navy Civil Engineering Corps; various contractors and the California Division of Highways. The work has been diverse, but Keim has carried with him at all times a high ideal of the professional function, and he has found it applicable in every instance. His analysis of the civil engineer's education and proper function show beyond doubt that the graduate civil engineer is not "trained" for construction . . . but that he is admirably suited to it.—Editor.

whatever work is required of them in the post-college curriculum.

Obviously, this phase of the development of construction engineering personnel cannot be accomplished in the university. But certainly, as an adjunct to basic engineering training, an approach to experience can be made by the development of attitudes and fundamental philosophy. In this regard Charles Steinmetz once said, "Indeed, the most important part of engineering work and also of other scientific work is the determination of the method of attacking the problem whatever it may be." The job of civil engineering education, then, is to set forth principles which help to determine how, when, and where to begin the attack, as well as the fundamentals which enter into the several phases of the attack.

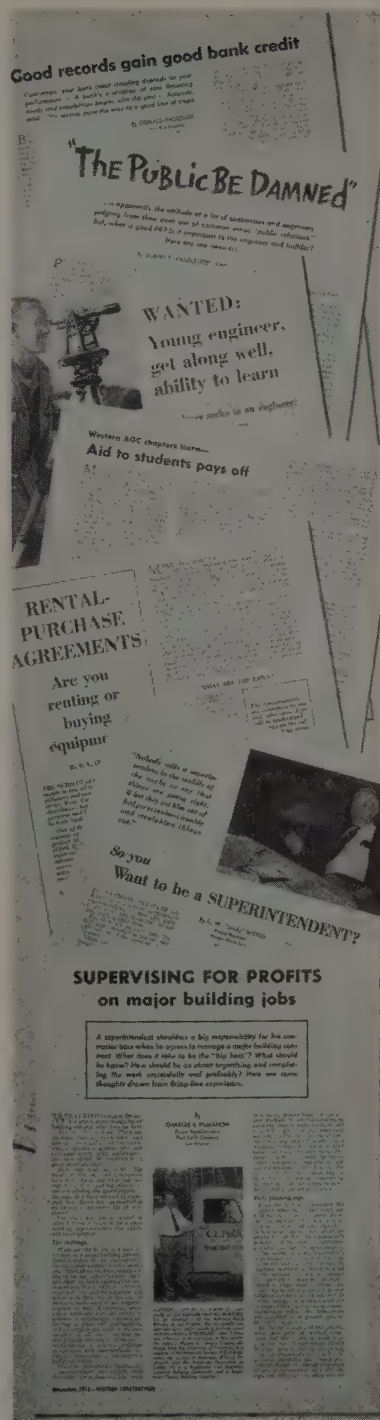
### Two-fold method

The manner of doing this is two-fold: fundamental science and the engineering method must be continually stressed, but at the same time the student must be shown by inspection of construction projects that there is coordination between the design and the construction method (the manner of attack). University of California engineering students, both in Berkeley and in Los Angeles, visit construction work. It was during such a "lab" session in Southern California that the writer met Mr. McMahon, superintendent for Peck-Cahill and author of the article "Supervising for profits on major building jobs."

In the ensuing conversation it was agreed that any problem must be analyzed in the light of all factors which may influence its solution if it is to be properly handled. No matter whether it is the design of a bridge, the design of concreting plant, the establishment of an organization for a construction project, or the manner of accomplishing any portion of the work, this approach in its highest sense is the "engineering method." Huxley, one of the greats of the world of scientific development, dubbed the method of reasoning used by engineers successful simply because it is trained and organized common sense applied in a systematic manner. If all contractors and engineers were active proponents of the engineering method, there would follow an era of great advance both in technical design and in contracting method and procedure.

### Design-construction tieup

It has long been my feeling that this fact, the complete interdependency of design and possible construction method, has yet to be learned by a good many engineers and contractors. I am convinced that a designer who does not know the limitations and uncertainties of construction machines and methods is not the good designer that he might be. On



THESE ARTICLES on the business side of construction appeared in *Western Construction*.

the other hand, the construction superintendent should know the designer's problems in order for him to be completely adequate. Each of them should be familiar with the impact of all the principles mentioned earlier in this article. Teams composed of engineer and superintendent with such qualifications have proven highly successful on numerous proj-

ects. More and more, this should be the rule rather than the exception.

In the analysis of a project there are many factors which may conceivably affect the result. Some have more importance than others. It is therefore a part of engineering education to emphasize methods for evaluating significant factors. Time can be conserved when these are catalogued in the order of their importance. Spending time on insignificant factors is like carrying non-significant figures in computing: it wastes time and, what is worse, it obscures the significant facts and relationships. The reliability of an answer is a function of the skill of the solver in selecting significant factors, and it is dependent on his experience in overall analysis as to whether slide rule accuracy is sufficient rather than logarithmic precision. The engineering method, learned in qualified engineering schools by constant drill on a variety of problem types, is a matter of determining the factors which affect a problem solution, setting limits on them, and evaluating their relative effects within those limits.

### No time for analysis

It is apparent that there is a large and fundamental place for such analysis before action is taken. But it is pointed out in the "construction option" of the civil engineering curriculum at the University of California that there is also a place for action when the time does not allow analysis. In the article by C. W. Wood this situation is summed up thus: "semantic qualifications and an engineer's thorough appraisal of all the facts may be fine in their place, but they are dynamite for a construction organization if they prevent a superintendent from giving fast positive decisions." One should not forget, however, that the ability of an experienced superintendent to make decisions is based not alone on experience in actual job situations. At least equally involved is past "thorough appraisal of all the facts."

### Engineering method

The basic engineering design of a given structure and the "design for its construction" may both be analyzed by the engineering method. In fulfilling the aim of engineering education, the University must point out both the similarities and the differences. Of course, there are more mathematically computable factors by which to rationalize a basic design than there are for a construction process. This is because there are more reasonably well known parameters upon which to base computations. For instance, in the design of a bridge you know (1) the length necessary, (2) the clear height of the lower chord, (3) the overhead clearance requirement, (4) the loads which will be applied to the structure, (5) methods of mathemat-

ical analysis to determine the effect of these loads, (6) the physical and chemical characteristics of steel, wood, concrete and aluminum, and (7) the basic mill costs of these alternative materials. You also have reasonably well known limits within which these various materials can be used. Even so, there are uncertainties as to how materials act. Otherwise, why are safety factors employed?

### Parameters

Parameters which are less exactly known affect the "design for construction" and include erection cost. Here it is that judgment enters, utilizing both thought and intuition. This is not to say that thought is not used in computation; but design may not have so many avenues to explore and prove as does construction planning. Erection cost depends fundamentally upon the design but, given a design and its location, erection cost also depends, to state a few items, upon (1) availability of machines by which to prepare the site and erect the structural elements, (2) alternative methods of erection, (3) the state of the labor market, (4) availability of materials included in the design at any given time and the place, (5) climatological conditions at the project site, (6) disposition and competence of the engineering inspector, (7) complexity of the project, introducing the necessity for coordination of the different trades, (8) reasonableness of the specifications, (9) whether there is an immediate urgency for the project, which would make a normal schedule procedure impossible, and (10) a whole host of local factors which can shade the manner of operations.

### Separate factors

In none of this has the subject been considered of whether or not a given project should even be undertaken. Opening this subject would introduce another group of factors, many of which are computable—but only upon certain assumptions which, in turn, may or may not be correct! For instance, what is the life of the proposed structure? What should be its capacity? What will be the continued demand for the facility? What will be its cost of operation? Will the answer to the foregoing justify its estimated cost of construction? In short, does the estimated rate of return fall within a range which makes the project attractive to capital?

### Wide range of uncertainty

It is by now apparent that there is a wide range of uncertainty inherent in the materials and processes with which engineering is concerned. There are uncertainties in the engineer's predictions as to rainfall, tides, waves, ground water, income, costs, operation condition, and life of the project. These uncertainties color all

of the aspects of design, construction, and operation, yet they must be accepted. An engineer, either designer or superintendent, is forever making choices between alternatives, each of which is, at best, an estimate loaded with uncertainties. The best method of dealing with these uncertainties—the engineering method—is to make every effort to determine the limit of their zone of applicability in every factor of a proposed project. It is the role of the engineer to minimize the composite uncertainty zone with respect to all his projects and actions.

### Pool of engineers

With engineering education based upon principles and approaches to problems as outlined above, the construction industry should have a "pool" of well oriented engineers interested in the industry from which to draw for training in their respective enterprises. It appears to me that the teaching profession, the consulting and design engineering organizations, and the contracting industry can do no better than to work together to produce engineering graduates whose basic orientation and preparation are sound, and who have the ability to think beyond the detail of today to the possibilities of tomorrow.

It is not enough to take a young man into an "educational factory" as if he were a log, and "slab" him off into a square peg to fit the square hole which seems necessary to fill at this moment. This is as if you were teaching a pig to dance, an elephant to tote logs, or a monkey to become proficient at picking locks by sufficient repetitive exercises. Instead, engineering education must give the young man long training in calculus, theoretical and applied mechanics, and principles of operation in order to inculcate in him a few fundamental ideas so firmly that he will never confuse them with the thousands of details involved in their application.

### Broad training program

It is impossible for a program to be fundamental and broad, as suggested above, when it is framed to meet local needs of an immediate nature. Training of such limited base personnel is not the function of engineering education. An understanding of the specific techniques and methods of a single contracting organization is best obtained in the field with that organization. And a graduate engineer so employed must not shun the doing of detail necessary to learn specific techniques while his experience grows. However, he and his employer must never overlook the fact that an understanding of such specific techniques is but one of the facets of the composite man which the contracting industry so vitally needs and whom it can obtain from recognized engineering schools.

Fundamental concepts are all that should be given engineering students in four years if we expect them to have a chance of becoming composite men. Here is where the construction industry can make its contribution to education and at the same time determine for itself where it is going. It must be willing to draw young men from the "pool," to teach them the respective techniques of each component of the industry (which industry can do better than the university or college), and always to give them opportunity to lengthen their vision and broaden their experience against the background of their undergraduate preparation.

### Contractors responsible also

What can be done to assist the construction industry in better doing what is presently required of it and in insuring its continued development? It is the engineering educator's responsibility to develop and maintain a curriculum of fundamentals, and to temper it where possible by giving purpose to the action required. The result is a graduate engineer whose education has a broad and stable foundation.

But the construction industry has at least half the responsibility; it must look at the graduate engineer not alone in terms of his immediate worth to the organization but in terms of "present worth" of a leader of tomorrow. Such a leader can be built only upon the foundation of broad engineering education.

## Colorado River water use to increase

RECORD USE of Colorado River water in Southern California this year was predicted regardless of the season's rainfall. Robert B. Diemer, general manager and chief engineer of the Metropolitan Water District, said that the District's 457-mi. aqueduct system carried an average of almost 200,000,000 gal. per day last year.

The Los Angeles Department of Water and Power is building a 10-mi. pipeline from Eagle Rock to Hollywood Reservoir which will deliver enough Colorado River water to serve 1,000,000 persons. Department officials have pointed out that the city's other supply sources, the Los Angeles River and the Owens River Aqueduct, have reached the limit of their capacities and that water for all future growth of this city must now be obtained from the Colorado River.

San Diego County Water Authority, another member of the Metropolitan Water District, is building an \$18,000,000 second barrel to the main aqueduct (*Western Construction*—July 1952, p. 82; October 1952, p. 107; November 1953, p. 104). The last pipe section on the northern half of this project was installed in December.

# Membrane under filter bed solves drainage problem

By H. H. BROWN

Engineer of Materials  
Arizona Highway Department

**E**NGINEERING DESIGN to fit a specific need can be illustrated by a bit of construction work that took place at the Arizona state fair grounds in Phoenix last August.

The problem consisted of providing good, all-weather alleys in the areas where race horses are housed at the fair grounds. George Blake, secretary of the State Fair Commission, presented the problem to the author, engineer of materials for the Arizona Highway Department.

He found the horse stable area to be about 242 x 600 ft., three-fourths covered by stables. Between rows of stables are 16-ft. alleys with 5-ft. walkways on either side. The stable roofs extend over the walkways.

## City grew

When the fair grounds were built they were at the edge of the city, but by 1953 the city had grown around the grounds so that there was no place for surface run-off to go. Because the terrain has only a very slight slope, all the rain draining from the roofs of the stables ponded in the alleys. During fall and winter months the alleys became pools of mud after

each rain, even a light rain. Since the racing season occurs during these same months, it was practically impossible to get tractor-drawn wagons through the alleys to service the stables.

The first suggested solution to the problem was to pave the alleys and build eave troughs on the stables to collect all the water except what actually fell on the alley themselves. But the fair commission said horse owners would probably object to any hard or slick surface because it might cause horses to fall and injure themselves. Another drawback was that the eave troughs would be expensive and there would be no place to dispose of the water.

## Final solution

The final solution selected was to place a membrane of 50-60 penetration asphalt, one gal. per sq. yd., covered with material which would allow the water to filter through to the membrane. Then holes would be drilled, at intervals of 75 ft. along the alleys, through the clay underlying the area into a sand, gravel, and boulder formation which was known to underlie the entire area. It was decided that these cesspools should be 3 ft. in diameter and 75 ft. apart to carry off the maximum rainfall anticipated.

As a trial of the proposed plan, one cesspool was drilled and a 75-ft. section of membrane placed, covered with 8 in. of gravel, 3 in. of chat, and 1 in. of sand. A measured amount of water was then sprayed on the roofs of adjacent stables. This water was equivalent to a 2-in. rainfall, and was applied over a 2½-hour period.

The water disappeared from the surface of the alley in a matter of seconds after the water was shut off. A loaded truck driven through the alley immediately afterward caused no damage to the construction and made only a slight impression in the surface of the sand. At this time the cesspool was full of water and nearly all voids in the sand-gravel filter were filled with water. All the water drained out of the sand-gravel filter within less than an hour. It was not determined how long it took the water in the cesspool to drain.

At last reports, there had been practically no rain in the area to test the efficiency of the design, but the design engineer has full confidence that it will work satisfactorily.

## Concrete parking apron under way at air base

PAVING of a 154,000-cu. yd. concrete parking apron capable of supporting modern bombers at Davis-Monthan Air Force Base, Tucson, Ariz., is scheduled to be finished sometime in April.

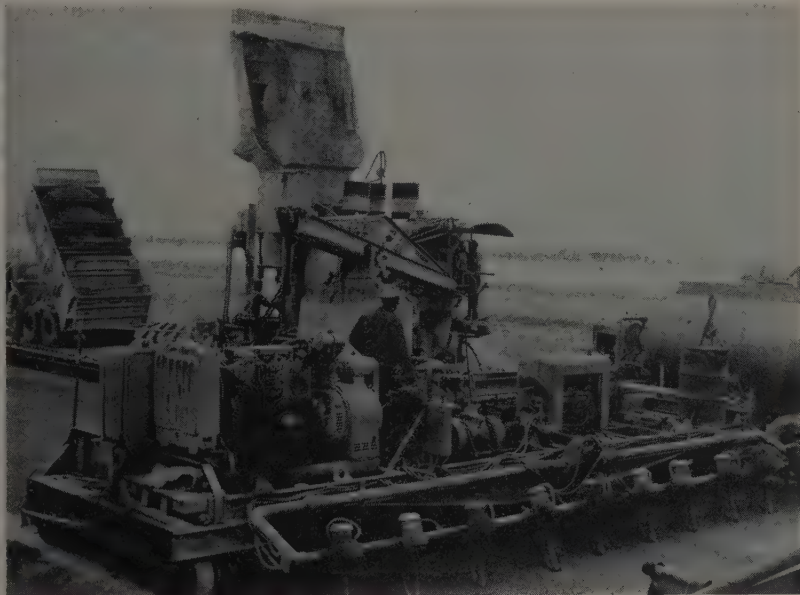
The job, which started in September 1953, consists of pouring 15-in. thick concrete slabs in strips 25 ft. wide to provide parking areas for heavy bombers, with wheel loads of 100,000 lb., belonging to the 36th Air Division.

Morrison-Knudsen Co., Inc., and R. A. Westbrook hold a \$2,368,478 joint venture contract to build the apron, which will be one of the largest of its kind. It will be 4,000 ft. long, 1,000 ft. wide at its broadest point, and 700 ft. wide at its narrowest point.

To meet the increased emphasis on finish called for by Corps of Engineers specifications, the contractors are using a battery of 10 Viber full-depth internal vibrators on a frame mounted on back of the spreader.

Powered by two engine-driven generators and designed for operation at 10,000 rpm., these vibrators provide fast and thorough consolidation to the full width and depth of the slab. Full depth vibration facilitates faster finishing of the harsh, maximum strength concrete, keeping length of the equipment train to a minimum.

Corps of Engineers inspectors on the project report that one passage of the vibration battery assures uniform consolidation of the concrete and also speeds edge stripping.





# Quarry floor makes good road base

**Network of asphalt-paved runways criss-cross 1,250 x 750-ft. quarry in order to keep down dust and speed up operations—Areas in use for 18 months prove adequate base can hold up under any treatment**

IT'S EASY to build roads that will stand up under a heavy beating if you own a quarry full of solid granite and in addition there is a hot-mix asphalt plant, owned by an allied company, right next to your quarry.

At least that was the experience of the Granite Rock Co., whose Logan Quarry is located south of the Pajaro River in the mountains east of Watsonville, Calif.

## Raised lots of dust

It was decided to engage in the road-building project about 18 months ago when the floor of the quarry, now about 1,250 ft. long and 750 ft. wide, began widening out. The main reason for building the roads was that trucks hauling the material from the quarry face to the primary crushing plant raised lots of dust and maintenance costs mounted way up. It would have been a needless expense to pave the whole floor of the quarry, so a system of runways was worked out to carry the trucks within 100 ft. of the face at several strategic spots along the edge. As the face recedes, paving is added so that the end of the runway is always 100 ft. from the quarry face.

The quarry floor is solid granite. It had been leveled off smoothly during the quarrying operations, so there was no need for a base course. The runways were paved to a maximum thickness of 3 in. with plant-mix asphalt. It came from the hot-mix plant of Central Supply Co., the allied company mentioned above, which has its Standard Steel 3,000-lb. pugmill and Madsen 2,000-lb. pugmill outside the quarry entrance.

**Heaviest beating**

A rectangle of ground just in front of the primary crushing plant was scheduled to receive the heaviest beating because the quarry trucks, which average 40 tons loaded, would be maneuvering in the same area constantly. Therefore, a mat of asphaltic concrete composed of 100% crushed rock with  $\frac{3}{4}$ -in. maximum size containing 5% of 120-150 penetration

asphalt, ranging in thickness from 4 to 5 in., was placed in front of the plant.

These paved areas have been in use constantly for the last 18 months and no signs of wear have developed as yet, which goes to prove that an adequate base can hold up under any treatment.

It would be difficult to put a dollar value on the savings brought about by the system of runways. One example of maintenance savings because of less dust in the motors can be drawn from the fact that formerly the air cleaners were serviced every two days—now they are serviced every two weeks. Also, the entire operation is speeded up because more trips between the quarry face and the primary crushing plant are made possible each day. Less tangible savings have resulted from the smoother road, which causes less fatigue to the truck drivers and adds considerably to the effective life of the equipment.

## 30% access road

At the time the paving operation was carried out, the only access to the quarry floor (besides a Southern Pacific Railroad spur track) was by means of a road with a 30% slope. This ramp was so steep that heavy equipment could not make it up to the top under its own power. Therefore, a 365-hp. Meade-Morrison double-drum hoist was put in to haul

equipment in need of maintenance work from the quarry floor to the maintenance shop on the upper level.

Paving this ramp presented quite a problem. The hoist was used to support a grader while it laid an asphalt mat on the ramp, but compaction with a roller was impossible because the hoist could not hold the roller steady on the steep grade. Therefore, the ramp was compacted by heavy trucks. All equipment and materials used in the paving job were lowered by using the hoist.

The quarry itself has been in operation since 1900. At that time, the operations were carried on without machinery of any kind. Rock was barred down from the sides of the granite slope. The larger pieces were broken up by sledge hammers to a maximum of about 6 in. and then the rock was hand-loaded on railroad flat cars and shipped out.

#### Berm at 85-ft. level

Present day operations are carried out on a different scale. The lower face rises 85 ft. from the quarry floor. A berm at the 85-ft. level forms the base for second-level operations. An access ramp to this berm starts near the spur track and slopes up a gentle incline around the eastern rim of the quarry making much easier access to the second-level operation possible and doing away with the need for using the 30% grade original ramp. The berm continues around the entire rim of the quarry forming a road which leads directly to the company's maintenance shops and offices also at the 85-ft. level.

#### Water from Pajaro River

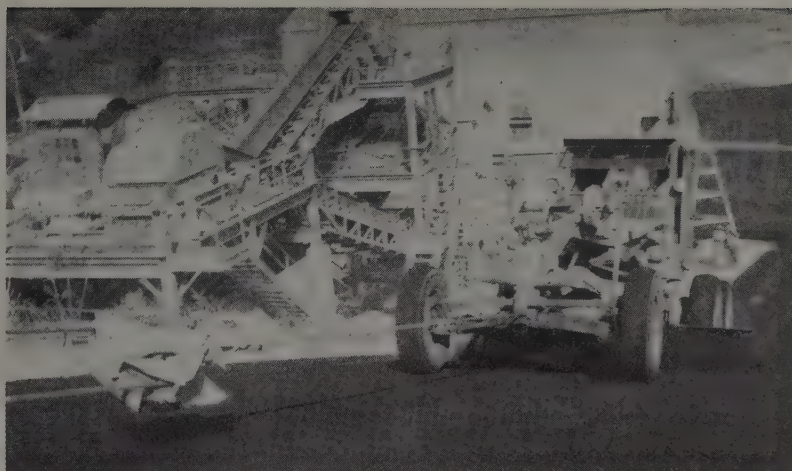
Working face of the second level goes up 150 ft. to the top of the mountain. There several miners are engaged in stripping overburden from the top of the granite ledge by hydraulicking.

Water for the hydraulicking comes from the Pajaro River through a 1,350-gpm. Allis-Chalmers priming pump and a two-stage, 1,000-gpm. Allis-Chalmers main pump. It reaches a head of 320 ft. at the monitor, where the nozzle pressure is 130 lb. The monitor, which weighs 500 lb., is mounted on a rubber-tired dolly and is moved by tractor to keep it from getting embedded into the mud.

#### Primary crushing plant

Mining operations in the quarry begin with drilling and blasting. Then the broken material, composed of granite, (quartz, feldspar, and hornblende), is loaded into a fleet of trucks (five new Euclids and two Sterlings—all with capacities of 14.8 cu. yd.) by three Bucyrus-Erie electric shovels. The shovels are a 75-B, 3-cu. yd. capacity; 85-B, 3¾ cu. yd.; and 100-B, 4 cu. yd.

The loaded trucks travel to the primary crushing plant where the —6-in.



**THE ONLY WAY** this motor grader can keep its equilibrium while laying an asphalt mat on this 30% slope is by being held in place by a 365-hp. Meade-Morrison, double drum hoist. The hoist was also used to haul heavy equipment up from the quarry floor to the maintenance shop whenever it was in need of servicing or repair work.

material is scalped off and fed into a screen tower for further segregation, loading into railroad cars, and stockpiling. All rock larger than 6 in. is dumped into a 60 x 48-in. Allis-Chalmers jaw crusher when it is first brought to the primary crushing plant, which goes down three stories underground. It goes through a series of screening and crushing systems, and finally it is fed into twin B. F. Goodrich conveyor belts which run up the 30% slope right next to the road. At the top of the hill, the material is loaded into a truck bunker, stockpiled, or dropped by gravity into the main crushing plant, next to the railroad tracks, where it is further segregated into different sized material.

#### Principal uses

Principal uses of the rock produced are concrete aggregates, railroad bal-

last, roofing granules, bituminous products, and stone dust for ceramics.

An interesting fact about the quarry is that it lies almost directly over the San Andreas Fault, along which most of the earthquakes in California start.

The granite dome of the quarry was formed by the upward "intrusion" of a molten mass. As it cooled, the outer portion cracked and more molten material was squeezed up into the cracks.

#### Began 20,000,000 years ago

Actually, the company's primary crushing began about 20,000,000 years ago when the rock deposit in the area was folded and broken, then crushed and uplifted. Sometimes unusual things are found in the quarry. For instance, during hydraulicking operations in 1931, a mastodon was uncovered in the sand overburden.

Lee Purtil is plant superintendent for the Granite Rock Co.

**WATER SHOOTS** out the nozzle of this monitor at a pressure of 130 lb. to strip the overburden from the mountaintop and expose the granite for quarrying operations. A two-man crew keeps the mud flying with the 500-lb. monitor, which is mounted on a rubber-tired dolly for mobility.



## Kenney rockfill dam—Key to project

**P**ROBABLY the key to the power development for the Alcan Project is Kenney Dam at the canyon of the Nechako River in Western British Columbia. A rockfill structure 324 ft. high with impervious clay core, it blocks the former eastward outlet of a chain of lakes and connecting streams 120 mi. long. This outlet, from a drainage area of 5,475 sq. mi., permitted the surplus water to flow east, then south and west and to the Fraser River system reaching tidewater at Vancouver, B. C., 400 air miles to the south.

While the dam, originally known as the "Nechako" or "Canyon" Dam, is reported to be the largest of its type in Canada, third in height of similar type dams in North America, and performs a highly important function, it is frequently overlooked in assessing the values of the various elements of this remarkable power development. It was the first of the principal construction items to be completed and has closed the former outlet of the reservoir area eastward since October 8, 1952. It is estimated that the filling of the 873-billion-cu. ft. reservoir to the operating level at elev. 2,800 will require until July 1957. However, water for power is available in sufficient quantity for the 1954 season from Tahtsa Lake, the highest and westernmost of the lakes in the reservoir area. The intake invert of the 10-mi. tunnel constructed westward through the coast range mountains to

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Kemano, B. C.

the underground powerhouse at Kemano, B. C., is 60 ft. below the normal level of Tahtsa Lake.

It was necessary to construct, or rebuild, approximately 65 mi. of road for rail and highway connections at Vanderhoof, B. C., to the Kenney Dam site. From Burns Lake, on the same highway and railway, approximately 110 mi. of road was required to serve the construction of saddle dams and spillway constructed at Skins Lake and Bear Lake. This road also served the east end of Tahtsa Lake from which point the intake structure and east end of the power tunnel was served by barge transportation on Tahtsa Lake.

### Access

Work of providing an access road, establishing camps, constructing the diversion tunnel, and preparing the site, was begun early in the 1951 construction season. By February 1952, the stripping of the borrow pits, stock piling of filter material, and excavating for foundations and core drainage was well along. The main embankment was started March 13, 1952. The first pour of concrete for the core pad was made in April, 1952. At dedication

ceremonies on May 10, 1952, the name was officially changed to Kenney Dam, in honor of the Honourable E. T. Kenney, the then Minister of Lands and Forests and Public Works for British Columbia.

### Concentrated work schedule

Over 1,100 men and the equipment shown on the equipment list (see box) were concentrated on the work during the 1952 season. The diversion tunnel gate was closed October 8, 1952 and the waters in the reservoir behind the dam began to rise. The impervious clay core was completed October 20, 1952 and the last of the main rock fill was placed November 27, 1952.

Final quantities included the following principal items:

|                                                           |                   |
|-----------------------------------------------------------|-------------------|
| Clear and grub dam foundation and borrow areas .....      | 201 acres         |
| Diversion tunnel excavation, unclassified .....           | 49,573 cu. yd.    |
| Diversion tunnel excavation, unclassified, portals .....  | 175,270 cu. yd.   |
| Diversion tunnel—concrete in lining, portals and plug.... | 4,340 cu. yd.     |
| Stripping dam foundation, earth.....                      | 764,802 cu. yd.   |
| Stripping dam foundation, rock.....                       | 125,087 cu. yd.   |
| Excavation cut-off trench, rock.....                      | 52,590 cu. yd.    |
| Dam embankment placed, impervious .....                   | 548,808 cu. yd.   |
| Dam embankment placed, quarry rock .....                  | 1,752,721 cu. yd. |
| Dam embankment placed, pervious.....                      | 729,351 cu. yd.   |
| Upstream slope protection, rock.....                      | 255,127 cu. yd.   |
| Grout holes drilled.....                                  | 77,209 lin. ft.   |
| Grout in foundation.....                                  | 48,760 cu. ft.    |
| Concrete core pads.....                                   | 4,830 cu. yd.     |

A 32-ft. horseshoe shaped diversion tunnel, 1,430 ft. long, was constructed through the rock abutment on the left bank of the river and upstream and downstream cofferdams were built at the dam site. The upstream cofferdam was built to elev. 2,590 ft., approximately 80 ft. above the diversion tunnel invert. The flow of the Nechako River reached 17,100 cfs. at this point in the spring of 1952. Various mixtures had been used to grout-seal the upstream cofferdam. Two 6-ft. and six 12-in. pumps kept the work area behind both the upstream and downstream cofferdams unwatered.

### Equipment—Kenney Dam

THE FOLLOWING equipment was used in constructing Kenney Dam, and some transferred as needed for construction of the saddle dams:

|                                                      |                                              |
|------------------------------------------------------|----------------------------------------------|
| 4 3½-yd. Marion 11M shovels                          | 4 600-cfm. Le Roi compressors                |
| 2 2½-yd. Bucyrus-Erie 54B shovels                    | 1 500-cfm. Gardner-Denver compressor         |
| 2 2½-yd. Northwest 80D shovels                       | 52 ½- to 1-ton trucks                        |
| 14 International TD-24 tractors                      | 9 Passenger vehicles                         |
| 6 Caterpillar D8 tractors                            | 2 Twin Diesel coaches (32-passenger)         |
| 1 Caterpillar D7 tractor, 1 D4 and 1 D2              | 25 2½- to 3-ton trucks                       |
| 4 International TD-14 tractors with overhead loaders | 1 White Low-boy trailer                      |
| 18 10-yd. Euclid end-dump trucks                     | 3 Low-boy trucks                             |
| 31 17-yd. Euclid end-dump trucks                     | 3 Tank trucks                                |
| 2 10-yd. Euclid bottom-dump trucks                   | 4 Caterpillar graders                        |
| 16 8-yd. GMC dump trucks                             | 1 Caterpillar diesel with 218-kva. generator |
| 22 10-yd. GMC dump trucks                            | 2 Twin diesels with 275-kva. generators      |
| 1 P&H No. 150 crane                                  | 1 GM diesel with 37-kva. generator           |
| 1 4,600-gal. Euclid tank truck                       | 7 Tournarockers                              |
| 2 105-cfm. Le Roi compressors                        | 8 Tournapulls                                |
| 2 210-cfm. Ingersoll-Rand compressors                | 1 Vibrating screening plant                  |
| 3 500-cfm. Ingersoll-Rand compressors                | 1 Crushing plant                             |
| 1 1,100-cfm. Ingersoll-Rand compressor               | 3 Grout machines                             |
|                                                      | 6 Diamond drills                             |
|                                                      | 1 Sand washing machine                       |
|                                                      | 1 Sand drying machine                        |
|                                                      | 4 12-in. Byron Jackson diesel pumps          |
|                                                      | 1 12-in. Byron Jackson electric pump         |



**AERIAL VIEW** above shows the dam area. Clay core for dam is completed, and last of main rockfill is scheduled to be finished within 20 days. The 234-ft.-high dam was built within two working seasons. Work on clay and sand filter zones is shown below three months before completion of dam.

Quarries and borrow pits were opened within a half-mile radius of the dam site. Coyote holes were bored for placing the quarry rock. The impervious material was processed in the pits, hauled, spread, and compacted by sheepsfoot rollers. The material was placed on a concrete slab set on bed rock and having a ridged upper surface.

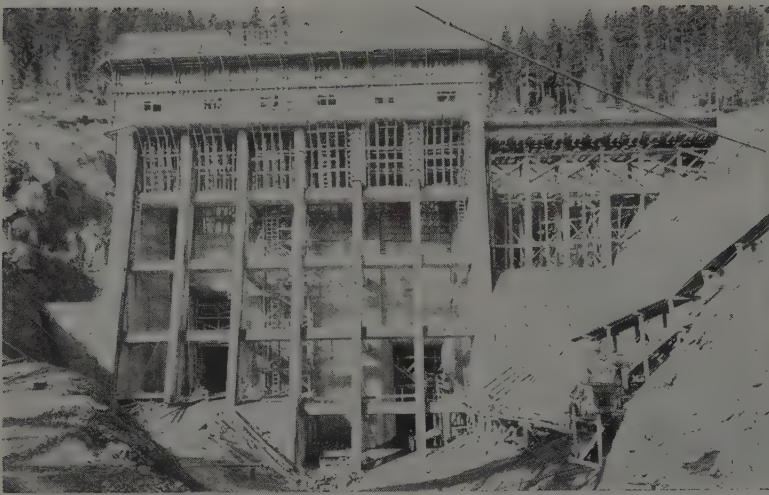
#### **Dam design**

The design of the dam called for the placing of a sluiced rock fill with upstream slope of 1 on 1.37 and downstream slope of 1 on 1.75. Gravel, sand, impervious clay material, pit run gravel, and quarry run rock were placed in successive layers upstream from the rock section. The final upstream slope is 1 on 2.5. The top of the dam is 40 ft. wide on elev. 2,825 ft., which is 25 ft. above proposed reservoir level.

To insure a flow of water in the upper Nechako River during the more than four years while the reservoir is filling, a timber crib dam and spillway were provided at the outlet of Murray Lake, a tributary of the Nechako River below Kenney Dam. By storing the spring run-off in Murray Lake, water could be released during the dry season.

No spillway was provided at Kenney Dam. Approximately 40 mi. west





AT THE OTHER END of the 120-mi. long chain of lakes and streams now blocked by Kenney Dam, this intake structure, with invert 60 ft. below normal level of Tahtsa Lake, serves the initial power tunnel of the project. Six sets of trash racks and trash rakes are provided.

of Kenney Dam, along the northern boundary of Ootsa Lake and the reservoir area, low gaps in the reservoir perimeter required the construction of six comparatively low saddle dams. Taking their names from adjacent small lakes, these dams are known as Skins Lake Dams 1, 2, and 3 and Bear Lake Dams 1, 2, and 3. A concrete spillway controlled by two gates with openings 35 ft. high and 35 ft. wide and two clear spillway openings was provided between the Skins Lake dams. The gate sills are at elevation 2,765 ft., while the clear openings are at elevation 2,800 ft. One of the clear openings is 36 ft. wide and the other is 37 ft., 2 in. wide. A roadway crosses the dams and spillway at elev. 2,820.

Quantities for the Skins Lake and Bear Lake dams and spillway were as follows:

|                           |                 |
|---------------------------|-----------------|
| Clear .....               | 165 acres       |
| Excavation—earth .....    | 400,505 cu. yd. |
| Excavation—rock .....     | 97,728 cu. yd.  |
| Rolled fill placed .....  | 775,332 cu. yd. |
| Filter gravel placed..... | 3,127 cu. yd.   |
| Pit run gravel placed..   | 61,741 cu. yd.  |
| Rip-rap placed .....      | 61,992 cu. yd.  |
| Concrete in spillway..    | 7,575 cu. yd.   |

Continuous rains in the spring and early summer of 1953 slowed the work in the Skins and Bear Lake area. Delays were necessary to let the excess water evaporate from fill material in the borrow pits. However, the work in that area was completed during the 1953 season and water is available from the reservoir for scheduled use in 1954.

#### Personnel

Morrison-Knudsen Company of Canada, Ltd., is general contractor for the power development on the Alcan Project being constructed for the Aluminum Company of Canada, Limited. Kenney Dam was constructed under sub-contract by Mannix, Ltd., with J. R. Bremner, Project Manager, in charge of the construction. The saddle dams and spillway were constructed by Morrison-Knudsen forces, with G. E. Murphey as Assistant Project Manager in charge. A. O. Strandberg is Project Manager, R. H. Madsen, Assistant Project Manager, and R. E. Reed, Area Engineer, for the power development of the Alcan Project.

## Los Angeles water and power projects report

ALTHOUGH Los Angeles experienced the driest year in the history of the local Weather Bureau during 1953, while the city's population grew past the 2,100,000 mark, there was ample water and electricity to meet the increased needs, the Department of Water and Power reported. Rainfall for the calendar year 1953 totaled only 4.08 in. as compared with a normal of 14.54 in., according to Weather Bureau reports.

During the fiscal year ending June 30, 1953, the total consumption of water in Los Angeles was more than 144,500,000,000 gal., a record 11% in-

crease over the preceding year, and an equivalent or larger figure was anticipated on the basis of calendar year estimates for 1953.

Los Angeles' principal source of water is the Owens River Aqueduct from the High Sierra, which supplied about 70% of the city's water needs last year. Local underground supplies of the Los Angeles River basin and water delivered by the Colorado River Aqueduct together furnished the remaining 30%.

The sale of electric energy by the municipal power system rose to a total of more than 4,333,000,000 kw-

hr in the same period. Excluding energy provided to other utilities, the sale of energy to all other customers increased 9.6% over the previous year. New hydroelectric plants in the Owens River Gorge and increased steam generation of electricity overcame the handicap of reduced power generation at Hoover Dam.

#### Maximum water consumption

The all-time peak use of water in Los Angeles occurred on July 13, 1953, when water consumption rose to 672,000,000 gal. for the day. A new record power peak for the city was reached on December 22, when the Department was required to generate electricity at the rate of 1,019,000 kw. to meet the demands of electric customers.

Construction of new facilities was carried on at the rate of about \$17,-000,000 for the year by the water system and about \$45,000,000 by the power system. Actual figures for the fiscal year ending June 30, 1953, showed a total of \$21,169,426 invested in extensions, additions, and improvements to the water system, and \$41,-913,853 to the power system.

Among the major water works projects of the year 1953 were:

Completion of Eagle Rock Reservoir at a cost of \$2,425,000, and the first sections of the \$7,000,000 Eagle Rock-Hollywood pipeline; improvement and increased storage of the Silver Lake Reservoir at a cost of \$1,500,000; completion of the Green Verdugo Reservoir at a cost of \$770,-000; near completion of the Upper Stone Canyon Reservoir project, estimated at \$2,600,000; construction of large new pipelines in Pacific Palisades, Sunland-Tujunga, the harbor area, and other locations; and the building of pumping plants, chlorinating and regulating stations, and other facilities.

#### Principal projects

Among the principal projects of the power system during the year were:

Completion of the \$50,000,000 Owens Gorge Power Project, bringing 112,500 kw. of electricity to Los Angeles from the High Sierra; work on the new \$75,000,000 Valley Steam Plant, including installation of two of the four generators; opening of new Receiving Station "H" in Hollywood at an initial cost of more than \$2,240,000, and work on two other major receiving stations; construction of transmission lines, distributing stations, and other facilities.

In addition, the water system added more than 230 mi. of distributing mains, 2,600 gate valves, 940 fire hydrants, and about 20,000 new water services. The power system also built many industrial stations and hundreds of miles of distribution power lines; the number of street lights was increased by over 2,000, and the number of service meters by over 23,000.



Aerial view shows cofferdam (foreground) and levees up to grade as—

## WELLPOINTS save the day on Los Angeles River job

By DON FIX

Project Engineer  
Peter Kiewit Sons' Co.  
Arcadia, California

CHANNEL improvements recently completed along the lower reaches of the Los Angeles River by Peter Kiewit Sons' Co. may have saved the nearby city of Long Beach from becoming a latter-day "Atlantis." An area of land subsidence centered on Terminal Island less than 1½ mi. away (location of concentrated oil well operations thought by many to have caused the situation) extends to the river channel, and has lowered the river bank elevation to a point less than 2 ft. above the extreme high tide level. The combination of a flood condition and a high tide would

have endangered large industrial and residential sections of Long Beach.

Improvements undertaken by Kiewit were part of a Corps of Engineers flood control project which will eventually control flood waters of the entire Los Angeles River and its tributaries. Scope of the work was reconstruction to higher level and reinforcement of riverbanks upstream from the Pacific Ocean a distance of 4,700 ft. The major borrow source—for 375,000 cu. yd. of fill—was to be the river bottom; so an early problem was determining a method for damming off tidal inflow while still allowing for river outflow. The answer, literally, was a dam.

An earth dam was constructed by end-dumping at the river mouth. A pumping station consisting of three 20-in. Fairbanks-Morse Niagara pro-

peller pumps (total capacity 45,000 gpm.) was constructed on piling supports 700 ft. upstream from the dam. These pumps were used to pump ocean seepage and river flow into the ocean.

Following the removal of the ocean water from the working area, work was begun on the unique feature of the job, a rock sill completely across the river bottom to control the level of the river bottom and prevent undermining of the river banks. (It should be noted that the design of previous sections of river improvement called for reinforced concrete bottom and grouted slopes, but because of the unequal subsidence on the described work, this design was impractical.) The downstream toe of the control sill required excavating to an elevation 32 ft. below sea level.

### Supervised by Stang

This excavation was accomplished only with the aid of a 2-stage system of wellpoints installed under the supervision of the John W. Stang Corp. The first stage of wellpoints was installed on the downstream side of the sill at el. -3. The sill was then excavated to el. -20, and the second stage installed. A discharge pipe was laid from the pumps, over the cofferdam to the ocean. The entire system required about 2,300 ft. of 8-in. header pipe with risers at 6-ft. centers, five 10-in. pumps, and 1,400 ft. of 10-in. discharge pipe.

During excavation for the rock sill portions of the old "Seaside foot bridge" were encountered. This bridge was destroyed by flood in 1937 with a loss of seven lives.

### New levees 12 ft. higher

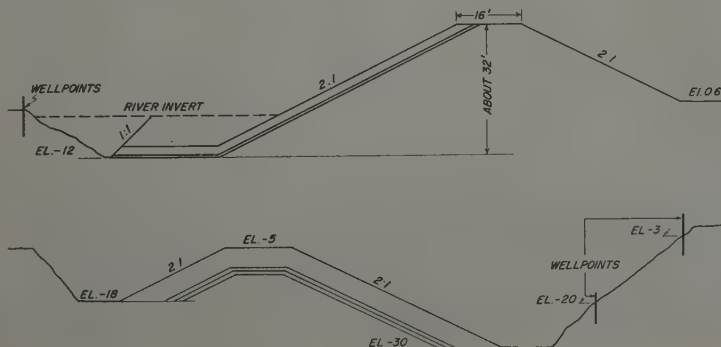
Construction of levees was carried on in conjunction with construction of the control sill. The new levees stand about 12 ft. above the old. The use of wellpoints in this operation was necessitated by the design of derrick-stone toes for the levees about 12 ft. below sea level. Wellpoints were necessary wherever excavation more than 2 ft. deep was attempted. The new construction was lined with a 6-in. layer of filter material and a 2-ft. layer of graded riprap (2 to 500 lb.). Most of the 135,000 tons of stone needed for this job were placed by means of a dragline fitted with a rock-skip resembling a section of dump truck bed.

### Unusual condition uncovered

The impervious quality of the soil encountered required the excavation for the toe trenches to be done by a dragline working on wooden mats. Fill material was hauled to the banks by Caterpillar D8's and C80 scrapers.

An unusual condition was encountered when a partially constructed bank caved away. Excavation revealed the old levee had been constructed upon a fat clay which possessed the smallest amount of co-

SCHEMATIC DRAWING of the channel improvements recently completed at the mouth of the Los Angeles River. Upper drawing shows the levee with its toe stretching out below the river invert. Below is the sill, with wellpoint installation shown at right.





FIRST STAGE wellpoints (left) in submerged sill area. Second stage points (center) are to lower level of water table.

hesive strength ever observed in a soil in this area. Placing added fill over this soil and then excavating

adjacent to the fill resulted in an action comparable to squeezing the side of your toothpaste tube. The fat clay was pushed laterally and displaced by the fill material. An additional 10,000 tons of derrick stone were required in the toe to assure stability of the bank.

Representing the Corps of Engineers on the work was Bob Loudon, resident engineer, and Fred Lopes, office engineer.

Heading field construction operations for the contractor was Lonnie Lawler, project superintendent, assisted by the following key supervisors: the author as project engineer; John McLaughlin, office engineer; Al Aleridge, rock superintendent; Bob McKinney, structure superintendent; Thad Martin, master mechanic; Buck White, Ed Kopp, and Cliff Kinsey, excavation foremen; Dave Leland, crusher foreman; Bill Winder, labor foreman, and Jack Randall, office manager.

The job has been rushed to completion to prevent any possible rain damage, and the cofferdam has now been removed. The Northwest cranes have been replaced by the feathered variety, and the sea gulls are busily setting up housekeeping in their remodeled home.

## Bid call authorized on \$5,600,000 job to eliminate Bay Bridge danger point

DIRECTOR of Public Works Frank B. Durkee has authorized the California Division of Highways to advertise for bids on improvements to the East Bay traffic distribution structure, eastern terminus of the San Francisco-Oakland Bay Bridge.

Estimated at \$5,600,000, it is the largest allocation for any one project in the 1953-54 state highway budget. The project calls for construction of three additional ramps designed to eliminate cross-weaving traffic movements. Traffic capacity of the structure will be approximately doubled.

New ramps connecting the San Francisco-Oakland Bay Bridge with U. S. 50 will be built above the present structure at the third level. A curved ramp will also be added from U. S. 50 to the Eastshore Freeway on the north.

Other access ramps are planned but will not be built until Cypress St. is developed as an elevated full freeway.

The three levels of vehicular roadways above the two levels of railroad tracks at the location where the Key System crosses below the Southern Pacific will result in a total of five levels of transportation arteries when this project is completed.

The work is expected to take about 2 yr. It will involve construction of about 10,000 ft. of new elevated struc-

tures varying in width between two and four lanes. This, together with about 6,000 ft. of existing viaduct that will be used, will comprise a total of

16,000 ft. or about 3 mi. of viaduct in the interchange area.

The new facilities will be built of structural steel with all welded connections, such as has been used for the elevated portion of the Bayshore Freeway in San Francisco. (*Western Construction*—Sept. 1953, pp. 78-81.)

A primary consideration during design was the necessity of handling traffic during construction. As there are no available streets to detour the large amount of traffic around the interchange, it will be necessary to carry all traffic through it while construction is in progress.

While motorists will necessarily experience some inconvenience, every practical measure will be taken to reduce congestion while work is under way. One such measure will be the construction of temporary timber viaducts to detour traffic around locations where major changes will be made in the present structure.

When it is necessary to restrict the flow of public traffic, such restriction will be confined to off-peak periods. Three-lane roadways will not be reduced to less than two lanes, and two-lane roadways will be maintained as such except for short intervals in off hours. If it will be necessary to stop traffic, for operations such as erection of steel work over the present lanes, this will be done between midnight and 6 a. m.

The existing interchange was placed in service 17 yr. ago when the Bay Bridge was completed. Recent traffic growth, with 120,000 vehicles per day now passing through the interchange, has required a major expansion of capacity. The planned improvements will permit twice the present traffic flow without congestion.

ARTIST'S IMPRESSION of how the proposed interchange at the eastern terminus of the San Francisco-Oakland Bay Bridge will look when it is completed.



# REPORTS from the COURTS

By HOWARD S. BURNSIDE, Attorney and Registered Engineer

## Alternate remedy under written contract

"IN FEBRUARY 1948 plaintiff and defendants entered into a written contract whereby plaintiff agreed to level a 40 acre tract of defendants' land . . . and to employ one D-8 tractor with bulldozer . . . and two D-8 tractors with 20-yard carry-alls. Defendants . . . were to . . . pay plaintiff for its work every 15 days from the day work started."<sup>1</sup> After this work was completed both parties agreed to extend the terms of the contract to cover other land leveling for defendants. During the course of this subsequent work the defendants did not keep up regular payments whereupon the plaintiff informed them that they would stop work if not paid within ten days. The payment thus demanded was not made so work was stopped before its completion.

After making several demands for payment plaintiff filed suit with a cause of action in quantum meruit, that is, for the reasonable value of the services performed. The jury returned a verdict for the plaintiff and defendants appealed contending that before plaintiff could bring this action the work under the contract must be fully performed.

This case is of particular interest because the general fact situation and the legal answer is common to an endless variety of contracts. One who has contracted to perform work discovers that, for one reason or another, he won't be paid or isn't being paid in accordance with the contract. He is faced with the necessity of choosing to complete the contract and sue for the contract price or to rescind the contract and sue for reasonable value of services.

In its opinion in the *Spitalny* case the Supreme Court of Arizona held that when payments are not made as provided in the contract the injured party has the right to terminate the contract and having rescinded then that party may sue for the reasonable value of services performed to the date of termination. This value is measured by the value to the defendants and not by the cost of the work to the plaintiffs and their anticipated profits under the rescinded contract. An additional item of damage allowed was interest on the judgment from the date the action was commenced.

Thus the plaintiff acted properly in stopping work and rescinding the

contract when payments were not made and thereafter suing in quantum meruit for the reasonable value of their services. An alternate course would have been to complete the work and sue for the contract price but the plaintiff was not required to complete the work in order to maintain the action as contended by the defendants.

<sup>1</sup>*Spitalny v. Tanner Const. Co.*, 254 P. 2d, 440.

## Contract of assistance not usurious

"IN A USURIOUS transaction, there must be a loan of money, which is to be repaid to the lender, with compensation for its use in an amount in excess of the highest permissible rate. And as a necessary concomitant there must exist the corrupt intent to exact the illegal charge for the use of the money lent."

"The presumptions of law are in favor of legality; and therefore if the transaction in question is open to two constructions, one making for legality, the other for illegality . . . it is the duty of the court to adopt the construction in favor of lawfulness."

Dealy was awarded the general contract for a hospital addition subject to a deposit of \$25,000.00 being made for use in performing the contract. To obtain the deposit Dealy agreed with the plaintiffs who furnished the deposit to return their \$25,000 and also to pay promissory notes in the total sum of \$10,000.00. This latter sum was to compensate plaintiffs for their "services" in securing the contract and in performing general administrative duties.

The written agreement provided further that this was not to be considered a partnership or joint venture but a contract of assistance. The plaintiffs were skilled in construction work and checked the job several times on week-ends.

Disagreement arose during the course of the work which resulted in the plaintiffs quitting the arrangement and bringing this action claiming the sum of \$10,000.00 for breach of contract. Judgment was awarded to plaintiffs and Dealy appealed contending that the agreement violated the usury statutes.

After making observations quoted above and cited from earlier cases, the appellate court continued:

"Where, as here, the facts show a joining of funds, property and labor in a common purpose to attain a result for the benefit of the parties and where each had a right in some measure to direct the conduct of the other through a fiduciary relationship which existed, the court was justified in finding that the parties engaged in a business enterprise for profit which was in the nature of a joint venture. (A provision in the agreement to share the losses being implied.) Under such circumstances, the agreement in question is not usurious." There was a dissent.

There are several interesting facets of this case to be noted. If the court had found the transaction to be usurious, the plaintiffs could not have enforced payment of the \$10,000.00. Since there was dissent it might be said this particular agreement was on the ragged edge. Usury is usually encountered as, or can be reduced to an excessive rate of interest on a loan.

Note particularly that the parties agreed this was not a joint venture or partnership; but the court said a provision to share losses would be implied. Thus while the plaintiffs sought to avoid the liabilities of a joint undertaking for a guaranteed profit the court inferred that they would be liable for any losses incurred in the venture.

*Moore v. Dealy*, 254 P. 2d 888.

## Contractors' purchases now tax exempt

IN *Johnson v. Crane Co.*, it was held that a plumbing contractor should pay the 2% sales tax on supplies purchased from the supply house for use by him as a plumbing subcontractor. He contended, but without success, that this was a sale for resale and thus exempt under the Arizona Excise Revenue Act. Since this sale occurred, however, the Act has been amended so that now sales of personal property to contractors for use in the performance of their contracts are exempt from the category of retail sales.

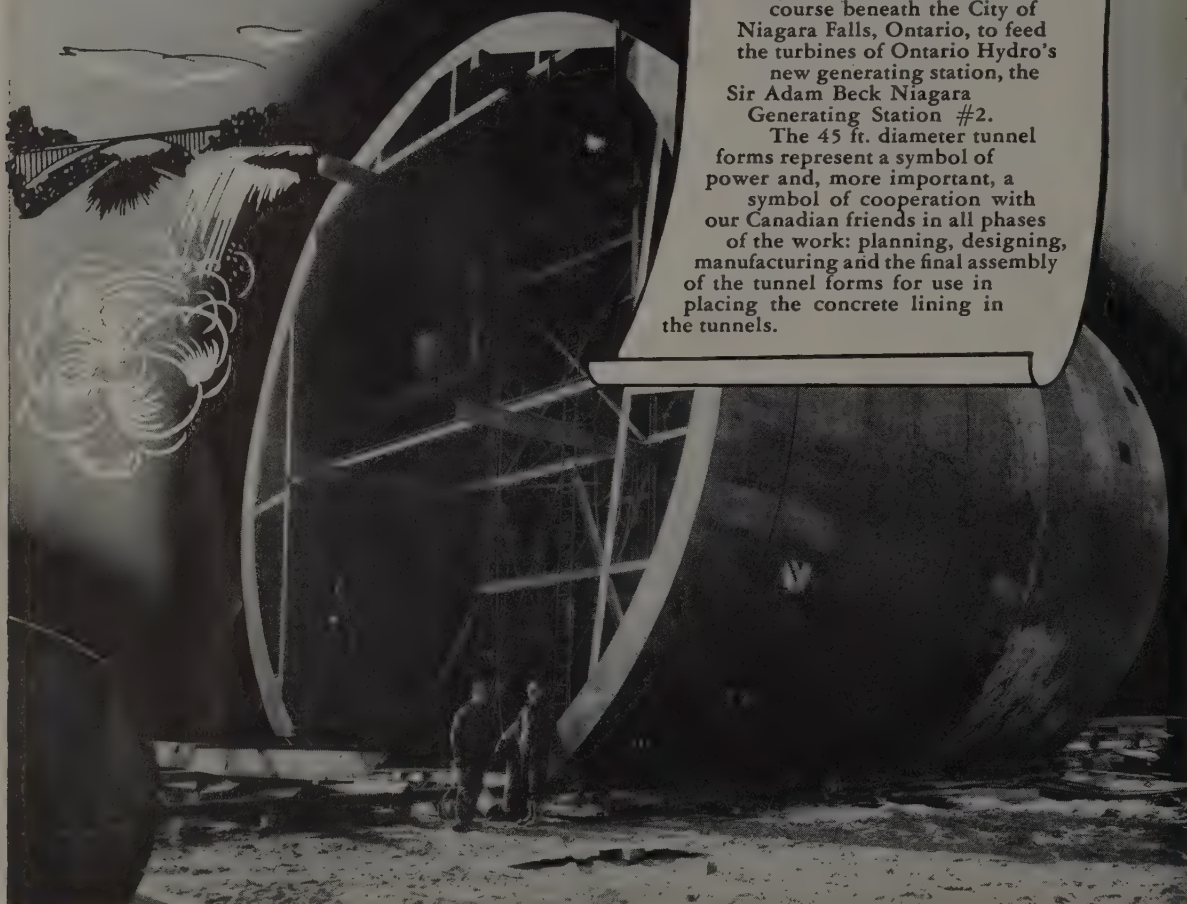
75 Ariz. 156.  
253 P. 2d 341.

## Notes

"USING a public sidewalk for a workshop does not as a matter of law affect the degree of care required by pedestrians." Thus if the independent contractor was careless in leaving supplies on walk in plain view, thereby causing pedestrian to stumble and fall, there is still a question for the jury whether the pedestrian was herself careless; and it was error to grant a non-suit against the independent contractor.

*Mathews v. Sears* 253 P. 2d 43.

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## ARIZONA

**MYSTERY IN THE CAPITOL**—A recent meeting of the Arizona State Building Commission which is making plans to enlarge and modernize the 50-yr.-old State Capitol Building, revealed that the original floor plans for the building are missing and no one knows where they are. Anyone knowing their whereabouts has been requested to notify the Commission. Tentative construction plans are for the addition of new wings to the north and south of the existing building and remodeling of the old central building. The sum of \$4,500,000 is available for the project.

**PHOENIX SEWER SURVEY**—Plans for cooperative construction of sanitary sewer facilities by the City of Phoenix and Phoenix Sanitary District No. 1 have reached the drafting stage after a survey by consulting engineers revealed that the joint construction would be cheaper than building separate systems. A bond issue of about \$5,000,000 must be approved by the taxpayers, however, before construction can start.

**BEELINE HIGHWAY**—Construction of the Beeline Highway from Phoenix to Flagstaff is expected to move along toward completion during 1954. The Phoenix terminus of

the route, which involved 3 mi. of 40-ft. paved highway, was built by Copper State Construction Co. on a \$174,740 contract. Construction plans for other parts of the road include a new 4-mi. section extending toward Payson, a reconstruction job that will straighten out 5½ mi. of the present Oxbow Hill section, a 3-mi. shortcut through Papago Park east of Phoenix, and another section of 14 mi. on the Phoenix end of the road.

**MOBILE CONCENTRATOR**—A 1,200-ton mill and concentrator belonging to Miami Copper Co. is in the process of being moved 12½ mi. to the site of another copper mine. The contract for moving the building, which is 480 ft. long and 250 ft. wide, is held by National Steel & Construction Co. of Phoenix. Sidney O'Neil, representative of the contractor, said that the move, which involves dismantling and re-erecting the plant, should be completed by about the middle of April. Work force for the move, which will cost more than \$800,000, will vary from 35 to 100 men.

**CONDEMNATION PROCEEDINGS** have been started against 24 property owners in Phoenix so that a \$200,000 paving project can begin. A Maricopa County right-of-way agent has reported that 95 of the 119 property owners involved have deeded land to the county, believing a 4-

lane highway will compensate them for the loss of their land. This involved each property owner giving up a 7-ft. strip of land at the present street front.

**FOREST ROAD CONSTRUCTION** in Arizona has been allotted \$1,276,415 for the 1954-1955 fiscal year. The money will be used to reconstruct a 3.4-mi. section of the Grand Canyon approach road, seal-coat 35 mi. of the Grand Canyon approach road, reconstruct 3½ mi. of the Beeline Highway north of Payson and build a new bridge across the East Verde River, place bituminous surfacing on 2½ mi. of the Beeline Highway, and complete the Coronado Trail by building a 3-mi. section between Alpine and Hannagan Meadow.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Arizona include a low bid of \$155,950 for 2½ mi. of grading and surfacing in Cochise County submitted by A. J. Gilbert of Warren. Project completion date is July 15, 1954. I. Givens Construction Co. of Phoenix submitted a low bid of \$239,760 for 4.8 mi. of road construction in Coconino County. W. J. Henson of Prescott was low bidder, at \$96,775, for 1¾ mi. of grading and surfacing in Mohave County. Completion date is July 31, 1954. Low bid of \$308,170 for 8 mi. of clearing, grading, and draining in Mohave County was submitted by Phoenix-Tempe Stone Co. of Phoenix. Completion date is January 15, 1955.

## ARIZONA OVERPASS BEGINS TO TAKE FORM

When the Stone Ave. Overpass (above), now being built by Fisher Construction Co. of Phoenix on a \$203,413 contract, is finished, only two other bids will remain to be let to complete the new Superior-Miami Highway.



## CALIFORNIA

**FIRE AND FLOOD**—Recent widespread forest fires followed by heavy floods have caused many requests for relief in Southern California. The danger was recognized by Maj. Gen. Bernard L. Robinson, deputy commander of the Corps of Engineers, in the course of an inspection tour of military and civil projects in the area. Relief was sought by Representative Hiestand of California, who introduced a bill in Congress calling for a \$10,000,000 emergency appropriation for fire prevention and flood control in the Angeles National Forest area. The congressman reported that he had sponsored a helicopter tour of the danger areas in order to make an aerial survey of the damage before deciding to seek these emergency



### SLABS ARE POURED FOR "HIGHEST EVER" LIFT

This temporary enclosure protects pouring of lift slabs from the weather. The job, a 5-story addition to Mercy Hospital in Sacramento, is being done under a \$2,330,000 contract by Heller-Campbell-Erickson-Lawrence Construction Co. Bud Gilbert is project superintendent. The lift will raise the roof slab 58 ft. from the ground, making this the highest lift ever attempted.

funds. Two Army engineers, a county flood control engineer, and an earthmoving contractor took part in the tour. At the same time, the Orange County Grand Jury recommended that a major bond issue be made to provide a comprehensive plan of flood control protection.

Even before the floods occurred, a special committee of California's Flood Control Conference reported to the State Water Resources Board that at least \$10,500,000 will be needed to pay for California's share of federally-constructed flood control projects. The state now has \$5,300,000 in unobligated funds for flood control, leaving a deficit of \$5,200,000 which the Legislature must appropriate in 1954 to pay for the project. The committee was headed by H. E. Hedger, chief engineer of the Los Angeles County Flood Control District.

**HEAVY FLOODS** in the Los Angeles area have caused all work on the \$3,500,000 Ocean Blvd. Bridge across the mouth of the Los Angeles River at Long Beach to be shut down until April. All wooden forms, structural steel, and equipment were removed by crane from an island in midstream which provided a working area for the pier construction. Walter C. Larson is job superintendent for Macco Construction Co. the contractor.

**TECOLOTE TUNNEL**—Drilling has been resumed on the Tecolote Tunnel after the work had been shut down for more than six months because of alleged intolerable working conditions (*Western Construction*—January 1954, p. 92) by Halvorson Contractors. Halvorson has installed \$1,000,000 worth of refrigeration

facilities and has subcontracted the remainder of the drilling to Coker Construction Co. and Peter Kiewit Sons' Co., the same combination which punched the Eklutna Tunnel through in Alaska (*Western Construction*—October 1953, pp. 83-88). Ray Blasongame, superintendent on the lake heading at Eklutna, is now working on this job. The tunnel, which will bring water to the Cachuma Project from the Santa Ynez River, was about 80% complete when work stopped. Total length will be about 33,600 ft.

**ALAMITOS BAY**, near Long Beach, has been approved as the site of a proposed \$10,000,000 small-boat harbor development, according to Frank B. Durkee, State Director of Public Works. Long Beach voters have already authorized the spending of that sum for the new harbor.

**SHASTA WATER**—Water has been released from the reservoir behind Shasta Dam at the rate of 18,500 cfs. in order to increase storage space behind Shasta Dam for possible flood control operations, according to Eugene Christian, Central Valley Project watermaster. An additional 13,500 cu. ft. was channeled through the power plant to produce hydroelectric energy. The releases were timed to fill in the Sacramento River behind a heavy run-off from tributaries in the Upper Sacramento Valley in order to minimize the possibility of dangerous rises in the river's level.

**BEAR CREEK DAM**—Bids have been called by the Sacramento District of the Corps of Engineers for construction of a \$700,000 flood control dam on Bear Creek in Merced County. The dam will be an earthfill

structure with a concrete spillway. It will be 1,830 ft. long, 92 ft. high, and will contain 436,000 cu. yd. of embankment. Col. William Ely, district engineer, said the bids will probably be opened some time in March and a construction contract awarded soon thereafter.

**AIR JET CENTER**—The population of Palmdale is expected to be tripled by the first half of 1955 because of the influx of workers to the Palmdale airplane jet center, formed by the facilities of the North American, Northrop, and Lockheed aircraft companies. Plans have already been made to build some 1,100 new homes to help house these workers.

**ANOTHER POWER PLANT** and reservoir will be built on the Owens River about 10 mi. north of Bishop, according to Samuel B. Morris, general manager of the Los Angeles Department of Water and Power. The project, to cost about \$2,776,000, will include a dam across the river, creating a lake more than 2 mi. long, and a power plant with a generating capacity of 2,350 kw.

**EVERYBODY** talks about the weather but no one does anything about it, Mark Twain once said. Well, 1953 was the second driest year in the 53-yr.-old weather history compiled by the Santa Maria Valley Water Conservation District, so members of the district are seeking \$17,000,000 from Congress to build Vaquero Dam on the Santa Maria River in an effort to replenish the valley's rapidly diminishing water resources. District records show that water levels in various wells in the valley have dropped an average of 29.7 ft. during the 8 yr. since 1945.

**HOSPITAL HOPES**—Plans have been drawn up for construction of a new 100-bed Catholic General Hospital, to cost \$2,000,000, to be built on a 10-ac. tract in Monterey Park.

**UNDERWATER SEWER PIPE**—The last link in a 7,000-ft. underwater pipe has been laid, completing the Orange County Sanitation District's ocean outfall sewer. The \$8,308,000 project, which began 5 yr. ago, includes both a land and underwater section of the outfall and an \$850,000 treatment plant. The underwater pipe, laid in units 24 ft. long and 78 in. in diameter, is believed to be the largest concrete pipe ever laid by the tower system. The entire project is expected to be in operation by July 1.

**A SAN FERNANDO VALLEY** site for a \$30,000,000 regional shopping center is being sought by a North Hollywood businessman.

**SUTHERLAND DAM**—Completion date on the Sutherland Dam Project (*Western Construction*—August 1953, p. 103) has been extended to April 8

because of the death of Stanley Bent, Jr., one of the contractors. Time extensions have also been given for the completion of Black Canyon Tunnel and the conduit linking it with Sutherland Dam because of a delay in the tunnel-lining job.

**WORK** on the second barrel of the San Diego Aqueduct is now three months ahead of schedule, according to Jean Walton, project supervisor for the Bureau of Reclamation. Completion of the entire job is expected in September.

**SANTA ANA FREEWAY**—A 3-mi. section of the Santa Ana Freeway has been opened, making it possible to drive the 14 mi. from downtown Los Angeles to Norwalk in 15 min. Construction costs of the project amounted to \$2,515,000.

**WORK HAS STARTED** on grading the new Placerville Freeway in El Dorado County under an \$809,975 contract held by Piombo Construction Co. of San Francisco. T. G. Smith is resident engineer for the State and Phil Dunn is construction superintendent for Piombo.

**RESERVOIR BOND**—Citizens of Hawthorne have approved an \$800,000 bond issue to finance building of a 3,500,000-gal. reservoir and other Water Department improvements.

**RIVERSIDE COUNTY** Road Commissioner A. C. Keith said that construction of the long-delayed Arlington-Mira Loma Freeway may begin soon. The 6-mi. freeway will cost about \$500,000.

**SHORTER HIGHWAY**—State Route 89 in Plumas County will be nearly  $\frac{3}{4}$  mi. shorter when a \$280,000 project, which includes a new bridge over the middle fork of the Feather River, starts. The State Highway Commission has approved the change. Construction will not start until funds are available.

**TWO LANES TO FOUR**—The State Highway Commission has recommended the earliest possible start on reconstruction of the present two-lane Highway 50-99 from Lodi to the Sacramento County line as a four-lane divided freeway. Funds for the job, estimated to cost \$3,100,000, depends on the availability of future highway funds.

**BIG BUDGET**—President Eisenhower recommended to Congress that it appropriate \$37,432,420 in new construction money for the Folsom, Sly Park, Solano, and Sacramento Valley Canals projects and for flood control along the Sacramento River. Of this money, \$21,326,590 would go to Folsom, \$3,065,830 would go to Sly Park, \$8,040,000 would go to the Solano County job, \$2,000,000 would go



#### IT'S A LONG WAY UP

This system of conveyor belts is used to feed rock and gravel from the river-bottom to a rock crushing plant on the cliff. A Caterpillar D8 tractor with an 8-U bulldozer blade pushes the material into the conveyor system.

to the Sacramento Valley Canals, and \$3,000,000 would be spent on Sacramento River levees. The sum of \$6,983,590 for the construction of powerhouses at Folsom and Nimbus would come from another \$23,493,000 overall appropriation for the Central Valley

Project. In Southern California, the Corps of Engineers would spend \$8,000,000 on the Los Angeles drainage area, \$5,000,000 on the Whittier Narrows Dam, and \$2,500,000 on the San Antonio Dam.

**SLY PARK DAM** in El Dorado County was 25% complete when the contractor shut down operations for the winter according to Tom Brooks, project office manager. Completion date has been set for November 1954.

**A NEW ROUTING** for U. S. 91 near Riverside has been adopted by the Highway Commission. Start of construction, estimated at \$3,600,000, depends on the availability of future highway funds.

**STORM DRAIN** Project No. 13 in Inglewood has been started. The project, expected to be finished in 2 yr., will cost \$3,121,800.

**TWO FELLOWSHIPS** for graduate study of transportation engineering have been established by the Automotive Safety Foundation at the University of California in 1954 and 1955. Preference for the fellowships, which provide \$1,500 plus fees for a year's study, is given to those with practical experience in highway engineering. Interested individuals should write to the Director, Institute of Transportation and Traffic Engineering, University of California, Berkeley 4, Calif., for further information.

**RECENT MAJOR CONTRACT AWARDS** and low bids in California include a low bid of \$438,790 for 18 mi. of levee repair on the Sacramento

#### CRANES COOPERATE ON BIG CONCRETE POUR

Two 45-ton Model MC-824 Lorain Moto-Cranes (with 70 and 50-ft. booms) cooperate in handling four 4-yd. Gar-Bro buckets while pouring 1,300 cu. yd. of concrete for turbine and generator bases at the new steam plant being built in Sun Valley, Calif., by the Los Angeles Department of Water and Power. Two buckets are used by each crane. Challenge truck mixers load one while other is being dumped.





### HALF-WAY POINT REACHED AT FOLSOM DAM

Work on Folsom Dam stopped briefly to celebrate reaching the half-way point in the construction. A. D. Edmonston, state engineer representing the Governor of California, tripped the bucket which contained the 500,000th cu. yd. of concrete to be poured. Col. W. J. Ely, Sacramento District Engineer, Corps of Engineers said, "No matter what happens now, we can keep going all winter."

River submitted by Basalt Rock Co., Inc. of Napa. Connolly-Pacific Co. of Long Beach was awarded a \$1,769,350 contract for jetty construction at Long Beach. Fred J. Early, Jr., Co. of Torrance and Stolte, Inc. received a \$2,977,000 contract award for runway and taxiway work at Lockheed Aircraft Corp. in Palmdale. Fredrickson & Watson Construction Co. of Oakland received a contract award of \$547,455 for grading ramps and freeway paving on U. S. 101 near San Luis Obispo.

Other contract news includes award of a \$300,000 to Goudeseune Construction, Inc. of Westminster for storm drain construction in El Segundo. Granite Construction Co. received awards for a \$123,615 job involving .8 mi. of grading and surfacing in Santa Cruz County and a \$288,690 job for 34 mi. of widening and surfacing in San Bernardino County. Griffith Co. of Los Angeles received a \$406,370 contract for 4½ mi. of widening and surfacing in Los Angeles. G. S. Harrington of Auburn received a \$198,500 contract to build a water plant at Placerville. W. E. Kier Construction Co. of El Segundo submitted a low bid of \$1,162,000 for an 8-story addition to El Cortez Hotel in San Diego. Charles MacClosky Co. of San Francisco was awarded a \$465,445 contract to build a freeway interchange in Los Angeles County. Parish Bros. of Benicia and Harms were awarded a \$848,750 joint venture contract for 4½ mi. of access road at Travis AFB near Vacaville.

More contract news includes a \$296,600 award for 8 mi. of Sacramento River levee work to H. Earl Parker of Marysville. Parker also

submitted a low bid of \$490,180 for other levee work on the Sacramento. George W. Peterson, Jack W. Baker, and Dragline Rentals Co. of Los Angeles submitted a low bid of \$1,831,070 for freeway and structure construction in Los Angeles. Piombo Construction Co. of San Francisco was awarded a \$809,970 contract for 1.3 mi. of freeway grading plus structure erection in El Dorado County. George Savala Paving Co. of Los Angeles was awarded a \$224,385 contract for 1.3 mi. of widening and surfacing in Santa Monica.

Other California contracts include a \$567,195 award to Stolte, Inc. of Oakland for earthwork, pipelines, structures, laterals, a pumping plant, and a reservoir on the Cachuma Project. United Concrete Pipe Corp. of Baldwin Park received a \$286,250 award for 6 mi. of water mains in Santa Barbara. Clyde W. Wood & Son of North Hollywood received a \$503,460 award for 6.3 mi. of grading and surfacing in Amador County. E. C. Young & Co. and Service Construction Co. of San Fernando were awarded a \$463,575 joint venture contract for freeway improvements in Los Angeles County.

## COLORADO

**STRAIGHT CREEK** has been recommended by several firms of consulting engineers as the most feasible site for a tunnel under the Continental Divide, west of Denver (*Western Construction*—February 1954, p. 72) from among the four possible sites which were studied. Business

groups on both the eastern and western slopes of the Divide are reported to favor the Straight Creek site also. This would involve drilling of a tunnel 7,220 ft. long at an elevation of 11,240 ft. It would cost more than \$15,000,000 to build. The recommendation has been submitted to the state legislature and Governor Dan Thornton has called for prompt action on the report. Mark U. Watrous, state highway engineer, said that he would be opposed to undertaking the project except as a toll tunnel because it was about 15 yr. ahead of time as far as current public road funds were concerned. He added that the engineers estimated about half the construction cost would have to be borne by other than toll revenue.

**VALLEY HIGHWAY**—Denver's planning director, W. F. Henninger, reported that some \$2,000,000 will be spent to obtain 84 parcels of property along the proposed Valley Highway route. Construction, expected to begin in 1955, will include two large bridges to carry traffic moving in opposite directions.

**PLANS TO REMODEL** the theater section of the Denver City Auditorium are being discussed by a committee appointed by the mayor several years ago. The sum of \$400,000 is available for the renovation.

**DENVER SEWAGE PLANT**—The Choun Construction Co. has started work on a \$200,000 expansion program at the sewage disposal plant of the Westminster Sanitation district in Denver.

**DENVER STATLER**—Construction on a 1,000-room hotel and an adjoining department store, at a cost of about \$20,000,000, is expected to start this summer in Denver. The hotel will be part of the Statler chain.

**BRIGHTON TO DENVER**—Bids were called on completion of the last unit in a 4-lane highway from Brighton to Denver by the state highway department. The project involves 8 mi. of asphalt and concrete surfacing on two 2-lane strips of U. S. 85. Estimated construction cost is \$336,670.

**MILE HIGH SKYSCRAPER**—The steel framework on the 23-story Mile High Center in downtown Denver is now at the 16th floor level. Concrete pouring is under way on the third and fourth floors and installation of the glass and aluminum facing of the building was scheduled to begin by the end of January, according to Henry C. Sexton, construction superintendent for George A. Fuller Co., co-developer of the project with Webb & Knapp, Inc.

**LUXURY HOTEL**—A special zoning ordinance has been requested from the Denver City Council to allow construction of a 15-story luxury

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## FIELD NOTES on the BEST DIAPHRAGM PUMP EVER BUILT!

With mud, sludge and water seeping into a 28 foot pit for an industrial sewer installation, W. W. Purdy Construction Company of Mansfield, Ohio put this Gorman-Rupp 3" diaphragm pump 3D-8R6, on this job at the Empire Steel Corporation factory at Mansfield.

A junction of several six-foot storm sewer tiles was necessary. Rapidly rising water in the 12 x 22 foot pit flooded out workmen and 18 inches of mud and slime accumulated in the pit. The Gorman-Rupp diaphragm pump cleaned out the pit and had the workmen back on the job in 30 minutes.

This job involved an 18 foot suction lift, 8 foot discharge elevation and about 35 feet of horizontal 3" hose discharge line into an open manhole. No attention was necessary except fuel supply and starting or stopping when required. The unit is self-priming. It was necessary to operate the unit several minutes every hour.

**THE GORMAN-RUPP COMPANY**  
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apartment hotel at a cost of \$2,250,000. If granted, the grounds will cover 11 ac. in the midst of a 56-ac. tract, which will afford residents of the building privacy in the middle of a semi-wooded park. Plans also call for a 200-car garage near the building.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Colorado include a low bid of \$124,225 submitted by Domenic Leone Construction Co., Inc. of Trinidad for 10 mi. of stabilization and surfacing in Otero County. The same company received a \$519,075 contract for 4.1 mi. of grading and concrete paving in El Paso County. Platt Rogers, Inc. of Denver received a \$154,555 contract award for building a viaduct in Pueblo.

## IDAHO

**IDAHO'S HIGHWAY DEPARTMENT**, in its second annual report, said that state expenditures on highways will probably have to be doubled or tripled if a modern system of safe and adequate highways is to be built in 10 years. The report said that the sum of \$11,458,470 had been spent on construction during the fiscal year ending June 30. It added that the department plans a more extensive program in 1954 and is working on an expanded 10-year program of highway needs to replace the old system of operating on a year-to-year basis. Major projects which are being considered by the board include plans for a four-lane super highway between Pocatello and Idaho Falls, still only in the discussion stage, and widening of a thoroughfare in Twin Falls

to relieve traffic congestion. Meanwhile, Earle V. Miller, state highway engineer, has asked county and highway district commissioners to supply information in order to complete a highway needs survey of the state. Miller said that the purpose of this study would be to develop a sound appraisal of highway transport needs on all rural roads and city streets in Idaho and to make a realistic estimate of the costs of bringing them up to adequate standards.

**MULTIPLE-PURPOSE PROJECTS** at Bruce Eddy site on the north fork and at Penny Cliffs on the middle fork of the Clearwater River meet the requirements for flood control and other water uses of the main control plan for the Columbia River Basin, according to the Corps of Engineers as stated in the Middle Snake River Review Report. Construction of these two projects would produce major local and regional flood control benefits, aid navigation, and add 4,690,000,000 kw-hr of energy to the Pacific Northwest power supply. Bruce Eddy would consist of a dam 570 ft. high creating a reservoir of 1,433,000 acre-feet. Installed power capacity would be 240,000 kw. Total cost of the project is estimated at \$117,500,000. Penny Cliffs would have a dam 590 ft. high which would store 2,300,000 acre-feet and would have an installed capacity of 292,000 kw. Its estimated cost is \$191,700,000.

Meanwhile, the proposed cooperation of private power companies in the Pacific Northwest to plan for joint development of dam sites (*Western Construction*—February 1954, p. 84) got into high gear when The Montana Power Co., Pacific Power &

Light Co., Portland General Electric Co., Mountain States Power Co., and Washington Water Power Co. filed a joint application with the Federal Power Commission for a preliminary permit to investigate the power potentials of the two sites. Opposition to the project stemmed mainly from sportsmen's groups, spearheaded by the Idaho Wild Life Federation, which claimed that the developments would make wild life resources "a dead loss."

**MAJOR CONSTRUCTION ITEM** planned for 1954 under the Canyon County road program is replacement of a 40-yr.-old wooden bridge by a prefabricated concrete structure, at an estimated cost of \$56,000, according to Glen Gaylord, county road supervisor.

**LUCKY PEAK DAM**—Completion of the 1,700-ft. long Lucky Peak Dam embankment with the placing of the last of more than 6,000,000 cu. yd. of material has been announced by the Corps of Engineers. Outlet structures and surface bridges to the dam, which is near Boise on the Boise River, remained to be built.

**ROAD RELOCATION** program at Palisades Dam has been trimmed by the Bureau of Reclamation because of a reduced figure for the project in the federal budget being prepared for the next fiscal year. The sum was cut from \$14,000,000 to \$12,200,000. The delay will not affect the date when water storage is started at Palisades, however, according to Harold T. Nelson, regional director of the bureau.

**AID TO IDAHO?**—The Atomic Energy Commission will release \$820,000 worth of impounded funds to help improve U. S. 26 in eastern Idaho, according to Senator Henry Dworshak. J. W. Williams, deputy general manager of the AEC, admitted that the road had deteriorated as a result of heavy traffic to the AEC national reactor testing station.

**TWO DAMS FOR ONE?**—The Bureau of Reclamation is considering substituting a 160-ft. dam at Mountain Sheep and a 480-ft. dam at Pleasant Valley, upstream, in place of the originally proposed 665-ft. dam at Mountain Sheep because the new proposal would be more economical, according to Harold T. Nelson, regional director of the Bureau.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Idaho include award of a \$620,465 contract to Frank Baune of Yardley for 6.7 mi. of grading and surfacing in Idaho County. Completion date is September 15, 1954. Carl E. Nelson of Logan received a \$468,060 contract award for 7.3 mi. of grading and surfacing in Twin Falls County. Completion date is September 15, 1954.

### LUCKY PEAK DAM IS ALMOST FINISHED

Lucky Peak Dam, 10 mi. east of Boise on the Boise River, is almost finished, according to the Corps of Engineers. Only outlet structures and approach bridges remain to be built.



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absorb the extra vertical loads into the main frame permitting all auxiliary equipment to be attached to the frame and leaving the tracks free to oscillate on uneven ground.

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no clutches, brakes or gadgets in the Eimco 105 final drives.

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# MONTANA

**PROSPECTS FOR CONSTRUCTION** of Libby Dam on the Kootenai River are "brighter than ever before," according to Rep. Metcalf. This was borne out by a report from the U. S. Forest Service, which added its approval to the recommendation of the Corps of Engineers (*Western Construction*—February 1954, p. 80) for construction of the \$263,321,000 project.

**ABOUT** 125 mi. of the 537-mi. Yellowstone Pipeline from the Billings area to Spokane, Wash., have been finished, according to the Continental Oil Co. Potential capacity of the \$20,-500,000 line, which is scheduled for completion in September 1954, is 25,-000 bbl. a day.

**BIDS WILL BE CALLED** in early April on \$1,500,000 worth of construction for the Montana National Guard unit at Gore Field near Great Falls, according to Col. N. A. Matthias, Corps of Engineers district engineer.

**HELENA IMPROVEMENT**—Proposed improvements of Helena's business-district streets, at an estimated \$509,000, is expected to be voted upon by property owners some time this spring. The work involves removal of street car tracks, paving and construction of curbs, and extensive re-

vision and re-installation of utilities connections serving business properties.

**ANACONDA ALUMINUM CO.** is building a \$60,000,000, two-pot aluminum reduction mill at Columbia Falls. It is expected that about 1,200 men will be employed at the peak of construction next summer.

**LONG-RANGE PLANS** for highway construction in the state have been announced by Scott P. Hart, state highway engineer, who revealed the details of a 4-yr., \$64,000,000 program. Among projects planned for construction during 1954 are the Blackfoot Canyon section of the Rogers Pass highway west of Lincoln, relocation of Highway 19 in central Montana, reconstruction of the Broadus-Alzada section of Highway 212, and many other projects involving new construction and permanent surfacing on gravel-surfaced roadway. The sum of \$12,000,000, including federal aid, is planned for new primary and urban highway construction and improvement work, \$6,370,950 for maintenance work, and \$71,000 for engineering, office, and laboratory equipment in 1954.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Montana include award of a \$141,345 contract to Billings Construction Co. of Billings for 8 mi. of grading and surfac-

ing in Yellowstone County. Completion date is September 30, 1954. F. L. Flynn & Co. of Billings was awarded a \$149,940 contract for a 385-ft. steel and concrete overpass in Broadwater County. Completion date is June 30, 1955. Hilde Construction Co., Inc. of Great Falls received a \$133,200 contract for 6.7 mi. of grading and surfacing in Blaine County. Completion date is September 15, 1954. W. R. Roscoe of Billings was awarded a \$375,750 contract for a 690-ft. bridge across the Missouri River in Broadwater County. Completion date is November 30, 1955. Taggart Construction Co. of Cody, Wyo., received a \$329,260 contract for 8.6 mi. of grading, surfacing, and oiling in Gallatin County. Completion date is September 15, 1954. Thayne Construction Co. of Salt Lake City, Utah, submitted a \$4,088,355 low bid for substructure construction of an earthfill dam near Wolf Point. If it receives the award, Thayne will have 1,100 days to do the job. Union Construction Co., Inc. of Missoula was awarded a \$112,415 contract for 2 mi. of grading, surfacing, and oiling in Ravalli County. Completion date is September 15, 1954.

# NEVADA

**HOOVER DAM THREAT**—A 20-ft. thick slab of rock, 115 ft. wide and 180 ft. high, which threatens the Hoover Dam valve house is being anchored securely to the canyon wall by means of 350 steel bars 2 in. wide and up to 33 ft. in length which are being grouted into drill holes. As an additional precaution the slab is being concreted to the canyon wall. Selby Drilling Co. of Boise; a subsidiary of Morrison-Knudsen Co., Inc., is doing the job. The anchoring was necessary because of earth tremors in the area which might have shaken the slab loose, according to Bureau of Reclamation authorities.

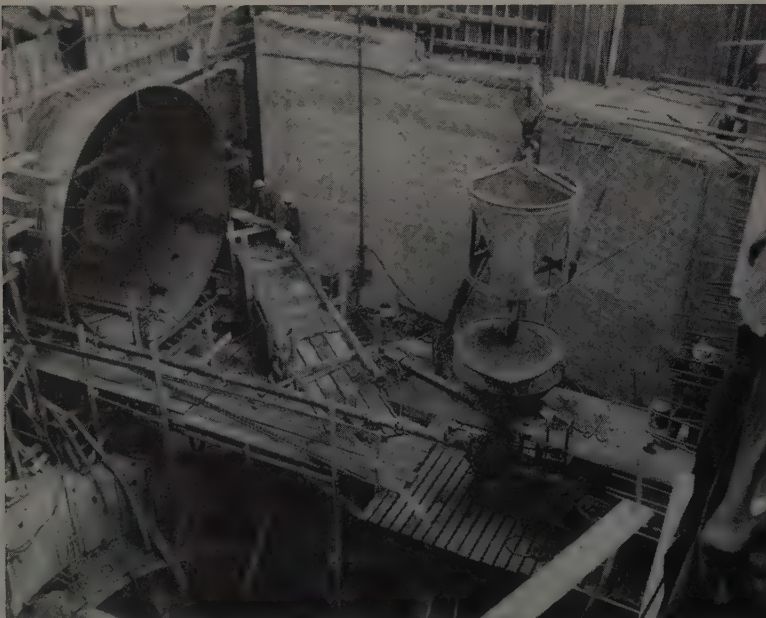
**SPARKS SEWER**—Construction on a new sewage plant and sewer lines in Sparks was authorized when the city received a \$420,000 loan for the project. G. E. Schilling of Reno is contractor on the job.

**LAS VEGAS VALLEY** water district is asking the State Legislature to validate an \$8,700,000 bond issue in order to carry on necessary construction.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Nevada include a \$322,215 contract awarded to Hoops Construction Co. of Twin Falls, Idaho, for 15 mi. of grading and surfacing in Eureka County. Silver State Construction Co., Inc. of Fallon received a \$720,250 contract award for 10 mi. of grading and surfacing in Churchill County.

## PUMPCRETE SEALS PENSTOCK LINER IN PLACE AT KERR DAM

Concrete is being pumped around the 800-ft.-long penstock liner at Kerr Dam of The Montana Power Co. on the Flathead River in western Montana in preparation for installation of a third 56,000-kw. generator, to bring the plant's installed capacity up to 168,000 kw. The dam is a concrete arch structure with a reservoir of 1,217,000 acre-feet and a net head at full load of 189½ ft. Completion is scheduled for the fall of 1954.



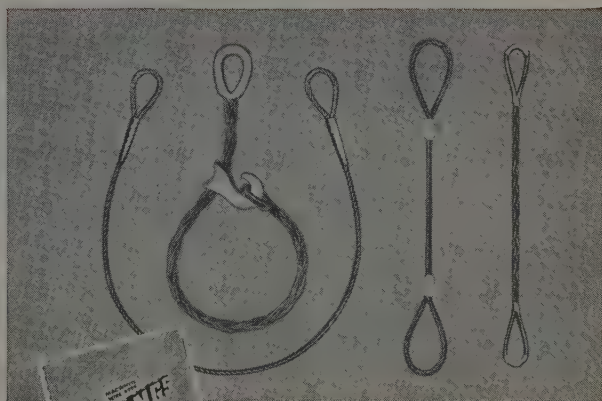
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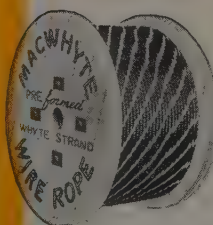
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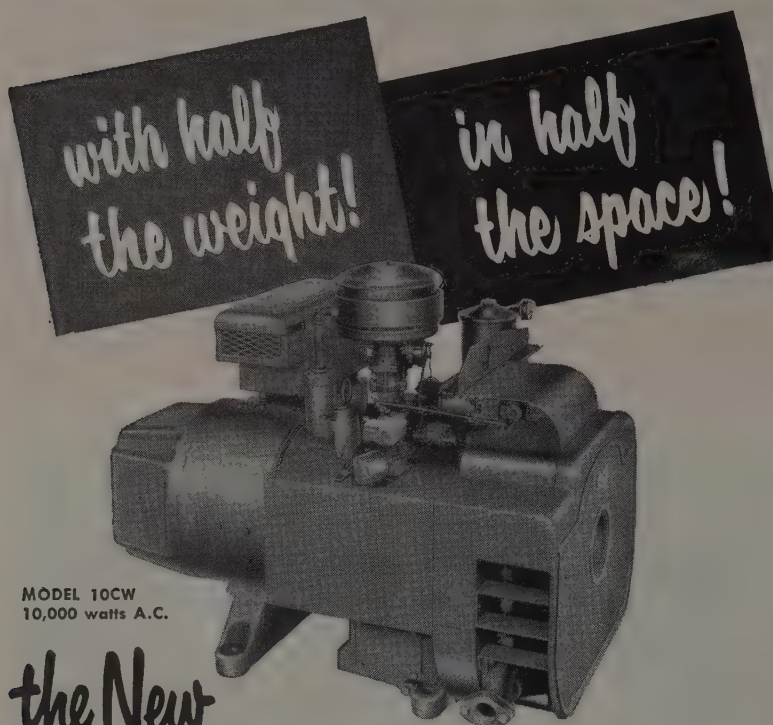
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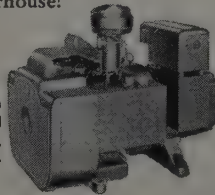
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## NEW MEXICO

ONE OF THE LARGEST continuous concrete pours ever to take place in New Mexico occurred when 355 cu. yd. were poured for almost nine straight hours on the foundation of the third unit of the Person Station, main power plant for the Public Service Co. in Albuquerque. A total of 71 truckloads of ready-mixed concrete were poured for the foundation structure, which is 49 ft. long, 27 ft. wide, and 24 ft. high. The generator to be installed in this third unit will have a maximum capacity of 40,000 kw., the largest in the state. Contractor on the job is the Stearns-Roger engineering and construction firm of Denver. W. W. Winder is project superintendent, and Leonard Gemmill supervised the concrete pour. Howard Person, whom the station is named after, and Max J. Niese are supervising construction for the Public Service Co.

**CONTRACTS FOR CONSTRUCTION** of Duranes and Lomas reservoirs in Albuquerque have been awarded to the Foster Construction Co. of Santa Fe which submitted a low bid of \$325,130. Completion date of the project has been set at June 1.

**POWER LINE**—Construction of a 115,000-volt power line from Santa Fe to Las Vegas is more than three-quarters finished, according to Public Service Co. officials. The hardest part of the job, that of blasting out holes for the setting of poles in the rocky Pecos country, is finished and wire stringing on the 57-mi. long line is almost 60% complete.

**FLASH FLOOD** control in Albuquerque, as proposed by the Corps of Engineers, has been approved by the Board of Engineers for Rivers and Harbors. The project will involve spending \$10,265,000 for construction of two large drainage ditches to divert flood waters away from the lowland areas and dump them into the Rio Grande. Some \$7,000,000 of this sum would be furnished by the federal government, but first Congress must authorize and appropriate it. Each canal will be designed to carry 50,000 cfs. In addition, the Sandia Conservancy District, the sponsoring agent, would have to spend some \$7,000,000 to \$15,000,000 more to build other ditches and storm sewers needed to carry flood waters safely through to the drainage ditches.

**WATER FORECAST**—Hope for improvement of the water storage situation in 1954 was seen in a joint report and forecast issued by the U. S. Weather Bureau and Soil Conservation Service. Although the amount of snow on the upper Rio Grande watershed indicates that water storage is below normal, the report says

the outlook may change substantially before the end of the snow season. Water storage in Caballo reservoir was 14,000 acre-feet and in Elephant Butte it was 111,000 acre-feet, making a combined total of 125,000 acre-feet in the two reservoirs, more than was measured at the same time in 1952.

**A YEAR'S STUDY** to determine how much various types of vehicles use New Mexico roads has been started by the State Highway Department. One of the main purposes is to figure how much mileage tax should be charged to interstate trucks. H. S. Wiley, highway planning director, said, "It has been authoritatively established that on a weight-distance basis, heavy vehicles are greatly under-assessed by motor fuel taxes alone." Highway officials said that interviews and other methods will be used to try to find out how much mileage is run up in New Mexico by various categories of vehicles.

**RECENT MAJOR CONTRACT AWARDS** and low bids in New Mexico include an award of \$526,485 to Brown Contracting Co. of Albuquerque for 11 mi. of grading and paving in Dona Ana County. P. R. Burn of Las Cruces submitted a low bid of \$203,410 for water supply and storage at White Sands Proving Grounds. Roy Dugger Co. of Corpus Christi, Tex., submitted a low bid of \$134,675 for rehabilitation of 38 mi. of drains between Isleta and Belen. Foster Construction Co. of Santa Fe received a \$325,125 contract for two prestressed concrete reservoirs in Albuquerque. Completion date is 240 days from January 21. Floyd Haake of Santa Fe received a \$141,150 award for 10 mi. of asphalt surfacing in Eddy and Chaves counties. Joseph C. Hastings of Albuquerque submitted a low bid of \$98,040 for earthwork, structures, and drains on the Tucumcari Project.

Other New Mexico contract news includes a low bid of \$1,055,985 submitted by Lembke-Clough & King Construction Co., Inc. of Albuquerque for construction of North Valley High School in Albuquerque. Lowdermilk Bros. of Espanola was awarded a \$147,180 contract for 2.8 mi. of access road at Los Alamos AEC works. Ottinger Construction Co. of Ft. Worth, Tex., submitted a low bid of \$206,755 for a tieback levee on the Middle Rio Grande Project. Henry Thygesen & Co. of Albuquerque was awarded a \$309,035 contract for 21 mi. of rolling and asphalt surfacing in Lea County. Harry Trotz of Lovington received a \$125,335 award for 23 mi. of rolling and seal coating in Roosevelt County. The same firm received a \$113,745 award for 55 mi. of rolling and seal coating in Santa Fe, Torrance, and San Miguel counties. Vega Engineering & Grading Co. of Berkeley, Calif., was low bidder at \$187,800 for earthwork, clearing, and



### THREE-IN-ONE SAVES THREE TIMES AS MUCH TIME

A method of rebuilding three blocks of street surface in the same time formerly required for one block has been devised by W. E. Martin, street superintendent of Hanford, Calif. He got together with Davies Machinery Co. and Reclamation Machinery Co. representatives and adapted a Reclamation Root Knife with Scarifier so it would fit a Caterpillar D7 tractor, which could pull a Hyster Grid Roller at the same time. The four ripper shanks (shown above) penetrate 12 in. in breaking up the surface and the grid roller, right behind, breaks the chunks into fragments. Further passes pulverize the material, then standard equipment completes the rebuilding process.

structures on the Middle Rio Grande Project.

## OREGON

**COOS BAY BRIDGE**—Coos County is seeking a new bridge across Isthmus slough near Coos Bay. A new bridge, estimated to cost \$185,000, would eliminate a dangerous curve and would aid navigation, county officials said. The present bridge, which has been described as "beyond repairing," is safe for light traffic only.

**PORTLAND PROJECT**—Tentative plans for Portland's most ambitious highway project call for spending \$31,700,000 for construction of the Foothills Route and Fremont Bridge combination. Construction of this structure is not foreseen in the near future, but traffic engineers feel that some such plan will be necessary before the Portland-Salem expressway through the city is complete.

**DEXTER DAM**—Dexter re-regulating dam and reservoir, 3 mi. downstream from Lookout Point Dam on the Willamette River, is about 50% complete, according to the Corps of Engineers. Some \$4,600,000 has already been spent on the concrete and earthfill dam and another \$6,000,000, including the cost of power equipment, remains to be spent. Construction schedule calls for "power on the line" from the power plant, which will have an installed capacity of 15,000 kw., by April 1954. The dam itself is

scheduled to be complete by September. Prime contractors on the job are a joint venture composed of McNutt Brothers of Eugene and C. E. Montag & Sons of Portland, who got the job for \$4,945,500.

**DEEPENING** of the ship passage at the mouth of the Columbia River is being sought by Senator Cordon, who asked Congress to approve a project to provide a channel 48 ft. deep and at least ½ mi. wide at a cost of \$8,555,000. The project, which has been recommended for approval by the Corps of Engineers, would include construction of a spur jetty costing \$5,657,000 and a dredging cost of \$2,898,000.

**PORTLAND GENERAL ELECTRIC CO.** expects to match or better its 1953 new construction expenditures of \$8,500,000 during 1954, according to James H. Polhemus, president of the company.

**PACIFIC Power & Light Co.** plans to spend some \$6,000,000 during 1954 on new construction, according to company officials. About \$4,800,000 will go for distribution lines and facilities, \$880,000 for work in Portland, \$100,000 for additional substations, \$120,000 for underground service in the business area of Portland, and \$250,000 for major relighting in Bend, Prineville, The Dalles, and Hood River.

**OPERATION FIR TREE**—About 120 mi. of forest roads have been built to date in the \$10,000,000 program to reforest Oregon's Tillamook Burn.



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The job started in 1948, when the people of Oregon voted to authorize bonds to pay for a 15-yr. rehabilitation program. Since July 1949, when the operation actually started, one-third of the program to restore more than 350,000 ac. of burned timber has been completed, it is reported. Other progress to date includes more than 50 mi. of snag-free fire breaks finished, several additional lookout towers established, and the following reforestation work accomplished: 150,000 ac. of pre-planting survey, 30,000 ac. naturally reseeded, 36,000 ac. aerially reseeded, and 15,000 ac. hand planted with more than 13,000,000 seedlings.

**HOW TO INCREASE** water supplies for West Linn and Oregon City is being studied by the Portland engineering firm of Stevens & Thompson. Two alternative plans are being considered. The first, that of adding a 30-in. pipeline to the present water source on the south fork of the Clackamas River costs \$2,542,000 and would carry a maximum of 7,000,000 gal. a day. Another plan, which would bring in 5,000,000 gal. a day, involves the construction of a pumping-filtering plant at a cost of \$915,000. To bring the output up to 10,000,000 gal. a day, construction cost of the plant would be \$1,077,200. Operation costs would be high for the pumping-filtering plant project but small for the pipeline. The South Fork Water Board is considering the advantages of both plans before presenting the problem of how to finance either to the voters.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Oregon include a low bid of \$107,165 submitted by Babler Bros., Inc. of Portland for twin 192-ft., reinforced concrete railroad overcrossings in Marion County. Calkins Crushing Co. of Ocean Lake was awarded a \$160,220 contract for 2 mi. of grading and paving and some stockpiling in Lincoln County. Donald M. Drake Co. of Portland submitted a low bid of \$233,815 for a 463-ft. bridge over Tualatin River in Washington County. Louis Elterich Co. of Port Angeles was awarded a \$152,550 contract for a railroad bridge at 15-Mile Creek near The Dalles Dam site. Completion date is 300 days from January 18. Vernie Jarl of Gresham received a \$184,700 contract for dredging and dike construction near Troutdale. Kuckenberg Construction Co. of Portland was awarded a \$244,700 contract for a cross dike at Troutdale. Morrison-Knudsen Co., Inc. of Boise, Idaho, was awarded a \$777,100 contract for 3 mi. of track location at The Dalles Dam site.

Other Oregon contract news includes a low bid of \$779,520 submitted by Fred H. Slate Co., Oregon Ltd., and E. C. Hall Co. of Portland for 4.8 mi. of grading and paving and

some stockpiling in Curry County. Jed Wilson of Seaside was awarded a \$112,730 contract for 2 mi. of paving and some stockpiling in Clatsop County.

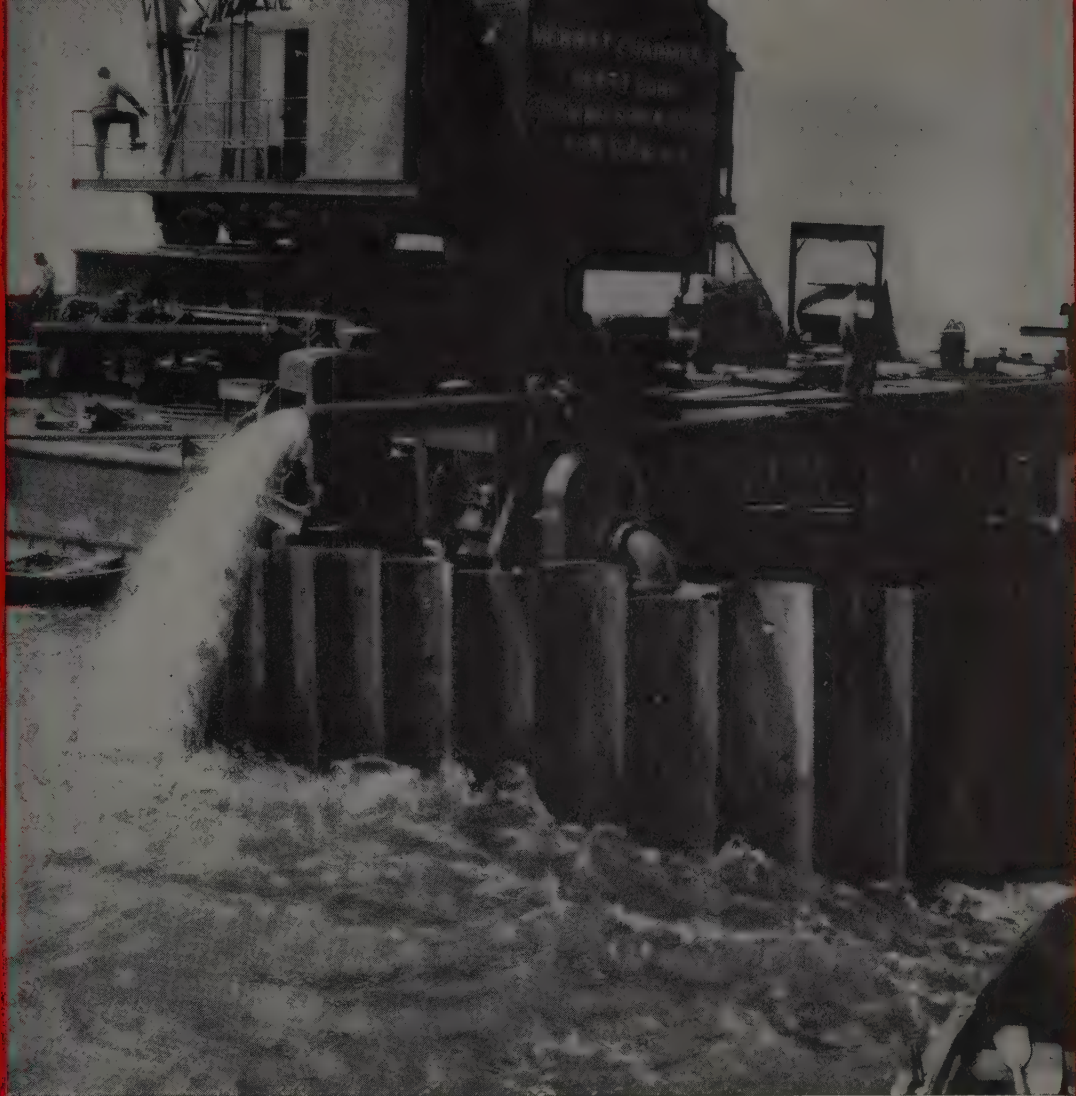
## UTAH

**WATER SUPPLY** of Salt Lake City is endangered because the major conduits cross earthquake fault lines, according to Ray E. Marsell, professor of geology at the University of Utah. All major aqueducts, with the exception of the Parley's Canyon line which is north of the point where the Wasatch fault ends, cross the zone on which major earthquakes might occur at some time, he said, pointing out that Utah is in a "live seismic zone," as proved by the fact that there has been at least one earthquake a year in Utah, on the average, since the state was settled, although none have been highly destructive.

**REAL ESTATE MEN** and property owners in Salt Lake City should make their building and zoning plans so as not to conflict with the proposed \$26,000,000 expressway, even though it may be years before the project is built, D. H. Whittenburg, State Road Commission Chairman, said recently. He pointed out that although the project would do much to relieve the city's traffic ills, necessary funds are lacking. He said that the congestion may become so critical that the people will demand the project be built. Meanwhile, he said, real estate board members can assist by advising against new construction along the proposed expressway's route.

**ENGINEERING WORK** on a proposed highway across the mouth of Parley's Canyon has been started, according to State Road Commission officials who met with Salt Lake City and county officials to discuss planning of highways in the vicinity of the city. Engineers said it might be necessary to make a fill from 30 to 50 ft. deep in the bottom of the canyon and to provide an underpass through which the railroad tracks and Parley's Creek might pass. The proposed road would be integrated with the proposed east-west expressway through Salt Lake City. Construction of the road might start during 1955.

**STRETCHING DOLLARS** — Construction funds for Utah's road projects have been stretched by 11%, according to a study of project bids for the first half of the fiscal year. The study revealed that on 30 jobs bid since July 1, the low bids have run nearly \$525,000 less than the engineering estimates on which the state highway commission figures its funds. The savings are due to increased competition among contractors, marked by the great increase in the number of



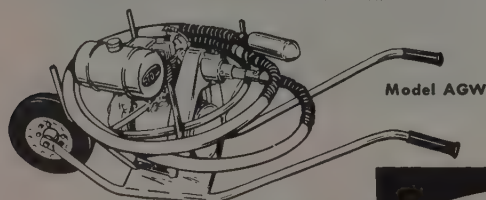
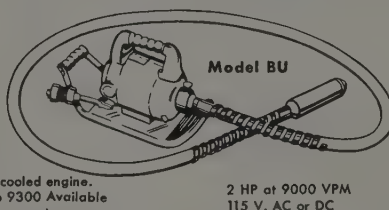
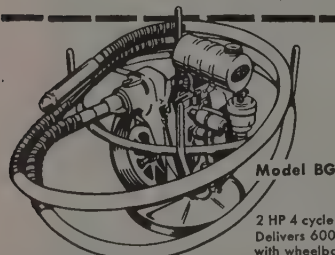
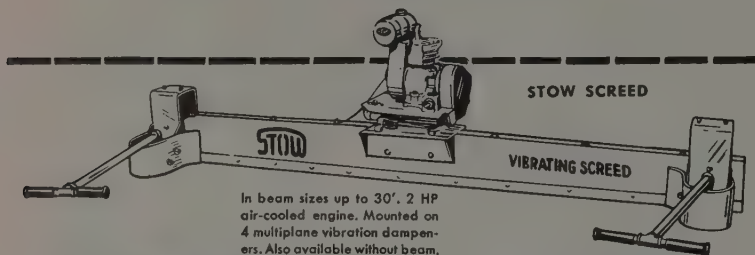
**PIERS FOR THE THREE MILE BRIDGE** over the Hudson River on the New York State Thruway between Nyack and Tarrytown created no problem for Merritt-Chapman & Scott Corporation of New York City. Of a total of 23 piers, 15 were built with cofferdams, two for each pier. Dependable, 8" AGC rated Marlow Self-Priming Centrifugal Contractor's Pumps were used on the job to dewater the cofferdams quickly and handle seepage water efficiently.

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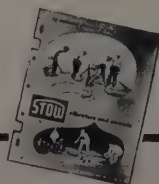


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bidders, a sure sign of increasing competition and decreasing cost. The state's "paper savings" are about to decrease, however, according to D. H. Whittenburg, State Road Commission chairman, who explained that the engineers who prepare the estimates will scale down their future estimates in accordance with the established cost decline.

**EXPLORATORY ENGINEERING** is being carried out by Boyle Brothers Drilling Co. of Salt Lake City to determine the feasibility of increasing the storage capacity of Mt. Dell Reservoir, one of the main links in Salt Lake City's municipal water system, in order to aid flood control for the city, according to Grant N. Burbidge, city commissioner in charge of the water department.

**WANSHIP DAM**—Wanship Dam on the Weber River, a key part of the Weber Basin Project east of Salt Lake City, will be put out to bid soon, according to the U. S. Bureau of Reclamation. The dam will be an earthfill structure 156 ft. high, 2,000 ft. long, and requiring an estimated 4,000,000 cu. yd. of excavation. Other materials involved include an estimated 3,100,000 cu. yd. of earth-fill and dam embankment, 8,000 cu. yd. of reinforced concrete, and 71,000 cu. yd. of riprap.

## WASHINGTON

**SNOW REMOVAL** on the 6,600 mi. of the state highway system cost more than \$250,000 during a two-week period in late January. Slides in Stevens Pass and near Rimrock Dam in White Pass blocked roads for several days. About 40,000 cu. yd. of sand and rock salt mix were used to clear the roads.

**ADDING A FIFTH LANE** to Lake Washington Floating Bridge by using the space now occupied by a sidewalk would alleviate traffic jams on the bridge, D. L. Evans, King County highway engineer has suggested. He recommended restoring toll charges during summer, when tourist traffic is heaviest, to finance the alteration job, which will take an estimated \$500,000.

**YALE DAM POWER**—Power generation at a rate almost 25% greater than the nameplate rating of the two generators at Yale Dam on the Lewis River has resulted from a full reservoir, according to Paul B. McKee, president of Pacific Power & Light Co., which owns the dam.

**EAGLE GORGE DAM**—The sum of \$170,000 in planning funds for Eagle Gorge Dam on the Green River is included in President Eisenhower's latest budget as submitted to Congress, according to Congressman

Thor C. Tollefson. Congress will be asked to make an appropriation for construction of the dam, which is needed to control floods in the Green and Duwamish river valleys. The state and King County have already pledged \$2,000,000 for the construction if the federal government will furnish the rest of the funds.

**FLOOD CONTROL** and power production projects on the Chewawa and Wenatchee rivers have been proposed by the Chelan County Public Utility District, which has applied to the Federal Power Commission for preliminary licenses for the project. Proposed construction would include a low dam at Lake Wenatchee, a dam and reservoir on the Chewawa River, a small generating plant at the Chewawa Dam, an equalizing reservoir on the Wenatchee River above Tumwater canyon, a tunnel from the equalizing reservoir through the mountains to Chumstick, and a generating plant with a capacity of 135,000 kw. on the Chumstick River.

**COLLAPSING COFFERDAM**—Collapse of a cofferdam being used in the construction of the Chehalis River highway bridge near Aberdeen caused a setback of several weeks in construction plans on the \$5,000,000 span being built by MacRae Bros. of Seattle. (*Western Construction*—September 1953, pp. 72-73.) Other work on the project was forecast by the news that bids on the approaches to the bridge will probably be called in April.

**OKANOGAN RESERVOIR**—Plans for a 400,000-gal. water reservoir near Okanogan are being prepared by W. L. Malony, Spokane engineer. Bids on the project, expected to cost around \$700,000, are scheduled for call sometime this spring.

**PRIEST RAPIDS**—The Corps of Engineers has withdrawn its objection to construction of Priest Rapids Dam on the Columbia River by Washington State public utility districts. Approval was given when design engineers agreed to incorporate certain changes suggested by the engineers. These changes require that the structure be built to develop all possible power, authorize the engineers to acquire needed lands for the project, and give them authority to regulate release of water for flood control and navigation.

**YAKIMA BRIDGE**—Completion of the Mabton-Sunnyside bridge over the Yakima River is expected this spring, according to Harold R. Sweet, Yakima County engineer. Original completion date was December 1953, but it was found that support pilings would have to go down almost 90 ft. instead of the 30 to 32 ft. specified in the original contract. Also, ice floes in the river crushed against the

bridge's three concrete piers and wooden falsework, endangering the whole project. Clifton & Applegate Construction Co. of Spokane holds the \$206,000 contract. Ralph Clapp is project superintendent.

**A NEW RECORD** for highway construction expenditures during 1954 was predicted by William A. Bugge, Director of Highways, who said that new construction contracts are expected to reach \$50,000,000, some \$6,000,000 more than the sum spent in 1953. He pointed out an encouraging trend in highway construction in that costs seemed to have leveled off from the high peak in late 1952 to about double what they were in 1940. This would seem to indicate that no further increases in the overall highway price level can be expected.

**NAVAL CONSTRUCTION**—Construction of a sixth drydock at the Puget Sound Naval Shipyard for about \$20,000,000 is included in a list of proposed projects being sought by Rear Admiral Homer N. Wallin, shipyard commander. Also on the list are a \$6,000,000 electronics shop, a proposed engineering-administration building, and improvements to present shop buildings. The yard has already received authorization for a \$1,066,000 rim widening of Drydock No. 5 in order to accommodate 40,000-ton, Midway-class carriers.

**SKAGIT PROJECT**—The Seattle City Council has appropriated \$23,000,000 from the City Light surplus

fund to build another generator and turbine at Ross Dam, a 300-ft. high gorge dam, and a highway between Diablo and Newhalem.

**CHIEF JOSEPH DAM**—A former state official is urging that the Okanogan, Douglas, and Chelan public utility districts should attempt to purchase Chief Joseph Dam from the federal government, pointing out that it would be cheaper for the three districts to combine and buy the dam from the government rather than carry out their own plans to build low-level power dams separately.

**WASHINGTON WATER POWER CO.** has budgeted \$4,053,600 for new construction in eastern Washington and northern Idaho during 1954, according to J. E. E. Royer, vice president and general manager of the firm. Projects will include building transmission and service lines, substations, and regulator stations.

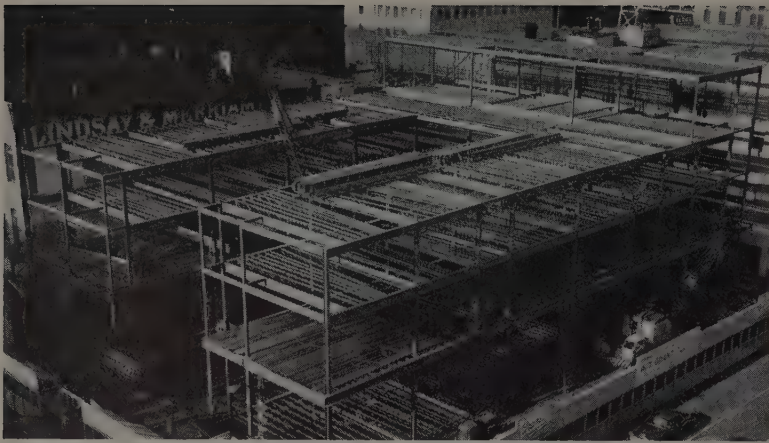
**CONSTRUCTION** of the \$1,000,000 Ballard Shopping Center in Seattle is expected to get under way soon. The structure will be a reinforced concrete building with a steel frame and masonry-filled wall. It will have 50,000 sq. ft. of floor space plus 15,000 sq. ft. in the basement.

**RECENT MAJOR CONTRACT AWARDS** and low bids in Washington include an award of \$100,125 to John E. Alexander of Seattle for an overcrossing in King County. Completion date is 240 days from Febru-

#### NO SLIP UPS AS THIS GRAIN ELEVATOR SLIPS UP

Rising at the rate of 6 in. an hr., this grain elevator is being constructed by the slip-form method by Henry George & Sons of Spokane at Almira, Wash. The jacking rods, which support and guide the forms, stick up in the air. A pair of elevators requires 1,200 cu. yd. of concrete and 60 men to raise to a 120-ft. level.





#### STEEL ERECTION IN CLOSE QUARTERS

Nearly 500 tons of structural steel make up the framework of this W. T. Grant Co. store going up in Spokane, Wash. Completion date for the building is in the fall of 1954. Walter G. Meyers and Sons of Spokane is the contractor. Steel fabrication and erection is being handled by Bethlehem Pacific Coast Steel Corp.

ary 2. Associated Sand & Gravel Co. of Everett was awarded a \$102,945 contract for 3 mi. of grading and surfacing in Snohomish County. Completion date is around May 1, 1954. J. C. Boespflug Construction Co. of Seattle was awarded a \$1,709,750 contract for a gypsum plant and plaster mill in Seattle. Columbia Asphalt Paving Co. of Yakima submitted a low bid of \$419,500 for roads in the Hanford area.

More Washington contract news includes a \$293,250 low bid submitted by Erwen Construction Co. of Pasco for two railroad undercrossing siphons near Prosser. Completion date is 300 days from January 6. N. Fiorito Co. of Seattle received a \$877,430 award for 2 mi. of freeway grading and paving in Clark County. Completion date is 300 days from January 12. K. T. Henderson of Longview was awarded a \$226,025 contract to build a sewage treatment plant at Longview. Joe Lundberg Construction Co. of Seattle was awarded a \$170,345 contract for an 800,000-gal. sewage treatment plant at Camas. Macdonald Building Co. of Tacoma was awarded a \$1,773,900 contract to build a state office building at Olympia.

Other Washington contract news concerns a \$149,530 contract award to C. E. Oneal Co., Inc. of Ellensburg for 4½ mi. of grading and surfacing in Okanogan County. Completion date is about June 15, 1954. Osberg Construction Co. of Seattle was awarded a \$207,000 contract for 6 mi. of slope stabilization in Lewis County. Ostruske-Murphy Co., Inc. of Tacoma submitted a low bid of \$239,000 for a water treatment plant at Kent. Pokor Construction Co. of Chehalis was awarded a \$162,895 contract for an undercrossing and approaches in Lewis County. Completion date is 210

days from January 12. Scheumann & Johnson of Seattle submitted a low bid of \$189,660 for a fishway and tunnel at Granite Falls on the South Fork of Stillaguamish River. Valley Construction Co. of Seattle was awarded a \$223,910 contract for a 5,000,000-gal. reservoir and pipeline at Pasco.

## WYOMING

**HIGHWAY EXPENDITURES** and truck and automobile license fee schedules will be given a thorough study by John L. Simmons, Cheyenne contractor, who has been retained by the state legislature. Main purpose of the study is to determine if the money raised for Wyoming highway construction is sufficient, and if not what steps can be taken to raise more funds.

**PLAINS PIPELINE CO.** is completing construction of an 8-in. line from the Claretton Oil producing area to Mush Creek station. This will increase the company's oil-delivering capacity to 30,000 bbl. daily.

**PINE BLUFFS STEAM PLANT**—Location of a \$10,500,000 steam generating plant at Pine Bluffs to serve rural electrical cooperatives in eastern Wyoming and northern Colorado is almost assured, according to Senator Barrett. The cooperatives have already applied for a loan to finance the project and work will begin as soon as possible. Completion of the plant is expected by December 1956.

**COUNTY ROAD STANDARDS**—A list of minimum standards and specifications for county road construction has been sent to all county com-

missioners by J. R. Bromley, State Highway Engineer. The commissioners have been asked for their opinions and suggestions about the minimum requirements in an effort to improve county roads under the state-county and farm-to-market programs.

**UNOBLIGATED COUNTY ROAD FUNDS** totaled \$948,850 at the start of the year, according to highway department officials. Most of the money will be used to construct state-county and farm-to-market roads.

## Here and There

**COLUMBIA BASIN COMMISSION**—Representatives of the Columbia Basin Commission have gone to Washington to seek restoration of at least \$4,000,000 in federal funds for irrigation of the Basin during 1954. This is in addition to the \$8,600,000 already allocated by the Bureau of the Budget. "This is the minimum amount we consider necessary to keep the project going," said Hubert Walter of Ephrata, Commission executive secretary.

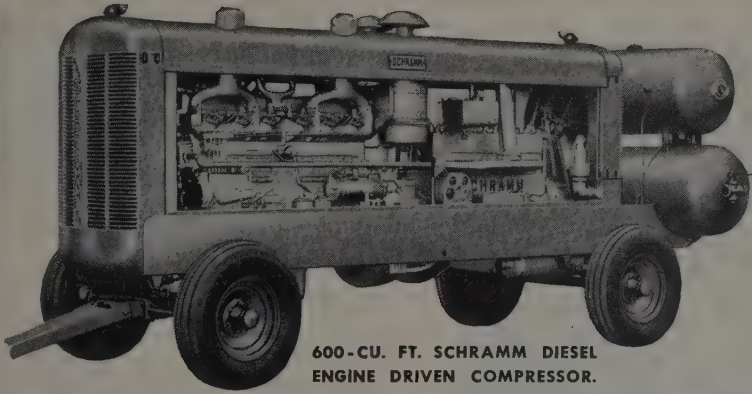
**CORPS OF ENGINEERS BUDGET**—The sum of \$444,322,000 has been requested from Congress for the Corps of Engineers civil works program during fiscal year 1955, in President Eisenhower's budget.

Some 13 new construction starts are included, among them \$1,000,000 for a harbor at Redwood City, Calif., and \$500,000 for the draining of Kawaiui Swamp in Hawaii. Items of interest to Westerners include \$1,040,000 for the Lower Columbia Fish Sanctuary program; \$265,000 for the Humboldt, Calif., harbor and bay; and the following flood control projects: In California, \$1,000,000 for the Cherry Valley Reservoir; \$8,000,000 for the Los Angeles County drainage area; \$320,000 for Merced County stream group; \$3,000,000 for the Sacramento River; \$2,500,000 for San Antonio Reservoir; and \$5,000,000 for Whittier Narrows Reservoir. In Idaho, \$1,750,000 for Lucky Peak Reservoir. In Montana, \$700,000 for Havre. In New Mexico, \$500,000 for Rio Grande Floodway. In Oregon, \$300,000 for Willamette River Basin bank protection. The following sums were appropriated for multiple-purpose projects, including power: In California, \$14,000,000 for Folsom Reservoir. In Idaho, \$4,360,000 for Albeni Falls Reservoir. In Oregon, \$24,000,000 for McNary Lock and Dam, \$4,000,000 for Lookout Point Reservoir, and \$34,100,000 for The Dalles Lock and Dam. And in Washington, \$27,000,000 for Chief Joseph Dam.

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600-CU. FT. SCHRAMM DIESEL  
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for painting steel tank.



2. Model 35-c. f. m. operating demolition  
tool for removing concrete base.



3. Schramm Pneumatractor with Sky-  
Worker solves overhead problems.



4. Model 60-c. f. m. furnishing air for  
paint sprays coating 65 mile of 20" pipe.



5. 105-c. f. m. Pneumapower providing air  
for backfill tampers.



6. 105-c. f. m. Unistage operating riveting  
hammers on steel erection job.



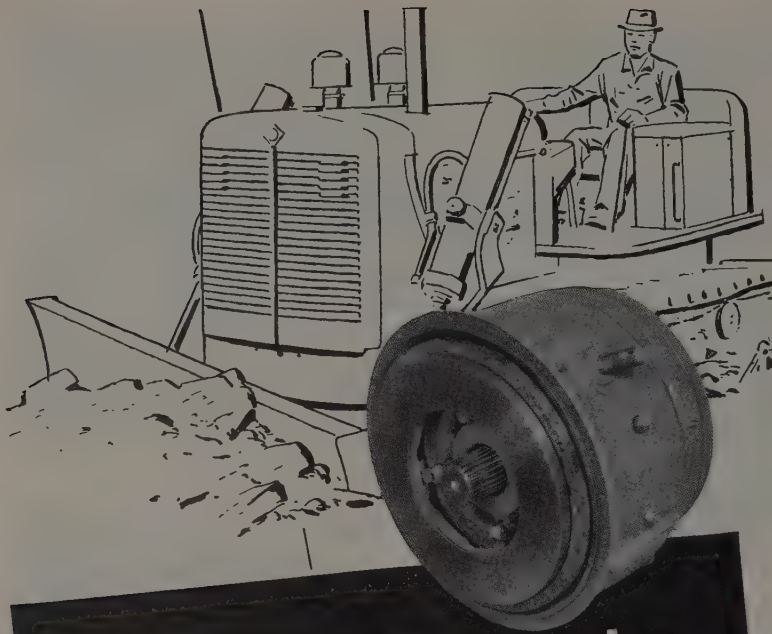
7. 315-c. f. m. operating three heavy duty  
rock excavating tools preparing new  
foundation.



8. 600-c. f. m. diesel engine drive oper-  
ating two WDR-126 Schramm Wagon  
Drills.



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**\* Get these advantages:**

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- Smooth, steady application of power . . . better rotation.
- Engine operates in maximum efficiency range; automatically matches power to load demands.
- Eliminates engine lugging, reduces gear shifting, boosts operator efficiency.
- Absorbs shock loads . . . saves clutches, engine, drive line components, tracks.
- Maximum application of engine power.



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be available until next October, according to Dr. William A. Pearl, Bonneville Power Administrator. "Power reserves now in storage at Grand Coulee and Hungry Horse are sufficient so the federal system can meet all firm commitments plus interruptible loads for the remainder of the present water year even if stream flows decline to a critical level," he said.

**PROJECT ADEQUATE ROADS—**

About one-third of all federal-aid funds authorized for primary roads and almost one-half of those authorized for urban highways have been used for improvement of the national system of interstate highways since World War II, according to the U. S. Bureau of Public Roads. The report said that almost \$900,000,000 in federal-aid funds have been spent on the system in the last 5 yr., but that 76% of that system is still in need of improvement or reconstruction and 16% of these needs are "critical." The report warns that a more rapid rate of construction is needed if the system is to be made adequate within a reasonable period of years.

**A SINGLE FIRST COURSE**

in mechanics is contained in the book, "Statics and Strength of Materials," which covers such subjects as bars under axial displacement, the truss, statically determinate beams, twisting of circular bars, stress at a point, and theories of failure for members subjected to biaxial stresses. The 506-page book, written by Roland H. Trautman, concentrates on principles and their general methods of application. Available for \$7.50 per copy from John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y.

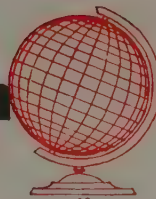
**"SHOWMANSHIP IN SAFETY"**

was published to help sell safety to workers in new and appealing ways. It contains more than 150 ideas for displays, demonstrations, stunts, awards, and other interest-arousing devices. Illustrated with cartoons, it is published by the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill. It sells for \$1.25 to Council members and double that price to non-members.

**THE 1954 EDITION OF "Solar**

**Ephemeris and Polaris Tables"** has been published by C. L. Berger & Sons, Inc. The 96-page booklet was prepared by Herman J. Shea, associate professor of surveying at Massachusetts Institute of Technology. It contains complete instructions for determining azimuths from the sun and the altitude of polaris and also directions for making astronomical observations and computing results. All requisite tables are included. Available from Berger at 50¢ per copy to cover handling and mailing costs. Address C. L. Berger & Sons, Inc., 37 Williams St., Boston 19, Mass.

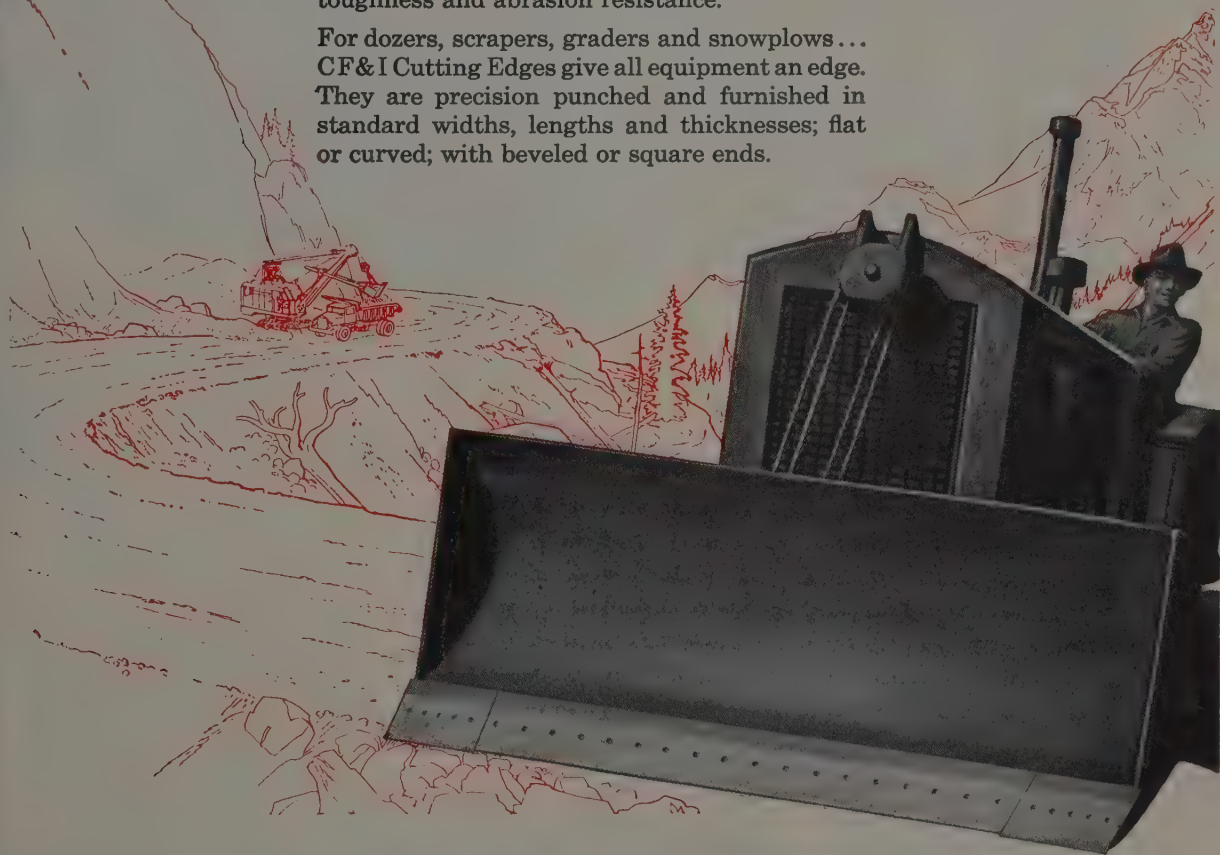
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## CUTTING EDGES

THE COLORADO FUEL AND IRON CORPORATION

1798

# ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

**ALASKAN UNEMPLOYMENT** now seems to have reached its peak. Reports from Anchorage, Fairbanks, Ketchikan, Petersburg, and other major communities indicate that the increase in joblessness which has been registered throughout the past winter months has now virtually subsided. Unemployment problem in the North is not to be minimized, however. During the past 11 months, residents and transients of the Anchorage area have received approximately \$2,000,000 in unemployment compensation payments. Carpenters and laborers now head the list of those seeking work.

**EMPLOYMENT OUTLOOK** will improve with the coming of spring and inauguration of new construction projects, Alaska job officials point out, but they warn once again that job-seekers from the United States would find rough-going in Alaska about now.

**A NATURAL GAS PIPELINE?** Known gas fields occur both in the U. S. Navy's Petroleum Reserve No. 4 in the Arctic and in an area adjacent to the reserve. A newspaper in Fairbanks has asked that consideration be given to construction of a pipeline to tap these fields. Governor B. Frank Heintzleman was given full details of the proposal when he visited Fairbanks and expressed interest in the proposal, which could provide a foundation for industrial expansion in Alaska's interior.

**CONSTRUCTION COSTS MAY GO UP, UP, UP.** With all of the high cost items that currently plague the contractor in Alaska today, northern construction is fast becoming the territory's biggest dollar-consuming industry. And the end is apparently not in sight in view of the announcement that freight rates to the territory will be increased 10% by the two major lines serving the North.

**EVERYTHING NEEDED** on a construction project, from paper-clips to bulldozers, will apparently have to be shipped north under the steeper tariffs. Steamship firms give as their reason for the new freight rates the fact that various operating costs require the boost.

**COST OF LABOR** is another important item not scheduled to come down out of the clouds—at least for the coming year. In current wage negotiations with contractors, most crafts are seeking increases, with a number of union bosses indicating privately they'll be content with present wages. All union officials however

have signified they would battle any cut in wages.

**HOT TIME AT HAINES**—Right now, it's below freezing at the seaport terminus of Haines, one of the focal points of the huge new Haines-Fairbanks pipe-laying project. Wretched weather and a mountain of administrative and technical details will no doubt leave a lot of seasoned construction men and engineers hot under the collar until the mountain is whittled to a molehill. Headquarters for the 621-mi. line have been set up at Haines and the first shipment of heavy equipment has already arrived. The resident engineer's main headquarters when the project gets under way this spring will be established at Tok Junction. Construction goals include a tank farm, pumping station, commissary and utility buildings. Five pumping stations will be put in along the pipeline that will cross about 290 mi. over Canadian territory to reach the interior terminus at Fairbanks.

**BEGINNING IN MARCH**, a torrent of construction workers will begin to pour in to the project. Hiring is being done through union offices. Workers will live in a series of construction camps strung out along the desolate pipeline right-of-way. In most cases they will be far removed from the comforts of civilization and employed under the most rugged conditions weather, terrain and remoteness can impose.

**THE ALASKA RAILROAD** has requested \$12,000,000 for construction of a new railroad dock at Seward and rehabilitation of the Portage-Seward segment of the line. The proposed new Seward dock would cost about \$2,900,000, with the remainder to go for rehabilitation. The old Seward dock, constructed in 1918, has been dangerously eroded by marine borers and by normal usage.

**HOPE FLAMES ANEW**—There's renewed hope in both Alaska and Canada that plans for a proposed industrial development at the headwaters of the Yukon River have not been completely scrapped. The project encompassed an estimated expenditure of about \$800,000,000. Plans for the job received a setback when Canadian officials declined to allow waters of the Yukon to be diverted through Canadian territory to Skagway, American port. Now, it is reported, a number of Canadian officials are rallying support for the project. W. A. C. Bennett, premier of British Columbia has stated he is in favor

of developing the area. Resources Minister Jean Lesage has stated in Ottawa that Ottawa would go along with the proposal if the manufacturing plant were to be constructed in Canada instead of on U. S. territory as originally proposed.

**LACK OF SURVEYING** and needed land law revisions are blocking efforts to develop Alaska, according to Lowell Puckett, regional administrator of the Bureau of Land Management in Anchorage. Answering repeated charges that the land bureau was "impeding progress" in the territory, Puckett pointed out that only 7% of the territory or less than 3,000,000 ac. has been surveyed. This failure to survey larger areas was ascribed to a lack of funds. Puckett pointed out that the bureau receives only \$140,000 to \$175,000 a year for surveys, making possible the employment of only five or six field crews.

**MODERN ENGINEERING KNOW-HOW** has rescued a famous Alaska gold mine from the junk heap. Completion of a rehabilitation program at the Big Hurrah gold mine in the Nome area has been announced. The mine has been shut down for 47 years. Between 1902 and 1907 it was reported to have produced almost a million dollars in gold. Active mining operations began around March 1.

**BLACK GOLD IN SPOTLIGHT**—All Alaska is watching oil developments along the southwestern coast, where active drilling is under way, and a number of major oil concerns have "staked their claims." However, so far there have been no gushers on the northern horizon. Despite this, interest in the territory's oil potential has been expressed by a Japanese business man, Tadao Sasayam, chairman of the board of the Alaska Pulp Co. Sasayam said a ready oil supply in Alaska would be of great interest to Japan because Japan must import a great deal of crude and refined oil from the United States.

**CONSTRUCTION NEWS CAPSULES**—Construction of a new road in the Mt. McKinley area uncovered copper mineralization in several places . . . The Georgia Pacific Plywood Co. has announced plans for a paper mill in the Juneau vicinity . . . A \$600,000 addition to the University of Alaska campus is slated for the coming year with construction of a new food service building . . . The construction price tag on Alaska's roads for 1953 was \$6,871,300 . . . The largest shipment of locomotives on one vessel in Alaska history was carried this winter by the Alaska Steamship Co. motorship Gadsden, bringing eight new locomotives north, two for the air force and the remainder for the Alaska Railroad . . . The federal government has allotted \$1,300,000 for construction of new school rooms in the Anchorage military area.

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OAKLAND, California ..... Cook Bros. Equipment Co., 416 East Eighth Street  
SACRAMENTO, California ..... Sacramento Valley Tractor Co., 1901 Broadway  
SALINAS, California ..... Farmers Mercantile Company, 15 W. Alisal Street  
SAN DIEGO 13, Calif. .... Southern Equipment & Supply Co., 2025 East Harbor Drive

SANTA MARIA, California ..... Hanson Equipment Company, Main St. at Blosser Road  
DENVER, Colorado ..... Liberty Trucks & Parts Co., 690 Lincoln Street  
ALBUQUERQUE, New Mexico ..... Leonard Motor Company, 1211 North 4th Street  
RENO, Nevada ..... Jenkins & Albright, 1131 W. 4th Street  
EUGENE, Oregon ..... Loggers & Contractors Machinery Co., 540 Filmore Street  
PORTLAND 14, Oregon ..... Loggers & Contractors Machinery Co., 240 S.E. Clay Street  
SALT LAKE CITY, Utah ..... Western Machinery Company, 2300 South Main Street  
SEATTLE 8, Washington ..... Bow Lake Equipment Co., Inc., 300 Michigan Avenue  
SEATTLE 4, Washington ..... Glenn Carrington & Co., 91 Columbia Street  
SPOKANE 1, Washington ..... Construction Equipment Company, W. 1118 Ide Avenue

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# UNIT PRICES

## Selected abstracts for Western projects

### CANAL—Laterals, pumping plant and reservoir for the Carpentaria Distribution System

California—Cachuma Project—USBR. Stolte, Inc., Oakland, was low bidder with \$567,196 submitted before the Bureau of Reclamation for a portion of the Carpentaria Distribution System. Work consists of earthwork, steel pipe lines and structures, Laterals 25 to 30, inclusive; construction of Carpentaria pumping plant, and Gobernador reservoir. Unit prices were as follows:

|                                                                                                      |           |        |
|------------------------------------------------------------------------------------------------------|-----------|--------|
| (1) Stolte, Inc.                                                                                     | \$567,196 |        |
| (2) R. C. R. Corp. and Mutual Pipeline Construction Co.                                              | 594,558   |        |
| Alex Robertson Co.                                                                                   | 604,866   |        |
| Coast Pipeline Contractors                                                                           | 606,078   |        |
| Macco Corp.                                                                                          | 634,515   |        |
| R. A. Wattson Co.                                                                                    | 684,205   |        |
| Engineers Limited Pipeline Co.                                                                       | 687,803   |        |
| Ofeco Construction Co., Inc.                                                                         | 719,932   |        |
| J. E. Young Pipe Line Contractor, Inc.                                                               | 728,266   |        |
| Floyd Shofner                                                                                        | 772,371   |        |
| Ventura Pipeline Construction Co. and Union Construction Co., Inc.                                   | 832,770   |        |
| Nomellini Construction Co.                                                                           | 888,442   |        |
| Engineer's estimate                                                                                  | 574,809   |        |
|                                                                                                      | (1)       | (2)    |
| 67,900 lin. ft. excavation and backfill of pipe trenches not over 4-ft. deep                         | 1.16      | 1.05   |
| 12,600 lin. ft. excavation and backfill of pipe trenches over 4 ft. and not over 6 ft. deep          | 1.29      | 2.00   |
| 1,800 lin. ft. excavation and backfill of pipe trenches over 6 ft. and not over 12 ft. deep          | 2.56      | 4.00   |
| 100 lin. ft. excavation and backfill of pipe trenches over 12 ft. and not over 16 ft. deep           | 3.81      | 10.00  |
| 8,900 cu. yd. special compaction                                                                     | 1.17      | 4.00   |
| 900 cu. yd. excavation and backfill for structures                                                   | 3.85      | 5.00   |
| 140 sq. yd. embedded rock protection                                                                 | 15.75     | 20.00  |
| 230 cu. yd. dumped riprap                                                                            | 2.50      | 8.00   |
| 4,100 cu. yd. excavation for reservoir and transportation to embankment                              | 2.10      | 1.25   |
| 2,300 cu. yd. earthfill in reservoir embankment                                                      | 0.62      | 1.00   |
| 470 lin. ft. constructing graded sand and gravel drains without sewer pipe                           | 0.50      | 1.00   |
| 300 lin. ft. constructing graded sand and gravel drains with 6-in. sewer pipe                        | 2.60      | 2.00   |
| 430 cu. yd. topsoil for planting                                                                     | 6.30      | 5.00   |
| 1 ton mulching topsoil areas                                                                         | 180.00    | 150.00 |
| 16 M. gals. water for planted areas                                                                  | 7.50      | 25.00  |
| 1,000 cu. yd. excavation for roadway                                                                 | 0.72      | 1.25   |
| 260 cu. yd. crusher-run surfacing                                                                    | 6.25      | 10.00  |
| 4 ton asphalt-emulsion penetration coat                                                              | 44.00     | 150.00 |
| 6 cu. yd. stone chips for seal coat                                                                  | 12.00     | 40.00  |
| 330 cu. yd. concrete                                                                                 | 47.00     | 68.00  |
| 30,000 lb. furnishing and placing reinforcing bars and fabric                                        | 0.22      | 0.16   |
| 630 sq. ft. furnishing and placing elastic joint-filler material                                     | 2.40      | 2.20   |
| 1,040 lin. ft. placing rubber water stop                                                             | 1.20      | 1.35   |
| 13,060 lin. ft. furnishing and installing 4½-in. O. D. lateral pipe                                  | 2.15      | 2.00   |
| 20,660 lin. ft. furnishing and installing 6½-in. O. D. lateral pipe                                  | 2.70      | 2.50   |
| 18,220 lin. ft. furnishing and installing 8½-in. O. D. lateral pipe                                  | 3.25      | 3.10   |
| 5,720 lin. ft. furnishing and installing 10¾-in. O. D. lateral pipe                                  | 4.10      | 3.60   |
| 11,030 lin. ft. furnishing and installing 12¾-in. O. D. lateral pipe                                 | 4.80      | 4.50   |
| 12,700 lin. ft. furnishing and installing 15-in. O. D. lateral pipe                                  | 6.40      | 7.10   |
| 58 ea. furnishing and installing 3-in. gate valves                                                   | 90.00     | 50.00  |
| 43 ea. furnishing and installing 4-in. gate valves                                                   | 100.00    | 60.00  |
| 29 ea. furnishing and installing 6-in. gate valves                                                   | 128.00    | 90.00  |
| 13 ea. furnishing and installing 8-in. gate valves                                                   | 166.00    | 200.00 |
| 3 ea. furnishing and installing 10-in. gate valves                                                   | 245.00    | 350.00 |
| 3 ea. furnishing and installing 12-in. gate valves                                                   | 930.00    | 400.00 |
| 2 ea. furnishing and installing 14-in. gate valves                                                   | 1,150.00  | 725.00 |
| 500 lin. ft. furnishing and installing 2-in. diam. standard steel pipe                               | 1.70      | 3.00   |
| 60 lin. ft. furnishing and installing 3-in. diam. standard steel pipe                                | 3.00      | 5.00   |
| 150 lin. ft. furnishing and installing 4-in. diam. standard steel pipe                               | 3.60      | 5.00   |
| 3 ea. furnishing and installing 3-in. pressure relief valves                                         | 315.00    | 260.00 |
| 17 ea. furnishing and installing 2-in. air-and-vacuum valves                                         | 290.00    | 130.00 |
| 55 ea. furnishing and installing 2-in. cocks                                                         | 19.00     | 35.00  |
| 21 ea. furnishing and installing 2-in. angle valves                                                  | 27.00     | 35.00  |
| 46 lin. ft. furnishing and installing 10-in. diam. casing pipe under railroad and highway crossings  | 22.00     | 14.00  |
| 110 lin. ft. furnishing and installing 12-in. diam. casing pipe under railroad and highway crossings | 13.90     | 14.00  |
| 105 lin. ft. furnishing and installing 15-in. diam. casing pipe under railroad and highway crossings | 21.00     | 16.00  |
| 1 ea. furnishing and installing fire hydrants                                                        | 443.00    | 300.00 |

|                                                                                                                  |           |           |
|------------------------------------------------------------------------------------------------------------------|-----------|-----------|
| 14 ea. furnishing and installing fire-hydrant guard posts                                                        | 32.00     | 50.00     |
| Lump sum, constructing pressure-reducing valve installation for lateral 23L                                      | 2,450.00  | 2,600.00  |
| Lump sum, constructing pressure-reducing valve installation for lateral 25R                                      | 2,450.00  | 3,000.00  |
| Lump sum, constructing pressure-reducing valve installation for lateral 28R                                      | 2,350.00  | 2,100.00  |
| Lump sum, constructing reservoir control valve installation                                                      | 4,210.00  | 6,500.00  |
| Lump sum, constructing pumping plant                                                                             | 19,090.00 | 19,500.00 |
| 70 lin. ft. furnishing and installing 8-in. cast-iron drain pipe                                                 | 6.50      | 10.00     |
| 1 ea. furnishing and installing 12-in. metal slide gate                                                          | 136.00    | 350.00    |
| Lump sum, furnishing and installing reinforced concrete slat pipe                                                | 192.00    | 500.00    |
| 50 lin. ft. furnishing and installing 12-in. diam. reinforced concrete culvert pipe                              | 3.50      | 6.00      |
| 420 lin. ft. furnishing and installing 15-in. diam. reinforced concrete culvert pipe                             | 4.10      | 8.00      |
| Lump sum, furnishing and installing metalwork for overflow                                                       | 98.00     | 50.00     |
| Lump sum, constructing float well                                                                                | 420.00    | 300.00    |
| Lump sum, constructing reservoir roof                                                                            | 19,220.00 | 16,500.00 |
| 850 lin. ft. furnishing and erecting chainlink fence                                                             | 4.24      | 4.00      |
| 275 lb. furnishing and installing grounding system                                                               | 2.08      | 1.50      |
| 175 lin. ft. furnishing and installing embedded electrical metal conduit 1 in. in diam.                          | 1.64      | 2.00      |
| 150 lin. ft. furnishing and installing buried electrical metal conduit 1 in. in diam.                            | 1.82      | 2.00      |
| 50 lin. ft. furnishing and installing exposed electrical metal conduit 1 in. in diam.                            | 1.74      | 2.00      |
| 60 lin. ft. furnishing and installing embedded electrical metal conduit 2½ in. in diam.                          | 4.20      | 5.00      |
| 10 lin. ft. furnishing and installing exposed electrical metal conduit 2½ in. in diam.                           | 12.70     | 5.00      |
| 200 lin. ft. furnishing and installing 4/0 AWG single conductor 600-volt insulated electrical cable              | 1.75      | 3.30      |
| 650 lin. ft. furnishing and installing No. 10 and No. 12 AWG single conductor 600-volt insulated electrical wire | 0.22      | 0.25      |
| Lump sum, furnishing and installing service pole and drops to metering and motor control board                   | 550.00    | 600.00    |
| Lump sum, furnishing and installing metering and motor control board                                             | 12,400.00 | 14,000.00 |
| Lump sum, furnishing and installing lighting units at pumping plants                                             | 170.00    | 800.00    |
| Lump sum, furnishing and installing weatherproof plug receptacles                                                | 34.00     | 10.00     |
| Lump sum, furnishing and installing float control equipment at Gobernador Reservoir                              | 530.00    | 200.00    |

### HIGHWAY—15 miles of grading, gravel surfacing and asphalt surfacing in Nevada

Nevada—Eureka County—State. Hoops Construction Co. was awarded a contract by the State Department of Highways on the basis of its low bid of \$322,213 for 15 mi. of grading, draining, and gravel and asphalt surfacing. Unit prices were as follows:

|                                                              |             |          |
|--------------------------------------------------------------|-------------|----------|
| (1) Hoops Construction Co.                                   | \$322,213   |          |
| (2) Dodge Construction, Inc.                                 | 333,333     |          |
| Isbell Construction Co.                                      | 334,778     |          |
| McCammon-Wunderlich Co.                                      | 336,346     |          |
| Duffy Reed Construction Co.                                  | 351,109     |          |
| Schwake Construction Co.                                     | 358,749     |          |
| W. W. Clyde & Co.                                            | 361,850     |          |
| Young & Smith Construction Co.                               | 364,353     |          |
| Eaton & Smith                                                | 370,913     |          |
| Peter Kiewit Sons' Co.                                       | 373,700     |          |
| Wells Cargo, Inc.                                            | 379,306     |          |
| Silver State Construction Co.                                | 381,716     |          |
|                                                              | (1)         | (2)      |
| Lump sum, signs                                              | \$ 1,000.00 | 557.00   |
| 13,538 lin. ft. remove fence                                 | 0.20        | 0.10     |
| 221 lin. ft. remove culvert pipe                             | 1.50        | 2.00     |
| 269,840 cu. yd. roadway excavation                           | 0.33        | 0.35     |
| 640 cu. yd. drainage excavation                              | 0.50        | 0.50     |
| 550 sta. V-type ditches                                      | 5.00        | 5.00     |
| 468,900 yd. sta. overhaul, yd. sta.                          | 0.01        | 0.015    |
| 3,640 yd. mi. overhaul, yd. mile                             | 0.16        | 0.20     |
| 750 cu. yd. structure excavation                             | 1.50        | 2.00     |
| 2,070 cu. yd. backfill                                       | 1.00        | 1.50     |
| 10,493 M gal. water                                          | 0.75        | 1.00     |
| Lump sum, furnish water equipment                            | 5,000.00    | 5,000.00 |
| 261 hr. power roller                                         | 6.00        | 6.00     |
| 15,568 ft. hr. tamping roller                                | 0.50        | 0.50     |
| 1,787 ft. hr. pneumatic-tired roller                         | 0.60        | 0.60     |
| 89,350 ton type 1 gravel base                                | 0.51        | 0.50     |
| 51,630 ton grad surface                                      | 0.65        | 0.70     |
| 116 ton liquid asphalt, type MC-2 (seal)                     | 36.00       | 36.50    |
| 573 ton sand blotter                                         | 1.00        | 3.00     |
| 1,302 ton liquid asphalt, type SC-3 or SC-4 (roadmix)        | 34.00       | 33.75    |
| 15.12 mi. roadmix                                            | 600.00      | 700.00   |
| 1,460 sq. yd. roadmix intersections                          | 0.50        | 0.25     |
| 201 cu. yd. Class AA concrete                                | 75.00       | 70.00    |
| 19,650 lb. reinforcing steel                                 | 0.15        | 0.16     |
| 2,340 lin. ft. 24-in. corrugated metal pipe (dipped)         | 6.25        | 5.75     |
| 106 lin. ft. 30-in. corrugated metal pipe (dipped)           | 7.25        | 7.00     |
| 132 lin. ft. 36-in. corrugated metal pipe (dipped)           | 11.50       | 11.00    |
| 150 lin. ft. 48-in. corrugated metal pipe (dipped)           | 16.00       | 17.50    |
| 48 lin. ft. 22 x 13-in. corrugated metal arch pipe (dipped)  | 5.00        | 5.00     |
| 932 lin. ft. 29 x 18-in. corrugated metal arch pipe (dipped) | 9.00        | 7.75     |

Continued on page 101

# UNIT PRICES ... CONTINUED

|                                                  |          |          |
|--------------------------------------------------|----------|----------|
| 54 lin. ft. relay culvert pipe.....              | 1.00     | 1.52     |
| 54 cu. yd. grouted hand-laid riprap.....         | 25.00    | 30.00    |
| 457 ea. culvert markers and guide posts.....     | 6.00     | 6.00     |
| 11,253 lin. ft. construct type B-4B fence.....   | 0.27     | 0.25     |
| 220 lin. ft. construct special timber fence..... | 3.00     | 3.50     |
| 1,035 lin. ft. reconstruct fence.....            | 0.20     | 0.20     |
| 124 ea. right-of-way markers.....                | 6.00     | 6.00     |
| Force account, miscellaneous work.....           | 1,600.00 | 1,600.00 |

## MISCELLANEOUS—44½ miles of 115-kv. transmission lines in Arizona

Arizona—Davis Dam Project—USBR. Elliott Construction Co., Omaha, Neb., was awarded a contract by the Bureau of Reclamation on the basis of a low bid of \$427,940 for construction of 115-kv. transmission lines from the Arizona Public Service Co.'s Saguaro steam electric station, now under construction near Red Rock, to connect with the Davis Dam transmission system. Unit prices were as follows:

|                                        |           |  |
|----------------------------------------|-----------|--|
| (1) Elliott Construction Co.....       | \$427,940 |  |
| (2) Hoak Construction Co.....          | 438,789   |  |
| Malcolm W. Larson Contracting Co.....  | 446,763   |  |
| R. N. Campsey Construction Co.....     | 452,010   |  |
| R. B. Stovall Co.....                  | 478,880   |  |
| Thompson, Haight & Keister.....        | 480,450   |  |
| Richards & Associates, Inc.....        | 480,705   |  |
| Hallett Construction Co.....           | 493,942   |  |
| Collins Electrical Co.....             | 493,174   |  |
| Commonwealth Electric Co.....          | 521,812   |  |
| Power Line Erectors, Inc.....          | 525,862   |  |
| Triple H. Construction Co.....         | 534,183   |  |
| Fischbach & Moore, Inc.....            | 545,119   |  |
| Donovan Construction Co.....           | 555,417   |  |
| George E. Miller.....                  | 561,079   |  |
| M. A. Pithoud.....                     | 563,267   |  |
| C. L. Electric Co.....                 | 569,843   |  |
| C. & J. Construction Co.....           | 587,947   |  |
| R. S. Seabrook & T. W. Eisenman.....   | 594,800   |  |
| The Howard P. Foley Co.....            | 596,553   |  |
| Chagnon Electric Co., Inc.....         | 598,086   |  |
| F. E. Wilder.....                      | 600,000   |  |
| Newbery Electric Corp. of Arizona..... | 616,666   |  |
| Engineer's estimate.....               | 546,105   |  |

|                                                                                         | (1)      | (2)      |
|-----------------------------------------------------------------------------------------|----------|----------|
| 20 ea. furnishing and constructing barbed-wire gate in right-of-way fence.....          | 34.00    | 58.00    |
| 2 ea. furnishing and installing prefabricated gate in right-of-way fence.....           | 63.00    | 60.00    |
| Lump sum, clearing land and right-of-way.....                                           | 5,500.00 | 7,000.00 |
| 1 ea. furnishing and constructing type HS structure with 45-ft. max. pole length.....   | 270.00   | 250.00   |
| 5 ea. furnishing and constructing type HS structure with 50-ft. max. pole length.....   | 330.00   | 270.00   |
| 39 ea. furnishing and constructing type HS structure with 55-ft. max. pole length.....  | 350.00   | 320.00   |
| 150 ea. furnishing and constructing type HS structure with 60-ft. max. pole length..... | 385.00   | 350.00   |
| 86 ea. furnishing and constructing type HS structure with 65-ft. max. pole length.....  | 422.00   | 380.00   |
| 7 ea. furnishing and constructing type HS structure with 70-ft. max. pole length.....   | 460.00   | 430.00   |
| 1 ea. furnishing and constructing type HS structure with 75-ft. max. pole length.....   | 505.00   | 475.00   |
| 1 ea. furnishing and constructing type HA structure with 55-ft. max. pole length.....   | 379.00   | 330.00   |
| 1 ea. furnishing and constructing type HA structure with 60-ft. max. pole length.....   | 414.00   | 380.00   |
| 1 ea. furnishing and constructing type HA structure with 65-ft. max. pole length.....   | 452.00   | 420.00   |
| 1 ea. furnishing and constructing type HA structure with 70-ft. max. pole length.....   | 491.00   | 460.00   |
| 3 ea. furnishing and constructing type HSB structure with 50-ft. max. pole length.....  | 349.00   | 310.00   |
| 8 ea. furnishing and constructing type HSB structure with 55-ft. max. pole length.....  | 391.00   | 360.00   |
| 19 ea. furnishing and constructing type HSB structure with 60-ft. max. pole length..... | 427.00   | 390.00   |
| 15 ea. furnishing and constructing type HSB structure with 65-ft. max. pole length..... | 465.00   | 425.00   |
| 3 ea. furnishing and constructing type HSB structure with 70-ft. max. pole length.....  | 503.00   | 465.00   |
| 1 ea. furnishing and constructing type HSB structure with 75-ft. max. pole length.....  | 547.00   | 520.00   |
| 1 ea. furnishing and constructing type 3A structure with 55-ft. max. pole length.....   | 414.00   | 360.00   |
| 1 ea. furnishing and constructing type 3A structure with 60-ft. max. pole length.....   | 468.00   | 395.00   |
| 1 ea. furnishing and constructing type 3A structure with 65-ft. max. pole length.....   | 524.00   | 450.00   |
| 1 ea. furnishing and constructing type 3AB structure with 60-ft. max. pole length.....  | 475.00   | 410.00   |
| 1 ea. furnishing and constructing type 3AB structure with 65-ft. max. pole length.....  | 531.00   | 470.00   |
| 1 ea. furnishing and constructing type 3AC structure with 60-ft. max. pole length.....  | 570.00   | 515.00   |
| 1 ea. furnishing and constructing type 3AC structure with 65-ft. max. pole length.....  | 626.00   | 565.00   |
| 1 ea. furnishing and constructing type 3AC structure with 70-ft. max. pole length.....  | 684.00   | 625.00   |
| 1 ea. furnishing and constructing type 3T structure with 55-ft. max. pole length.....   | 560.00   | 620.00   |
| 1 ea. furnishing and constructing type 3T structure with 60-ft. max. pole length.....   | 602.00   | 660.00   |
| 1 ea. furnishing and constructing type 3T structure with 65-ft. max. pole length.....   | 660.00   | 715.00   |

|                                                                                                                                  |          |          |
|----------------------------------------------------------------------------------------------------------------------------------|----------|----------|
| 1 ea. furnishing and constructing type 3T structure with 70-ft. max. pole length.....                                            | 715.00   | 770.00   |
| 1 ea. furnishing and constructing type 3T structure with 75-ft. max. pole length.....                                            | 783.00   | 830.00   |
| 1 ea. furnishing and constructing type 3AT structure with 60-ft. max. pole length.....                                           | 485.00   | 580.00   |
| 1 ea. furnishing and constructing type 3AT structure with 65-ft. max. pole length.....                                           | 542.00   | 640.00   |
| 1 ea. furnishing and constructing type 3AT structure with 70-ft. max. pole length.....                                           | 600.00   | 700.00   |
| 340 ea. furnishing, assembling, and attaching X-braces for 12-ft. pole spacing.....                                              | 37.00    | 38.00    |
| 4 ea. furnishing, assembling, and attaching X-braces for 14-ft., 6-in. pole spacing.....                                         | 40.00    | 44.00    |
| 20 ea. furnishing and constructing single guys.....                                                                              | 21.00    | 25.00    |
| 90 ea. furnishing and constructing double guys.....                                                                              | 30.00    | 32.00    |
| 20 ea. furnishing and installing guy protector.....                                                                              | 10.00    | 8.00     |
| 1 ea. furnishing and constructing stub guy with 45-ft. pole.....                                                                 | 131.00   | 135.00   |
| 1 ea. furnishing and constructing stub guy with 50-ft. pole.....                                                                 | 149.00   | 149.00   |
| 1 ea. furnishing and constructing stub guy with 55-ft. pole.....                                                                 | 171.00   | 173.00   |
| 106 ea. furnishing and placing plate or cone guy anchor.....                                                                     | 33.00    | 20.00    |
| 4 ea. furnishing and placing grouted anchors.....                                                                                | 28.00    | 20.00    |
| 1,018 ea. assembling and attaching suspension-insulator assembly with 7 insulator units.....                                     | 11.50    | 16.00    |
| 18 ea. assembling and attaching suspension-insulator assembly with 8 insulator units.....                                        | 25.00    | 18.00    |
| 27 ea. assembling and attaching suspension-insulator assembly with 9 insulator units.....                                        | 25.00    | 20.00    |
| 6 ea. assembling and attaching double suspension-insulator assembly with 9 insulator units per string and single yoke plate..... | 40.00    | 30.00    |
| 48 ea. assembling and attaching tension-insulator assembly with 9 insulator units.....                                           | 37.00    | 20.00    |
| 54 ea. assembling and attaching tension-insulator assembly with 10 insulator units.....                                          | 37.00    | 22.00    |
| 44.25 mi. of line, furnishing and stringing three 795,000-circ. mil ACSR conductors.....                                         | 4,576.00 | 5,000.00 |
| 3 ea. furnishing and attaching 50-pound hold-down weight.....                                                                    | 20.00    | 14.00    |
| 3 ea. furnishing and attaching 100-pound hold-down weight.....                                                                   | 34.00    | 26.00    |
| 3 ea. furnishing and attaching 180-pound hold-down weight.....                                                                   | 59.00    | 43.00    |
| 44.25 mi. of line, furnishing and stringing two ¾-in. galvanized-steel overhead ground wires.....                                | 620.00   | 700.00   |
| 102 ea. furnishing and attaching vibration damper to conductor.....                                                              | 12.00    | 16.00    |
| 80 ea. furnishing and attaching vibration damper to overhead ground wire.....                                                    | 7.00     | 10.00    |
| 70 ea. furnishing and installing fence ground posts and grounding non-electric fence.....                                        | 8.00     | 8.00     |
| 10 ea. furnishing and installing fence ground posts and grounding electric fence.....                                            | 8.00     | 12.00    |
| Lump sum, removing the required portion of the Phoenix-Tucson No. 2 transmission line.....                                       | 6,350.00 | 3,000.00 |

## BRIDGE—Steel bridge on concrete piers

Montana—Broadwater County—State. W. P. Roscoe Co., Billings, won an award from the State Highway Commission on the basis of a low bid of \$375,749 for construction of a 689½-ft. structural steel bridge on concrete piers crossing the Missouri River near Toston on the Three Forks-Townsend highway. Unit prices were as follows:

|                                              |           |  |
|----------------------------------------------|-----------|--|
| (1) W. P. Roscoe Co.....                     | \$375,749 |  |
| (2) Hansen & Parr Construction Co.....       | 384,754   |  |
| McLaughlin Construction Co.....              | 385,067   |  |
| N. A. Nelson Construction Co.....            | 418,160   |  |
| Cahill-Mooney Construction Co.....           | 420,475   |  |
| Montana Engineering and Construction Co..... | 428,515   |  |
| J. J. Badraun Co.....                        | 431,674   |  |
| Cop Construction Co.....                     | 433,810   |  |
| Haggerty-Messmer Co.....                     | 442,852   |  |
| C. B. Lauch Construction Co.....             | 456,411   |  |

|                                          | (1)       | (2)       |
|------------------------------------------|-----------|-----------|
| 740,700 lb. structural steel.....        | .232      | .2325     |
| 183,104 lb. reinforcing steel.....       | .15       | .155      |
| 784 cu. yd. Class A concrete.....        | 50.00     | 48.00     |
| 871 cu. yd. Class AD concrete.....       | 70.00     | 80.00     |
| 1,374 lin. ft. steel bridge rail.....    | 9.00      | 9.50      |
| Lump sum, shoring and cribs.....         | 31,000.00 | 53,000.00 |
| 2,415 cu. yd. structure excavation.....  | 7.00      | 2.40      |
| Lump sum, removal of ex. structures..... | 16,000.00 | 5,000.00  |

## MISCELLANEOUS—Pile dike repair and constructing dolphins in the Columbia River

Oregon—Columbia River—C. of E. General Construction Co., Portland, submitted a low bid of \$20,755 before the Corps of Engineers for repairing existing pile dikes and constructing dolphins at designated locations in the Columbia River between the mouth of the Willamette River and Bradwood. Unit prices were as follows:

|                                  |          |  |
|----------------------------------|----------|--|
| (1) General Construction Co..... | \$20,755 |  |
| (2) H. G. Palmberg.....          | 23,290   |  |
| Larson Construction Co.....      | 25,360   |  |
| The Hart Construction Co.....    | 26,232   |  |
| Engineer's estimate.....         | 19,640   |  |

|                                                   | (1)  | (2)  |
|---------------------------------------------------|------|------|
| 6,300 lin. ft. piling, Douglas fir, in place..... | 1.85 | 1.90 |
| 4,400 lb. hardware, in place.....                 | .25  | .30  |
| 2,000 cu. yd. stone, in place.....                | 4.00 | 5.00 |

# ENGINEERS on the move

Appointment of **R. J. Walter** as regional director of the Bureau of Reclamation, Denver, and **Frank M. Clinton** as regional director at Billings, Mont., was recently announced. Walter succeeds **Avery A. Batson**. Clinton, assistant director of Region 1 at Boise, succeeds **Kenneth F. Vernon**. Simultaneously with this announcement, Commissioner **W. A. Dexheimer** announced the following appointments: **Grant Bloodgood**, chief construction engineer, Denver, named associate chief engineer; and **J. R. Riter**, chief hydrologist with headquarters in Denver, named chief development engineer, heading the project development division in Denver. Dexheimer said Vernon will remain on as a special assistant to Clinton. Batson, regional director at Denver since 1947, joins Riter's staff.

**L. R. Douglass**, director of power for the Bureau of Reclamation's Boulder Canyon Project, is retiring March 31 following a distinguished career of 21 years as a Reclamation engineer and administrator. Douglass

**L. R. Douglass**  
director of power  
Boulder Canyon  
Project  
U. S. Bureau of  
Reclamation



has been in immediate charge of Hoover Dam and power plant since July 1950. He worked on the design of this project in the early 1930's and moved to Boulder City in 1944 to become assistant regional director of Region 3.

**Stephen A. Birch** of S. Birch & Sons Construction Co., Great Falls, was elected new president of Montana Contractors Association, Inc., AGC. Chosen to serve with him for the next year are **Frank Fly** of Miles City, vice president, and **Elmer Schye** of White Sulphur Springs, treasurer.

**E. J. Maupin, Jr.**, of Dodge Construction, Fallon, Nev., was recently elected to represent District 2 on the

Board of Directors of The Associated General Contractors of America, according to announcement by **H. E. Foreman**, managing director of AGC. District 2 embraces Arizona, California and Nevada.

**Charles D. Holm** of Glendive is the new 1954 president of Montana Building Chapter, Associated General Contractors, succeeding **Frank P. Messmer**, Bozeman. Also elected are **E. R. Mitchell** of Great Falls, vice president, and **L. G. Hardy** of Billings, treasurer.

A DEADLINE of April 30, 1954, has been set for the receipt of papers prepared for the 5th Congress of the International Commission on Large Dams, to be held in Paris in 1955. A reviewing committee has been established by the U. S. Committee and includes **Walter Dreyer**, chairman; **L. N. McClellan** and **F. B. Slichter**. Members should address papers to Dreyer, c/o Pacific Gas & Electric Co., 245 Market Street, San Francisco.

Papers recommended by the review committee will be submitted officially and printed in the transactions of the 5th Congress without cost to the authors. Other papers may be recommended for unofficial submission and printing at the authors' expense.

Similar rules govern submission of "communications," but the deadline for their receipt is June 30, 1954. Also, at its discretion the review committee may recommend publication of papers and communications submitted by non-members of the U. S. Committee.

The appointment of **Thomas E. Fellows** as chief estimator of **Ford J. Twaits Co.**, prominent Los Angeles general contracting and engineering organization, was recently announced by **Carl H. Wittenberg**, partner and general manager of the firm. A graduate civil engineer, Fellows' work has been entirely in the construction field and has embraced design, field engi-

neering and estimating. For the past six years he was associated with **H. E. Stoudt & Son**, general contractor, in the capacity of vice president and chief engineer. Prior to that he was one of several partners engaged in general contracting.

**Walter Wheeler** has been appointed city engineer of Kirkland, Wash., succeeding **Julius Lucoff**. Wheeler is a former assistant traffic engineer with the Seattle district of the Washington Department of Highways.

**Harry I. Hamilton** of Hamilton & Thoms, Eugene, was elected president of Oregon Chapter of Associated



**Harry I. Hamilton**  
president  
Oregon Chapter  
Associated General  
Contractors

General Contractors at its annual meeting. He succeeds **W. Ray Rogers**. The following were chosen to serve with Hamilton: **Lloyd Babler** of Babler Bros., first vice president; **M. A. Erland** of Erland & Blickle, second vice president, and **Frank Lyons** of Frank Lyons & Co., reelected secretary.

**Charles S. Hazen**, water management officer in eastern Washington for the Bureau of Reclamation, has been appointed area engineer in charge of the Spokane development area office, according to announcement by Regional Director **Harold T. Nelson**.

**L. N. McClellan**, Bureau of Reclamation chief engineer, Denver, Colo., has been designated an assistant commissioner in charge of all USBR activities in the Denver area. Also announced by Commissioner Dexheimer is the appointment of **S. W. Crosthwait** as assistant commissioner, with headquarters in Washington, D. C. The assistant commissioner in charge of irrigation and power, **H. F. McPhail**, is also stationed in Washington.

On the move since the first of the year are several engineers of The Asphalt Institute. **Fred N. Finn** has been named district engineer at Sacramento, Calif. In San Francisco, **Cecil J. Van Til** is the new area engineer. **James M. Lackey**, district engineer at Los Angeles, has been elevated to the position of special projects engineer, working out of Los Angeles. Named to fill the district



PHOTO—UNDERWOOD & UNDERWOOD

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engineer spot left vacant by Lackey's promotion is **Phil Bailey**, who moved up from area engineer.

**William P. Price, Jr.**, who had been a resident engineer on the recently completed Canyon Ferry Dam in Montana, has accepted a position as assistant to **Julian Hinds**, general manager and chief engineer of the United Water Conservation District, Santa Paula, Calif.

**John H. Spohrer**, formerly superintendent for R. E. Payne, Inc., contractor on the remodeling of the City

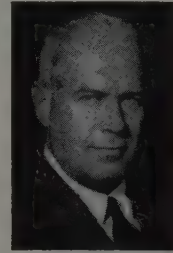
Hall in Inglewood, Calif., has been named successor to **Garfield J. Leftwich**, Inglewood city building superintendent.

**Ray W. Russ** has been named head of the inspection division of the building department of Denver, Colo. He has had eighteen years' experience in construction and engineering, recently as an architectural engineer in Fort Worth, Texas.

**Arthur J. Davidson**, USBR, has been named 1954 president of Spokane Section, American Society of

Civil Engineers. Other officers elected are: **J. Byron Barber**, first vice president; **Chester A. Moore**, second vice president, and **John F. Mangan**, secretary-treasurer.

**David B. Sloan** has succeeded **E. C. Johnson** as president of the firm of **Gibbs & Hill, Inc.**, consulting engi-



**David B. Sloan**  
president  
**Gibbs & Hill, Inc.**  
consulting  
engineers

neers, designers and constructors. Johnson resigned for reasons of health. The company maintains offices in Los Angeles, as well as New York, Indianapolis and San Antonio.

**Robert L. Ryan**, for the past twenty years county surveyor of Ventura County, Calif., recently announced his plans to retire to his ranch near Santa Paula, following a new organization plan by the county resulting in the duties of the surveyor being reduced.

After 34 years in state service, **Daniel C. Willett** has retired as chief construction and structural engineer of California's Division of Architecture. Originally associated with the Division of Highways, Willett had spent the last 26 years with the Division of Architecture, including 6 years as chief construction engineer. His replacement is the present assist-

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## CALENDAR

**Apr. 28-May 1**—Pacific Southwest Local Sections, ASCE, conference, at Sacramento, Calif.

**April 30-May 1**—Northwest Conference, ASCE, annual meeting, at Spokane, Wash.

**May 27-29**—California Society of Professional Engineers, annual convention and trade show, at Mark Hopkins Hotel, San Francisco.

**Sept. 16-18**—Western Association of State Highways Officials, 33rd annual conference, at Challenger Inn, Sun Valley, Idaho.

**Oct. 14-16**—Structural Engineers Association of California, annual convention at Hotel Del Coronado, San Diego.

ant chief construction engineer, C. M. "Tex" Herd.

Alton E. Alspaugh, as of Feb. 1, joined the staff of the Pacific Power & Light Co., Portland, Ore., as hydro-electric development engineer. Since 1939 he has been in the employ of the Corps of Engineers at Bonneville Dam, the district office in Walla Walla, Wash., and recently as civilian engineer at the division headquarters in Portland.

Chris Wyller, for the past 28 years engineer with the Bureau of Public Roads at Juneau, Alaska, has been made acting district engineer in the re-established Alaska District.

Edward W. Ford has been appointed registrar and executive secretary of the California Contractors' State License Board, succeeding N. J. Morrissey, who was named director of the California Department of Professional and Vocational Standards last October. Ford had been acting registrar since Morrissey left the board.

Robert L. Ryan, Ventura County engineer surveyor, is the newly elected president of the Santa Barbara-Ventura Counties Branch of the Los Angeles Section of the American Society of Civil Engineers. Other officers elected to serve in 1954 are: vice president, R. E. Burnett, USBR construction engineer; secretary-treasurer, George Conahey, staff member at USN School for CE Corps officers at Port Hueneme, Calif.

H. D. Hughes of Roswell has been selected to serve throughout 1954 as president of New Mexico Building Branch, Associated General Contractors, succeeding John T. Testman. T. C. Styron, Albuquerque, becomes the new vice president and O. G. Bradbury, secretary-treasurer.

Officers elected to serve the new Marysville Subsection of the Sacramento Section of the American Society of Civil Engineers are: president, C. E. Paulsen; vice president, Ray Jacobs; secretary, Vince Barsi; treasurer, Ray Miller, and member of the board, Ed Whitnack. Marysville is the third subsection to be formed within the Sacramento Section and its constitution and by-laws are patterned after its older Shasta and Central Valley brother organizations.

Among recent changes in the personnel of the Oregon State Highway Department have been the promotion of three of its engineers. L. H. Young has been made assistant division engineer at Roseburg, moving from Baker where he was district maintenance

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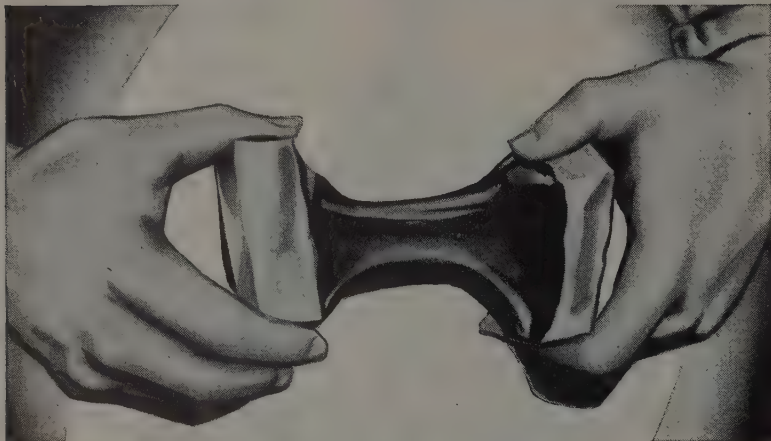
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superintendent. J. T. Skelton has been promoted from resident bridge engineer in Portland to assistant bridge engineer in Salem. **Mitchell M. Stump**, resident construction engineer at The Dalles, succeeds to the position left vacant by Young at Baker.

Lee Headrick, county road superintendent of Ada County, Idaho, was unanimously reappointed to another term at a recent meeting of the county commission.

Ed V. Berg, an engineer for Consolidated Diking Improvement District No. 1 in Washington, recently left the District under the State retirement system.

## DEATHS

Clement V. Dewart, 69, died suddenly in Palo Alto, Calif., recently. He was one of the principal engineers under Joseph B. Strauss, chief engineer and builder of the Golden Gate Bridge in the '30s.

Glenn E. Blanchard, 58, member of the firm of Blanchard Brothers, contractors of Denver, Colo., died Jan. 11.

Charles E. Parker, 71, former longtime employee of the Seattle city engineer's department, and father of City Engineer William E. Parker, died at his home in Seattle on Jan. 18.

Thomas Lockett, 83, for many years a supervisory construction man on highways, tunnels and railways in the Pacific Northwest, died recently in Seattle.

William L. Olsen, 50, assistant maintenance engineer of the Los Angeles County Road Department, died at his home in San Marino, Jan. 16.

Albert E. Chandler, 81, died recently in an Oakland hospital after a brief illness. He was a leading California authority on water and land law. In 1903 he became the first civil engineer to be employed by the State of Nevada.

Thomas K. Biesinger, 76, for many years a prominent Salt Lake City building contractor, died there Jan. 16.

Louis C. Mayer, 71, civil engineer with the City of Los Angeles for 36 years, died Jan. 28.

R. W. Morris, 44, city traffic engineer of Phoenix, Ariz., died recently.



Mass production means lowest-cost parts—our special, exclusive factory methods mean highest quality. Left, pneumatic gauges are used to check liner dimensions. Right, tin-plating pistons with specially designed continuous electrolytic-plating bath.

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# SUPERVISING the jobs

J. W. (Bill) Askee, with the assistance of Parly Linford, is superintending the construction of a junior high school in Midvale, Utah, for Garff, Rybert & Garff Construction Co., who received the bid at \$1,279,000. Job engineer is Don Stevenson.

Dale Stokes is superintendent for Joseph C. Hastings, contractor with a \$98,000 job on the Tucumcari Project in New Mexico. Contract is for earthwork, structures, etc., Coulter drain and rehabilitation of Ragsdill drain.

Mike Hansler is general superintendent for Macdonald Building Co. who has the contract in the amount of \$1,749,665 for the erection of a state office building in Olympia, Wash.

Claude Eggebratten, superintendent, is supervising the installation of a water treatment plant at Placerville, Calif., for contractor G. S. Herrington who got the contract on a bid of \$198,510. Don Griesbeck is mechanics superintendent.

Tom Royden, assisted by Bob Wallace, is supervising Royden Construction Co.'s \$259,000 contract for 10½ mi. of surfacing on the McNary-Eagar highway, Arizona.

Paul Hesalroad is Barnard-Curtiss Co.'s superintendent on a \$332,655 contract for earthwork and structures for rehabilitation of Vermejo diversion dam, Vermejo Canal and Eagle Trail Canal, New Mexico.

Mel Paradis, Roy Williamson, L. O. Minor, carpenter foremen, and W. E. Wilbanks, labor foreman, are key men on the erection of fourteen ward buildings at the Porterville state hospital, Calif. R. Pedersen & Sons is doing the work at a cost of \$1,921,490.

Ray Revell, project manager; W. H. (Bill) McClaskey, assistant projects manager; Carl King, superintendent, and Walter Sabin, office manager, are working for Morrison-Knudsen Co., Inc., on the \$379,500 contract for installation of a cooling pond for the central heat and power

plant at Eielson AFB, Alaska. Two other M-K projects are, or will be, operating under the supervision of these same men, namely hardstands and taxiways, a \$4,600,628 contract, and Eielson streets and paving, \$2,560,570.

E. Hunt and W. Bridges, superintendents, are supervising a \$181,095 contract held for Kevry Construction Inc. for sanitary sewer installation in Banning, Calif. William Nilson is in charge of materials and equipment. This job is expected to be finished in record time (probably by mid-July), according to Edmond J. Vadnais, general manager of the company, who has some new equipment working at the site.

Bill Kimble is superintendent on a highway job for John Delphia who recently won a \$480,335 award for 8 mi. of grading and surfacing in Fresno County, Calif. Among the other key personnel on the job are Dave Soden and D. J. Seymour, grading foremen, Albert Luttrell, labor foreman, and Joe Parker, master mechanic. C. W. Le Count is in the engineer spot.

Bob Hayden (left) talks with his hands in describing a fine point of Nimbus Dam construction to John Fondahl, project engineer for Winston-Johnson on the \$6,067,400 project in California. Hayden was superintendent on the work until January, has since taken a position as superintendent for an English and Swiss joint venture on a hydro project in New Zealand. His replacement at Nimbus is E. W. Danielsen. A review of Winston-Johnson's prime contract operations starts on page 47 of this issue.



Edward C. Pinkston is superintending some cross-dike construction at Troutdale, Ore., for Kuckenberg Construction Co., who is doing the work at \$244,700. Job consists of clearing, drainage, including installation of 40-in. pipe, and the building of the cross-dike. General Construction Co. will handle the dredging of about 371,500 cu. yd. of material for Kuckenberg.

E. D. Harper is general superintendent and Dan Mulvihill is his assistant, working for Foothill Electric, who has the subcontract for electrical installation of powerhouse and switchyard on the Garrison Dam Project, Riverdale, No. Dak. This is a Corps of Engineers project being built by prime contractor Kaiser-Perini-Walsh. Project manager for this joint venture firm is R. C. Wilson.

Len Pulley, general superintendent, and Sam Ellerman, job superintendent, are key men on a \$268,490 job recently awarded to Sim J. Harris Co. for improvements on Johnson and Richardson avenues in El Cajon, Calif.

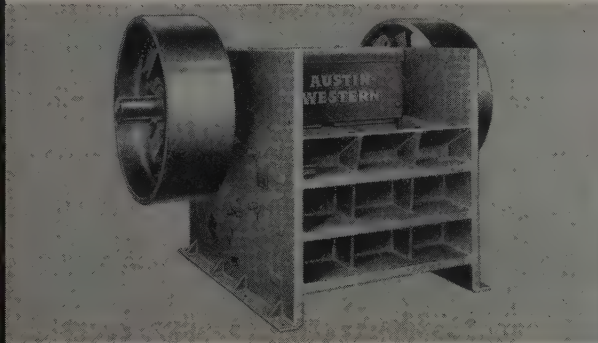
"Bill" Pullman is superintendent for Concrete Construction Service, Inc., which is erecting four bridges at a cost of \$160,000 for the City of Los Angeles. Job is located at Bull Creek channel, Van Nuys, Calif. General foreman is Tom Stipe.

J. C. (Dinty) Moore, general superintendent, assisted by Joseph N. Rabe, carpenter superintendent, and Fred Hollingsworth, labor superintendent,

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|---------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|
| Oversize shafts of Chrome Vanadium steel, the toughest and strongest material available.                                  | Yes  | No       | No       | No       |
| Bearings located so center line of bearing proper comes within side plate. Thus side plate bears thrust of crushing load. | Yes  | No       | Yes      | No       |
| Machined steel toggle plate for absolute protection instead of cast iron.                                                 | Yes  | No       | No       | No       |
| All bearings of anti-friction self-aligning type.                                                                         | Yes  | Yes      | Yes      | No       |
| All jaws and cheek plates made of manganese steel for maximum life.                                                       | Yes  | Yes      | No       | Yes      |
| Steel plate crusher frame for high strength without weight of cast steel frame.                                           | Yes  | No       | Yes      | No       |
| Total                                                                                                                     | 100% | 33⅓%     | 50%      | 16⅔%     |



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Roller Bearing Jaw Crusher



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and Screening Plant with 1036 jaw crusher

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**Vern Leiding** (right) shows **Adolph Bauer** of **A. Teichert & Son, Inc.**, around the site of a new concrete arch bridge across the Sacramento River. Leiding is superintendent on the job for **Charles MacClosky Co.**

heads the erection of an 8-story addition to the El Cortez Hotel in San Diego, Calif. **W. E. Kier Construction Co.** is doing the work at a cost of \$1,162,000. **H. S. Challis** is the time-keeper on the job.

**William F. Haeschel** is general superintendent for **Louis C. Dunn, Inc.**, who is building an office addition to the plant of **Consolidated Western Steel Co.** in Los Angeles. This is a \$300,000 job.

**Jack Evans**, superintendent, with the help of **Troy Newton**, crushing superintendent, is directing two con-

tracts for highway work in New Mexico recently awarded to **Harry Trotz**. One is a \$125,330 job consisting of 23 mi. of rolling and seal coat on U. S. 70, in Roosevelt County, and the other is for 55 mi. of similar work on various highways in Santa Fe, Torrance and San Miguel counties, costing \$113,743.

**Ward W. White** is superintendent on the \$2,000,000 job of **Peter Kiewit Sons' Co.** and **Fred J. Early, Jr., Co.**, joint venture contractor, for Section 1, Unit A, La Cienega-San Fernando relief sewer being built for the City of Los Angeles. He is assisted by superintendents **R. H. McKinney**, struc-

tures; **Harry Okert**, excavation, and **Fred Scales**, concrete. Other key men working for the contractor are: **R. J. Zack**, project engineer; **R. D. Brigrance**, general pile driver foreman; **J. D. Brown**, master mechanic; **S. W. Brown** and **C. F. Hansen**, tunnel foremen; **W. A. Madison**, labor foreman; **J. F. McLaughlin** and **James Kovack**, engineers. Other foremen on the job are: **W. R. Wampler**, pile driver; **C. A. Kinsey**, excavation; **W. W. Leland**, cement finisher; **W. D. Baldridge**, oiler, and HDR foremen **T. E. Martin** and **Samuel Padgett**. And in the office, **F. D. Nagel**, manager; **W. E. Fenelon**, accountant, and **Bonnie D. White**, clerk.

**Bill Lassetter** is general superintendent, and **C. F. Berryhill** is foreman on the Fort Moore Pioneer Memorial being erected in downtown Los Angeles for the City and County of Los Angeles. **Brock & Son, Inc.**, is contractor on the construction of this monument, a \$376,000 structure. **K. A. Adachi** and **D. Nagano** are the architects.

**Henry Von Der Kuhlen** is superintendent for a \$1,000,000 building under construction for **Transport Indemnity Co.** in Los Angeles, contract for which is being executed by **Pozzo Construction Co.** **Jack McPhee** is

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- A majority of the counties in the country now *prefer* the use of emulsions to hot asphalt, tar and cutbacks for surface treatments.

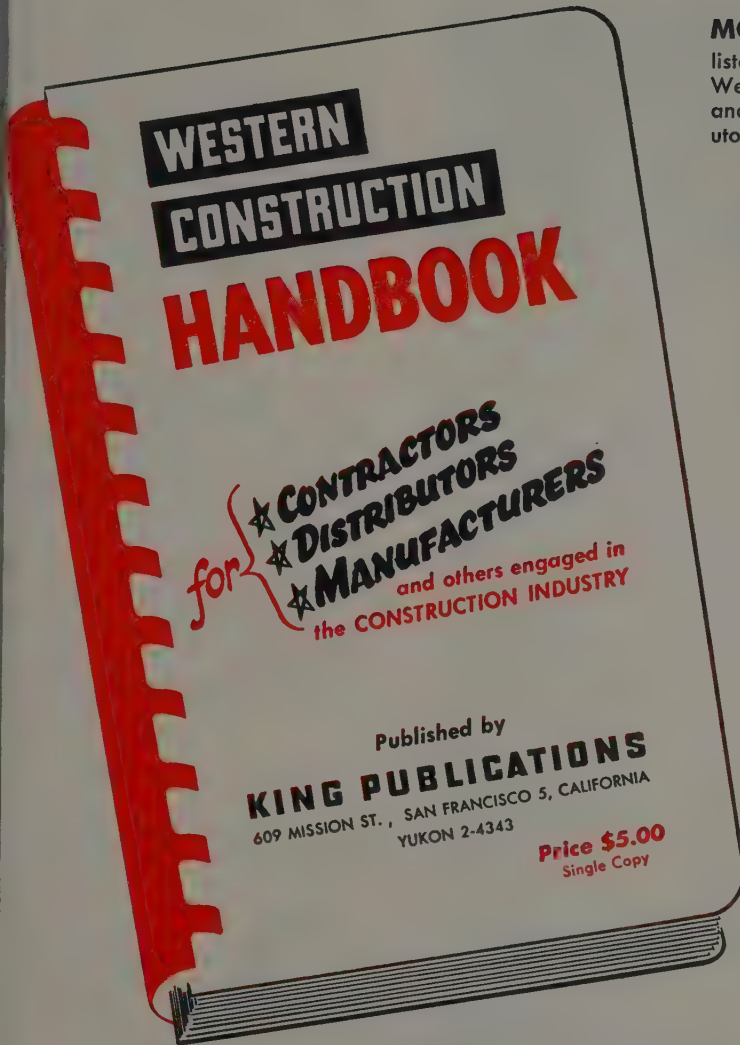
Our new booklet, "BITUMULS SURFACE TREATMENTS AND PENETRATION PAVEMENTS," gives full details on all types of Surface Treatments, Single, Double and Triple. There are Bitumuls Engineers working out of offices near you who will welcome an opportunity to discuss your Surface Treatment work.

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carpenter foreman and **Alex Morony** is labor foreman on the same job.

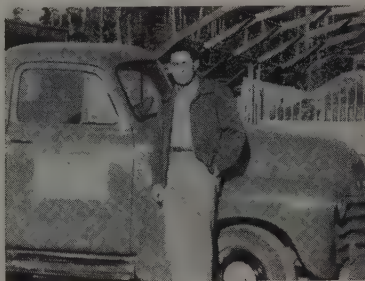
**Robert Bangar** is supervising a sewer project at Los Angeles for Vido Artukovich Co., who recently received the contract from the County.

**F. C. Matchette**, superintendent, heads the construction force building the addition to the Carnation Building in Los Angeles, a \$1,000,000 project being erected by William Simpson Construction Co. Other key men are **Ray W. Carson**, carpenter foreman; **Frank F. Martinez**, labor foreman, and **Charles Bolin**, paymaster. For Newbery Electrical Corp., subcontractor, **D. W. Pickering** is in the superintendent spot; and for How Bros., plumbing subcontractor, **Edgar M. Husted** is superintendent.

**R. M. Hayden** has accepted the general superintendent spot with Cubitts & Szchokke, joint venture contractor on the Roxburgh hydro project at Otago, New Zealand.

**E. H. (Bud) Smith** has been superintending some excavating and grading work in Reseda, Calif., for Kirst Construction Co. Grade foreman **J. C. (Red) French** and **Eric Lewis** also have been on the job.

**Joseph S. (Joe) Hare**, until recently employed by J. A. Jones Construction Co. at Palisades, Idaho, has moved to Alaska where he is working as general superintendent for Carson Con-



**Joe Hare**

struction Co., which is putting up high school buildings (gym, auditorium and classrooms) at Ketchikan. Structures are of rigid steel frame with paneled roof, wall and floor space, a type of building new in the Alaskan area.

**H. J. Shirley** is general superintendent on the North Reseda Junior High School being erected for Los Angeles County at a cost of \$2,000,000 by W. B. Nicholson, contractor. **H. E. Limburger** is Shirley's assistant. Others among the key personnel are: chief inspector **E. C. Neal**; office man-

ager **Sam Fisher**; carpenter foreman **Gordon Horn**, **C. W. Kidman**, **Earl Thompson**, **J. A. Odle** and **J. V. Shirley**, and labor foreman **Arturo Mazana**. Reinforcing steel work is being handled by Soule Steel Co., with **Otto Schneider** acting as foreman.

**Earnest Redfern**, job superintendent, heads a reinforced concrete conduit job for North H. Plunkett & Co., who recently received the award on a bid of \$664,583. The work is located at Aliso Creek and extends from the S. P. R. R. to Wilbur Ave., Northridge, Los Angeles County, Calif. Redfern has the assistance of **Joseph L. Castillo**, concrete superintendent, **Don Pardee**, engineer, and **Bob Twadell**, mechanic.

## 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.

Doyle Strong, 33, carpenter, suffer-

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ed a crushed chest and other injuries when he was buried under 30 tons of earth, and despite the heroic efforts of fellow workers who dug him out, he died later in the hospital. Strong had been working behind a 48-ft. retaining wall, part of the Ft. Moore Pioneer Memorial in Los Angeles, when the accident occurred. He was in the act of climbing a ladder to set forms for concrete when the rain-soaked earth gave way.

Ray M. Earslay, 34, electrical worker, while inside a building, fell to the concrete floor when a 9-ft. high scaffold railing broke as he backed against it. He was pronounced dead on arrival at the hospital. He lived in Richland, Washington, where the fatal accident occurred, and had been in construction work in the Northwest for many years.

William Derri, 33, a lineman working alone on a power pole removing a guy wire, was instantly killed when he came in contact with a 30,000-volt transformer. The accident occurred near Fort Morgan, Colorado. The crew members, who were working 600 ft. away, removed his body from the pole.

**ACCIDENTAL DEATHS** and serious injuries on the West's construction jobs are reported each month in the interest of promoting safety-on-the-job.

By the fast help of volunteers, William George was rescued from an 8-ft. ditch when a 200-lb. block of frozen earth caved in and fell on him. He was working on a new sewer installation at Grand Coulee, Washington, at the time. It was found at the Coulee Dam hospital where George was taken that due to the fast work of the rescuers his injuries were not serious and he was released the following day.

William Henry Clay, 53, Rio Linda, California, died from injuries as a result of a fall at Folsom Dam. Clay, an electrician, apparently lost his footing while carrying a rail across a trestle on top of the dam and plunged into a gravel bed 60 ft. below. He was pronounced dead on arrival at Mercy Hospital, Sacramento.

Iver C. Hansen, 35, a civil engineer for Solano County, California, was crushed to death when a tractor being mounted on a truck toppled over and pinned him to the ground. The accident occurred at Grass Valley where Hansen was spending the week-end with his brother Arlie who is in the sand and gravel business there. The victim was standing beside a ramp on which his brother was driving the tractor onto the truck. Hansen resided in Vallejo.



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# TRICKS of the TRADES

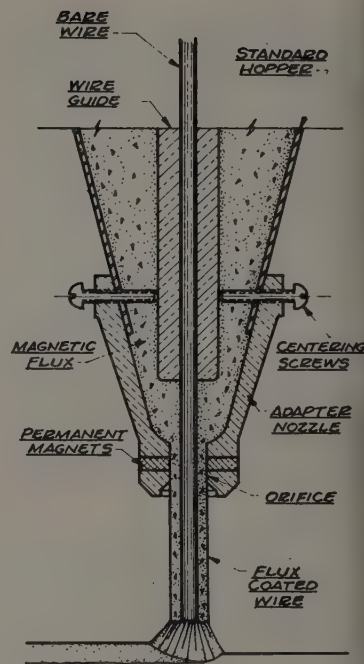
## Nozzle adapter for "squirt" welder speeds deposit of various alloys



ADAPTER TIP, replacing standard tip, governs amount and concentricity of flux coating.

A SIMPLE nozzle adapter for the conventional semi-automatic or "squirt" welder is announced by Stoody Co., Whittier, Calif. The device makes possible the deposit of various alloys at speeds far higher than can be obtained by ordinary manual welding, even exceeding the deposition rate achieved by the full automatic electric welding head. The process utilizes the magnetic field created by the passage of the electric current through the bare electrode, plus a magnetic alloy flux which coats the wire immediately ahead of the welding arc. The operating cycle is completed by the use of permanent magnets in the nozzle adapter which act as a dam to the flow of flux whenever the arc is broken.

Squirt welders now in use may all be adapted to operate with magnetic alloy flux. The photograph and sketch show clearly how easily the adaptation is made. The adapter tip containing the permanent magnets replaces the standard tip, centers the



CROSS SECTION through adapter nozzle shows operating cycle from start to finish.

wire to assure a concentric flux coating and governs the amount of flux applied to the wire.

The first material to be released is Stoody Magnecote 301 which produces a manganese deposit of full Hadfield properties. Other materials will be marketed very shortly, following conclusive tests.

Literature describing the alloy flux and the adapter nozzle is available and may be had upon request.

## Winch and float lick pump problems for hydraulicking



HYDRAULICKING can be pretty aggravating at times when your water supply is not constant. Lee Purtill, plant superintendent for the Granite Rock Company near Watsonville, Calif., found this to be so on his operation, which consists of stripping overburden to get down to the granite rock for quarrying purposes.

His water supply comes from the Pajaro River, which has a nasty habit of changing its level rapidly during the rainy season. Sometimes flash floods in the mountains above have caused the river level to change as much as 25 ft.

Each time this happened, he had to send a crew of men down to change the level of the priming pump, and more often than not by the time the pump could be changed the river level had changed again.

He got around this by installing a Link-Belt worm screw winch on a track. Now, whenever the river level

Concluded on page 116

UNITED STATES STEEL AT WORK IN THE WEST—the world-famous cable cars of San Francisco, Calif.



## SYMBOL OF A CITY . . . with a lifeline of steel!

Since 1873, when the cable cars first came to San Francisco, they have remained as the one outstanding symbol of the city by the Golden Gate. Up and down the hills they go, holding tight to their cable of steel. And from the earliest days, these steel cables have been produced in the Western mills of United States Steel.

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UNITED STATES STEEL

## Trencher digs into rock to start excavation

TRENCHING MACHINES usually are not standard equipment for excavating beds for water reservoirs, but a Texas contractor found that he needed a Cleveland Trencher to get one such job started and keep it rolling.



Whittle Construction Co. was excavating for a 2,500,000-gal. water tank in a residential section of Dallas. The under-surface formation of the site consisted of hard white rock—so hard that a dragline bucket could not even scratch the surface. So Whittle put his trencher to work on the project.

The trencher dug into the rock formation, excavating shallow trenches across the entire tank bed. This not only provided a volume of excavated rock but also left places for the dragline bucket to bite into the weakened rock bed. As each layer of rock was cleared away, the trencher dug the next level and prepared it for the haul out by the dragline.

## WINCH AND FLOAT

... Continued from page 114

changes, all he has to do is send a man down to crank the pump either up or down and keep the intake hose at a constant level. He wanted to keep the intake hose as near the surface as possible in order to avoid sucking sand and other foreign substances up from the river bottom.

Another problem encountered was when a whirlpool would form around the intake and air would be sucked up into the pump and ruin the priming. To cure this, he placed a float around the end of the intake hose to keep whirlpools from forming.

## TOOLS of the TRADES

Use the coupon on page 123 for free information on any of these items

301

**DRILLSTEELS**—Bethlehem Pacific Coast Steel Corp. has published a booklet called "Bethlehem Mining and Quarrying Steels." It's packed with pictures and specifications about hollow and auger drill steels, solid drill steel, broaching and channeller steels, and stone-dressing steels. Also contains recommendations for forging and heat-treatment.

302

**"HYDRAULIC POWER . . . Really a Simple Thing"** is a four-page booklet published by Henry Manufacturing Co. It tells, in simple language and with plenty of easy-to-understand drawings, just how hydraulic systems work. Also contains tips on servicing and lists recommended oils.

303

**A FOUR PAGE** folder describing and illustrating its line of steel folding legs



has been published by Wagner Manufacturing Co. Contains suggested uses and complete specifications.

304

**FEATURES** of the new Aircospot gun for inert-gas-shielded spot welding are described in a four-page folder just issued by Air Reduction Pacific Co. This gun, which weighs 4 lb., makes it possible to weld from one side only and needs no back-up plate. Specification list included.

305

**HARDFACING** and buildup rods and electrodes are described in a new 48-page, 2-color catalog just published by American Manganese Steel Division, American Brake Shoe Co. Full metallurgical and physical properties are given. A technical section, complete with charts and photographs, helps in selecting the correct hardfacing rod for unusual problems.

306

**HOW TO SPlice** rubber transmission belts is described in a 32-page, illustrated handbook just published by the B. F. Goodrich Co. Nine out of ten transmission belt failures are said to occur from belt fastener trouble. Each

step in splicing procedure is explained by photographs. Also featured is a series of tables for figuring endless belt lengths and how much time is needed to vulcanize belting of various thicknesses and types.

307

**BATTERY BOOKLET**—A 44-page booklet called "Storage Battery Technical Service Manual" tells all about how batteries are made, work, and how they should be installed and repaired. Published by The Association of American Battery Manufacturers, 2706 First National Tower, Akron, Ohio. Costs 30 cents.

308

**FASTER** and smoother welded deposit can be obtained by use of Coated Tube Stoodite, a new electrode designed for hard-facing heavy construction equipment, according to the Stoody Co. Deposits are semi-austenitic, not affected by ordinary heat-treat methods, and show a Rockwell C hardness of 56-60 under normal welding procedure. Descriptive literature is available. Fill out the coupon for more information.

309

**ANTI-RUST PAINT**—Rustrem anti-rust paint is described in Product Information Bulletin 55319-R, published by Speco, Inc. It is said to resist temperature changes by expanding and contracting with metal surfaces.

310

**THE SAW-MOR** Power Hack-Saw, a reciprocating saw attachment that fits both  $\frac{3}{4}$ - and  $\frac{1}{2}$ -in. electric or air drills



for power, has been announced by Saw-Mor Tool & Blade Co. The entire unit weighs less than 4 lb. Fill in coupon for more information.

311

**JETWELD**, a new electrode produced by The Lincoln Electric Co., incorporates powdered metal into the electrode coating. It is a heavily-coated, shielded-arc type for operation in flat or near flat positions which meets the physical requirements of class E-7016. Typical welding speeds in lap and fillet work are on the order of 12 to 15 in. per min. Available in  $\frac{3}{32}$ ,  $\frac{1}{8}$ , and  $\frac{1}{4}$ -in. sizes.

# HOLLOW

# COST MONEY!

If you hold to within 5% of grade (that's less than  $\frac{1}{2}$  inch on a 9 inch thickness of material) you are putting almost 176 cu. yds. of extra material in every mile of road. You estimate what those 176 yds. cost you in your area . . . Hollows cost money!

The Adnun equipped with the Fluid Level will materially reduce waste in spreading stone and other base course materials and in laying asphalt base and surface.

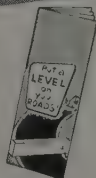
With the Adnun Fluid Level you supplement the amazing accuracy of Adnun Continuous Course Correction with a gauge control so positive that you can take out the dips that won't show under the straight edge. Continuous Course Correction removes the short hollows and combines with the Fluid Level to give you results ordinarily associated with long wheelbase.

With the Adnun Fluid Level you have full control from subgrade to finished surface. With each course laid by the Adnun to an absolute plane and to accurate thickness *all the way* across the road and for every mile, better density and longer road life with less waste of materials is a sure result. With the Fluid Level you should beat that 5%.

Don't throw away material! Figure closer with the Adnun and the Fluid Level. If you haven't seen the booklet, "Put a Level on your Roads," ask for it.

\* The Fluid Tells you it's Level. A turn of the hand adjustment wheel holds a positive grade. Every mile of road can be uniform as to thickness and density.

If you haven't seen the little booklet, "Put A Level On Your Roads," ask for it. It has some new thinking on road building.



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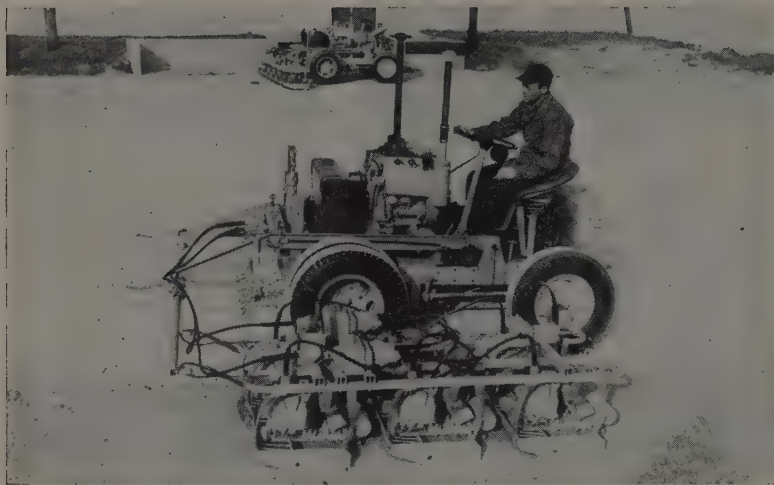
## BLACK TOP PAVER

## BLAW-KNOX COMPANY

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EQUIPMENT DIVISION

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## Multiple vibratory tamper adaptable to consolidation of many materials

THE JACKSON multiple vibratory tamper, which has found wide-spread favor as a medium for keying and filling rock base courses in macadam road construction, now can be readily adapted to the consolidation of all materials normally used in flexible base-course widening operations.

In this application, the six vibratory

compactor units, which are normally mounted ahead of the tractor for standard road construction, are assembled in tandem (single or double row), and towed at the side of the tractor over the widening strip. With three compactors in tandem (single or double row) complete compaction is achieved in one pass.

## Form work difficult at Sutherland Dam

AS COMPLETION of Sutherland Dam on Santa Ysabel Creek near San Diego, Calif., nears, a review of the problems encountered in its construction (*Western Construction*—

August 1953, p. 103; November 1952, pp. 63 and 116) shows that the concrete form work was extremely difficult and complex.

One example of difficulty encoun-



tered was when a heavy rainstorm caused floodwaters to back up on the newly-set forms, but the forms remained undamaged and pouring continued without interruption. Chief credit for this resistance to water damage went to Thompson's Water Seal, whose makers are proud of its performance on this project. For example, many of the 8 x 60-ft. arched panel forms have been used for six or more pours without any warping or raising of grain.

### Joint venture contract

Construction of the 162-ft. high structure, which will be able to store 36,700 acre-feet of water, is being performed under a \$2,896,485 joint venture contract by Bent Construction Co. and The Daley Corp.

## Galvanized metal paint designed to stick

PAINTS are steadily being developed for more highly specialized uses and one noteworthy example of designing to solve a particular job maintenance problem deserves to be better known by the painter. This is galvanized metal primer.

This paint, perfected in Du Pont Co. laboratories, solves a long-standing problem—a satisfactory material for finishing galvanized iron gutters, downspouts, and roofing. Orthodox coating materials will not stick to galvanized surfaces because of the chemical reaction between the zinc skin covering the iron and the vehicle found in ordinary paints.

But when the zinc dust from the small section of a two-compartment container is mixed with the specially formulated synthetic vehicle in the large can, a primer is produced which will adhere tenaciously to galvanized metal.

### Mix for job only

The material cannot be stored successfully once the metallic dust and vehicle or binder are combined. Consequently, you mix just enough for the job to be done.

When confronted with new galvanizing, it is necessary first to remove the factory-deposited oil and grease by a thorough cleaning with turpentine. Well weathered galvanized surfaces need only a soap wash and a clear water rinse. Rusted areas should be sanded well. There's no need to etch the surface chemically before painting.

Galvanized metal primer behaves equally well on copper surfaces and is specifically recommended for copper screens to minimize staining of sills and siding. Moreover, the life of galvanized screening can be prolonged several times by a properly applied coat of this highly protective coating.

## NEW LITERATURE

367

### Koehring bulletin

An 8-page, 2-color catalog covers the 15-ton lift capacity and ½-yd. dipper capacity Model 205 excavator by Koehring Co. Brief, concise text and 25 photographs and diagrams explain the machine's chief components and describe the 205's heavy-duty operating features when equipped with accessory equipment.

368

### On rock drills

Economy and operating features of the Silver Streak line of rock drills are contained in an 8-page bulletin packed with detailed description, specifications and photographs. Tells about other related tools, too. Bulletin 87-X by Joy Manufacturing Co.

369

### Cleveland catalog

A 4-page illustrated bulletin by Cleveland Trencher Co. describes its complete line of equipment. Each of Cleveland's seven models of trenchers and backfillers is given concise treatment, including specific advantages, typical job applications, specifica-

tions, and special Cleveland construction features of each model. Bulletin No. S-111-A.

370

### Sanitary landfill equipment

American Tractor Corp. has issued a 4-page bulletin on the Terratrak, a crawler tractor ideally adaptable for low cost sanitary landfill operations in the smaller community. Picture story shows this equipment on a hard day's job. Separate specification sheets on the models GT 34 and DT 34 Terratrak are also available.

371

### Tournapull job stories

Reprints of job stories on Model C Tournapull operations in various parts of the country are assembled in a booklet offered by Le Tourneau-Westinghouse. Illustrations are accompanied by informative data on haul length, load time and cycle time. Form TP-347.

372

### Athey catalog

Form No. A382 by Athey Products Corp. is on its Force-Feed HiLoader. Job photos show the HiLoader on a variety of applications and large detailed shot points out the salient features of this machine. Specifications

and diagrams are included. Send in coupon for a free copy of this 8-page publication.

373

### For subsurface explorers

Acker Drill Co. has published a 16-page catalog which covers a wide selection of soil sampling tools in general use. Diagrams and text point out salient features. Also lists and pictures related accessory tools, along with brief explanations of the use of each.

374

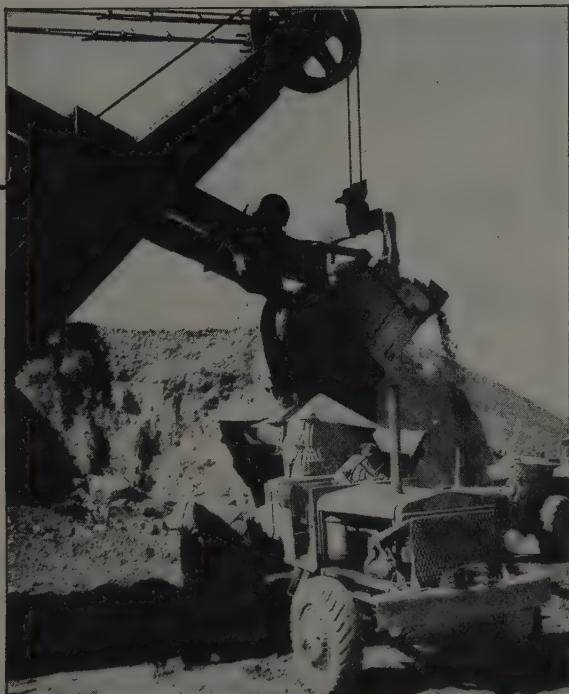
### Pipeline contractors!

An easy-to-read, folder-type booklet, "Here's Why You Find Cat-Built Machines On So Many Spreads," discusses the importance of control, teamwork, dependability and safety on spreading procedures. Includes many photographs of Caterpillar diesel-powered equipment in various phases of pipelaying operations. Form D404 by Caterpillar Tractor Co.

375

### "Belting for Industry"

Hamilton Rubber Manufacturing Corp. has a 4-page folder on rubber conveyor belting. Lists and illustrates various types and what they are used for.



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# NEW LITERATURE

Free copies of any of the items in this section may be obtained by using coupon on page 123.

312

## Wire rope fact finder

Columbia-Geneva Steel Division, U. S. Steel Corp., is offering a handy, pocket-sized indicator for ordering its Tiger Brand wire rope. All you have to do is slide an insertion back and forth to give you the size, strength, price and weight of ropes of the 6x37 classification, 7- and 19-wire galvanized strand rope, and ropes of the 8x19 classification. Also gives diameter tolerances. Form 1059.

313

## Snowlift information

Form NL-166, "How to Cut Snow Removal Costs up to 50%" is being offered by **National Lift Co.**, manufacturer of Snowlift hydraulic snow plow controls.

314

## Tautline cableways

Pictures in profusion—16 pages of them, plus sketches and text—describe types, spans, working loads and other details of tautline cableways. This 3-color informative catalog which illustrates cableways at work in various applications, will be of wide interest to construction and consulting engineers, public utilities and industrial concerns. General Catalog Section G by **Sauerman Bros., Inc.** Mail in coupon for your free copy.

315

## Steel bolts for structures

For finding the essential facts about high tensile steel bolts for structural joints, an information-packed 12-page bulletin by **Gary Screw & Bolt Division, Pittsburgh Screw & Bolt Corp.**, provides quick reference data on ASTM specifications, ASA standards, and assembly specifications of the Research Council on Riveted and Bolted Structural Joints for high tensile steel bolts. Text also presents a research report on the effect of various fasten-

ers on the fatigue strength of a structural joint. Bulletin 101.

316

## High-speed concrete forming

An illustrated 4-page folder by **Rocform Corp.** shows you the Rocform method of "package" concrete forming for high speed concrete wall construction—with no tie rods, walers, or forming lumber to purchase for replacement. An additional leaflet describes the company's new adjustable outside corner clamps and inside filler form which does away with fillers in forming.

317

## Lumber buyers handbook

The 1954 "Where to Buy" directory of the **West Coast Lumbermen's Association** is now available for lumber purchasers of Douglas fir, West Coast hemlock, Sitka spruce, Western red cedar and other woods. The details necessary for selecting mills able to furnish the needed lumber are arranged for quick availability. Information on capacities, equipment and special facilities, species and lumber items manufactured, augment the data and names of officials and addresses.

318

## Power driver bulletin

A 4-page bulletin offered by **Velocity-Power Tool Co.** provides photographs and details of the design, operation and numerous applications for its Model P Driver, a new portable powder-actuated tool for driving steel studs into steel, concrete or masonry, and for other work. Bulletin No. 1401-2.

319

## For drilling underground . . .

Bulletin No. 340 recently issued by **Sprague & Henwood, Inc.**, illustrates and describes two sizes of air-operated machines for either diamond core drilling or blast-hole drilling underground. Gives complete working data and specifications. Also summarizes the Sprague & Henwood line

of diamond bits and other accessory equipment for diamond core drilling of any kind.

320

## Builders behold! Authoritative stone catalog

A 48-page catalog giving full color photographs, detailed descriptions, characteristics and sources of the most important building stones should be of considerable interest to men in the building industry. It is the first time such a catalog of natural building stones has been made available. Color range, properties, size information and uses are given for each separate stone. The index gives a complete classification (according to dimensional stones, rubble stones and split face), plus every trade name, color classification, company and quarry location. In addition, the characteristics of the various building stones, such as limestone, sandstone and quartzite, are given in another section. Building stone is also classified according to cut stone, ashlar facing and flagstone. And there is also a complete general discussion of color and pattern in stonework. Free copies are offered to architects, engineers, builders and contractors if they will write on their business letterheads. Otherwise a charge must be made. This valuable catalog is being offered by **Stone Council, International Cut Stone Contractors' and Quarrymen's Association.**

321

## Pioneer brochure

A booklet, complete with specifications and details, describes the new Pioneer 35-S In-Line portable gravel plant. For a free copy of this 8-page, 2-color publication now offered by

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Quality Carbon and Alloy Steel Castings

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322

### Data on lightweight pipe

Naylor Pipe Co. is offering Bulletin No. 507 covering typical applications of its lightweight, lockseam-spiral-weld pipe and fittings. Included are standard specifications on 4- to 30-in. diameter pipe, plus data on fabricated fittings, flanges and connections.

323

### Tips about wire rope

"How to Get More Work Out of Your Wire Rope," a new free folder by Leschen Wire Rope Division, H. K. Porter Co., Inc., gives 17 tips for improving wire rope service. Suggestions for correct handling and storing and recommendations for proper use. All wire rope users and equipment operators should be especially interested.

324

### For testing cement . . .

A recently issued bulletin offered by Baldwin-Lima-Hamilton Corp. gives all the facts about a new 50,000-lb. cement tester. Its four illustrated pages cover evolution of the machine with the development of ASTM Test Method C 109-52. Features and specifications are included. Bulletin 4205.

325

### Three Owen brochures

Owen Bucket Co. is offering three illustrated new folders on its line of attachments. Form G-O85315 covers grapples; Form MD-O85310, clam-shell buckets; and a third is on Types K and S material handling buckets. Specification tables are included.

326

### Trailer information

A profusely illustrated 4-page bulletin covers the line of heavy-duty trailers manufactured by Rogers Bros. Corp. Featured is the Power-Lift detachable gooseneck trailer. Send in for a free copy.

327

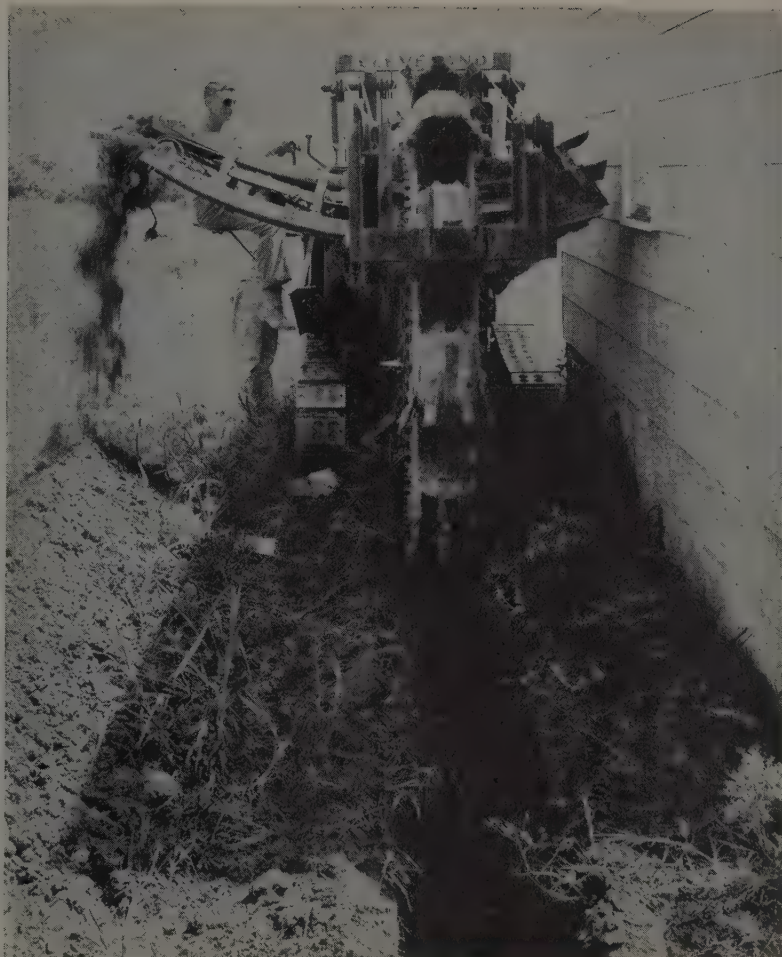
### Steel replacement parts

Bulletin No. 1051 covers Oro manganese steel replacement parts for the sand, gravel and crushed stone industries. Replacements listed include crushing surfaces for hammermills, disintegrators, roll, jaw, gyratory, and cone crushers, chains and links. Available from Kensington Steel Co.

328

### Power and profit

An illustrated, 2-color, 8-page booklet, "Power and Profit in Construction and Mining," shows Cat diesel engines and electric sets on the job in



## 20" from Trench to Wall

IN NORFOLK, VA. this Model 92 CLEVELAND "Baby Digger" shows how its useful compactness enables it to place a trench safely within 20" of a house wall. Balanced perfectly on its smooth full crawlers, the 92 maneuvers easily in even the closest quarters, with less damage to lawns, walks and driveways. Because it digs any size of trench from 10 to 20 inches wide and up to 5 feet deep, it is usable on a wide variety of jobs.



The 92 hustles safely from job to job . . . at legal limit speeds . . . because it's so easily portable on the drop-axle, tilt-bed CLEVELAND T5 Trailer.

*Write for descriptive literature and specifications or get the full story on CLEVELANDS from your local distributor.*



**THE CLEVELAND TRENCHER CO.**

*"Pioneer of the Modern Trencher"*

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*Dirt is removed for new Illinois Power & Light Company dam*



## JOB-ENGINEERED FINANCE PLANS



More power is on the way for eastern Illinois with the construction of the Illinois Power and Light Company dam. Helping push the job to completion is the E. E. Schnitzius Co., Inc., of Indianapolis. His portion of the project: speedy removal of  $\frac{1}{2}$  million yards of dirt, at rates up to 9,000 yards a day.

Mr. Schnitzius has always maintained his fleet at full readiness to take on and com-

plete projects like this one. In his own words: "C.I.T. Corporation installment purchase plans have helped me to put practically all my equipment on the job."

C.I.T. Corporation can help you to prepare your equipment fleet for larger and more profitable jobs. Meet your money requirements with either equipment financing or a capital loan. For quick action write or call one of the offices listed below.

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Chicago 1, Illinois



many parts of the world in both mining and construction operations. **Caterpillar Tractor Co.** has included in this booklet the story of how it rates this equipment. Detailed charts show the rated horsepower of all Cat diesel engines and the kilowatt output of all Cat electric sets. Form D309.

**339**

### Trip through a CraneMobile

A conversational style and plenty of drawings tell the story of the CraneMobile in this handy, pocket-sized booklet published by **Bay City Shovels, Inc.** Tells about its design, construction and operating features. Title is "All Lifts Are Easier With a CraneMobile."

## Literature briefs . . .

**330**

**BIGGER LOADS**—**Cook Bros. Equipment Co.** has made available detailed information on its Load King, a new 15-ton capacity heavy-duty truck for the construction industry.

**331**

**SAW CATALOG**—**Consolidated Machinery & Supply Co., Ltd.**, manufacturer of the Comet line of saws for the building industry, is offering complete catalog information on its new Utility radial saw.

**332**

**SAFETY ON WHEELS**—Find out about the Reversalarm, an automatic

warning gong for the protection of workers from the backing-up movements of trucks. Manufacturer **B. F. McDonald Co.** is offering bulletin and prices.

**333**

**TIMBER TIPS**—**Timber Engineering Co.** is offering a free book, "How to Build Wood Frame Teco Trussed Rafters."

**334**

**56-PAGE CATALOG**—As an aid to planning form work, **Superior Concrete Accessories, Inc.**, is offering a 56-page catalog on its line of form ties, anchors and other concrete accessories.

**335**

**EUCLID BULLETIN**—Form T551 by **Euclid Division, General Motors Corp.**, features spreading operations of its Twin-Power scraper.

**336**

**TRAILER CATALOG**—A free illustrated catalog by **Fruehauf Trailer Co.** covers its line of hard-working trailers for various construction requirements.

**337**

**SLUICE GATES**—**Chapman Valve Manufacturing Co.** has a catalog describing the various types and sizes in its standard line of sluice gates for waterworks, sewage works and flood control projects.

**338**

**DIESEL DATA**—**Detroit Diesel Engine Division, General Motors Corp.**, has a complete list of more than 750

different models of equipment for which its diesel power units are available for either original or replacement service.

**339**

**CRUSHERS**—Brochures by **Straub Manufacturing Co.** are being offered on its Kue-Ken crushers featuring direct crushing action.

**340**

**64 PAGES ON WIRE ROPE**—Do you want to find out about wire rope? **Leschen Wire Rope Division, H. K. Porter Co., Inc.**, has made available a 64-page handbook covering Red-Strand wire rope constructions.

**341**

**MIXALL**—Informative literature about the Mixall for maintenance and various small paving jobs is being offered by **Barber-Greene Co.**

**342**

**HOPTO BULLETIN**—For complete information on the Hopto, a low-cost machine for loading, trenching and excavating, send in for free literature by manufacturer **Badger Machine Co.**

**343**

**WATERSEAL**—**Thompson's Water Seal** for waterproofing all porous materials is the subject of informative literature by **By-Chemical Products Co.**

**344**

**ARE YOU ON THE LEVEL?** **Leupold & Stevens Instruments, Inc.**, is offering free information on its line of levels for builders and engineers.

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Organization.....

# NEW EQUIPMENT

More information on any of the items in this section may be obtained by using coupon on page 123.

345

## New machine mechanizes contraction joint sawing at about 3 min. per joint

Test results of new Di-Met production-type contraction joint cutter showed a total cycling time of about 3 min. per contraction joint, including moving the machine from one joint location to another. Introduction of this



machine thus makes possible the mechanization of contraction joint sawing and saves time on the job. The cutter, which measures 14 ft., 6 in. across with an 8-in. depth, spans the slab. An "H" beam serves as a track across the slab and supports a traversing carriage upon which are mounted two or more heavy-duty spindles which operate simultaneously, each carrying a Di-Met concrete blade (available in different diameters for making 0- to 6-in. variable cut depths), which is lowered into the concrete and takes a 6-ft. traverse. Wheel traversing speed is completely variable from 0 to about 25 ft. per min.; road speeds are adjustable at up to 75 ft. per min. Manufacturer is Felker Manufacturing Co.

346

## Portable belt conveyor can screen and load over 800 tons per hr.

A portable belt conveyor, available in 18-, 24-, 30- and 36-in. belt widths and various lengths, is designed for rugged service in gravel, clay and aggregate production. The 36-in. Model 101 (pictured) carries a Model SB-80 8-ft. x 48-in. vibrating screen which is entirely supported by the conveyor during operation and need not be re-



moved during transportation. Strong design of frame and carriage section permits installation of large 7- and 8-ft. vibrating screens, even on the smaller sizes. Likewise, a large gravel trap or hopper can be added to the tail section for either dozer or shovel loading. Other features include a self-cleaning tail pulley, bar-type self-lagged head pulley, all anti-friction bearings, choice of greaseless or regular ball-bearing idlers, pneumatic tires, and separate clutch for individual operation of vibrating screen and conveyor belt. Manufacturer is Kolman Manufacturing Co.

347

## 15-ton capacity truck crane version of Koehring's Model 205 excavator offered

Featuring a 15-ton lift capacity, a truck crane version of its recently improved Model 205 excavator has been announced by Koehring Co. The 205 can be adapted to clamshell, dragline, shovel and hoe; and for high lift crane service, straight boom jibs up to 30 ft. long, with cable and counterweighted hooks, are available. Its truck body has 10 forward speeds ranging from 2.03 mph. to

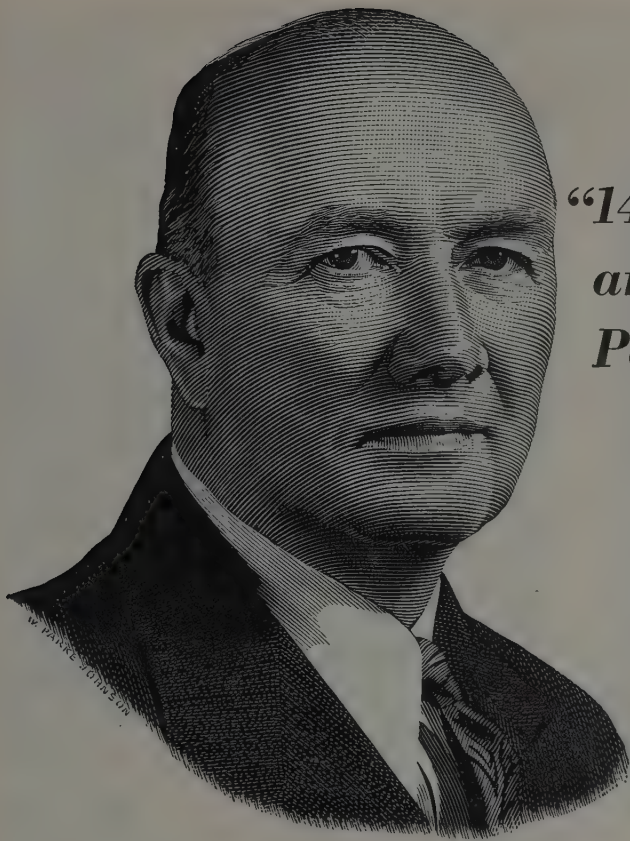


32.6 for travel. There are two reverse speeds. Other features are carburized flame-hardened steel gears, fully-enclosed for constant dirt-free lubrication, and automatic traction brakes. The crane operator's cab has been redesigned with levers rearranged for easier handling. The turntable swings on 4 adjustable hook rollers. When equipped as a shovel, the dipper is tripped electrically. Further details and prices are available.

348

## Compaction rollers added to Rosco line cover 60- and 84-in. wide areas

The Rosco-Pactor, a multiple wheel pneumatic-tired roller, has been added to the line of bituminous road and street equipment offered by Rosco Manufacturing Co. It is now being built in both 9- and 13-wheel types designed to assure equal weight distribution on all tires. Smooth tread 7.50-15 tires provide positive lap between front and rear tread. The larger model weighs 3,700 lb. and provides a compaction path of 84 in. The 9-wheel model weighs 2,820 lb. and has a 60-in. compaction path. Both have a



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# 4940 PILES DRIVEN without a hitch!

McKiernan-Terry Hammer driving the first concrete pile at the Terminal de Pasajeros in La Guaira, Venezuela. Frederick Snare Corporation, Contractors.



Four McKiernan-Terry Type S-8 Single-Acting Pile Hammers were used to drive 4940 concrete and steel piles on this important project . . . making a typically perfect McKiernan-Terry record.

Three of the hammers drove a total of 4000 18-inch square concrete piles, of 57-ft. average length. A fourth S-8 hammer drove 940 14-inch steel H-piles averaging 53-ft. in length. The report on this job states: "Performance of these hammers was excellent.

"All piles were driven to 63 tons bearing capacity, no mechanical difficulties were experienced with any of the hammers, and no repair parts had to be ordered."

Upon completion of the job, all four McKiernan-Terry Hammers were still in excellent condition, capable of a lot more work without requiring attention.

This performance record illustrates why so many contractors choose McKiernan-Terry Pile Hammers for speedy, accurate and economical pile driving. 11 Double-acting hammers, 5 single-acting hammers and 2 extractors are available

in the complete McKiernan-Terry line.

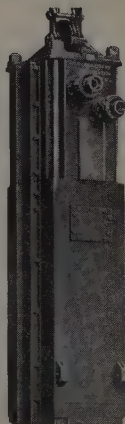
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Also manufacturers of Coal and Ore Unloaders and Bridges, Grab Buckets, Textile and Special Machinery

106-in. wheelbase, a 44-in. loaded height, and a 10-ft. box length. Data Sheet 54-F9 is available.

349

## Self-propelled pneumatic tired roller covers 72-in. area at 250 lb. per in.

Tampo Manufacturing Co. has announced the first self-propelled pneumatic tired roller for the construction industry. The new 9-wheel roller, Model SP9, has a 72-in. solid coverage rolling width with 250 lb. per lineal in., or



2,000-lb. maximum wheel load, of rolling width. Built either as a sand ballast or as a water ballast, optional equipment is available to suit varying job requirements. It has 31 hp. and high tractive effort, working speeds of 2½ and 4½ mph., both forward and reverse, with travel speeds up to 12 mph. Its small size, short wheelbase and hydraulic power steering make it a highly maneuverable unit. Drive wheels are non-oscillating to provide maximum ruggedness in design features as well as to give proper flotation to the drive set when operating in loose material.

350

## Grader attachment ideal for highway maintenance

A heavy (1,300-lb.) device, the Strathmore Road-Disc Attachment, is available for use with any make of motor grader. Highway maintenance crews should find it useful



for the care of weedy shoulders, which are speedily taken care of by the Road-Disc's 24 heavy 20-in. disc blades. It has a heavy channel iron frame and oil bath Timken bearings, which are mounted in an extra-heavy tube to assure positive alignment under all conditions. Manufacturer is Strathmore Machine Works.



# "Century"

ASBESTOS-CEMENT PIPE

installed in Penna.  
State Park

Hickory Run State Park in White Haven is one of several Pennsylvania Parks in which "Century" pipe has been used to supply water for recreational areas. For generations to come, this line will carry its full capacity, without the need for maintenance.

Long, trouble-free service is to be expected of "Century" pipe. Being non-metallic, this exceptionally strong, durable pipe cannot tuberculate, rust, or corrode. Its bore stays smooth and frictionless, keeping pumping costs low. It is light in weight, easy to lay, low in cost.

Before you decide on the pipe for *any* water-carrying line, for economy's sake you ought to find out all about "Century" pipe. Write for "Mains Without Maintenance"—an informative free booklet of real value to anyone concerned with water main construction.

**KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA**

*Nature made asbestos... Kearsbey & Mattison has made it serve mankind since 1873*



# flatten cost curves with UNIVERSAL Flat-base pipe



conduits



railroads



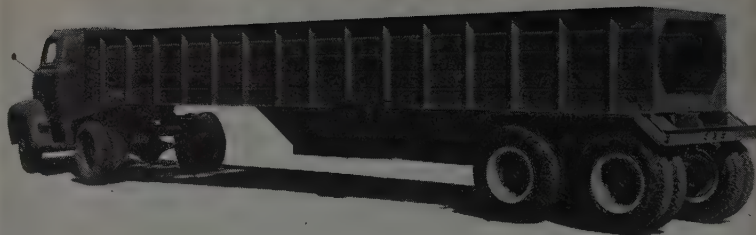
industry

Pre-cast concrete pipe saves up to 30% over built-in-place methods. Easy installation. Up to 100 feet of UNIVERSAL Flat-base pipe can be laid and covered in one day!

Built for heavy duty, low maintenance. Flatten your cost curves . . . specify UNIVERSAL Flat-base concrete pipe. Write . . . we'll tell you more.

## THE UNIVERSAL CONCRETE PIPE COMPANY

297 SOUTH HIGH STREET  
COLUMBUS 15, OHIO  
A subsidiary of the American-Marietta Co.



351

### Hopper dump trailer has 10- to 14-yd. capacity

A new trailer unit for hauling sand, gravel, cement and other materials is reported to be particularly suited for serving bins and overhead loading. It is available in both single and tandem axle models with 10- and 14-yd. capacities, respectively. The bodies, which

are fabricated from high tensile steel, are ribbed and braced vertically by triangular pressed steel posts, and diagonally by struts and gussets. The sand-tight dump gates are flanged and reinforced with steel channels. Separate trip mechanism is provided on the gates of each hopper. Dumping is in windrows which can be readily leveled by scraper. Manufacturer is Fruehauf Trailer Co.

352

### Lowest priced Moto-Crane has 6-ton capacity

The latest Lorain Moto-Crane, the 6-ton Model MC-104, is the lowest-priced Moto-Crane on the market, thus marking the manufacturer's re-entry in the small rubber-tired crane



field. It is fully convertible to a  $\frac{3}{8}$ -yd. shovel, hoe, clamshell and dragline. One of its outstanding features is a completely new, rugged 3-axle carrier. Side frames are 15 in. deep with massive front bumper and cross bracing built into the frame as a single weldment. It is equipped with a 6-cylinder, 112-hp. Ford motor and has 8 forward speeds up to 45 mph. and 2 reverse speeds. All ten heavy-duty tires give good flotation for soft ground travel. Carrier over-all width is 96 in. Manufacturer is Thew Shovel Co.

353

### Special reinforcing tie wire announced by Bethlehem

Bethlehem Pacific Coast Steel Corp. has started production of special reinforcing tie wire for speeding steel reinforcing bar placement. Produced in both 14- and 16-gauge stock spooled to fit present coil dispenser units, the wire content is about  $\frac{3}{16}$

to 4 lb. per coil and will be packed in cartons for convenient handling. It is made from new billet steel and is coiled from bright annealed wire stock.

354

### Truck mixers feature improved weight distribution

In new 5- and 6-cu. yd. capacity truck mixers the center of gravity has been moved forward and lowered by combining the pedestal and the 90-gal. water tank. The resulting improved weight distribution makes possible greater payloads on any 10-wheel truck of 175-in. wheelbase or more. A Chrysler 6-cylinder engine equipped with fluid drive offers exceptional operational control when used with the mixer's combination



throttle and over-center drum brake. All controls are conveniently located. The ratchet controlled chute, which measures 14 ft. when extended, accomplishes easy concrete placement. Manufacturer is Willard Concrete Machinery Sales Co.

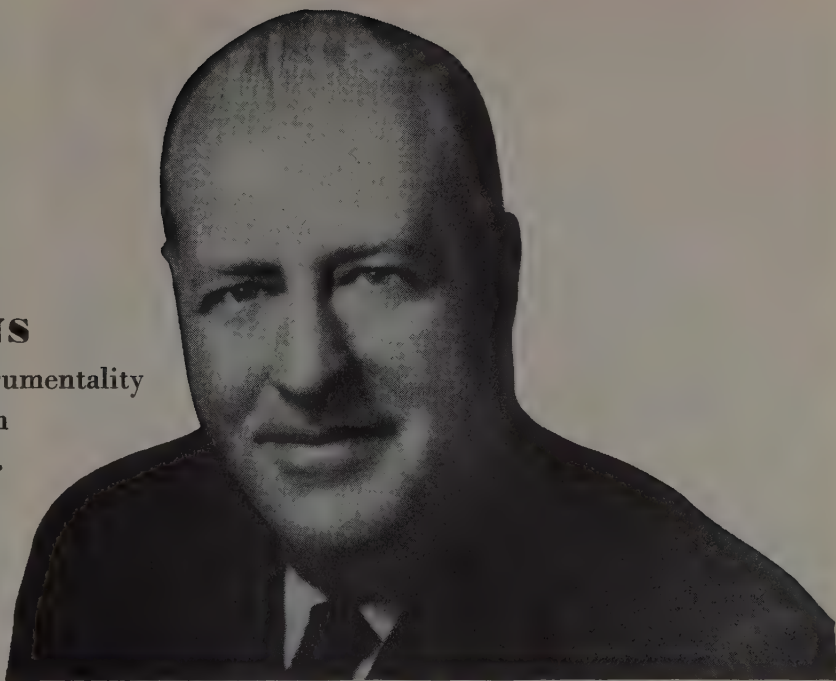
355

### Improved resin cement

An improved resin cement is reported to have superior rheological properties which minimize down time. It does not tend to run out of the joints and can even be used easily on

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constitute our greatest instrumentality for adult business education and exchange of know-how. They are veritable textbooks for the sciences, businesses, industries and professions that they serve."



*Lee H. Bristol, President, Bristol-Myers Company*

Staying ahead of important developments is a must for all executives in business, in industry, in professions. As Mr. Bristol says, business publications are veritable textbooks. But, more than that, they are current revisions of the texts of essential businesses, industries and professions. Forecast shadows of the coming events on the business horizon are shown to American leaders in each issue of business

publications. Specialized periodicals, often sharply focussed, cover many specific fields. No man in leadership, or in training for leadership, can afford to miss the regular reading of his business publications. That's why advertising pages of the Business Press make such a *direct route for anyone who has anything to sell to the buying factors in business, industry or the professions.*



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vertical and ceiling joints. It is completely resistant to alkalis, acids, solvents and salts at temperatures up to 375 deg. F. Manufacturer is Atlas Mineral Products Co.

356

### New crane carrier mounts Model T-35 Schield Bantam

Schild-Bantam Co. has added a new specially designed crane carrier to its line of trucks available for mounting the Model T-35. Featuring a rugged 12-in. "I" beam frame,



26,000-lb. rated rear axles and large tires, it provides maximum stability and versatility under all operating conditions. A short 16½-ft. turning radius affords outstanding maneuverability. It has a 148-in. wheelbase; 4-

wheel drive; 10 wheels; a Hercules JXC 6-cylinder gasoline engine developing 113 hp. at 3,200 rpm.; a 26-gal. gasoline tank, and a 5-speed transmission giving 10 speeds forward and 2 reverse. Other top features are its 2-position (forward and rear) mounting for the upper machinery and design to provide good clearance on either road travel or in restricted areas.

357

### Mobile heater designed for heavy-duty, outdoor drying

The Bes-D-Frostr, a blower type heater with axial fan, is a large unit for drying and curing concrete, cement, plastering, masonry and paint,



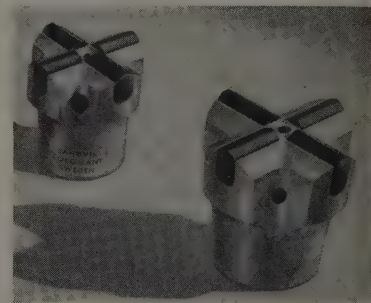
and also for heavy-duty outdoor drying of highways, concrete ditches, culverts and foundation work. Powered by gasoline engine or electric

motor, it lights instantly, requires no reheating, and is capable of producing 1 to 4,000,000 Btu per hr. Manufacturer is Besler Corp.

358

### New Coromant carbide-tipped detachable rock bits

A full series of carbide-tipped detachable rock bits, available in from 1½- to 4-in. diameters, have been added to the Coromant drill steel line.



Canadian tests showed these new tools to be drilling up to 300% more footage. The improvements are said to be the result of a new Coromant formula for the carbide insert and also a special Swedish steel used in the skirt and body of the bit. The Coromant line is manufactured by Sandvik in Sweden and is distributed

## YOUR BOND RATE COULD GIVE YOU THE EDGE ON YOUR NEXT BID!

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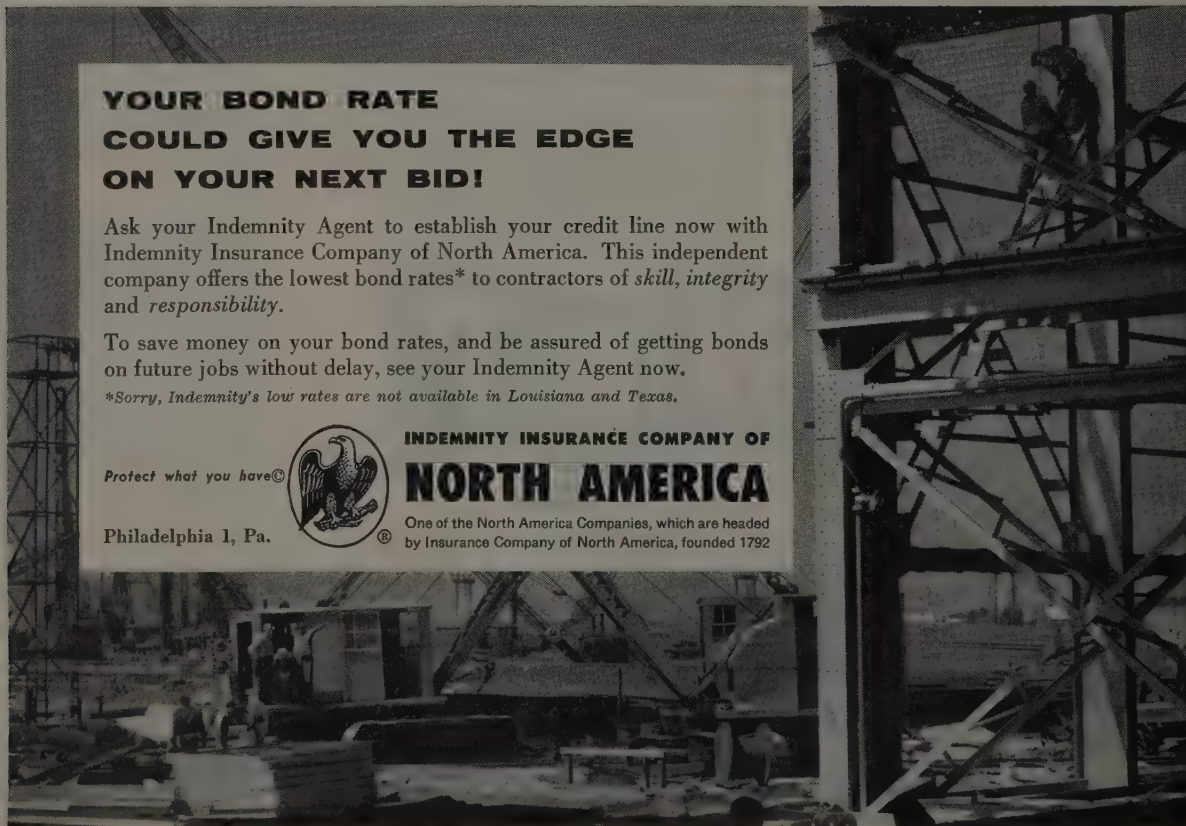


Philadelphia 1, Pa.

INDEMNITY INSURANCE COMPANY OF

**NORTH AMERICA**

One of the North America Companies, which are headed by Insurance Company of North America, founded 1792



in the West by Copco Pacific, Ltd. Literature on these new bits and other Coromant steel products and Atlas rock drills is available.

357

### Power Float compacts harsher, drier mixtures

A heavy-duty, portable compaction machine, the Kelley Compressor Power Float, has been designed for fast, efficient action over

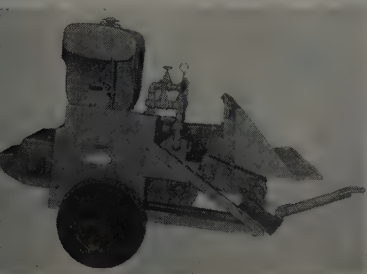


marsh, dry concrete or asphalt mixtures recommended for superior, dust-free floors. The heavy, rapid impact of the 4 compacting hammers on a rotating disc compacts, densifies and floats the slab to a smooth level surface for proper finishing. Manufacturer is Kelley Machine Division, Wiesner-Rapp Co., Inc.

360

### JR-54 Multi-Pug mixer handles up to 2 tons per min.

K. E. McConnaughay has announced its new Model JR-54 Multi-Pug portable asphalt mixer. The sec-



ond in the line of McConnaughay units engineered to handle cold mix, the JR-54 has a capacity of up to 2 tons per min. Proportioning of asphalt and aggregate is volumetric.

# Spectacular!

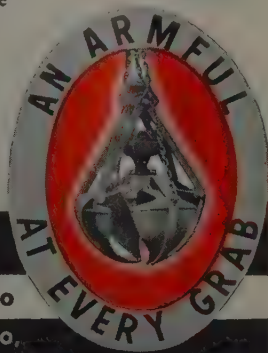
## YES!

### but also significant

Loads like this have to be handled infrequently but when they are encountered they can't be permitted to stop operations.

If it's an Owen Bucket you can handle such unusual, especially difficult loads without fear of damage to the bucket.

Long experience has taught Owen Engineers where to build in the extra strength in additional material or *special* steel to withstand the abuse to which all buckets are subjected occasionally. That's why they render service for uncommonly long periods with remarkably low repair and maintenance expense.



## THE OWEN BUCKET CO.

6060 Breakwater Ave., Cleveland 2, Ohio

BRANCHES: NEW YORK, PHILADELPHIA, CHICAGO, BERKELEY, CALIFORNIA, FT. LAUDERDALE, FLORIDA

## Ford announces 1954 line of trucks

Ford Division of Ford Motor Co. has announced its 1954 line of trucks, which are powered by five new, overhead valve, short-stroke, low-friction, high-economy truck engines designed

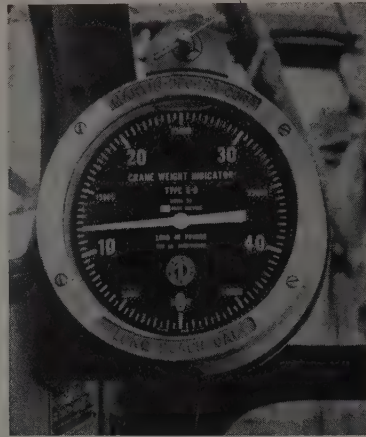


and developed exclusively for trucks. Features are the Series T-700 and T-800, with gross combination weights up to 60,000 lb., the first tandem axle trucks ever built by Ford, and the C-700 and C-900 cab forward series—two new Big Job trucks (pictured). The C-900, extra heavy-duty model, has the largest cab forward capacities ever offered by this manufacturer. Steering effort on all of the Big Job trucks is reduced as much as 75% by Master-Guide power steering. This new line of trucks numbers more than

220 models ranging from 4,000 to 40,000-lb. rated gross vehicle weight.

## Weight indicator for cranes with 50,000-lb. capacities

Another low-cost weight measuring device has been announced by Martin-Decker Corp. It can be at-

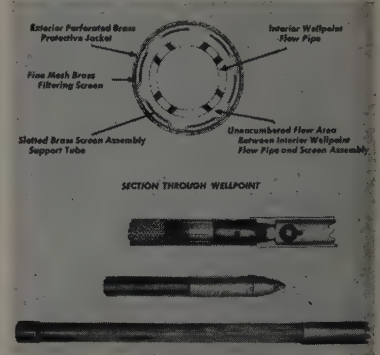


tached to boom cranes, bridge cranes or overhead hoists having capacities up to 50,000 lb. Designated the Type S-6, the indicating gauge is mounted by the operator for convenient tare

adjustment and accurate readability. Guaranteed accuracy is 1% of the maximum reading on the dial. Available in 10,000-, 25,000-, and 50,000-lb. capacities. Complete information is available.

## Wellpoints designed for free flow, higher capacity

A new wellpoint, the Freeflow, with patented features developed through years of research and field experience,



has been announced by Foundation Equipment Co. These features are as follows: A non-rust screen assembly which has no contact with the inner pipe and is without internal supports, resulting in an unobstructed flow area and greater capacity. No sand or silt pockets. Less maintenance; when necessary simply unscrew the jet head and remove screen assembly.

## Low-priced ladder hoist

A low-priced, 80-lb. ladder hoist, especially good for roofers whose operations are on one- to three-story buildings, is easily moved and easily operated. It can be mounted on any ladder up to 40 ft. Mechanism con-



**How to trench across a stream...**

**Ice and the swift current of Rock River presented a formidable hazard to a contractor engaged in laying 4 in. natural gas pipe. He consulted with Sauerman engineers.**

The result was an efficient working arrangement using equipment best suited for that particular job. The crossing was made with minimum expense and risk.

A track cable was stretched across the river and hung so it closely paralleled the slope of the river bed. A Sauerman Crescent Scraper was attached to a single-wheel carrier which rode the track cable. Digging depth was almost automatic, since the scraper could dig no further than the length of the cable which attached it to the carrier. The track cable also served to keep the scraper working in a straight line.

The ¾-cu. yd. Crescent was powered by a two-drum hoist. Maximum span was 700 feet. One man handled the entire trenching operation. A second man was used occasionally to check the depth of the cut. Material pulled in by the scraper was removed by a small clamshell.

For more information and some new ideas, write for Field Report 219, Scrapers with Boom Machines, Field Report 209, Scrapers with Tractors and Catalog J.



**SAUERMAN BROS., Inc.**

524 S. Clinton Street, Chicago 7, Illinois



sists of a motor with a V-belt drive to a drum with a capacity of 125 ft. of  $\frac{1}{2}$ -in. manila rope. Capacity is 100 lb. When this hoist is mounted on an auxiliary hoist stand or tubular scaffold and wire rope is used, its capacity is increased to 200 lb. Two levers control operations. Electric motor model sells for \$108 and gasoline motor model sells for \$137.50. Manufacturer is Reimann & Georger.

365

### Model 20 Shovel loader lifts 1,500 lb.

A partner of the larger Shovel loaders is the Model 20, which digs, loads, carries and dumps via front-end loader boom arms. The Model 20 has a 12-

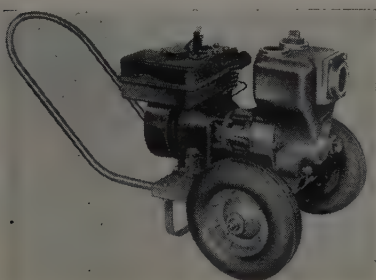


cu. ft. loader bucket which lifts a 1,500-lb. load to a 7-ft. height. Its short 90-in. turning radius permits close work both inside and outside. Gasoline-driven, the new unit has 4 forward speeds and one reverse speed. Maximum travel speed is 14 mph. Manufacturer is Baker-Lull Corp. Send in for Form No. AD-60.

366

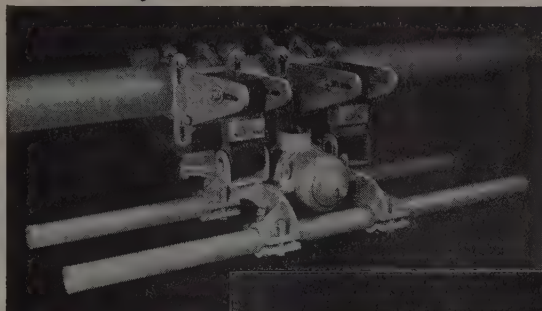
### New line of self-priming centrifugal pumps

Jacuzzi Bros., Inc., has announced a new line of self-priming centrifugal pumps for de-watering excavations and quarries or for any other applica-



tion demanding rapid movement of large volumes of water. Improved design features a balanced type of priming port which prevents loss of capacity due to re-circulation of water. Specially built to handle muddy or unclear water, they are now available in a wide range of horsepower ratings with choice of electric motor, gasoline engine, or heavy-duty transmission head for belt drive. Bulletin JCT-2 contains complete details.

## SURFACE and INTERNAL VIBRATION for CONCRETE PAVING



### INTERNAL TYPE

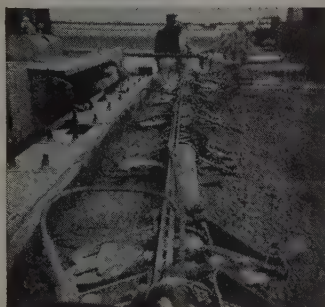
Tubes vibrate deep in concrete. One unit, as shown, for each 5'-0" (maximum) of slab width. Usually attached to front of finisher.

### SURFACE TYPE

Tube vibrates on surface. Accomplishes thorough densification of 10" concrete slabs. One unit, as shown, for each 6'-0" (maximum) of slab width. Usually attached to rear of spreader.



## JACKSON GIVES YOU BOTH!



A 25', 5-motor Tube of the internal type quickly plasticizing a tough mix on thick slab construction.



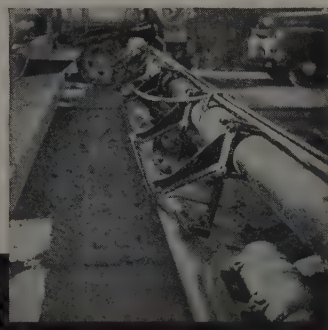
On this job, on which no spreader was used, the Paving Tube materially reduced the cost of spreading concrete.

In this view note the highly plastic condition of the concrete accomplished by the surface type Paving Tube towed by the spreader.

The contractor who owns a Jackson Paving Tube can quickly switch from INTERNAL to SURFACE vibration, or vice versa, and meet any concrete slab specifications — at a minimum of equipment investment.

Supplied with extraordinarily powerful motors, the JACKSON INTERNAL Paving Tube will thoroughly vibrate all concrete slabs as thick as 24" and as wide as 25', quickly plasticizing the very dry, harsh mixes. Attached to a standard finisher, its use materially reduces spreading labor where no spreader is used. Adapted to SURFACE vibratory operation, it will do a perfect job of vibrating any mix in depths up to 12". Powered by a Jackson Portable Power Plant mounted on parent equipment and controlled by its operator.

For better results and lowest possible costs buy a JACKSON Vibratory Paving Tube. See your Jackson distributor or write for complete details.



**JACKSON VIBRATORS, INC.**  
LUDINGTON MICHIGAN

# Westerners who attended the AED convention

## Arizona

Arizona Equipment Sales, Inc., Phoenix—Joe E. Angle.  
State Tractor & Equipment Co., Phoenix—Harold R. Bone  
and J. R. Robinson.  
Western Machinery Co., Phoenix—R. B. George.

## British Columbia

Air Equipment Service, Ltd., Vancouver—D. E. Dickey  
and C. P. Ritchie.  
B. C. Equipment Co., Ltd., Vancouver—S. F. Crocker.  
Dietrich-Collins Equipment, Ltd., Vancouver—James B.  
Collins and Larry R. Van Kleeck.  
International Agencies & Machinery Co., Ltd., Vancouver  
—H. G. Malcolmson and D. S. Dick.  
Purves Ritchie, Ltd., Vancouver—L. W. McRae and R. C.  
Atkinson.  
Vancouver Equipment Corp., Ltd., Vancouver—J. G. G.  
Morgan.  
A. B. Wing, Ltd., Vancouver—F. A. Templeton and A. B.  
Wing.

## California

Allied Equipment Co., Fresno—M. C. Orendorff.  
Edward R. Bacon Co., San Francisco—Albert P. Hahn  
and Jack H. How.  
Brown-Bevis Industrial Equipment Co., Los Angeles—  
V. V. Bailey, C. E. Skidmore, and Roy Whiting.  
Buran Equipment Co., Oakland—I. R. Kramer.  
Casey-Metcalf Machinery Co., Los Angeles—T. D. Casey  
and Edward Metcalf.  
Coast Equipment Co., San Francisco—Paul R. Egli and  
W. M. Nosman.  
Contractors' Machinery Co., San Francisco—Bill Beatty.  
Crook Co., Los Angeles—Al Chappell.  
Electric Tool & Supply Co., Los Angeles—A. R. Williams.  
Fornaciari Co., Los Angeles—Paul Fornaciari.  
Garlinghouse Brothers, Los Angeles—R. N. Armstrong  
and A. F. Garlinghouse.  
C. H. Grant Co., Oakland—Charles H. Grant.  
Gridley Equipment Co., Los Angeles—Horace Gridley.  
Harron, Rickard & McCone of So. California, Los Angeles  
—James W. Savage and Alex B. Todd, Jr.  
Kern County Equipment Co., Bakersfield—J. A. Michels.  
Geo. E. Philpott Co., San Francisco—Paul A. McDonald  
and George M. Philpott.  
Sacramento Valley Tractor Co., Sacramento—W. H. Pahl.  
Shaw Sales & Service Co., Los Angeles—Beal Shaw and  
W. B. Shaw.  
Western Machinery Co., San Francisco—Herb Mayer.  
Western Traction Co., San Francisco—John Jorgansen.

## Colorado

Colorado Builders' Supply Co., Denver—Charles E. Berry,  
J. P. Fellows, Charles B. Hansen, and James D.  
Maitland.  
Ray Corson Machinery Co., Denver—J. J. Booth and R. E.  
Corson.  
Gunderson-Taylor Machinery Co., Denver—Edward F.  
Taylor.  
Liberty Truck & Parts Co., Denver—F. V. Altwater, R. F.  
Carlson, and W. W. Carlson.  
McKelvy Machinery Co., Denver—J. R. McKelvy.  
H. W. Moore Equipment Co., Denver—Walter Babcock  
and J. C. Moore.  
Power Equipment Co., Denver—W. J. Faulkner.  
S & M Supply Co., Grand Junction—D. G. Son.  
Western Machinery Co., Denver—L. M. Jones.

## Hawaii

Edward R. Bacon Co. of Hawaii, Ltd., Honolulu—E. R.  
Bacon.

## Idaho

Engineering Sales Service, Inc., Boise—H. W. Hurd.  
Intermountain Equipment Co., Boise—A. Aldecoa, Philip  
A. Dufford, and R. W. Stevens.  
The Sawtooth Co., Boise—A. H. Burroughs, Jr.  
Western Equipment Co., Boise—G. M. Gehrke.

## Montana

Caird Engineering Works, Helena—Howard W. Bogie.  
Hall-Perry Machinery Co., Butte—L. E. Jones.  
Industrial Equipment Co., Billings—W. C. Hardie.  
Mountain Tractor Co., Missoula—V. R. Howell.  
Normont Equipment Co., Great Falls—J. B. Beatty.  
Seitz Machinery Co., Billings—E. K. Kleckner and Mel-  
vin Seitz.  
Western Construction Equipment Co., Billings—Harold  
M. Doolen.

## New Mexico

J. D. Coggins Co., Albuquerque—K. G. Pettyjohn.  
Contractors' Equipment & Supply Co., Albuquerque—  
D. U. Rakestraw.  
Lively Equipment Co., Albuquerque—W. E. Lively, Jr.  
N. C. Ribble Co., Albuquerque—Ray L. Collins and N. C.  
Ribble.  
Smith Machinery Co., Inc., Roswell—Cecil Schrimsher.

## Oregon

Cal-Ore Machinery Co., Medford—John M. Garner.  
Clyde Equipment Co., Portland—Oscar Bjorge and W. H.  
Booth.  
Columbia Equipment Co., Portland—F. B. McBath and  
Jim Wahoske.  
Contractors Equipment Corp., Portland—O. C. Jessup.  
Cramer Machinery Co., Portland—C. P. Cramer.  
Feenaughty Machinery Co., Portland—D. J. Feenaughty  
and M. B. Mack.  
Howard-Cooper Corp., Portland—F. R. Cooper and F. S.  
Parker.  
Loggers & Contractors Machinery Co., Portland—A. F.  
Sersanous.  
Western Equipment Co., Portland—A. E. Vanstrom.

## Utah

Arnold Machinery Co., Salt Lake City—R. L. Arnold and  
J. W. Plant.  
Cate Equipment Co., Salt Lake City—Birt E. Slater.  
Foulger Equipment Co., Salt Lake City—W. E. Archer,  
B. L. Foulger, and D. E. Foulger.  
Heiner Equipment & Supply Co., Salt Lake City—Keith  
P. Heiner.  
The C. H. Jones Equipment Co., Salt Lake City—Russell  
S. Stewart.  
Kimball Equipment Co., Salt Lake City—J. F. Kimball.  
The Lang Company, Inc., Salt Lake City—Richard H.  
Rampton and Frank E. Scheffner.  
Lund Machinery Co., Salt Lake City—Joseph N. McRae.  
Rocky Mountain Machinery Co., Salt Lake City—L. W.  
Gurr and Leland Knudson.  
Western Machinery Co., Salt Lake City—L. T. McGuire.  
Wheeler-Kershaw Co., Salt Lake City—Walter W. Ker-  
shaw and J. K. Wheeler.

## Washington

Construction Equipment Co., Spokane—F. G. Peterson, Jr.  
and Ray Post.  
A. H. Cox & Co., Seattle—G. H. Jamison and J. A. Widrig.  
General Machinery Co., Spokane—E. J. Simons, Jr. and  
Mrs. E. J. Simons.  
Modern Machinery Co., Inc., Spokane—C. H. Davis.  
Universal Equipment Co., Seattle—F. R. Steckel.  
Western Machinery Co., Spokane—H. A. Myers.  
Western Tractor & Equipment Co., Seattle—Harry B.  
Fay, Sr., Jack Fay, and Ted Fay.

## Upping sales, dropping costs are AED topics

**H**OW TO INCREASE SALES and decrease costs was the subject uppermost in the minds of the more than 2,800 equipment distributors and manufacturers who attended the 35th Annual Meeting of the Associated Equipment Distributors at the Waldorf Astoria Hotel in New York City from January 31 through February 4.

Featured on the program were a talk by Leo Cherne, president of the Research Institute of America on "Human Relations in Selling," a panel discussion on "Building Distributors' Sales," a panel discussion on "Questions of Paramount Importance to Distributors in the Coming Year," and a series of talks on "Cost Reduction" by management consultants and accountants.

Some 124 Western distributors were there to discuss the special problems encountered in the West as a region and to make sure they were keeping up to date in equipment innovations.

New officers of the association elected at the meeting include George W. Gagel, president of Machinery & Sup-



Gagel

Shaw

plies Co., Inc., Kansas City, Mo., selected as president to replace S. John Oechsle; R. J. Finn, executive vice president; F. J. Fitzpatrick, treasurer; and the following vice presidents: S. F. Laskey, L. M. Doolen, and R. S. Hamilton.

Beal Shaw, president of Shaw Sales and Service of Los Angeles, was installed for his third term as director of Region 11.

Frank Skidmore, former general manager of Contractors' Equipment & Supply Co., Albuquerque, New Mex., who was elected executive vice president at last year's Chicago meeting (*Western Construction*—March 1953, pp. 170-172), has been appointed Director of Industry Relations, a new position created in the Association's development of an enlarged program of industry relations and membership services.

His activities will be concentrated on various projects having to do with distributor-manufacturer relations, customer relations, distributor-man-



## Building a Reputation

In construction, perhaps more than in other fields, a man is known by his accomplishments. Let a contractor do an outstanding job and the word gets around — his reputation grows.

That's true of bonding companies, too. The reputation that the Aetna Casualty and Surety Company enjoys with contractors everywhere is the result of outstanding service to the construction industry.

Wherever you are, whatever the size of your project, Aetna is in a position to render you prompt, efficient, helpful service.

The next time you need a bond, why not join the many hundreds of leading contractors who bond with Aetna—always.

**No job too big--no job too small**

**ÆTNA CASUALTY AND SURETY COMPANY**

AFFILIATED COMPANIES: ÆTNA LIFE INSURANCE COMPANY  
 AUTOMOBILE INSURANCE COMPANY • STANDARD FIRE INSURANCE COMPANY  
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That has been the **MALL** Objective for over 20 Years of Concrete Vibrator Manufacture

MALL pioneered in the development of concrete vibration—and over the years MALL Vibrators have earned the reputation of *being good* and *staying good*. Reason: MALL developed the best method of vibration, built the best type of machine to use it, and kept job-testing and making improvements until today MALL Vibrators have a quality, stamina and performance that gets jobs done faster, easier and better than ever before. Job-test one.

### A VIBRATOR FOR EVERY JOB

Take your pick—gasoline engine, electric or pneumatic—a wide choice of models in many sizes to meet every job requirement. Get more facts—mail the coupon.

40 Factory-Owned Service Warehouses, Coast to Coast for Fast, Dependable Service.

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Send me more facts about Mall Concrete Vibrators.

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Firm \_\_\_\_\_

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CU-100

agement methods, and other technical and semi-technical programs sponsored by the Association. He will work from the AED's national headquarters in Chicago.

The new president's program can probably best be expressed in these excerpts from his installation address:

"... this administration will seek to step up and intensify the services which a full-grown trade association should render to its membership.

"You have recently been notified ... regarding a much-needed addition to our permanent staff in Chicago." (Frank Skidmore's appointment). "This will be the first time in many years that AED will have available a competent and well-versed industry man coming directly from the ranks of the distributor on a full-time basis ... Frank Skidmore should lend us real and valuable assistance on some of the problems confronting us.

"... a start will be made on what we hope will be a permanent policy of joint regional meetings.

"We will endeavor to plan and promote with our best customers, the AGC, a network of local joint AGC-AED meetings and committees wherever such local organizations exist, so that a better understanding of the service distributors and their organization can render, will result.



**AED PAST PRESIDENT A. F. Sersanous, (left)** who is president of **Loggers & Contractors Machinery Co., Portland**, adds a past president's pin to the lapel of **S. John Oechsle, Metalweld, Inc.,** who was AED's 1953 president.

"We propose to intensify our efforts, through a joint committee and our executive office, to achieve the goals which both manufacturers and distributors have long sought in the field of distributor-manufacturer relations. This effort should broadly deal with service policies, territorial and distribution policies, a more com-

## YUBA-SCHROCK MOTORIZED HEAD PULLEY For Belt Conveyors and Bucket Elevators

### "PULLEY WITH THE DRIVE INSIDE"

Safe, compact, simple  
—no chains, no belts,  
no sprockets, no  
exposed motors.



Built by YUBA for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington.

Built and sold in other states by Iowa Manufacturing Company, Cedar Rapids, Iowa.

Pulley shell of this revolutionary head pulley rotates around electric motor and reduction gears, which are held stationary by torque arm attached to conveyor frame. Quickly in-

stalled—requires no more room than idler pulley. All moving parts protected against weather, grit, dirt. Diameters 10 1/2" to 56". 1/3 to 125 hp. for voltages to 2300. Job proved.

Write **TODAY** for folder and name of nearest distributor.



**YUBA MANUFACTURING CO.**

Pulley and Sprocket Dept.

Phone 628

Benicia, Calif.

70

prehensive understanding of the responsibility of both manufacturer and distributor, and related problems.

"On the whole, this can be a good year. You distributors are just as competent as I, if not more so, in making predictions. However, there is no good solid reason why—if we work a lot harder, make intelligent adjustments in our individual operations, and face conditions with real American courage—1954 should not, on the average, measure up to another satisfactory year."

#### Wooldridge appoints new Arizona rep.

Shriver Machinery Co., Phoenix, has been appointed exclusive distributor for Wooldridge earthmoving equipment for the entire state of Arizona, with the exception of Yuma County, it is announced jointly by the Wooldridge company and the Arizona firm. Heading the Shriver organization are W. R. Shriver, president; E. M. Michels, sales manager; L. G. Edwards, service manager, and A. V. Ehrman, office manager.

#### Washington firm shortens name

Charles W. Thompson, president of Washington Machinery & Storage Co., Seattle, announces that his company has shortened its name to Washington Machinery Co. Under its former name the firm has been prominently identified as a supplier of heavy construction, industrial and allied machinery. Ownership and organization remain the same, with John P. Studebaker as vice president and general manager, and Hil Berglund, secretary and production manager.

#### Ryerson named Carlon plastic pipe distributor

Joseph T. Ryerson & Son, Inc., steel service organization, is now distributing plastic pipe and fittings produced by Carlon Products Corp., according to an announcement by J. L. McDermott, manager of the industrial plastic division of Ryerson, who says Carlon plastic pipe weighs about one-eighth as much as steel pipe and is comparable in price to galvanized pipe. Information on this product may be secured from any of the four Ryerson plants in the West, located in San Francisco, Los Angeles, Seattle and Spokane.

#### News from Foulger

According to an announcement by B. L. Foulger, president and general manager of Foulger Equipment Co. of Salt Lake City, Jack A. Vetchell is now directing the entire sales organization of the company. Formerly, Vetchell was industrial division district manager for J. I. Case Co., Portland, Ore.

News is also announced that Foulger has been appointed distributor in

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Form more contact area per man hour with **UNI-FORM** Concrete Forms... the **MECHANIZED** concrete forming system

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**Forms**  
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- Automatic accuracy of wall widths for faster erection
- Alignment and bracing on 1 side only—substantially reduces labor, material cost
- Fast job starts . . . Ready to use when they reach the job—save time
- LOWEST ALL AROUND CONCRETE FORMING COSTS

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BOW LAKE EQUIPMENT COMPANY . . . . . Seattle, Wash.  
McCRACKEN-RIPLEY COMPANY . . . . . Portland, Oregon  
UNIVERSAL FORM CLAMP CO. . . . . San Leandro, Calif.  
UNIVERSAL FORM CLAMP CO. . . . . Los Angeles, Calif.

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**NEW FACILITIES** of Air-Mac, Inc. of Washington are now ready for business. The building has a display floor space that is 100 ft. long and 40 ft. wide.

Utah, eastern Nevada, western Wyoming and southeast Idaho, for Clark Equipment Co., Industrial Truck Division, world-wide handler of industrial trucks and allied equipment. Appointment of this new distributorship marks the first time Clark has had an Intermountain representative with a complete parts and service facility.

#### New Nevada outlet for Euclid

The Euclid Division, General Motors Corp., announces the appointment of Sierra Machinery Co., Inc., as a new distributor of Euclid earth-moving equipment in the state of

Nevada. Included in the territory covered is all of Nevada except White Pine, Elko and Clark counties adjoining Utah, as well as a number of counties in California adjoining Nevada to the west. Sierra, with headquarters in Reno, is an established machinery house well equipped to provide complete sales and service facilities. J. D. Burgess, president, has been active in the construction equipment field for many years.

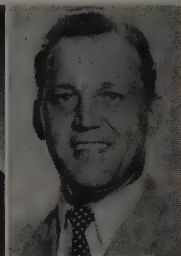
#### Air-Mac has new site

Air-Mac, Inc. of Washington recently moved into a new, ultra-modern building with larger sales, service,

shop, yard and display facilities. Located at 3838 Fourth Ave. So., Seattle, the new facilities provide display floor space 100 x 40 ft., visible to the public both day and night through large floor to ceiling windows. Every possible sales, parts, shop and parking facility has been provided to assure customers of top quality performance. S. B. McDonald heads the company as president. T. J. Bannan is vice president.



**McDonald**



**Nystrom**

#### Clark names two district mgrs.

Appointment of Marshall O. Nystrom and Dudley A. Burnett as district managers of the construction machinery division of Clark Equipment Co. is announced by Clarence E. Killebrew, vice president. Nystrom will represent Clark's construction machinery division in the eleven Western states, and Oklahoma and

## ZIP.....

PRIMACORD\* detonates along its length even faster than that! 14,400 MPH as a matter of fact. That's practically instantaneous detonation . . . yet "slow" enough to fire each hole in its order of hook up. This provides ideal relief of burden and best fragmentation. On top of that, PRIMACORD requires no caps in the hole.

**\*Four Types Available  
PLAIN, REINFORCED  
WIREBOUND, PLASTIC.**



**COAST MANUFACTURING & SUPPLY CO.**  
LIVERMORE, CALIFORNIA

### "I wonder whatever happened to Joe Clapshaw"



**. . . asked pretty Mali Vargas the other day.**

Joe's last 2 copies of WESTERN CONSTRUCTION were returned to us by the post office as undeliverable.

We had to stop his subscription because WE DON'T KNOW WHERE JOE IS.

IF he had used the easy-change-of-address-card now bound into each copy of WC to send us his new address, he'd still be receiving his magazine each month.

**DON'T BE ANOTHER MR. CLAPSHAW—WHEN YOU CALL THE MOVERS, BE SURE TO ALSO RIP OUT THE CHANGE OF ADDRESS CARD IN YOUR CURRENT COPY AND SEND IT TO US (NO POSTAGE NEEDED)!**

#### **WESTERN CONSTRUCTION**

609 Mission Street

San Francisco 5, Calif.

Texas. He was formerly Western district representative for Frank G. Hough Co. Burnett will be located in the East.

#### Oliver organizes Western division

A. King McCord, president of The Oliver Corp., announces the organization of the Western Division of Oliver. This division will be comprised of Be-Ge Manufacturing Co., recently acquired by Oliver, and the sales branch organizations of Portland, Ore., Oakland and Los Angeles, Calif. S. W. White, Jr., has been named manager of the Western division.



White

Pettibon

#### Soulé Steel's Southwestern sales and service

Soulé Steel Co.'s new Southwestern sales and service headquarters in Phoenix, Ariz., is in charge of Chris Pettibon, district manager, formerly of the Los Angeles office. Pettibon combines an industrial engineering background with seventeen years of practical experience in the construction and building materials field. His new territory embraces Arizona, New Mexico and El Paso, Texas.

#### McGilvray, Westinghouse exec, retires

Joseph R. McGilvray, who has guided Westinghouse Electric Corp. manufacturing and repair operations in the West since 1946, retired last month after a 30-year career with the company.

#### Homelite names four Western mgrs.

R. C. (Bob) Glidden has been appointed manager of the Northern California-Nevada sales district for Homelite Corporation, it was recently announced by Nelson Thompson, vice president and sales manager. He will headquarter at San Francisco. At the same time it was announced that Ralph Evans will serve as manager of the San Francisco branch office, LaMar Cheney as branch manager of the Fresno office, and Richard Dodein as manager of the Sacramento branch.

#### Rucker becomes distributor for Rotary Lift

Rotary Lift Co., designer and builder of hydraulic lifting devices, announces the appointment of The Rucker Co., Oakland, Calif., as distributor of its industrial lifts for the

# Now! FASTER DIGGING

**WITH**  
**ESCO**  
**BOX POINTS**  
**AND ADAPTERS**  
**for all makes**  
**and types of**  
**buckets**

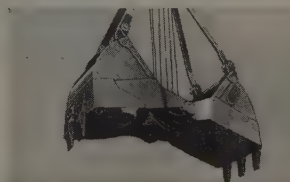
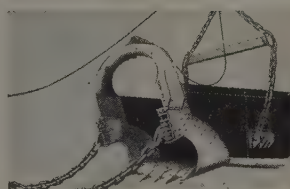
Money saving, quick-changing. ESCO Box Points and Adapters will cut your operating costs and speed production on big jobs and small.

## YARDAGE GOES UP! COSTS GO DOWN!

ESCO® Box Points and Adapters on your hoe bucket, dragline, dipper, clamshell, tractor loader and ripper make possible faster digging, at less cost, with minimum downtime. Heat treated and differentially hardened for shock and abrasion resistance, ESCO Box Points stay sharper, last longer and cost less than solid teeth. And ESCO Adapters outlast many changes of points. Correct adapter pitch results in higher digging efficiency.

With ESCO Adapters on your equipment, installing or changing points is a simple matter. Only 2½ minutes to remove and only 2½ minutes to install a set of 4 sharp ESCO Box Points. Downtime is all but eliminated.

ESCO Box Points are available in 6 point shapes (five different sizes, widths 3" to 7"), each designed for specific digging conditions. Now you can select the right point for maximum digging efficiency on any job. Your ESCO dealer can furnish these points and adapters for all makes and types of buckets.



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Offices and Warehouses: Honolulu, Hawaii; Houston, Texas; New York, New York; Los Angeles, San Francisco, California; Seattle, Spokane, Washington; Centralia, Pennsylvania; Eugene, Medford, Oregon; Salt Lake City, Utah. In Canada: Vancouver, B. C., and Toronto, Ontario.

**ELECTRIC STEEL FOUNDRY CO.**

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712 PORTER ST., DANVILLE, ILL.

states of Washington, Oregon, Idaho, Nevada, Arizona and California. Rucker has specialized in sales of hydraulic equipment for many years and maintains branches in South Gate, Calif., and Seattle, Wash.

#### Trailmobile establishes new post

Harry W. Crank has been appointed tank-trailer sales manager of Trailmobile, Inc., a newly created post in line with the present expansion policy of the firm. He will also continue his present activities as chief engineer of the Trailmobile plant in Springfield, Mo.

#### Baker-Raulang holds elections

William A. Bauer, president, and Charles N. Sumwalt, Jr., executive vice president, are newly-elected officers of Baker-Raulang Co. Bauer, also chairman of the board, succeeds James W. Moran, former president who retired at the beginning of the

year. Sumwalt was formerly vice president in charge of the company's Eastern sales division.

#### American Brake Shoe news

Kempton Dunn, formerly first vice president of American Brake Shoe Co., has been elected to the presidential post following the retirement of Maurice N. Trainer. Trainer, however, was appointed to the newly created position of vice chairman, according to an announcement by William B. Given, Jr., chairman.

#### Nordberg announcement

The Crusher, Screen, and Process Machinery Division of Nordberg Manufacturing Co. announces that the vacancy occasioned by the retirement of Oscar Gruender, division consulting engineer, has resulted in the appointment of Jack S. Bond as assistant general manager of the division in addition to his present duties

as sales manager. And Howard M. Zoerb, formerly administrative manager is appointed divisional consulting engineer.

#### Sales switches at Atlas Powder

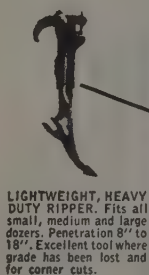
Eugene F. Daily, as of mid-January became district manager of Atlas Powder Co.'s San Francisco explosives sales district, replacing William T. Mahood, who was recalled to the Wilmington general office. Harry E. Urben, formerly of the Seattle office is assistant manager at San Francisco. In the Seattle district, John R. Nichols has been promoted from salesman to the position of sales agent with headquarters in Spokane.

#### Goodman gets Diamond

Goodman Manufacturing Co., builder of mining and tunneling machinery, has acquired from Diamond Iron Works, Minneapolis, Minn., its line of crushing, screening and handling

## HENSLEY EQUIPMENT SAVES THE ORIGINAL COST . . .

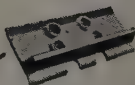
*When the going is TOUGH!*



**LIGHTWEIGHT, HEAVY DUTY RIPPER.** Fits all small, medium and large dozers. Penetration 8" to 18". Excellent tool where grade has been lost and for corner cuts.



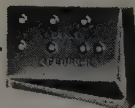
**REMOVABLE DOZER RIPPER.** When used in sets of three to five units they give you coverage the width of blade for ripping concrete, hardpan, blacktop, red rock and other hard surfaces.



**D-7, D-8, TD-24 HEAVY DUTY GROUSER SHOES.** Bar engineered to wear evenly with minimum loss of traction and flotation.



**D-7 AND D-8 BOTTOM TRACK ROLLERS and roller parts—machined to fit track rail and give maximum value in traction.**



**HEAVY DUTY ROCK END BITS for D-6, D-7 and D-8 dozers.** Designed for lasting wear and penetration.

## INCREASE YOUR TRACTOR'S WORKING POWER

...With These and Other Items Available at Your Hensley Equipment Dealer: Dozer brush rakes, scraper rippers, scarifier shanks and teeth, overlay end bits, hitch blocks, D-8 water pump shafts and impellers. From the moment you equip your rig with Hensley—you begin to SAVE!

**There's a Hensley Equipment Dealer Near You**

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Hensley Factory, Oakland. Hensley Branches: Sacramento (Eldon Wible); Grass Valley (Frank Rowe)

#### COLORADO

Gossman Scraper Works, Monte Vista; S & M Supply Company, Grand Junction; Joe Smith Machinery, Denver.

#### MONTANA

Seltz Machinery Co., Billings and Great Falls; Treasure State Equipment Co., Kalispell and Missoula.

#### NEVADA

Elko Blacksmith Shop, Elko.

#### NEW MEXICO

Lively Equipment Co., Albuquerque.

#### OREGON

Fowler Engr. Sales, Ashland; Western Equipment Company, Eugene and Portland.

#### TEXAS

Lively Equipment Co., El Paso.

#### WASHINGTON

Western Tractor & Equip. Co., Chehalis, Seattle and Tacoma.

#### WYOMING

Wilson Equip. & Supply Co., Casper and Cheyenne.

#### ALASKA

Western Tractor & Equip. Co. (Philpott Equip Co.), Anchorage and Fairbanks.

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equipment for rock, sand and gravel. Diamond will operate as Diamond Iron Works, Division Goodman Manufacturing Co. and operations will be transferred to Goodman's main plant in Chicago. Key Diamond personnel in sales, engineering and service will be retained under the direction of Carl E. Hanson, sales manager, and W. Eckley, chief engineer, who will headquarter in Chicago.

#### Airco expands in Northwest

The continued expansion of its business in the Northwest has made it necessary for Air Reduction Pacific Co. to enlarge its facilities in Seattle, Wash. The newly completed facilities provide increased manufacturing capacity, new warehouse, display room, apparatus repair department, a welding and cutting demonstration room, and enlarged office facilities.

#### Willis Holmes joins Gorman-Rupp

Willis T. Holmes, formerly with Douglas Aircraft Co., has joined the Gorman-Rupp Co. as West Coast dis-



**Willis T. Holmes**  
new West Coast  
district manager  
Gorman-Rupp Co.

trict manager, with headquarters in Arcadia, Calif. Acting as liaison between factory, distributor and pump user, Holmes coordinates Gorman-Rupp's expanding business in the construction pump field, as well as irrigation and petroleum, in the West Coast area.

#### Westinghouse appointment

The appointment of Arthur S. Davis as regional gearing representative for Westinghouse Electric Corp. was recently announced by Walter J. Maytham, Pacific Coast regional manager. Davis, a mechanical engineer will make his headquarters at the San Francisco office.

#### Heil distributors and management trade ideas

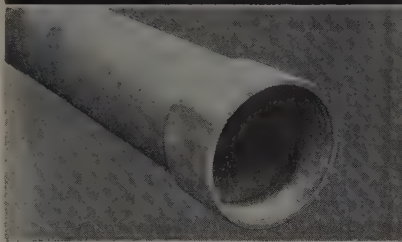
John Schetky of Schetky Equipment Co., Portland, Ore., was one of five Heil body and hoist distributors comprising the Distributor's Advisory Committee who journeyed to Milwaukee recently to meet with top management of The Heil Co. to exchange ideas on the selling and production of the company's line of truck bodies and hydraulic hoists.

#### ESCO gets distributorship

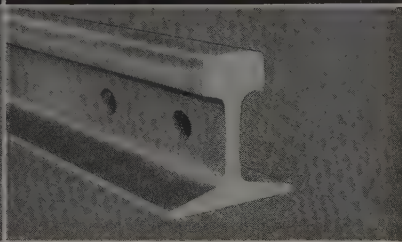
Electric Steel Foundry Co., Portland, Ore. has been appointed a stock distributor for the Hills-McCanna



### PIPE



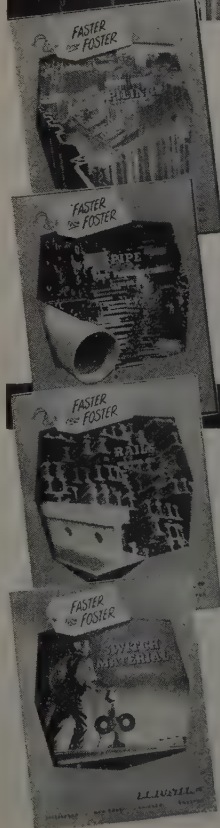
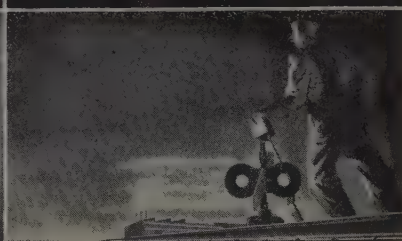
### RAILS



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**Barber-Greene**  
AURORA, ILLINOIS, U.S.A.

Robert J. Sullivan has been named supervisor of Caterpillar Tractor Co.'s Arizona proving grounds, succeeding F. E. Kronenberg who has become a research staff engineer at the company's Peoria plant. Also newly appointed as a special sales representative for Caterpillar is Robert A. Guernsey. He will headquarter at the Western division offices in San Leandro, Calif. For the past two years, Guernsey has been a Caterpillar representative in Idaho and Washington.

AND FORGET ABOUT SEEPAGE  
WITH LABYRINTH  
WATERSTOPS

hit, made by Felker Mfg. Co., concrete and curbs, removes core concrete, tile, granite and marble; transit pipes and many other things, according to the operator.

Heavy-Duty Air-Cooled engine and stamina required to operate. Operator pays to specify machine, regardless of size. These rough-and-ready machines, without power, are run on gasoline. They are used at the ends of the line. They are available in sizes from 3 to 12 inches, and are used for the removal of concrete, tile, granite and marble; transit pipes and many other things, according to the operator.



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WESTERN CONSTRUCTION—March, 1951

# MANUFACTURERS

## J. E. Tom to American Tractor Corp.

Marc B. Rojzman, president of American Tractor Corp., announces the appointment of John Tom as Director of Engineering. Tom brings to American Tractor a wealth of experience in the tractor field, having spent many years as a designer, chief engineer and developer of crawler tractors, as well as loaders, trail builders, bulldozers, cranes and allied equipment. During the last eight years he has been doing consulting engineering work.

## Pomona expansion

Pomona Tile Manufacturing Co. is adding about 51,000 sq. ft. to its Pomona, Calif., plant to house manufacturing facilities for its Space-Rite wall tile and Perma-glaze deck tile lines. This half-million dollar addition is anticipated to provide work for more than 100 additional employees.

## New quarters for Pipe Linings

Pipe Linings, Inc., complete pipe coating and lining service, has moved to new and greatly expanded plant facilities at 2414 East 223rd Street, Wilmington, Calif.



A DIAMOND service pin in recognition of 25 years' service is given Joseph Hanratty on the occasion of his retirement from Pioneer Engineering Works. Pictured (from left) are Melvin Ovestrud, engineering consultant; Hanratty, O. J. Ellertson, president of Pioneer; and L. W. Yerk, consultant. Both consultants are former presidents of the company.

## Pioneer's Hanratty retires

Joseph Hanratty, the man credited with the original organization of Pioneer Engineering Works, Inc., has retired after serving the firm for 25 years. At the date of his retirement he was consultant for government

sales, and though his activities at Pioneer were principally in the sales field, he was responsible for many original ideas behind Pioneer's innovations in the industry. Among these was the design of the first completely portable washing plant.

# FOR YOU

## WESTERN

## CONSTRUCTION

# CLASSIFIED ADS!

Turn NOW to pages 145, 146, 147, 148

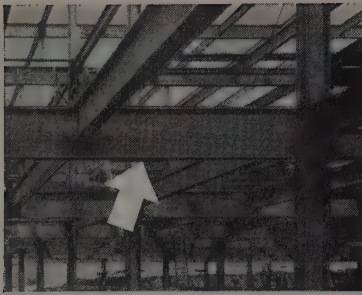


Fig. 1. Welded detail on multi-story 1700-ton framework built with 15% less steel. Structural designers: Paul E. Jeffers and Robert Wilder, Los Angeles, California.

## DESIGN IDEA CUTS STEEL COSTS 15%

**I**n the 1700-ton framework above, continuous girders passing over columns are spliced at points of minimum stress between columns rather than at the columns. The construction, made possible at low cost by arc welding, permits use of smaller size girders, thus cutting steel requirements 15%.

The example shown is typical of how cost-minded architects and structural engineers are utilizing ultimate benefits of welded designs to lower construction costs. Through continuous framing, by eliminating splice plates, and taking advantage of low-cost shop fabricating methods, structural savings of 15% to 20% over riveting are common achievements. Furthermore, welded buildings provide more useable space because less height is required per story and greater floor area results from smaller beam and column sizes.



Fig. 2. Beam to column connection on 11-story apartment, 1200-ton frame erected with 25% less steel. Engineers and Contractors: Byrne Organization, Inc., Washington, D. C.

### HOW TO DESIGN FOR WELDED CONSTRUCTION

Structural design data sheets giving latest information on welded construction are available to architects and structural designers. Write on your letterhead to Dept. 4301.

**THE LINCOLN ELECTRIC COMPANY**  
Cleveland 17, Ohio

**THE WORLD'S LARGEST MANUFACTURER OF  
ARC WELDING EQUIPMENT**

### Vibro-Plus elevates Jonsson

Vibro-Plus Products, Inc., manufacturer of construction and industrial vibratory equipment, announces the elevation of Tage Jonsson to vice president and general manager. He has been with the company since 1949 and together with Eric Fridh has guided the Vibro-Plus operations. Fridh has left to accept a position in South America and Jonsson will now function alone.

### Caterpillar ups Bessler

Former Caterpillar Tractor Co. service representative in Idaho, eastern Washington and western Montana, since 1949, Ray Bessler, has been promoted to assistant plains division service manager at the company's Peoria, Ill., headquarters. Bessler recently returned from Korea where he assisted Corps of Engineers personnel in a training program for operation, improvement of service methods, and maintenance of Cat equipment.

### H. K. Porter appointment

The newly created position of assistant general manager, Leschen Wire Rope Division, H. K. Porter Co., Inc., is held by H. A. Harrington, as announced by D. W. Vernon, vice president and general manager of Leschen.

### Tile Council elects Boget

The Tile Council of America has elected Verne Boget, vice president of Gladding, McBean, Los Angeles, as its chairman for 1954.

### New prexy for Seattle Construction Council

Seattle Construction Council, an affiliate of the Seattle Chapter, Associated General Contractors, has selected R. M. (Dick) Black of Allied Floors Co. its president for 1954. Black succeeds Edward B. Scriven.

### Pacific Clay builds lab

Pacific Clay Products is building a \$100,000 research laboratory at Los Nietos, Calif., according to John D. Fredericks, president. The laboratory will be devoted primarily to improving the quality of the company's clay products and to developing methods of producing longer lengths of vitrified clay pipe. Research activities in the new lab will be headed by Meredith C. Brown, formerly director of research and development, who has been appointed vice president of the company in charge of research and development.

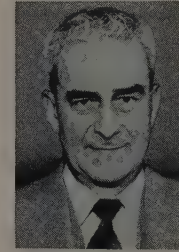
### Blaw-Knox acquires Apsco line

W. Cordes Snyder, Jr., president of Blaw-Knox Co., has announced Blaw-Knox's acquisition of All Purpose Spreader Co., stating, "The acquisition of Apsco is another step for Blaw-Knox in rounding out a complete package of road paving equipment for contractors." Blaw-Knox

will coordinate sales and distribution of the Apsco machines with its other highway equipment. The road widener and base paver will be added to the Blaw-Knox line immediately the former to be called the Blaw-Knox Apsco Widener, and the latter the Blaw-Knox Base Paver. Other products acquired in the transaction will be available later.

### Power Crane & Shovel Assn. elects Steelman

As a result of elections held at its annual meeting, the Power Crane & Shovel Association elected Julien R. Steelman president for 1954. Steelman



**Julien R. Steelman**  
new president,  
Power Crane &  
Shovel Association

is president of Koehring Co. Walter W. Walb, president of American Steel Dredge Co., was elected vice president of the organization. The association is a national group composed of the 17 leading U. S. manufacturers of excavators.

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## Maginn leaves Calaveras

H. C. (Pat) Maginn, executive vice president of Calaveras Cement Co., has left the Calaveras post in order to devote full time to his new position as president of Blair Holdings Corp. He will, however, continue as director of Calaveras.

## Carver announcements

Robert E. Tanner and William Dowd figure in two announcements from Carver Pump Co. Tanner was elected vice president and general manager as well as sales manager of the firm. Dowd, outstanding authority on centrifugal pump design, manufacture and application, is now associated with Carver in the capacity of consultant.

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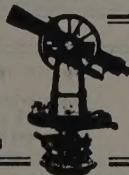
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## Fuller acquires axle firm

Fuller Manufacturing Co. acquired Shuler Axle Co. of Louisville, Ky., as announced by E. L. Ludvigsen, president of Fuller. Acquisition of the Shuler company, which manufactures high-grade front axles for heavy trucks, tractors, busses and construction equipment, as well as tubular, square and I-beam rear axles for transport trailers and other equipment, marks a further step in Fuller's expansion program. Shuler will continue to operate as a wholly owned Fuller subsidiary.

## Thew elects Lundgren

C. B. Smythe, president of The Thew Shovel Co., announced that A. C. Lundgren has been elected a vice president of the firm by action of the board of directors. Lundgren, a Thew employee since 1911, was formerly director of purchases.

## Byers name change

The Byers Manufacturing Co., Ravenna, Ohio, a new corporation, has taken over the business of Byers Machine Co., manufacturer of shovels and cranes. According to the announcement by Byers vice president and general manager, P. T. Redfern, this move entailed no change in management or policy, and is solely a transfer of assets to the new corporation.

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Bucyrus-Erie 120-B electric dragline, mounted on Caterpillars: 100 foot boom; 4 3/4 cubic yard bucket. Has recently been reconditioned and in excellent condition, has been used mostly for rehandle. Reason for sale: Less rehandle in new coal pits and have two other machines. Specifications and photographs sent on request.

Northwestern Improvement Co.  
Colstrip, Montana

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- One—36" pump 20,400 gpm.
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Operating at 10 foot head, together with four motors and three vacuum pumps. Will demonstrate pumps, price \$10,000.00. For further information write,

YUMA COUNTY WATER USERS' ASSOCIATION  
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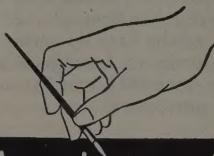
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CONSTRUCTION CONSULTANTS  
411 So. 5th Ave. Lake Worth, Florida

## BRIDGES

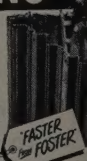
Bailey bridges for rent.  
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Used steel truss bridges for sale.

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# Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods  
Alloys as they are supposed to be

Corrosion Resistant—  
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# BACKFILL, uncompacted

## Airborne skyhook starts job from the middle

From time to time some startling new development announces another step forward in the progress of the present air age in which we live. Now it's the Army Engineers with news of a lightweight bridge which can be dropped in sections from planes. The sections, built of aluminum with a maximum length of 75 ft., can be erected in 45 min. Shorter spans, 43 and 60 ft. long, are also available. All three lengths have a maximum capacity of 60 tons. Thus a tank could push a bridge into place and then cross the bridge it helped build. So don't be

surprised if you run across a bridge out in the middle of nowhere with no access road at either end. It might be the Army starting a job from the middle.

## Paging a modern day Dan'l Boone

Smile when you say "beaver" within the hearing of New Mexico State Fish and Game Department workers stationed in Albuquerque these days. Apparently a group of the chisel-toothed animals is fighting back against the human race for invading their territory. They have toppled a

big cottonwood into the yard of an Albuquerque home, breaking fences and snapping a power line. And another tree hangs partly-gnawed over the apartment of a neighbor. On the other hand, it may be that the beavers are just out of practice in the art of timber felling and have aimed the trees in the wrong direction, because another tree fell into nearby Atrisco Riverside Drain, which is apparently the largest body of water to be found anywhere in the vicinity of the threatened structures.

At any rate, Jim Peckumn, district game warden, and Tom Rayborn, a trapper, laid plans and set traps to capture the pesky varmints. No further reports have been received from the scene of the crime, so it must be supposed that the criminals have been apprehended. Or maybe the reason we haven't heard any more is because the trappers were trapped by the beavers.

## Softest "rock slide" ever blocks U. S. 410

Reports of a rock slide on U. S. 410, about 20 mi. west of Walla Walla, Wash., sent state highway patrol officers racing to the scene. When they got there, they found that the rocks were nothing but tumbleweeds—stacked up by the hundreds as a result of heavy winds which had blown the roving vegetation down from the neighboring hills and piled them up for half a mile across most of the highway. Some hardy motorists plowed through the barrier and came out with lots of camouflage clinging to their cars. Nothing was said about how the highway was cleared. Maybe they used snowplows.

## What's new?

Research for the "Twenty-five years ago" items brought to light evidence that precast concrete was more common in the late Twenties than we had thought. (The Posey vehicular tube in Oakland had been a major precasting effort.) A February 1929 article in *Western Construction* briefly reviewed the design and construction for the Denver & Rio Grande Western of precast concrete deck slabs for minor railroad bridges. Pueblo Bridge & Construction Co. had the contract to produce the units, each being 16 ft. long, 7 ft. wide and 2 ft. thick. They were used in pairs for each span of a single-track structure. Including 1,600 lb. of re-steel, the slabs weighed 18 tons and cost \$300 each.

## Twenty-five years ago in *Western Construction*

"On Saturday, March 2, the San Francisco Bay Toll-Bridge Co., owners, and the Raymond Concrete Pile Co., contractors, entertained a host of engineers and public officials at a luncheon in the Hotel Benjamin Franklin, San Mateo, to commemorate the completion of the San Francisco Bay toll bridge between Little Coyote point, near San Mateo, and Mt. Eden, near Hayward, Alameda County. Following the luncheon the cavalcade traversed the bridge to witness the formal opening by President Coolidge, by telegraph from Washington, D. C."

\* \* \*

An article by A. G. Darwin reviewed technical details on the new Cascade Tunnel, east of Seattle, of the Great Northern Railway. This bore, 7.8 mi. in length, was then the longest railroad tunnel in the western hemisphere. A. Guthrie and Co. of St. Paul established a world's record advance of 1,157 ft. in 29½ days on the 8 x 9-ft. pioneer drift.

\* \* \*

"The Slag Paving Brick & Products Co. has been organized to manufacture brick from the 'mountains' of slag at the Old Dominion mine at Globe, Arizona. The first unit of the plant, to cost \$200,000, will be completed about May 1, and will have a daily capacity of 300 tons. Chemists have devised a

method for making a very hard brick, an improvement over the method developed in England, which will be particularly suitable for highway pavements."

\* \* \*

"Representing a new departure in American electrical machine design, a new pocket-size blasting machine is announced by engineers of the Hercules Powder Co., Wilmington, Del. It is the first machine of American design to apply the dynamo principle to a blasting machine of such compactness. It weighs only 4¾-lb. and will slip into an ordinary coat pocket."

\* \* \*

Excerpts from low bid by Driscoll Const. Co. for concrete paving in Otero County, Colo., as follows: 32,900 cu. yd. excavation, common—\$0.29; 82,000 sta. yd. excavation, overhaul—\$0.02; 240 lin. ft. 15-in. C.M.P. culvert—\$1.40; 562 cu. yd. class A concrete—\$16.50; 72,200 lb. reinforcing—\$0.055.

\* \* \*

The City of Tacoma requested bids on the second unit of the Lake Cushman hydroelectric development. The dam was to be of the concrete arch type with a height of 240 ft. and a crest length of 450 ft. The outlet tunnel leading to the penstocks was to be 13,000 ft. long and 17 ft. in diameter inside the concrete lining.

... The Editors